merSETA
MANUFACTURING, ENGINEERING AND RELATED SERVICES SETA

SECTOR SKILLS PLAN

UPDATE

2016/17-2020/21

PROMOTING ARTISAN DEVELOPMENT FOR EMPLOYABILITY

1 August 2016

OFFICIAL SIGN OFF

FINAL SUBMISSION OF REQUIRED SSP DOCUMENTS AS PER DHET GUIDELINES FOR SSP UPDATE 2016/2017

It is hereby certified that this Final merSETA Sector Skills Plan takes into account all the relevant policies, legislation and other mandates for which merSETA is responsible and accurately reflects the submission requirements of the Department of Higher Education and Training (DHET).

This submission comprises a merSETA Cover Letter, a second draft of the Continuous Improvement Plan (CIP) and the Final SSP which was developed in accordance with the SSP Framework produced by DHET. The SSP has addressed feedback received from both DHET and the SETA Review Panel appointed by the Minister.

Dr R. Patel

Chief Executive Officer Signature: .....

Ms P. Baleni

Chairperson of the merSETA Accounting Authority Signature: .....

1 August 2016

EXECUTIVE SUMMARY

The Sector Skills Plan update for the 2016/2017 period represents the second time that the SSP framework which was developed by the DHET has been implemented.

merSETA have produced the SSP in collaboration with its key stakeholders and has capitalised on its involvement with the LMIP, the SETA Cluster (Goods Cluster), DHET workshops on research and labour market intelligence as well as internal capacity building to ensure rigorous interrogation of research findings.

This SSP summarises the manufacturing, engineering and related services sectors profile in terms of its employer and employee composition, economic trends and drivers of change, it highlights SETA partnerships, skills issues and skills mismatches which all culminates in priority actions to be undertaken to meet the needs of the sector.

With regards to the current context of the sector in terms of its profile and the economic climate, the SSP demonstrates the significant impact that global and local economic conditions have had on the sector. The number of employees in the sector has decreased substantially. Overall Stats SA reported 100 000 jobs were lost in manufacturing, making up a third of all job losses in South Africa. The manufacturing, engineering and related services sector represents a significant proportion of the total manufacturing sector and these trends have a major impact on merSETA stakeholders.

The number of vacancies in the sector has decreased and stakeholders have warned of even further retrenchments and head-count freezes to be implemented in the near future. These trends do not bode well for the sector and will further contribute to national levels of joblessness and economic uncertainty.

Furthermore, the sector must remain globally competitive, as such it has seen a decline in traditional manufacturing production in favour of automation and higher technological intensity. These trends give an indication that the medium business, small business and informal business sectors will become a key component for employment opportunities and skills development opportunities going forward. Developments in advanced manufacturing must be closely monitored to ensure adequate skills initiatives are applied to meet skills demands and support the rise of black industrialists.

Analysis of demand has shown continued and increasing demand for mid to highly skilled workers. Low skilled workers have borne the brunt of the negative employment trend. There continues to be challenges in terms of transformation at the various occupational levels; black workers are still being represented in low level occupations, with relatively lower representation at professional and managerial levels. In terms of the age profile of workers, the majority of new entrants into the sector are semi skilled youth, however there is an indication that younger workers are also tending to be more represented in the technical and professional skills levels in accordance with the trend to automation and innovation in the sector. Overall, we do see some positive movement in terms of opportunities for the previously disadvantaged and women but the sector's demographic profile remains stable.

Key skills issues have revealed that the merSETA have a significant role to play in terms of its alignment with national development priorities, there is however a trend emerging in the general economy as well as national development that calls for a focus on skilled workers in

the IPAP, SIPs and Operation Phakisa. Skills for the green economy are also in ever increasing demand both for sustainable production and renewable energies.

When considering the skills mismatches within our sectors, the merSETA has surmised that a shortage of highly skilled people is one of the factors that have contributed to the slow adoption of technology, lowered productivity, lowered competitiveness and high cost of production over time. The labour force was unable to keep up with the demands of industry at a global level. Skills requirements of the evolving sector are dependent on highly analytical and problem solving ability.

Poor throughput of learners with maths, science and engineering hampers efforts to compete globally. There is a prevailing trend in our sector which demonstrates a reluctance of employers to employ TVET graduates due to a lack of practical exposure (both learners and lecturers), up-to-date theoretical knowledge and low work-readiness. Furthermore industry has identified the lack of support for smaller and emerging sector skills needs for occupations at the cutting edge of technology and global competition.

merSETA has capitalised on its partnerships within the TVET sector to best assist and understand the skills needs and dynamics from industry. merSETA has local and international partnerships with Higher Education Institutions and TVET Colleges to develop greater synergies in terms of skills supply and demand. These partnerships not only speak to skills development needs in terms of producing a relevant supply of skills but also fosters a dynamic pool of professional engagements and projects to critically assess skills within our sectors and meet current and future expectations of the sector.

Ultimately the SSP has focused attention on the following strategic issues:

- Addressing strategic skills development challenges to drive employment and economic growth.
- Supporting opportunities for innovation in products, services, operations and business approaches.
- Balancing competing short and longer-term skills development needs for the sector as well as stakeholder and shareholder needs and interests.
- Enhancing merSETA's capacity to respond to the skills development required by the sector.

The implementation of identified skills development priorities are linked to a range of inter-related strategic issues that arise from the sector analysis, including the cross-cutting imperatives of rural development, sustainable green skills development, and skills development of people with disabilities. In this regard, the importance of appropriate local and regional level skills development support to affect positive change in the informal, emerging businesses and SME sectors has been noted.

RESEARCH PROCESS AND METHODS

PROJECT	Motor Chamber Research phase 2	Metal Chamber Research phase 2	Plastics Chamber research phase 3
TOPIC	"merSETA follow-up future skills development research project for the Motor Chamber- Report 3 & 4: Pilot project and consolidated report".	"Occupational skills demand dynamics in the metal industry". "How do we change the face of training to produce technical skills for the metal industry in the 21st century?"	"Demand Profiler Foresight Analysis and Software Update"
STUDY DESIGN	Qualitative and quantitative triangulations	Qualitative and quantitative triangulations	Qualitative research design
OBJECTIVES	The objective of this project was to determine actual skills requirements in relation to the identified change drivers within the various geographical and market sectors to determine what type of motor skills sector skills are required in those areas. The purpose or objective of the all Chambers research projects is to inform the merSETA Sector Skills plan.	Objective is to identify future trends and better planning scenarios in terms of skills supply and demand. The purpose or objective of the all Chambers research projects is to inform the merSETA Sector Skills plan.	To explore and provide research-based recommendations on how the plastics and related industries can best attract, develop and retain technical talent in order to ensure that the industry continues to "survive and thrive" in an increasingly competitive and changeable marketplace. Furthermore, to validate and expand the qualitative information collected in Phases I and II about trends influencing skills in the plastics industry.
DATA COLLECTION TOOL	*Desktop research *Interviews with key stakeholders (Structured questionnaire) *Focus groups *Enterprise stakeholder workshop	*Desktop research *Interviews with key stakeholders (semi-structured) *Focus group workshop, survey	*Focus groups *Desktop literature review
SAMPLE SIZE	Industry practitioner: 6 Small practitioner: 8 Motor Chamber Officials: 4 **Total sample size: 18**	The survey was sent to all firms in the sector which amounts to 2094 firms. Of these firms only 126 responses were received. **Total sample size: 126**	10-15 per focus group (three focus groups) **Total sample size: 30-45**
SCOPE OF STUDY	Industry practitioners at merSETA head office, practitioners in rural and informal areas. More specifically practitioners outlining large and medium metropolitan centres, as well as practitioners in rural areas distant from any city and municipal economists of geographical market areas.	Firms that employ people in the metals and engineering industries. Focussing on sub sectors, region, company size, race, gender, disability and occupational levels.	Plastics and related industries. Each workshop included an active member of the Plastics Institute, production managers, research and development and related managers, managing directors as well as related managers.

PROJECT	Motor Chamber Research phase 2	Metal Chamber Research phase 2	Plastics Chamber research phase 3
DATA SOURCES USED	Data from the Bureau for Economic Research was used. In-depth desktop research was done, focus groups were held and telephonic consultation with key stakeholders were held.	Data from the Career Junction Index was used along with survey, interviews and workshops. A key data source used in this study was the Quarterly Labour Force Survey (QLFS) published by Stats SA.	Existing data collected and analysed in Phases I and II of the research project were summarised and provided as inputs/ "conversation starters" in the Focus Groups. Furthermore, selected articles, books etc, on the following were also used: *An international plastics sector (Canada) *Quality improvement programmes *literature on influencing change
TIME FRAME	May 2014-May 2015	April 2014- August 2015	April 2014- August 2015

PROJECT	New Tyre Chamber Research phase 2	Auto Chamber Research phase 2	TRACER study
TOPIC	"Skills demand foresight analysis research report"	"The capacities of technical high schools and TVET colleges to meet the training needs of the automotive industry"	TRACER STUDY Final Report - 30 March 2016
STUDY DESIGN	Qualitative and quantitative triangulations	Qualitative research	Quantitative and qualitative approach
OBJECTIVES	To update skills demand foresight analysis research report following on from phase 1 of the Chamber research projects. The purpose or objective of the all Chambers research projects is to inform the merSETA Sector Skills plan.	The study attempts to understand the capability of the institutions to interact using the expanded understanding of capability described in the theoretical framework. Focussing on the capacities of TVET schools and colleges to meet the training needs of the automotive industry. The purpose or objective of the all Chambers research projects is to inform the merSETA Sector Skills plan.	To take stock of the employment status of graduates, determine learner post learning program activities, establish expectations of learners who have successfully completed their learning programme, to develop a deeper analysis of enablers, benefits and obstacles of employment opportunities after the learner's final assessments.
DATA COLLECTION TOOL	*Telephonic interviews *High-level secondary desktop review *Mix of secondary (desktop) and primary (interviews) research stakeholder interview questionnaires	*literature review *Focus groups *Research questionnaire	*Structured questionnaires qualitative engagement with the training providers and employers * Literature review
SAMPLE SIZE	Not specified	Eastern Cape 13, Gauteng, 16, KwaZulu -Natal 13	Total of 1030 learners Total of 8 training companies Total of 20 employers

PROJECT	New Tyre Chamber Research phase 2	Auto Chamber Research phase 2	TRACER study
		Total sample size: 42	**Total sample size: 1058**
SCOPE OF STUDY	*Synthetic rubbers*End-of-life tyres (ELTs) *Upgrading of capital equipment *Lean manufacturing Tyre companies namely Bridgestone, Appolo, Sumitomo, Continental, Goodyear and then merSETA.	Technical high schools and TVET colleges, in provinces with an automotive industry presence including the Eastern Cape, Gauteng, and Kwa-Zulu Natal.	The analysis was generated as per the demographics variables of race, gender, age, geographical spread and the type of analysis in this reports includes: • The post qualification employment rates both in terms of geographic spread, race, gender and sub-sectorial spread.• Post qualification migration rates in terms of geographic spread, race, and gender.• Post qualification studies in terms of geographic spread, race and gender.• Links between the different learning pathways and employment. Sample group (learner, employers and training providers)
DATA SOURCES USED	Focused industry reports, reports compiled by prominent international tyre industry associations, academic articles, relevant industry news publications, and leading global tyre manufacturer annual reports.	Focus groups by regions with representatives of employers, technical high schools, and TVET colleges.	merSETA learner database of learners who have completed learning program/s with an institution. Other data sources as were available which included tracer/impact assessment reports from the merSETA and of similar organisations as well as qualitative engagements with employers and training providers. Data on impact assessments and tracer studies from SETAs and other organisations were perused and reviewed along with international impact assessment reports and as well as a variety of research reports and secondary data telephonic interviews.
TIME FRAME	June 2014-June 2015	September 2014- September 2015	August 2014- December 2014 *Learner data from the SETA year April 2012 - March 2013 was used.

PROJECT	Composites Skills Mapping Project	Metal Chamber Research phase 3	Plastics Chamber research phase 4
TOPIC	"Development of Skills and Occupation Map for Composites Industry"	"Metal Sector Occupations in high demand: Supply-side Challenges and Specialised training needs".	"Explore the skills and knowledge related or linked to innovative practices in order to grow the Plastics industry in South Africa".
STUDY DESIGN	Qualitative and quantitative triangulations	Qualitative and quantitative triangulations	Qualitative and quantitative triangulations
OBJECTIVES	The objective of this project is to develop a skills and occupations map for the composites industry, in support of the Composites Industry revitalisation project spearheaded by CSIR Strategic Implementation Unit (SIU).	The purpose of this research study is fundamentally to conduct occupational studies on the following high demand occupations: boilermaker, welder, millwright, fitter & turner, toolmaker and patternmaker. This is done to determine what specialised skills will be required for artisans in these trades over the next three to five years to remain relevant, productive and supportive of improving the competitiveness of metal industry firms. The purpose or objective of the all Chambers research projects is to inform the merSETA Sector Skills plan.	The overall stated objective of this (fourth) round of research is "to explore the skills and knowledge related or linked to innovative practices in order to grow the Plastics industry sector in South Africa. **Towards this end the research objectives are to:** *Determine the innovation practices adopted by companies in order to build the right innovation capabilities. *Stratify the degree of innovative practice within the plastics industry *Explore in-depth innovative practices adopted by the most innovative companies. *Develop a matrix of skills, knowledge and abilities for creating an innovation culture. The purpose or objective of the all Chambers research projects is to inform the merSETA Sector Skills plan.
DATA COLLECTION TOOL	Value-chain approach consisting of : compiling a value chain of the manufacturing processes, link a job or jobs to each mode of the value chain, compile a skills profile of each job including products or services , task, core skills and foundational knowledge. interviews with key staff , selected plant visits.	* Desk Research * Key stakeholder interviews * Workshops with industry experts * Focus group discussions with trainers/instructors	*Desktop research *Semi-structured in-depth interviews

PROJECT	Composites Skills Mapping Project	Metal Chamber Research phase 3	Plastics Chamber research phase 4
SAMPLE SIZE	**Total sample size: between 20-25 companies**	Not yet specified	12 Interview per province **Total of 48 interviews**
SCOPE OF STUDY	A selection of companies that represent the broad scope of the composite manufacturing processes. Key staff, ECO/owner, production managers and R&D managers.	Occupational studies on the following high demand occupations: boilermaker, welder, millwright, fitter & turner, toolmaker and patternmaker.	The research builds on previous research projects, focussing on the: *Management level *Engineering professional level *Artisan level In this way four companies per province will be targeted.
DATA SOURCES USED	*Plastics Chamber Regional Workshops: *Plastics Chamber Research Project (Phase II and Phase III).	Metal Chamber research project phase II. Interviews with key industry stakeholders, group discussion and working groups.	Existing data collected and analysed in previous phases of the research project.
TIME FRAME	October 2015-March 2016	January 2016- June 2016	December 2015- June 2016

PROJECT	Auto Chamber Research phase 3
TOPIC	"Are the unemployed shop floor employees who undertook the NCAMA level 2 Qualification, able to meet the technology and global requirements for Industry".
STUDY DESIGN	Qualitative and quantitative triangulations
OBJECTIVES	To look at the NCAMA level 2 qualification and describe the experiences of those employees and employers within the OEM sector; to link the experiences of the NQF 2 to the literature regarding change/ education and to ensure the validity of research; to identify 'best-fit' curriculum needs from the Qualifications and to the OEM's; to identify what part of the curriculum added the most valuable to the OEMS; to identify enablers and inhibiters in the workplace that can be addressed to promote the NCAMA curriculum and to recommend the articulation of a NQF level 3,4,5 qualification is deemed feasible for the OEM's. The purpose or objective of the all Chambers research projects is to inform the merSETA Sector Skills plan.
DATA COLLECTION TOOL	*Focus groups
SAMPLE SIZE	Not yet specified
SCOPE OF STUDY	Various industries that engaged with the NCAMA qualification.
DATA SOURCES USED	N/A
TIME FRAME	December 2015- June 2016

ACRONYMS

AATP	Accelerated Artisan Training Programmes
AIDS	Acquired Immune Deficiency Syndrome
AIS	Automotive Investment Scheme
AMT	Automatic
ARPL	Artisan Recognition Prior Learning
ATD-TTT	Artisan and Technologist Development Technical Task Team
ATR	Annual Training Report
APDP	Automotive Production and Development Programme
BER	Bureau for Economic Research
CAD/CAM	Computer-Aided Design/Modelling
CBQ	Cost Benefit Quality
CEPPWAWU	Chemical Energy Paper Printing Wood and Allied Workers Union
CETEMF	Capital equipment, transport equipment, metal fabrication
CHE	Council for Higher Education
COMET	Competence Measurement in Education and Training
CPI	Consumer Price Index
CNC	Computer Numerical Control
CPD	Continuous Professional Development
CSIR	Council for Scientific and Industrial Research
DHET	Department of Higher Education and Training
DoL	Department of Labour
DPRU	Development Policy Research Unit
DSAP	Dual System Apprenticeship Programme
Dti	Department of Trade and Industry
ECSA	Engineering Council of South Africa
ESSA	Employment Services South Africa
FET	Further Education and Training
GET	General Education and Training
GDP	Gross Domestic Product
GWM&E	Government-Wide Monitoring and Evaluation
HEI	Higher Education Institutions
HEMIS	Higher Education Management Information System
HET	Higher Education and Training
HIV	Human Immunodeficiency Virus
HSRC	Human Sciences Research council
ICT	Information and Communication Technology
IDC	Industrial Development Corporation
IDZ	Industrial Development Zone
IPAP	Industrial Policy Action Plan
JSE	Johannesburg Stock Exchange
LMI	Labour Market Intelligence
LMIP	Labour Market Intelligence Partnerships
MBA	Master of Business Administration
merSETA	Manufacturing, Engineering and Related Services Sector Education and Training Authority
MHCV	Medium and Heavy Commercial Vehicles
NAACAM	National Association of Automotive Component Manufacturers
NAMB	National Artisan Moderation Body
NATED	National Technical Education
NCPC-SA	National Cleaner Production Centre of South Africa
NCV	National Certificate (Vocational)
NDP	National Development Plan
NEET	Not in Employment, Education or Training
NGO	Non-governmental Organisation

NGP	New Growth Plan
NMMU	Nelson Mandela Metropolitan University
NQF	National Qualifications Framework
NSDS	National Skills Development Strategy
NSF	National Skills Fund
NUMSA	National Union of Metalworkers of South Africa
NYDA	National Youth Development Agency
OEM	Original Equipment Manufacturers
OFO	Organising Framework for Occupations
PDI	Previously Disadvantaged Individual
PhD	Doctor of Philosophy
PICC	Presidential Infrastructure Coordination Committee
PIVOTAL	Professional, Vocational, Technical and Academic Learning
PlasticsSA	Plastics Federation of South Africa
PPP	Public-Private Partnership
PWD	People with Disabilities
QCTO	Quality Council for Trades and Occupations
QLFS	Quarterly Labour Force Survey
QMR	Quarterly Management Report
R&D	Research and Development
RAP	Retrenchment Assistance Programme
Redisa	Recycling and Economic Development Initiative of South Africa
REAL	Centre for Researching and Learning
Rm	Rand (million)
RMI	Retail Motor Industry
RPL	Recognition of Prior Learning
SA	South Africa/South African
SAA	South African Airways
SADC	Southern African Development Community
SAQA	South African Qualifications Authority
SDL	Skills Development Levy
SEIFSA	Steel and Engineering Industries Federation of South Africa
SET	Science, Engineering and Technology
SETA	Sector Education and Training Authority
SEZ	Special Economic Zone
SIC	Standard Industrial Classification
SIP	Special Infrastructure Project
SME	Small- and medium enterprises
SMME	Small, medium and micro-enterprises
SOE	State Owned Enterprise
SSP	Sector Skills Plan
Stats SA	Statistics South Africa
STEM	Science, Technology, Engineering and Mathematics
TLS	Training and Lay off Scheme
TVET	Technical & Vocational Education and Training College
UCT	University of Cape Town
WELA	Women in Engineering Programme
WIL	Work Integrated Learning
WSP	Workplace Skills Plan
WTO	World Trade Organisation

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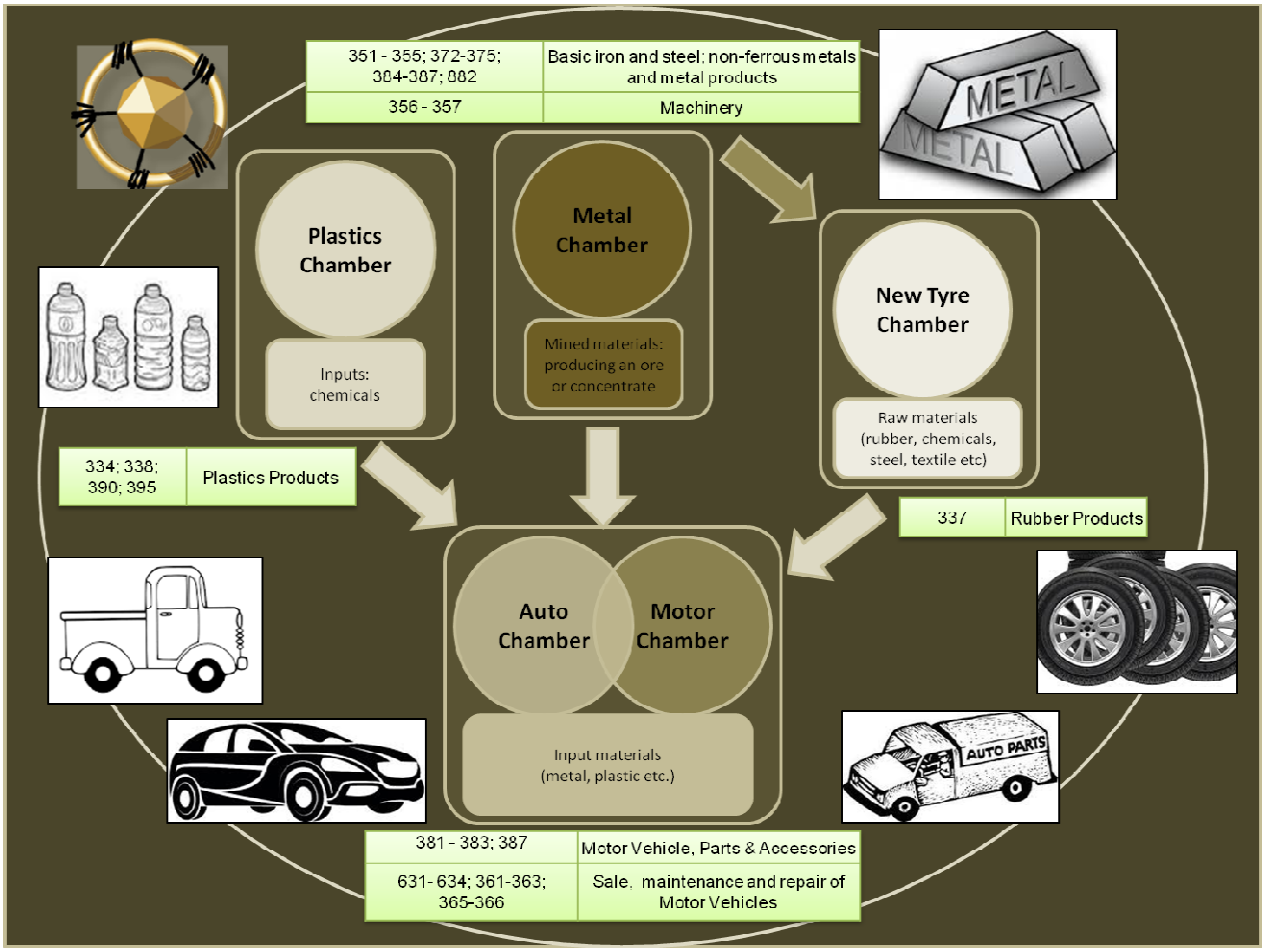
1 SECTOR PROFILE

The purpose of this chapter is to present the profile of the manufacturing, engineering and related services sector. It elaborates on the sector scope of coverage, key role players, economic performance, profile of employers and employees. The chapter also describes the major sector characteristics that influences sector skills needs and skills development requirements.

1.1 SCOPE OF COVERAGE

The merSETA, established in terms of the skills development legislation of 1998, includes a range of manufacturing activities in addition to a few related service and retail activities. On the basis of the three-digit Standard Industrial Classification (SIC) codes that are used in capturing the data for the National Accounts, figure 1 below outlines the industrial activities aligned to the merSETA scope of coverage and classifies them by chamber. The figure depicts the interrelationships between the chambers and demonstrates flow of inputs.

Figure 1: merSETA scope of coverage by SIC code and Chamber (SIC codes are represented in the green boxes)**



As demonstrated in figure 1, merSETA member companies belong to one of five chambers. This five-chamber structure does not however totally align with the National Accounts data or with the references in the literature to the firms contained in this group, which generally refer to the metals industry, the automotive industry (combining the auto and motor chambers), or the plastics manufacturing industry. Furthermore, while the majority of merSETA firms fall within the overall manufacturing sector in the National Accounts data,

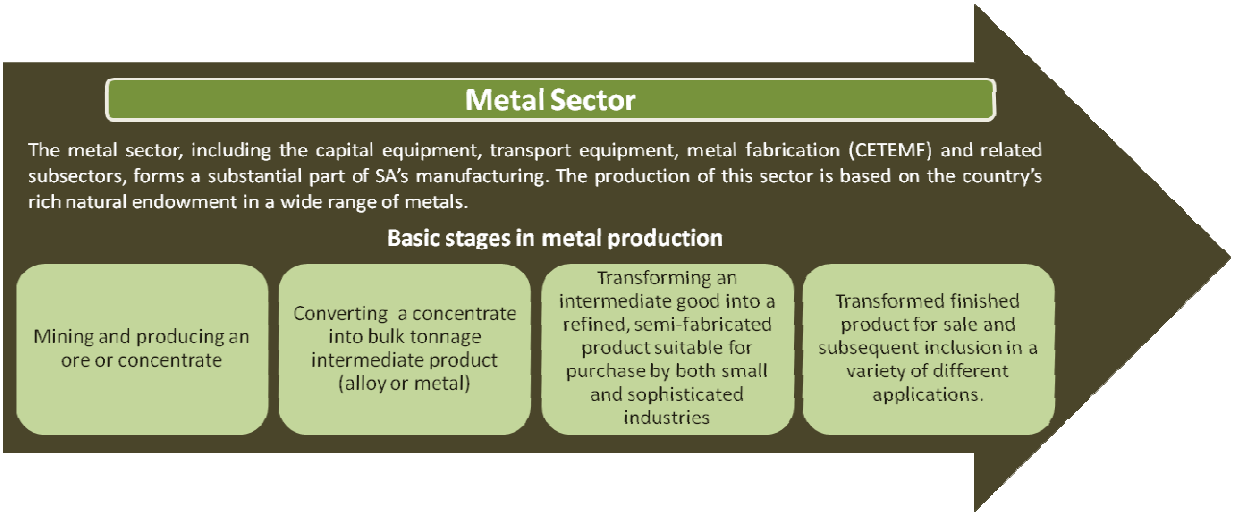
and make up a sizeable proportion of total SA manufacturing, the merSETA also includes firms that fall into the retail and construction sectors. In terms of the specific standard industrial classification codes that falls into the merSETA scope of coverage, table 1 below outlines the codes at 3 digit level, chamber and industrial sector.

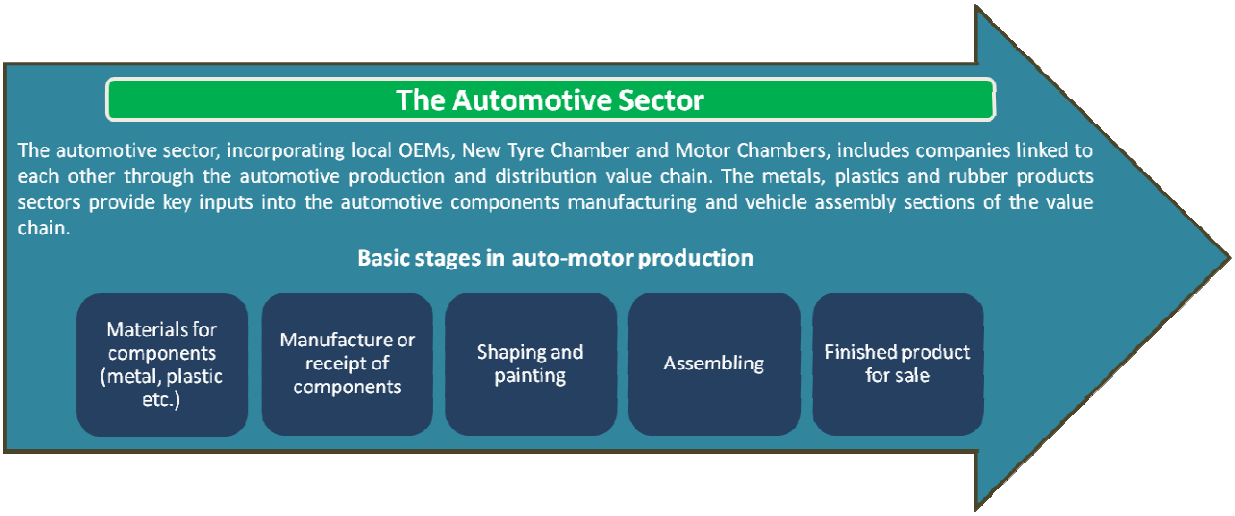
Table 1: merSETA Scope of Coverage by SIC code, chamber and Industrial Sector

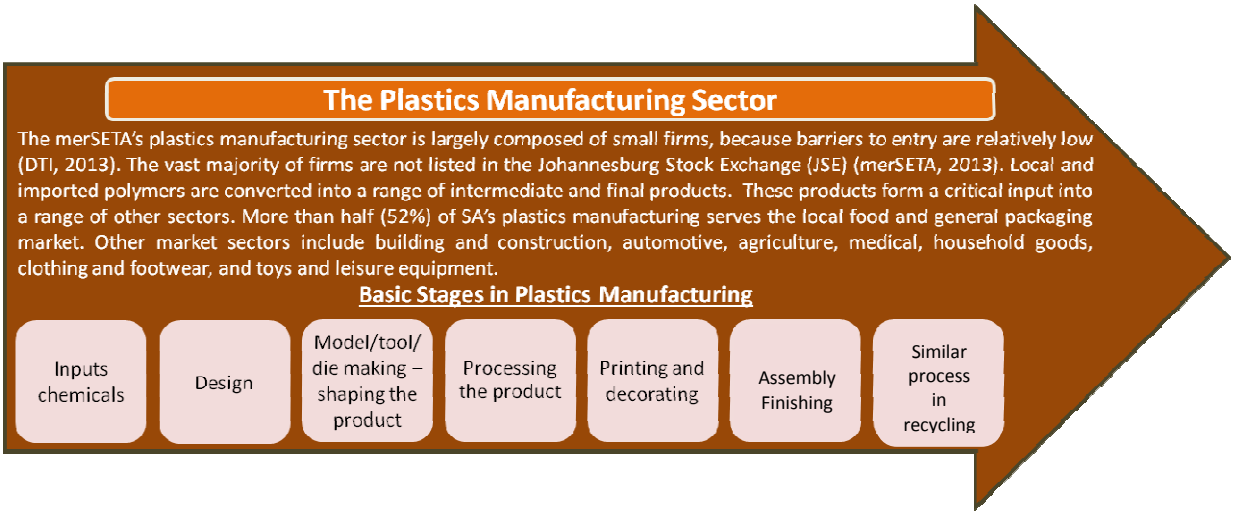
Chamber	SIC	Description	Sector
Auto	381	manufacture of motor vehicles	**Manufacturing**
Metal	351	manufacture of basic iron and steel	**Manufacturing**
	352	manufacture of basic precious and non-ferrous metals	
	353	casting of metals	
	354	manufacture of structural metal products, tanks, reservoirs and steam generators	
	355	manufacture of other fabricated metal products; metalwork service activities	
	356	manufacture of general purpose machinery	
	357	manufacture of special purpose machinery	
	358	manufacture of household appliances n.e.c.	
	361	manufacture of electric motors, generators and transformers	
	362	manufacture of electricity distribution and control apparatus	
	363	manufacture of insulated wire and cable	
	365	manufacture of electric lamps and lighting equipment	
	366	manufacture of other electrical equipment n.e.c.	
	371	manufacture of electronic valves and tubes and other electronic components	
	372	manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	
	373	manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods	
	374	manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and for other purposes, except optical instruments	
	375	manufacture of optical instruments and photographic equipment	
	384	building and repairing of ships and boats	
	385	manufacture of railway and tramway locomotives and rolling stock	
	386	manufacture of aircraft and spacecraft	
	387	manufacture of transport equipment n.e.c.	
	503	building installation	**Construction**
	504	building completion	
Motor	382	manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	**Manufacturing**
	383	manufacture of parts and accessories for motor vehicles and their engines	
	387	manufacture of transport equipment n.e.c.	
	631	sale of motor vehicles	**Retail**
	632	maintenance and repair of motor vehicles	
	633	sale of motor vehicle parts and accessories	
	634	sale, maintenance and repair of motor cycles and related parts and accessories	
New Tyre	337	manufacture of rubber products	**Manufacturing**
Plastics	334	manufacture of basic chemicals	**Manufacturing**
	338	manufacture of plastic products	
	395	recycling n.e.c.	

1.1.1 Industrial Overview

This section provides a depiction of each of merSETA's sectors industrial activities and outputs. The motor and new tyre sectors could not be explicitly depicted due to the overlap within the automotive sector.







1.2 KEY ROLE PLAYERS

The industry is shaped primarily by big businesses, but is also influenced by national priorities and watchdog organisations which monitor and regulate industry. The key industry players within merSETA's sectors includes some of the worlds largest OEMs, large steel and engineering companies, large plastics manufacturers, large motor retail and service companies and some of the largest global tyre manufacturers. The tables below identify and describe the role of these players in the industry.

1.2.1 Key Players Representing Workers and Employers in the Metal, Engineering and Related Services Sectors

The table below outlines the watchdog organisations that work to regulate the sector, representing both the interests of employers and workers.

Table 2: Key Regulatory organisation in the MERSETA Scope of Coverage

Organisation type	Name of organisation	Information	Main Role
Labour Organisations	National Union of Metalworkers South Africa (NUMSA)	NUMSA is on of the bigger unions in the sector. NUMSA represents workers from the engineering (steel production), vehicle assembly, automotive components manufacturing, new tyre and electronics manufacturing subsectors.	Unions play a significant role in advocating and fighting for worker's rights, skills development and improving conditions of employment and advocating for transformation among other things.
	Chemical Energy Paper Printing Wood and Allied workers Union (CEPPWAWU)	This union represents workers in the Plastics Sector.	
	Metal and Electrical Workers Union of South Africa (MEWUSA)	This union represents workers in the Plastics and Metal Sector.	
	Solidarity	Solidarity represents workers across the merSETA sectors.	
	United Association of South Africa (UASA)	Represents over 72000 workers across industrial sectors.	
	Motor Industry Staff Association (MISA)	Represents employees in the Retail Motor Industry.	
Employer Organisations	The Steel and Engineering Industries Federation of Southern Africa (SEIFSA)	This federation represents employers in the metal and engineering sectors.	Employer organisations represent members in collective bargaining, data and information gathering and skills development.
	Automobile Manufacturers Employers Organisation (AMEO)	Represents all South African vehicle manufacturers.	
	Retail Motor Industry Organisation (RMI)	Represents the retail segment of the auto motor industry, with a membership of 7 500.	
	The South African Tyre Manufacturers Conference (SATMC)	This organisations members comprise the local tyre manufacturers in South Africa, Bridgestone,	

Organisation type	Name of organisation	Information	Main Role
		Continental, Goodyear and Sumitomo.	
	Plastics Federation of South Africa (Plastics SA)	This federation represents employers in all plastics sectors including polymer producers and importers, converters, machine suppliers, fabricators and recyclers.	
Professional Organisations	Engineering Council of South Africa (ECSA)	The ECSA's primary role is the regulation of the engineering profession in terms of the Engineering Profession Act (EPA), 46 of 2000. There has been continued growth in registration numbers at ECSA with an increase from 43 967 registrations on 31 March 2014 to 45 806 registrations on 31 March 2015 which is a 4.1% increase (ECSA, 2015).	Its core functions are the accreditation of engineering programmes, registration of persons as professionals in specified categories, and the regulation of the practice of registered persons.
Bargaining Councils	National Bargaining Forum (NBF)	Non-statutory centralised bargaining for the Automotive assembly sector formed by NUMSA and Automobile Manufacturers Employer Organisation (AMEO) to which all 7 original equipment manufacturers (OEMs) belong.	The Labour Relations Act provides for the self-regulation of industries through the medium of Bargaining Councils. Bargaining Councils deal with collective agreements, solve labour disputes, establish various schemes and make proposals on labour policies and laws (DOL 2016).
	Metal and Engineering Industries Bargaining Council (MIEBC)	Provide for the co-regulation of stable and productive employment relations in the metal and engineering industries.	
	Motor Industry Bargaining Council (MIBCO)	Create and maintain industrial stability in the Motor Industry.	
	Bargaining Council for the New Tyre Manufacturing Industry	Represents New Tyre Industry in terms of regulation.	

1.2.2 Key Employers

The industry is shaped primarily by big businesses that employ the most people and make big profits. The table below represents some of the bigger employers under the merSETA scope of coverage.

Table 3: Key Employers by Sector

Auto (employment >500)	Metal (employment >1500)	Motor (employment > 1500)	New Tyre (employment >250)	Plastics (employment >450)
BMW SA	ArcelorMittal SA	McCarthy Limited	Continental Tyre SA Pty LTD	Zibo Containers Pty Ltd
Volkswagen SA	Amt Placement Services	Unitrans	Bridgestone South Africa (Pty) Ltd	Multiknit,sakpro,knittex & Multiknit Internat
Mercedes Benz SA	AVENG (AFRICA) Manufacturing	CMH Holdings	GOODYEAR SA (PTY) LTD (Walmer)	POLYOAK PACKAGING CAPE
Toyota SA	Roshcon Pty Ltd	Sandown Motor Holdings	Sumitomo Rubber South Africa (PTY) Ltd	Mpact Plastics
Ford Motor Company	Macsteel	Hesto Harnesses	Leader Rubber Company SA	Tropic Plastic & Packaging Industry Pty Ltd
General Motors of South Africa	Murray & Roberts Power & Energy A Division	TIAUTO Investments		Boxmore Plastics SA (Pty) Ltd
Nissan SA	Barloworld Equipment	Auto Industrial Group		AAT Composites Pty Ltd
Scania South Africa Pty Ltd	Phoenix Steel	Cargo Motors		Marley Pipe Systems (SA) Pty Ltd
Volvo Group	BMG	Trentyre		
	SCAW Metals	MA Automotive Tool and Die		

While the table above documents some of the bigger employers in the manufacturing, engineering and related services sectors, it should be noted that other players making waves in the industry are those who, despite being small make a significant contribution to the economy through increased investments and growing exports. The Department of Trade and Industry (DTI) have noted that these players have recognised opportunities for exports (particularly in Africa), leveraging off of the devaluation of the South African rand. Companies in the auto sector, the boatbuilding sector, locomotives, plastics and other beneficiation sectors have shown great potential.

1.3 ECONOMIC PERFORMANCE

The Manufacturing, Engineering and related services sector continues to take strain, this is compounded by the fact that the sector has not fully recovered from the 2009 recession. Overall, the South African economy grew by 1.3% in 2015, down from 1,5% in 2014 and

2.2% in 2013. Growth in manufacturing was almost flat in 2015, with the industry expanding marginally by 0.1 percent (Stats SA, 2015).

Since the 2015 electricity crisis has negatively affected all energy-intensive steel and engineering industries, electricity distribution has stabilised. However, electricity price hikes will further cripple the already bleeding South African economy (SEIFSA 2016, BusinessTech 2016).

The manufacturing industry slump bares tribute to low productivity, compared to international competitors, such as China and Germany; high input costs, especially labour costs and efficiency, which render the SA manufacturing sector less competitive; however the domestic market does show resilience. According to Statistics South Africa (2016), manufacturing production increased by 4% in May 2016 compared with May 2015. This increase was mainly due to higher production in the following sub-sectors most which fall within the merSETA scope of coverage:

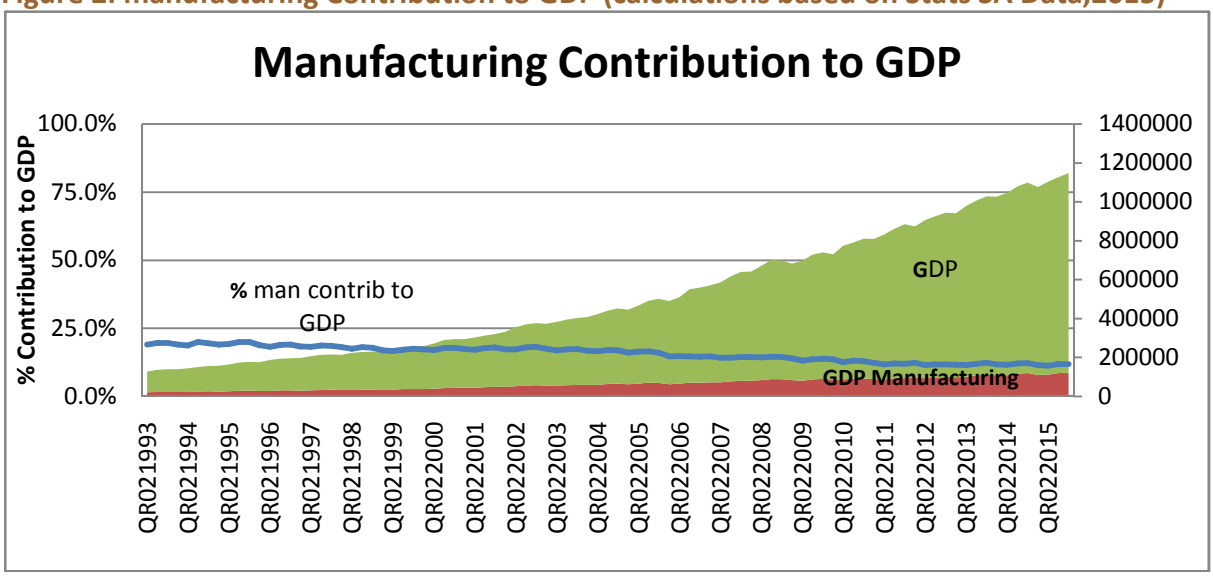
- Rubber and plastic products, petroleum, chemical products, (9,0% and contributing 2.1 percentage points)
- Motor vehicles, parts and accessories and other transport equipment (4,2% and contributing 0.3 of a percentage point)
- Basic iron and steel, non-ferrous metal products, metal products and machinery (1, 5% and contributing 0.3 of a percentage point)

Continued investor confidence in South Africa, coupled with government interventions such as the Automotive Investment Scheme, Manufacturing Competitiveness Enhancement Programme and Manufacturing investment Scheme have contributed to the survival of the sector. An increase in exports partly due to the decline of the value of the Rand has contributed to an increase in production in export oriented sectors such as the automotive sub-sector.

The biggest shift that leaders in the manufacturing sector are dealing with is the move globally from traditional manufacturing practices which were labour intensive and required low technology, to models embracing the latest technological and digital advances. These new models require skill sets which are in short supply in the manufacturing sector. The low level of skills continues to be a constraint for the business environment. The steel industry in particular has taken a hit with closing down of steel plants in Arcelor Mittal South Africa and Evraz Highveld Steel and Vanadium due to extremely difficult trading conditions in the steel market, which are being exacerbated by increasing uncontrollable costs and a flood of cheap steel imports from China.

Overall, the outlook remains uncertain. The manufacturing sector's contribution to the GDP as a whole (of which the merSETA sector forms a significant proportion) has experienced contraction from about 19.7 % in 1993 to about 11.8% at the end of 2015 as shown in figure 2 below.

Figure 2: manufacturing Contribution to GDP (calculations based on Stats SA Data,2015)



1.3.1 Economic performance of the merSETA sub-sectors

The economic performance of the manufacturing sector has resulted in the sector shedding jobs. In the first quarter of 2016, the manufacturing sector as a whole has shed 100 000 jobs (Stats SA, 2016). According to SEISFA, around 500 000 jobs could be shed in 2016 in the sector as a result of the economic downturn, high salary and electricity costs (SABC, 2016).

Below we analyse the economic performance of the five merSETA sub-sectors.

The metals industry being the manufacturing, engineering and related services' biggest sub-sector continues to face challenges recording a 7% year-on-year decline in production during the first quarter of 2016 and a 5% overall drop over a one-year period indicating that the sector was “spiralling into a deeper crisis” than previously thought, according to SEISFA chief economist Henk Langenhoven (Engineering News, 2016). Rising electricity prices, plummeting global steel prices and poor demand has contributed to the steel crisis. This has resulted in closure or threatening closure of steel manufacturing companies. The looming closure of Arcelor Mittal's Saldanha Works steel plant for example threatens the direct employment of over 1 000 people and could cost the broader local economy at least 4 000 jobs (Cape Talk, 2016).

The Automotive industry has continued to show resilience despite tough economic times; the sector saw major automotive companies investing billions in South Africa recently. Significant examples include BMW which announced in 2015 its plans to invest R6-billion at BMW SA’s Rosslyn plant to produce the next-generation X3 sports-activity vehicle (SAV) for the local and export markets (Engineering News, 2016a). Toyota South Africa has also invested R6.1-billion to facilitate production of the new Fortuner and Hilux (Engineering News, 2016b). Ford has also invested R2.5-billion to build the new Everest sports-utility vehicle (SUV) at its Silverton assembly plant, in Pretoria. There are however growing concerns surrounding political and economic stability as well as stability in the labour market, where issues such as skills and wage negotiations have become a serious concern. Toyota South Africa for example, emphasised the importance of stable production conditions within the South African automotive industry. This warning came ahead of the start of negotiations to facilitate new multiyear wage agreements within the local industry (Engineering News, 2016b).

The new tyre industry is facing numerous challenges due to continued increase of cheap tyre imports from the east. High electricity costs and increasing transport costs are also

taking their toll on the sector. One-sided labour laws and customs, the pending carbon tax, the high cost of tooling imports due to the weak currency and reduced productivity have all contributed to the underperformance of sector (Transport World Africa, 2014). Despite the challenges, there is continued confidence in South Africa as a buoyant investment destination as evidenced by the R2 billion investment by the Japanese-listed company Sumitomo Rubber Industries. The investment will see the plant employing an additional 420 people over the coming years (Business Day live, 2016). Similarly, Goodyear South Africa announced in 2015 that it will invest R670 million to increase production of high-value-added (HVA) consumer tyres at its Uitenhage manufacturing plant to drive profitable growth and meet market demands (SATMC, 2015).

The plastics industry continues to face challenges due to prevailing economic conditions and competition from cheap imported plastic products from Chinese markets. Another significant challenge faced by the local plastics industry is the costs involved in complying with local legislation and regulation which could add from about 5% to 15% to the baseline costs of the product (Engineering News, 2015). This has reduced the competiveness of the local plastics industry in the face of the prevailing economic conditions. The increase in demand of plastics and related products as a cheaper alternative to metal has boosted the growth of the sector.

1.3.2 MerSETA sub-sectors sales growth

In figure 3, we highlight the sales in each of the merSETA subsectors. Sales are one of the key indicators of the size of the sector. The metals sub-sector, followed by the motor and auto sub-sectors still remain the biggest sub-sectors with the plastics and new tyre sub-sectors being the smallest in the merSETA scope of coverage. Sales growth on the other hand is a key indicator of economic performance. In figure 4, we highlight the growth in sales (rands) of products produced by the merSETA sub-sectors in the last 10 years (2006-2016). The data indicates that the metals and engineering sector which is one of the biggest sub-sectors in terms of size and sales volumes has stagnated in growth due to a complexity of factors discussed in section 1.3.1. The plastics sub-sector, the smallest sub-sector has experienced significant growth in sales due to the growth in demand for plastics products in various sectors where plastics has become a cheaper alternative for metal and other products inter alia. The automotive industry growth in sales compared to other sub-sectors has remained lower in the past 10 years. This can be attributed to harsh economic conditions which have affected consumer spending domestically.

Figure 3: merSETA Sector Sales 2006 - 2016 (calculations based on Stats SA data, 2016)

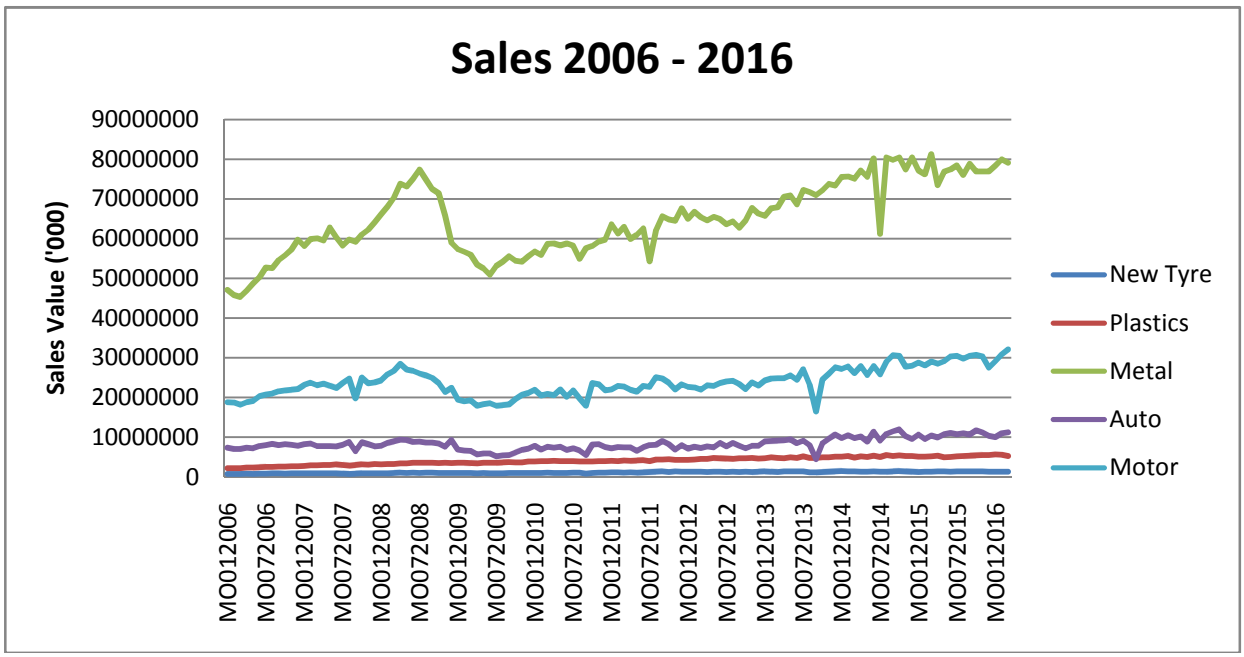
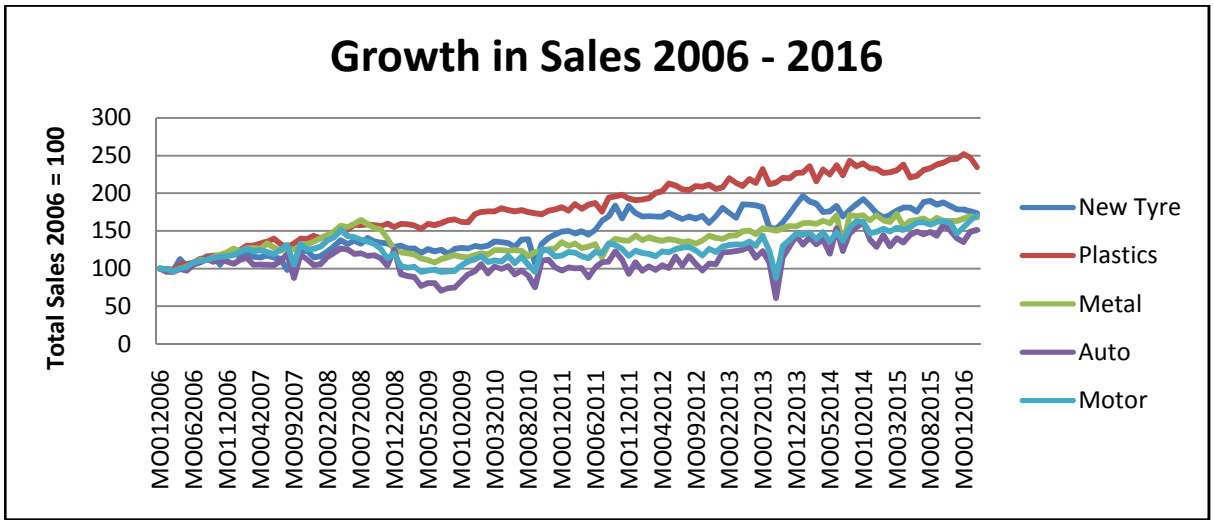


Figure 4: Growth in merSETA Sector Sales 2006 - 2016 (calculations based on Stats SA data, 2016)



1.3.3 THE IMPACT OF ECONOMIC PERFORMANCE ON SKILLS DEVELOPMENT

The weak performance of the manufacturing, engineering and related service sector is affecting employment. The contraction of the sector has resulted in the sector shedding jobs especially unskilled workers. According to key findings from the 2014 Metal Chamber research, to grow and survive, in the face of harsh economic conditions and competition, industry needs to continue to invest in automation to cut down labour and other costs of production (merSETA, 2014). This has however created an opportunity for highly skilled people to drive the automated processes. Findings from the 2015 Motor Chamber research also highlighted the need to increase the number of highly skilled people in the sector so as to increase productivity which is essential for the competitiveness, growth and survival of the sector (merSETA, 2015). This places emphasis on the need for the merSETA to facilitate the development of unskilled and semi-skilled workers who risk losing their jobs due to mechanisation. This is important in a sector like merSETA which is semi-skilled intensive.

1.4 EMPLOYER PROFILE

In the 2016/2017 financial year, 4388 companies submitted employment data to merSETA, which is an increase of just under 10% from the previous year. These 4388 companies represent a total of 4622 companies when considering the regional footprint of all branches. In terms of the size of companies in the merSETA sector most are small and medium, but they only employ 35% of all employees; large companies account for 65% of employment as seen in table 4 below.

Table 4: merSETA Companies by Size

Company Size	No. Companies	% Share Companies	Employment	% Share Employment
large	655	14%	602111	65%
medium	1247	27%	191653	20%
small	2720	59%	137951	15%
Grand Total	**4622**	**100%**	**931714**	**100%**

Of all the merSETA sectors, the motor sector shows the greatest share of employment among small and medium enterprises, comprising 45% of total employment in that sector. All other sector's small and medium enterprises account for less than 35% of total employment for their respective sectors as seen in table 5 below.

Table 5: merSETA Companies by Size and Chamber

Chamber	Company Size	No. Companies	% Share	Employment	% Share
Auto	large	12	13%	48615	87%
	medium	26	28%	3271	6%
	small	54	59%	3504	6%
Metal	large	350	15%	301393	65%
	medium	651	28%	96894	21%
	small	1350	57%	65748	14%
Motor	large	162	11%	141322	56%
	medium	371	26%	63186	25%
	small	908	63%	49668	20%
New Tyre	large	10	32%	13908	91%
	medium	4	13%	497	3%
	small	17	55%	737	5%
Plastics	large	110	19%	93388	72%
	medium	166	29%	24414	17%
	small	293	51%	15368	11%
Unknown	large	11	8%	3486	36%
	medium	29	21%	3390	35%
	small	98	71%	2925	30%
Grand Total		**4622**		**931714**	

*** Unknown chamber represents companies in the data where there is no SIC code and hence cannot be assigned to a specific chamber or sector*

Despite the small share of employment among small and medium enterprises, the government has prioritised entrepreneurship and the advancement of Small, Medium and Micro-sized Enterprises (SMMEs) as the catalyst to achieving economic growth and development (DTI, 2015).

1.4.1 Provincial distribution of merSETA companies

In terms of the provincial distribution of the companies within merSETA's five chambers as seen in figure 5, most are concentrated in Gauteng, the Western Cape, KwaZulu-Natal and the Eastern Cape. The metal sector also has a footprint in the Northern Cape and Mpumalanga. The motor sector shows a footprint in all other provinces as do the other sectors, but to a lesser degree. The same pattern is visible when considering the size of companies across the provinces as seen in table 6.

Figure 5 : merSETA Companies by Chamber and Province (merSETA WSP, 2016)

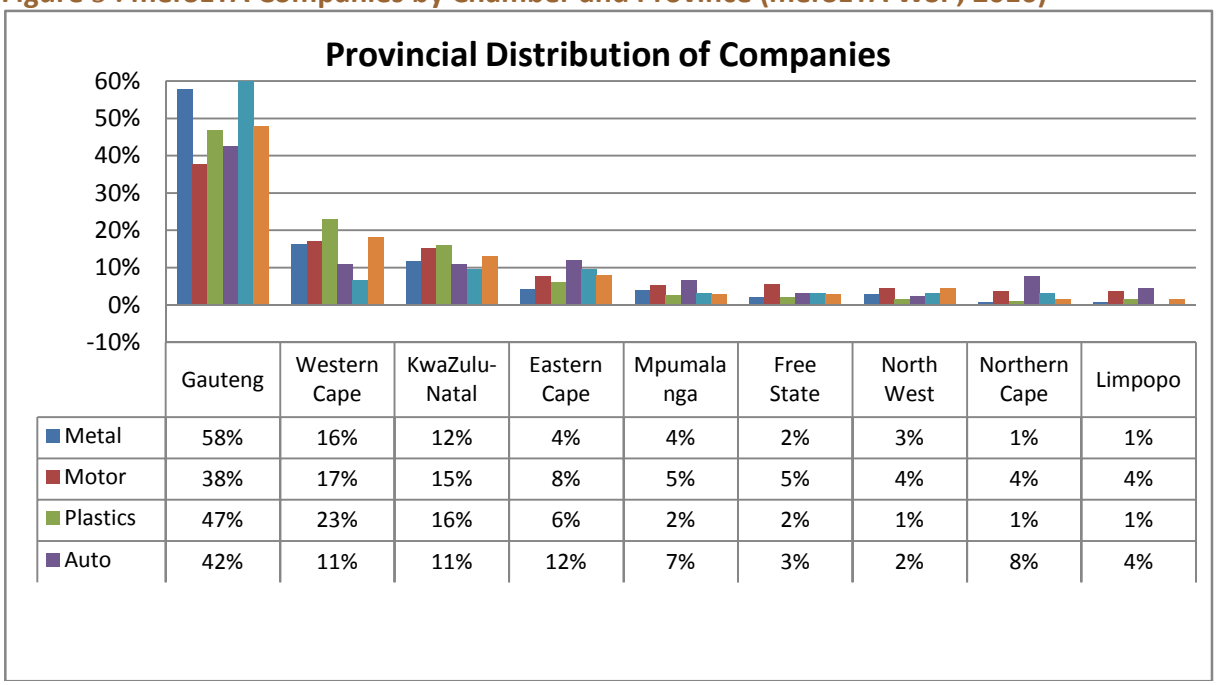


Table 6: Provincial spread of companies by size (merSETA WSP, 2016)

Province	Large		Medium		Small		Grand Total	
Gauteng	367	56%	656	53%	1265	47%	2288	50%
Western Cape	82	13%	191	15%	521	19%	794	17%
KwaZulu-Natal	90	14%	173	14%	349	13%	612	13%
Eastern Cape	55	8%	61	5%	150	6%	266	6%
Mpumalanga	30	5%	52	4%	113	4%	195	4%
Free State	9	1%	30	2%	108	4%	147	3%
North West	13	2%	46	4%	87	3%	146	3%
Northern Cape	4	1%	16	1%	67	2%	87	2%
Limpopo	5	1%	22	2%	60	2%	87	2%
Grand Total	**655**	**100%**	**1247**	**100%**	**2720**	**100%**	**4622**	**100%**

1.5 LABOUR MARKET PROFILE

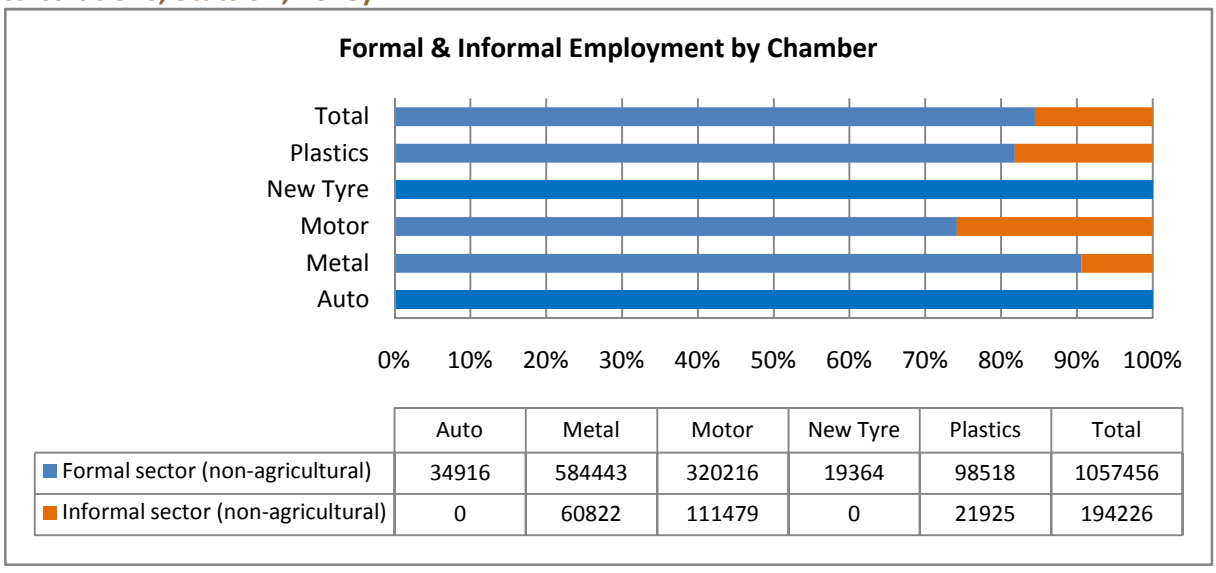
Data submitted to the merSETA in WSPs by 4388 companies represents the majority of employees in the sector. In total, the WSP data (un-weighted) represents 541 928 employees which is represents 51% of the total size of the population in formal employment as per Stats SA data for the first quarter of 2016. When the data are weighted up proportionally by chamber and levies paid, the data represents slightly less than 932 000 employees, representing about 85% of all employees formally employed in the manufacturing, engineering and related services sector.

The analysis of Workplace Skills Plans (WSPs) submitted to the merSETA in June 2016 sets total employment in the sector at an estimated 931 713. This figure excludes employment in the non-levy-paying companies allocated to the sector. According to the 2016 Quarterly Labour Force Survey (QLFS), the manufacturing sector shed 100 000 jobs representing almost a third of total losses in the first quarter of 2016 (QLFS, 2016). The national economy employed about 15.6 million people in the first quarter of 2016.

The manufacturing sector (under the merSETA scope of coverage) provided employment for about 1.2 million people (both formal and informal) or 13.1% of the total employed population. The biggest employer is the metals sector employing 52% of all manufacturing employees, the motor sector accounts for 30% employment, plastics and rubber products represents 12% of employees, and auto 3% (merSETA calculations, Stats SA QLFS, 2015).

In terms of the formal and informal employment split within the merSETA scope of coverage, overall 84% are formally employed, with 16% employed informally (merSETA calculations, Stats SA QLFS, 2015). Figure 6 below shows that across all sectors most employees are in formal employment, with the motor sector representing the largest proportion of informal workers (25%), this followed by the plastics sector which represents about 15% informal workers. There were no data on any informal workers in the auto and new tyre sectors.

Figure 6: Formal and Informal Employment in the merSETA Scope of Coverage (own calculations, Stats SA, 2015)



	Auto	Metal	Motor	New Tyre	Plastics	Total
Formal sector (non-agricultural)	34916	584443	320216	19364	98518	1057456
Informal sector (non-agricultural)	0	60822	111479	0	21925	194226

1.5.1 Provincial distribution of employees

The geographical distribution of employees is likely to follow the geographical distribution of the sector as a whole, with employment concentrated in Gauteng, but with nodes of higher-level employment the Western Cape, Eastern Cape and KwaZulu-Natal. When considering the more rural regions, there are higher concentrations of merSETA employment in the motor retail, motor service and repairs, and metal fabrication subsectors than in the other merSETA subsectors. Table 7 below reflects this scenario and shows a similar trend to Stats SA QLFS data for the fourth quarter of 2015.

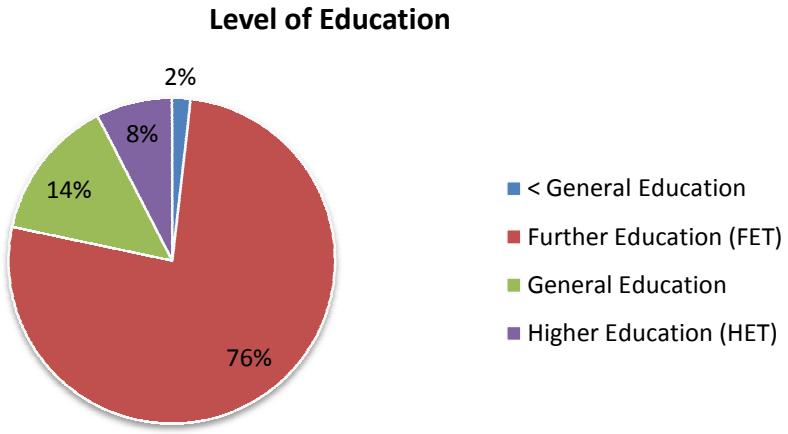
Table 7: merSETA Provincial Distribution of Employees (WSP data, 2016)

Province	Total Employed	Total Employed %
Gauteng	531266	57%
KwaZulu-Natal	140443	15%
Western Cape	107581	12%
Eastern Cape	71596	8%
Mpumalanga	30748	3%
North West	17166	2%
Free State	16539	2%
Limpopo	9854	1%
Northern Cape	6519	1%
Grand Total	**931713**	100%

1.5.2 Educational profile

There is no detailed information available on the skills levels of employees from merSETA data, however the QLFS Q4 2015 data from STATS SA were utilised to establish a proxy measure for educational levels of merSETA sector employees. According to 2015 Q4 QLFS data (see figure 7 and table 8) the majority of employees have an NQF level 4 (48%), but overall 90% of employees have TVET band qualifications with less than 10% having qualifications higher than TVET level.

Figure 7: Highest level of Education attained by merSETA Employees (own calculations, Stats SA, 2015)



The data also shows that women tend to be less represented above NQF 4, however from the data it would seem that women who progress beyond NQF4 predominately attain NQF 7 and above, surpassing the proportion of men with the same level of education (table 8).

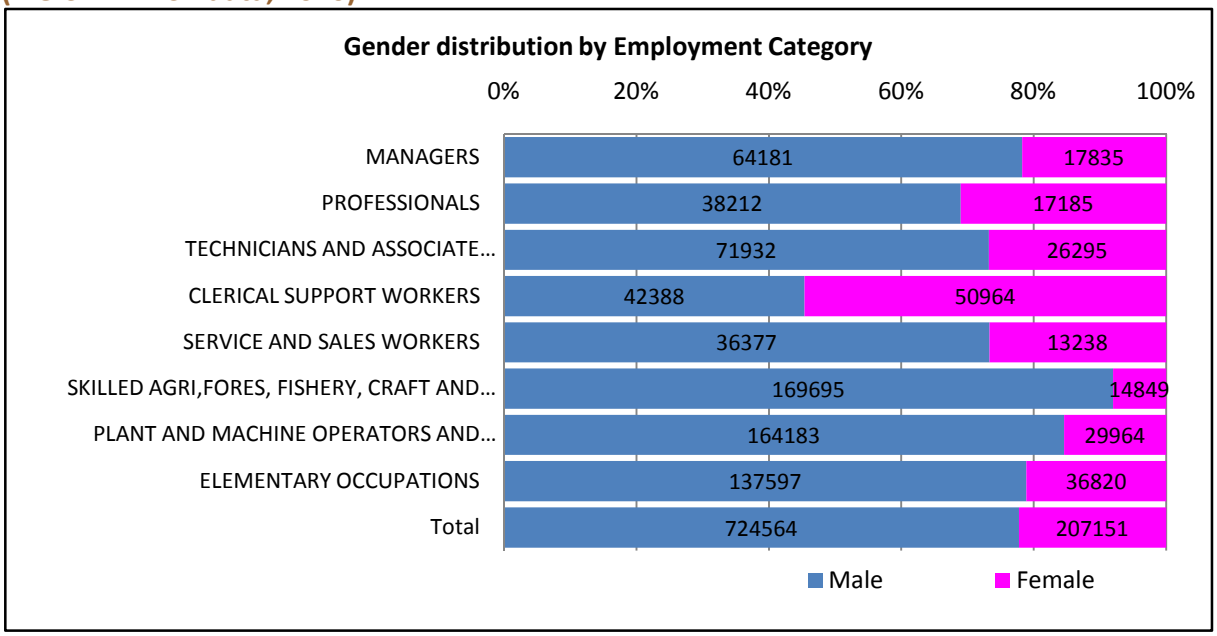
Table 8: Educational Levels of Employees in merSETA scope of coverage (own calculations , Stats SA, 2015)

NQF Level	Gender				Total	
	Male		Female			
No schooling	11562	1%	2271	1%	13833	1%
less than level 1	8668	1%	0	0%	8668	1%
NQF 1	161361	16%	13641	6%	175002	14%
NQF 2	142406	14%	24863	11%	167270	13%
NQF 3	147393	14%	29180	13%	176573	14%
NQF 4	466636	46%	136940	60%	603576	48%
NQF 5	11728	1%	761	0%	12489	1%
NQF 6	10098	1%	581	0%	10679	1%
NQF 7	33736	3%	11813	5%	45549	4%
NQF 8	5232	1%	2412	1%	7643	1%
NQF 9	9722	1%	7191	3%	16913	1%
DK	5849	1%	0	0%	5849	0%
Other	7639	1%	0	0%	7639	1%
Total	**1022030**		**229652**		**1251683**	

1.5.3 Race and gender distribution of employees

merSETA's sectors are male dominated with 78% males and 22% females representing the gender profile of the sector. As can be seen in figure 8 below, the group of clerical support workers is the only occupational category in which there is more or less an equal split between men and women. For the other major occupational categories, the proportion of women is greater among higher ranking occupations than lower level elementary, operator and trade worker levels.

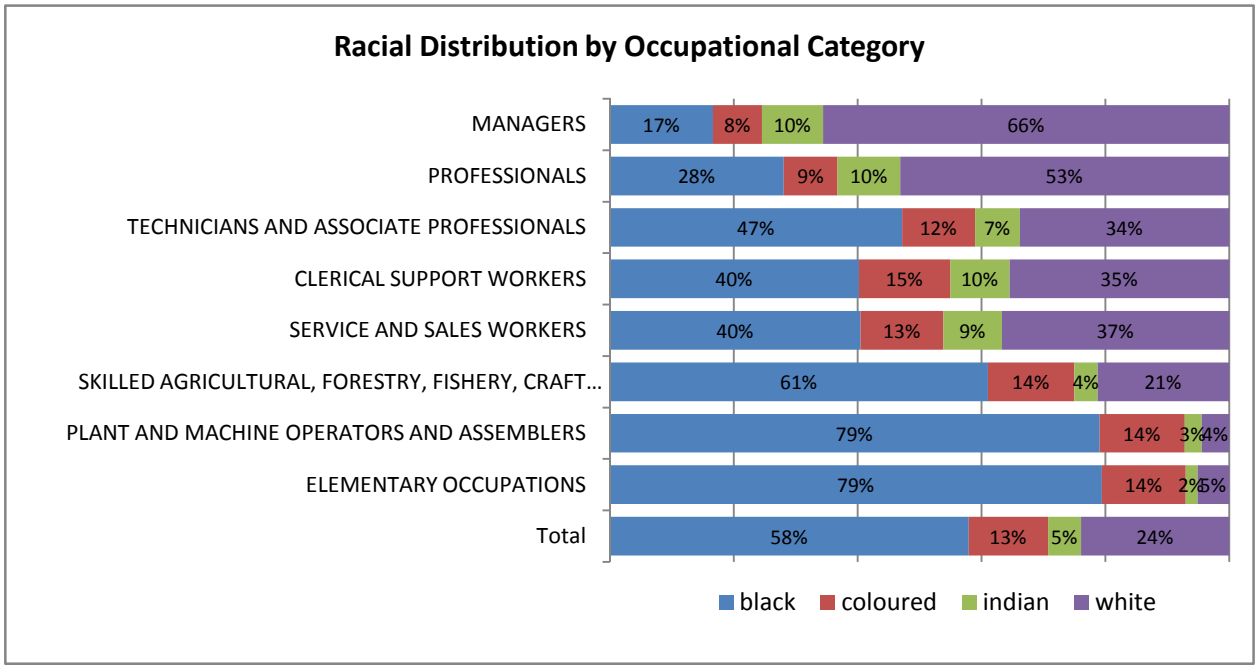
Figure 8: Gender distribution of employees in the sector according to occupational group (merSETA WSP data, 2016)



Racial distribution is an important indicator of transformation in the sector. In terms of race, more than half (58.0%) of merSETA employees are Black and almost a quarter (24%) are White. Indians constitute 5% while Coloureds constitute 13%.

The data as reflected in figure 9 below also reveals that transformation in the sector has not been progressive with previously disadvantaged racial groups still occupying lower occupational categories. White employees form the largest racial group in the occupational categories of managers (66%) and professionals (53%). Black employees make up the majority of workers for technician and associate professionals (47%), service and sales workers (40%) and clerical support workers (40%). It is important that these indicators be tracked for changes over time. As merSETA's data collection systems become more embedded, more detailed monitoring of transformation will become possible.

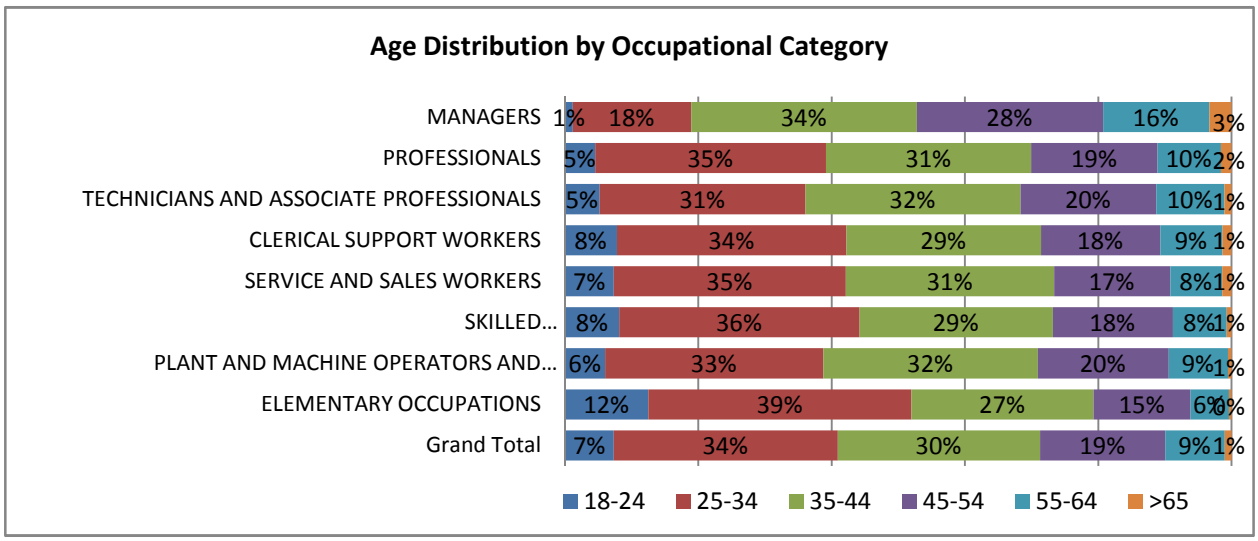
Figure 9: Racial Distribution of Employees (merSETA WSP, 2016)



1.5.4 Age distribution of employees

merSETA is a youthful sector, in 2016, 41% of all employees were younger than 35 years and only 10% were between 55 and 64 years old (Figure 10). The group elementary occupations have a relatively large proportion of workers younger than 35 years (51%). This group is to a larger extent composed of semi-skilled people with basic entry level qualifications (grade 12). The highest proportion of those aged over 35 are at managerial or professional level, this is due to the correlation between age, skill and experience.

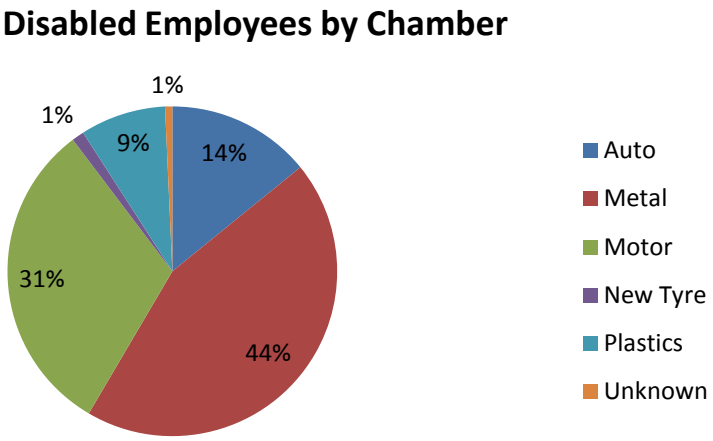
Figure 10: Age Distribution of Employees (merSETA WSP, 2016)



1.5.5 Disability

According to merSETA WSP data, merSETA organisations employ approximately 4196 people with disabilities (this data is not weighted).

Figure 11: Employees with disabilities by Chamber (merSETA WSP data, 2016)



The bigger sectors employ more disabled employees as demonstrated in figure 11, however when considering the number of disabled employees as a percentage of total employment, the auto and motor sectors employ more disabled people.

More male disabled people are employed in the sector with the majority of these being artisans (craft and related trades workers) as seen in table 9 below. The majority of female disabled employees are employed as clerical workers. The majority of male disabled workers are artisans and are employed in the metal (50%) and motor (33%) sectors as per the merSETA WSP data for 2016.

Table 9: Occupational Categories of employees with disabilities (merSETA, WSP data, 016)

Employment Categories	Disabled	%	Male	%	Female	%
MANAGERS	372	9%	276	10%	96	7%
PROFESSIONALS	348	8%	191	7%	157	11%
TECHNICIANS AND ASSOCIATE PROFESSIONALS	446	11%	272	10%	174	12%
CLERICAL SUPPORT WORKERS	762	18%	269	10%	493	34%
SERVICE AND SALES WORKERS	246	6%	185	7%	61	4%
CRAFT AND RELATED TRADES WORKERS	592	14%	518	19%	74	5%
PLANT AND MACHINE OPERATORS AND ASSEMBLERS	888	21%	720	26%	168	12%
ELEMENTARY OCCUPATIONS	542	13%	335	12%	207	14%
Total	**4196**		**2766**		**1430**	
	100%		**66%**		**34%**	

1.5.6 Workforce by Occupational Category and Chamber

Overall, the manufacturing, engineering and related services sector comprises a majority of semi-skilled and skilled workers. One in every 5 workers is skilled across all chambers and a quarter are employed at technician level or higher as demonstrated in table 10 below.

Table 10: Occupational Categories of employees by Chamber (merSETA, WSP data, 2016)

Employment Categories	Chambers					
	Auto	Metal	Motor	Plastics	New Tyre	Total
MANAGERS	10%	9%	11%	6%	8%	**9%**
PROFESSIONALS	11%	7%	5%	3%	4%	**6%**
TECHNICIANS AND ASSOCIATE PROFESSIONALS	16%	12%	8%	7%	8%	**11%**
CLERICAL SUPPORT WORKERS	7%	9%	13%	8%	6%	**10%**
SERVICE AND SALES WORKERS	3%	3%	12%	4%	3%	**5%**
SKILLED AGRI, FOREST, FISHERY, CRAFT AND TRADES	15%	24%	18%	11%	7%	**20%**
PLANT & MACHINE OPERATORS AND ASSEMBLERS	34%	20%	15%	25%	55%	**21%**
ELEMENTARY OCCUPATIONS	4%	16%	19%	37%	8%	**19%**
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

The majority of employees in the auto sector are at operator level followed by the trades; the metal sector has a high concentration of skilled trade workers; the motor sector has a relatively high number of elementary workers, but not as high a concentration as that of plastics, this is possibly due to the high numbers employed in recycling of plastics materials. More than half of all employees in the new tyre sector are employed as operators. One in ten employees in the motor sector is a manager - this is possibly due to the high number of owner managers of small and medium enterprises. The auto sector employs a high number of professionals, this possibly attributed to the high tech intensive nature of the sector.

1.6 CONCLUSION

This chapter has provided an overview of the merSETA labour market profile and economic performance of the sector. The chapter described organisations within the sector and the sector's employment profile. Factors affecting the performance of the sector such as the domestic and global economic environment, technology changes and labour market dynamics were also highlighted.

South Africa's economy continues to be negatively affected by global trading conditions, with adverse home-grown factors aggravating its performance in recent times**.** Harsh recessionary conditions in the Eurozone are having a particularly detrimental effect on the local manufacturing sector, specifically its export-oriented segments. Combined with a sharp decline in the global demand for commodities, subdued growth elsewhere in the world and competitive challenges on the local front, such developments are stifling prospects for a meaningful industrial recovery (IDC 2013). The IDC projects 2016 to be a challenging year due to the difficult conditions in the South African economy and modest global growth (IDC 2015).

Overall, the sector is experiencing a sharp decline in the number of employees due to the harsh climate. Furthermore, an ever decreasing contribution to the overall economy was depicted. According to National Planning Commission commissioner Dr Miriam Altman, while it was important for South Africa to grow its manufacturing output, the sector was unlikely to be a major source of employment in future, she said it was unlikely that more than 0% to 3% of employment created in South Africa over the next 20 years would come from the manufacturing sector. The sector is still however regarded as a sector that can create jobs in the national plans such as the NDP, NGP and IPAP. This is however dependent on the conditions under which the various subsectors must operate as well as the lengths to which government and foreign investors are willing to go to ensure viability of the sector in the long run.

While advanced manufacturing techniques and machinery require higher levels of skills, such jobs justify the generally high wages demanded in South Africa and also provide companies with sustainable commercial opportunities. This arguably will have an impact in the future oriented approach to manufacturing and engineering skills development as this will demand the need to focus on up-skilling the workforce and redesigning curricula to meet the changing trends; this issue also emerged as recommendations from the merSETA Motor Chamber research (2013). Furthermore, the manufacturing sector has been identified as one of the four priority sectors that have been selected as new growth areas in the ocean economy, with the objective of growing them and deriving value for the country. These include marine transport and manufacturing activities such as coastal shipping, transhipment, boat building, repair and refurbishment which should boost the demand for skills particularly in the plastics and metal sectors.

Ultimately this chapter has demonstrated the immediacy of the sectors' need to up-skill the current workforce in line with local and global trends in manufacturing. If not, the unskilled and semi-skilled worker faces imminent job losses.

2 KEY SKILLS ISSUES

This chapter identifies factors that are driving change in the sector and influencing skills demand and supply either positively or negatively. There are many factors that impact on skills demand and supply in the merSETA sector such as technological innovation and the global and domestic economic environment. This chapter will identify the "key skills issues" and analyse their implications for skills development in the sector. The chapter will also look at how government policies and strategies influence considerations of skills supply and demand in the merSETA sectors.

2.1 CHANGE DRIVERS

2.1.1 Factors affecting Skills Demand and Supply in the merSETA

2.1.1.1 Advanced Manufacturing

Disruptive labour market changes, including the rise of robots and artificial intelligence will result in a net loss of 5.1 million jobs over the next five years in 15 leading countries, according to an analysis published by the World Economic Forum (WEF) in January 2016. The assessment highlights the challenges posed by modern technologies that are automating and making redundant multiple human tasks, from manufacturing to healthcare. With the International Labour Organization already forecasting an increase in global unemployment of 11 million by 2020, the size of the additional job losses is sobering.

The fourth industrial revolution will have a significant impact on training and skills development needs of the manufacturing and engineering sector. According to the World Economic Forum, "re-skilling and retraining efforts may not yield the desired return if they are not cognizant of impending disruptive change and instead base their content primarily on today's requirements of past successes". Amongst the main change barriers include the lack of understanding of the disruptions ahead, resource constraints, short term profitability pressures and lack of alignment between workforce strategies and firm's innovation strategies.

Short term recommendations

- Making use of data analytics - organisations should build a new approach to workforce planning which requires a centralisation of data and planning metrics.
- Talent diversity - no more excuses - businesses need to deal with the issues of talent diversity whether it is in the realm of gender, age, ethnicity etc. These are known barriers which need to be tackled.

Long term recommendations

- Rethinking education systems - research shows that children currently in primary schools will work in completely different job types. This calls for the need for government, business, education and training providers and other relevant social partners to start imagining what a true 21st century curriculum could entail.
- Rethinking and reinventing competencies in the formal and informal sectors - as more job functions become redundant, the labour force would naturally morph into a parallel economy to ensure livelihoods. As technology advances in the formal sector, there are still opportunities for skills utilisation in the informal sector that may not have kept pace with their formal counterparts, for example a backyard mechanic of

the future will have to use current technologies to service, repair and replace parts of (what would then be) older motor vehicle models.

It is for this reason that the merSETA has expanded its footprint in support of Higher Education initiatives focussed on science, engineering and technology. These initiatives range from aligning post graduate programme support to the national technology innovation programmes such as those identified in the Advanced Manufacturing Technology Strategy (AMTS), to the development of university teaching staff in STEM programmes. The AMTS is an initiative of the Department of Science and Technology and is implemented as an approach that cuts across all sectors of manufacturing through support for new skills sets, unique hard and soft technologies and efficient value chains. Focus areas in the current AMTS Technology Roadmap include advanced electronics, smart/digital manufacturing, light weight structures and photonics.

Global advances in manufacturing technology have resulted in skills demand shifts in the sector. The proportion of unskilled and semi-skilled workers in the sector has declined, while the proportion of skilled and highly skilled workers has increased. These shifts are driven by the increase in cost of labour resulting in the automation of manufacturing processes so as to reduce labour costs. As employees will have to engage with new and increasingly complex technologies on an ongoing basis within the workplace, the baseline qualifications required across the board are increasing. The majority of OEMs for example, now only accept individuals who have passed Grade 12 Maths as operators on the shop floor.

According to the Department of Science and Technology, Director General Dr Phil Mjwara, South Africa has no alternative but to develop its advanced manufacturing capabilities. Poor labour productivity relative to other export-orientated countries hampers South Africa's global competitiveness. Advanced manufacturing, including the production of advanced materials and the use of advanced manufacturing techniques, can create alternative employment opportunities through the creation and growth of new industries and markets. Advanced manufacturing needs a highly skilled labour force and the merSETA has given support through various interventions such as policy dialogue and partnering with Universities of Technology to establish research Chairs for Manufacturing Skills Development (See chapter 4).

2.1.1.2 Domestic economic environment

The manufacturing sector continues to occupy a significant share of the South Africa economy, less than a decade into the 21st century. The global economic crisis has negatively affected economic growth in South Africa over the last four years prompting the decline in economic growth (Stats SA, 2016).

In South Africa, manufacturing production has remained slow. This is partly due to the combination of low production rates among various industries which include basic iron and steel, non-ferrous metal products, metal products and machinery and motor vehicles, parts and accessories and other transport equipment among others (Stats SA, 2016).

In addition, the current trends in unemployment are indicative of the prevailing harsh economic conditions that have seen the weakening of the Rand, decreased productivity, de-industrialisation, loss of investor confidence and fears of South Africa being downgraded to non-investment grade ratings levels – also known as junk status. This downgrade would result in continued unemployment, continued rise in budget and trade deficits, and the loss

of foreign investment along with domestic capital (Businesstec, 2016). The threat looms at a time when South Africa is facing long-standing structural issues including among others electricity shortages and price increases affecting local economic growth at a time when global economic growth is slow (Mail & Guardian, 2016). This coupled with the prevailing political and social conditions offer an insight into the significant challenges currently confronting the South African labour market.

In order to ensure that South Africa does not continue on a negative trajectory, the sector must look for opportunities for growth despite the harsh climate. Ultimately the sector should heed the message of a structural change in manufacturing recognising that it is not so much that manufacturing is in decline, but rather that manufacturing must keep up with the demands of the current climate which has a direct impact on skills and skills development. Workers must be up-skilled and re-skilled, the supply in the education pipeline must be set up to meet the demands of advanced manufacturing and aligning of skills to meet demands of a changing sector. More investment is needed in higher level skills for research and development of new and cutting edge products which are manufactured on-shore.

2.1.1.3 Global economic environment

Economic contraction has resulted in severe job losses across the sector. Economic recovery slowed with continued challenges facing the European financial systems and the slow growth of China (one of South Africa's biggest trading partner) (BizNews, 2015). In the Eurozone, policy makers are grappling with ways for countries to meet deficit targets, but at the same time escape a second consecutive year of recession and the social unrest associated with record high levels of unemployment (Reuters, 2013). These markets represent SA's current major export markets and the negative effect of limited or no growth in these markets within the merSETA sectors, is currently only being counterbalanced in part by the growth of and increased exports to other African economies (Mail & Guardian, 2013). Inexpensive imports from China pose further challenges to the local industry. These factors will influence the sector's requirements for new skills (as opposed to skills for replacement demand and to fill vacancies that result from skills scarcity). Furthermore, against the context of a declining sector, retrenchments and layoffs are becoming more noticeable. The merSETA's Retrenchment Assistance Programme and participation in the National Training Layoff Scheme, seeks to counteract this.

2.2 ALIGNMENT WITH NATIONAL STRATEGIES

The merSETA recognizes the importance of national imperatives to promote social inclusion and grow a sustainable environment in which South Africans can thrive. These national priorities are linked to many national plans and strategies, but the foundation of all our efforts starts with the National Development Plan as depicted in figure 12 below.

The merSETA recognises the importance of national strategies in driving imperatives that are critical for the growth and development of South Africa's civil and business sectors. The National Development Plan, Human Resource Strategy, Rural Development Strategy and Infrastructure (SIPs) documents all have at their core key levers to ensure continued economic growth, job creation, sustained livelihoods, social justice and access to decent living conditions through human and community development. These plans draw a focus to the following key issues:

- **Transformation of the national economy** which demands increasing proportions of Black Africans in the more highly skilled occupational groups for which relevant technical degrees, learnerships and apprenticeships are required on the supply side. Many positions (including management) demand not only a relevant qualification, but also many years of work experience in the sector in order to 'qualify' the individual.

- **Community Development** which through the Integrated Rural Development Strategy (2000) requires organisations to direct a specific focus on improving the opportunities and well-being of people living in rural areas, and particularly the rural poor.

- **Making opportunities available to People with Disabilities (PWD)** which aims to ensure that firms recruit and provide training opportunities for people with disabilities, and also ensure that firms are able to retain employees who become disabled while they are employed within the sector.

- **Supporting the Green and Blue Economies** which draws attention to the depletion of natural resources as a result of human activities including manufacturing. It recognises industrial and community development opportunities in marine transport and manufacturing, offshore oil and gas exploration, aquaculture as well as marine protection services and ocean governance. These initiatives embrace the concept of cleaner production as a way of reducing the negative effects of manufacturing production activities on the environment while also uncapping potential growth areas. Ultimately, these initiatives move manufacturing into a realm of respect for and partnership with nature and its resources.

- **Supporting the informal, small and medium business sectors** which play a critical role in the economic and social development of the country. The government has prioritised entrepreneurship and the advancement of Small, Medium and Micro-sized Enterprises (SMMEs) as the catalyst to achieving economic growth and development (DTI, 2015). Research by Global Entrepreneurship Monitor (2014) shows that small businesses in South Africa are significant contributors to job creation, creating more than 50% of all employment opportunities and contributing more than 45% of the country's gross domestic product.

Figure 12: Depiction of National Plans, Programmes and Strategies to which merSETA is aligned

The Industrial Policy Action Plan is arguably one of the key policy initiatives which addresses key areas of concern and is aimed at stimulating economic growth through re-industrialisation. The overriding aim of the IPAP is to achieve higher levels of inclusion and sustainability.

The importance and overarching role of the IPAP in re-industrialisation was emphasised at the 2016 Manufacturing Indaba. IPAP 2016/17 – 2018-19 highlights six critical initiatives to achieve a higher-impact industrial policy which seeks to stimulate growth in the manufacturing sector. These initiatives highlighted below have major implications for skills planning in the sector.

Infrastructure-driven industrialisation seeks to sustain and build the public infrastructure programme, with stronger support for **local manufacturing** and economic infrastructure (IPAP 2016). This demands the development of artisans, technicians and other skilled workers as well as highly skilled professionals such as engineers and architects. Research and development skills are important for knowledge production and innovation which is a critical success factor for industrialisation.

Resource-driven industrialisation seeks to enable the leveraging of mineral resources for greater levels of downstream **beneficiation and value addition** while building up both the demand and competitive advantages South Africa enjoys in the upstream mining, transport and capital goods sectors (IPAP 2016). This highlights the need for high skilled extensive research and development initiatives at Masters and PhD level to continuously innovate and improve the industry. Skills that need to be developed around this initiative generally fall within Science, Technology, Engineering and Mathematics (STEM).

Advanced manufacturing-driven industrialisation seeks to continuously focus on key spill-over sectors with stronger conditions for public sector support allied to strong stakeholder engagement and also **support emerging black industrial entrepreneurs that links to transformation imperatives** (IPAP 2016). Advanced manufacturing includes the production of advanced materials as well as the use of advanced manufacturing techniques which therefore calls for the need to invest in high-level skills with a focus on Science, Technology, Engineering and Mathematics (SETM). Research and development skills typically at Masters and PhD level are also crucial for advanced manufacturing as it links to knowledge production that enables new technological adoption.

Rolling-out the intra-governmental Operation Phakisa Plan for the marine economy. The oceans economy has the potential to contribute between 59 Billion to the country's GDP and add 316 000 jobs. To achieve these targets skills have been identified as a key driver of success. Some of the critical skills identified by the Maritime Sector Skills Technical Task Team (MSSTTT) include engineers (chemical engineers, geotechnical, drilling, structural, marine and mechanical); maritime technologists; designers; electricians; metal fabricators; boiler makers and welders; riggers; and technicians. The merSETA for example is responsible for some of the skills needed for boat and ship building in the marine transport. **Automotives Master Plan** will be extended by the DTI established team of technical experts who will develop a post-2020 Automotives Master Plan to examine the entire automotive sector. The purpose is to ensure that in the context of long term policy certainty a post-2020 Master Plan will create a framework to secure even higher levels of investment and production, higher exports, **deepening localisation** and expanding employment. To successfully deepen localisation skills development should take place in a way that ensure the country is up to date with technological developments globally. The sector needs to invest in high-level skills such as engineers, technologist and technicians as well research and development skills. With the availability of high level skills among other things, industry will have access to a skills supply pool which is key in giving the manufacturing sector a competitive edge globally.

Additional initiatives include the need to:

- Maximise opportunities presented to the domestic economy by a growing market on the African continent.
- Strengthen local public procurement processes needs and deepen the process of ongoing monitoring and evaluation.
- Leverage the devaluation of the Rand to make South African manufactured products more globally competitive.
- Create opportunities for the expansion and further development of SA's domestic manufacturing capabilities and.
- Build strong partnerships with global Original Equipment Manufacturers (OEMs) that are focused on transferring technologies and growing our exports in OEM value chains.

If industrial growth can be assisted by these key levers, this would catapult the sector into a new skills era, where opportunities for transformation and youth development are created. Investments in skills will thus not result in a brain drain or training for unemployment because opportunities could be taken up more readily.

2.3 CONCLUSION

It is clear from the discussion in this chapter that the manufacturing, engineering and related services sector is experiencing significant changes due to domestic and global economic developments. Technology is also a significant change driver in the sector, but has a far reaching impact on skills development and labour demand. It is also evident from the discussion above that the merSETA needs to play a more active role in supporting government imperatives, and many of these can be achieved through the key national strategies of which the IPAP capture many critical policy lever to affect real change.

3 EXTENT OF SKILLS MISMATCH

This chapter focuses on highlighting the occupationally based skills mismatches in the sector by identifying the extent and nature of skills demand and supply. The overarching objective of this chapter is to identify the scarce skills and skills gaps in the sector. The data was sourced from multiple sources such as the merSETA WSP data, merSETA chamber led research, desktop research and national accounts data.

3.1 EXTENT AND NATURE OF DEMAND

3.1.1 Analysis of Vacancies in the Sector

The WSP 2016 data provides information on vacancies in the sector. Companies indicated the total number of vacancies that they had in the previous financial year, the number of vacancies that were filled in the previous financial year and vacancies they anticipate for the upcoming financial year.

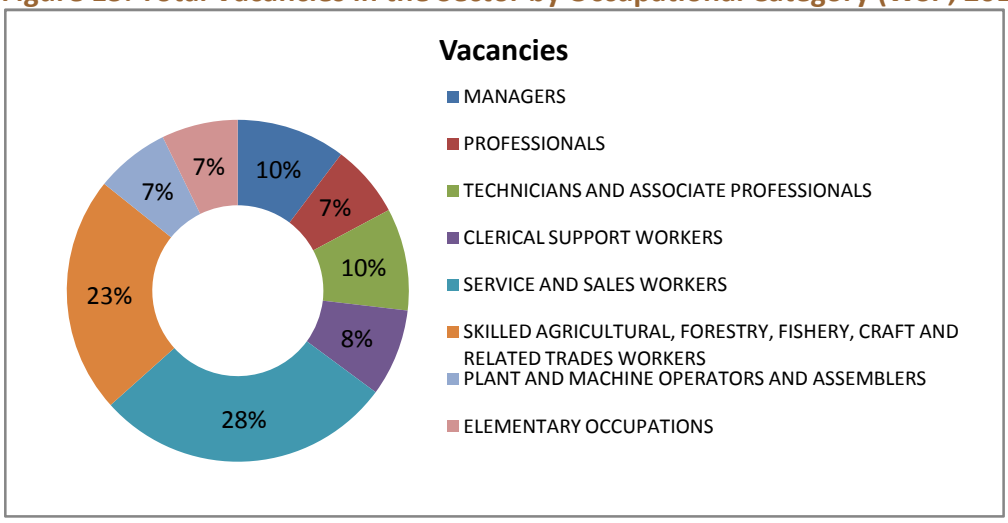
The data yielded the following information:

- there were a total of 18903 vacancies;
- 13423 vacancies were filled;
- 3598 vacancies were not filled;
- 5479 vacancies are anticipated for the next financial year.

Unfilled vacancies in the sector were attributed to difficult to fill positions by respondent companies if more than half of vacancies for that position remained unfilled. The motor and metal sectors had the highest number of vacancies.

Figure 13 below demonstrates that the greatest demand is for service and sales workers followed by skilled craft and trades workers indicating a demand for mid to higher level skills. Elementary and operator level skills only account for 14% of the total demand.

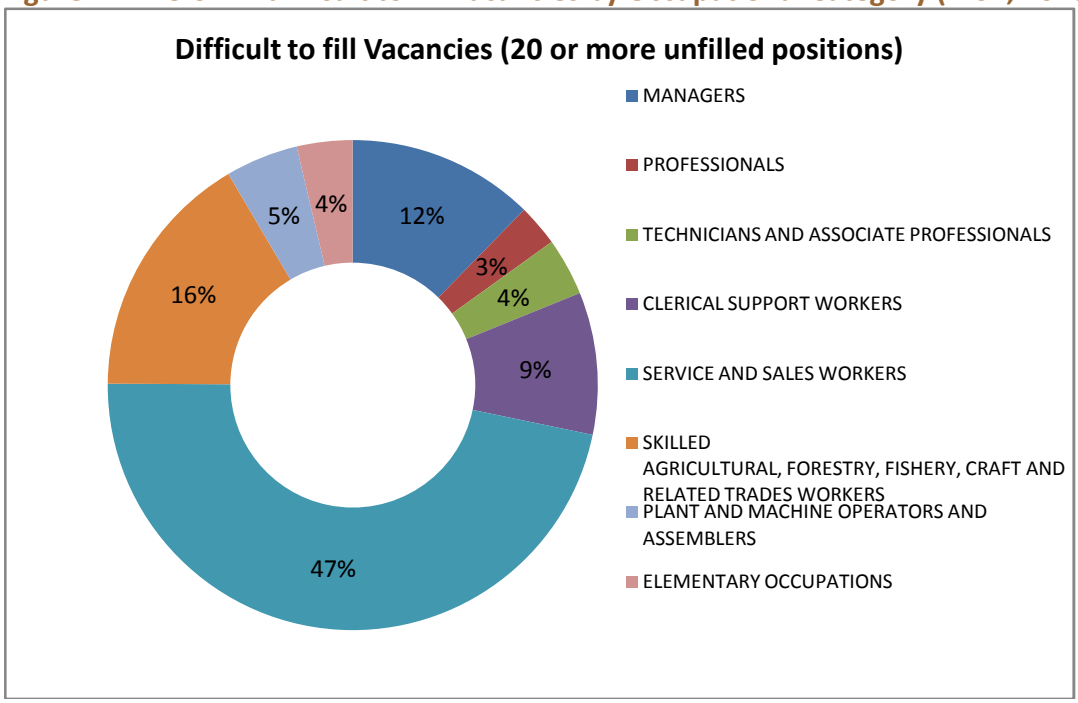
Figure 13: Total Vacancies in the Sector by Occupational Category (WSP, 2016)



3.1.2 Occupations that are difficult to fill

As demonstrated by figure 14, sectors reporting highest demand is for service and sales workers, craft and trades workers and managers respectively. These positions are deemed difficult to fill as there were 20 or more unfilled positions indicated in the sample per OFO code.

Figure 14: merSETA difficult to fill vacancies by Occupational Category (WSP, 2016)



The occupational composition of the merSETA sector shows that technicians and associated professionals account for 10% of total sector employment while professionals (including engineers) make up 6% of employment in the sector. Professionals and technicians are employed across a range of the following technical-skill areas: mechanical engineering, industrial engineering, electrical engineering, electronics engineering, metallurgical engineering and chemical engineering. Professionals also fill non-line function positions such as accounting, financial management, human resources management, information technology and communications, and marketing. Training of professionals generally takes place at universities and universities of technology (qualifications at NQF Level 8 and above), while technician training is done at universities of technology (qualifications at NQF levels 6 and 7). Training for both these groups lie within the HET system.

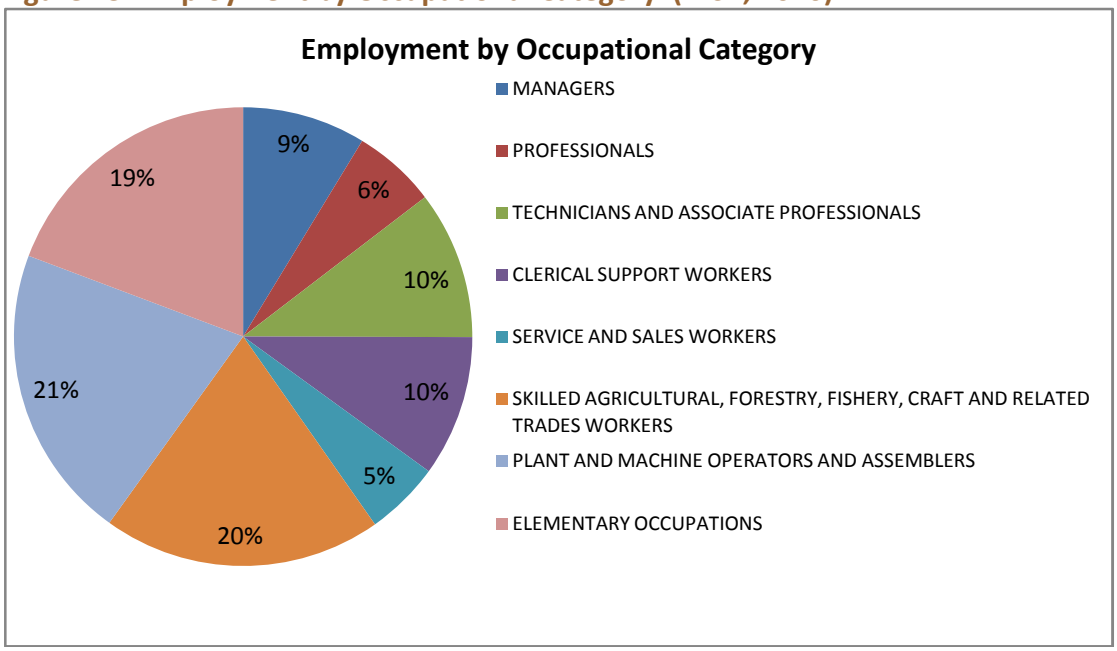
An analysis of the merSETA 2016 WSP data and key findings from the 2013 and 2014 chamber led research reports led to the following conclusions about occupational demand in the sector:

- Professionals, technicians and associated professionals and crafts and related trades workers, including artisans, emerged as the occupational categories where there is an increasing demand for highly skilled people. The demand has been pushed up as a result of digitization, mechanization, and automation of manufacturing processes.

- There has been a decrease in demand for people at the lower occupational levels despite the fact that the lower skills categories such as elementary workers still constitute a significant number (104 426) in the sector.

- Plant and machine operators constitutes the majority of employees in the sector (21%). Managers make up 9% of the sector occupational profile and are generally recruited from within the professional ranks of the industry. The artisan occupations that occur most frequently in the merSETA sector include: fitters, fitters and turners, electricians, metal machinists, toolmakers, millwrights, precision instrument makers and repairers, and air conditioning and refrigeration technicians. The training of artisans happens through the TVET system and by means of apprenticeships and learnerships.

Figure 15: Employment by Occupational Category (WSP, 2016)



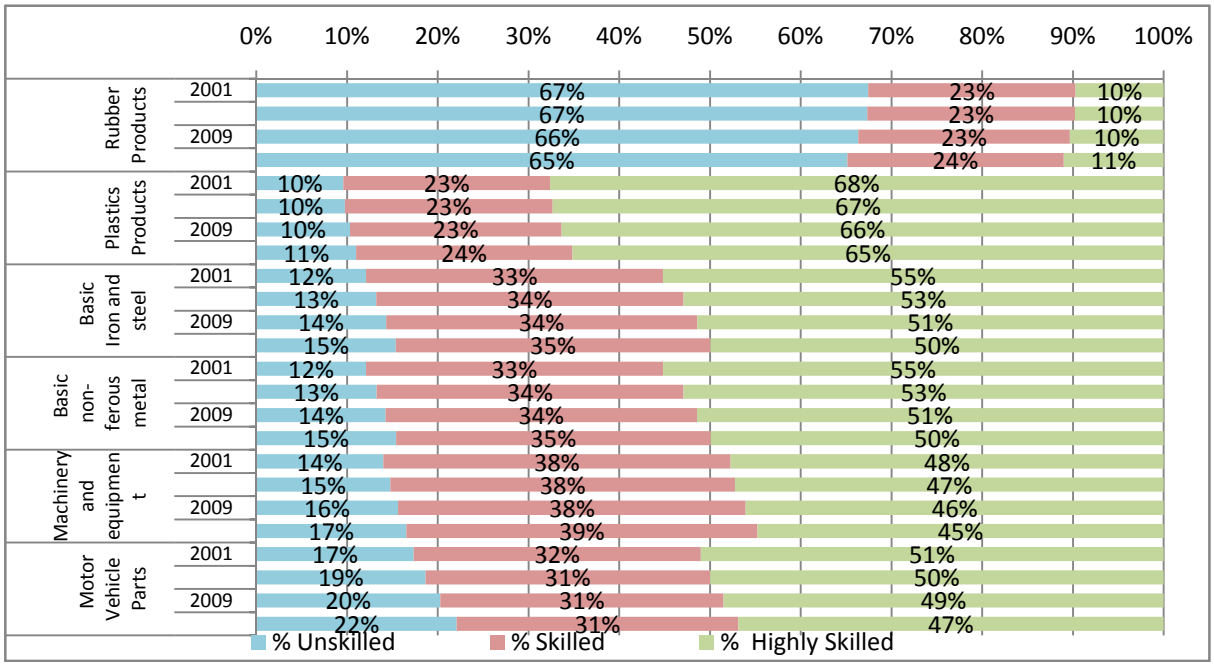
3.1.3 Demand based on Skills levels of Employed Workers in the sector over time

The merSETA sector is characterised by a higher demand for high-skilled workers relative to unskilled workers over time as seen in the graph below. The proportion of unskilled and semi-skilled workers has seen a decline in the merSETA sector in the recent past. Within the merSETA sectors the rubber products sector employs the largest proportion of unskilled and semi-skilled workers within this skills level category accounting for 65% of total employment in that sector. The merSETA sector that employs the least amount of semi-skilled and unskilled workers is the plastics sector at 11%. Preliminary findings from the University of Cape Town (UCT) Department of Policy Research Unit (DPRU) LMIP survey also show that the merSETA labour market is semi-skilled intensive and draws a large number of Grade 12 completers. Workplace training is therefore a key component of skills development. The metal sector has the highest skills intensity (23% of workers have an FET qualification, diploma or degree), followed by auto and plastics (14% of workers have an FET qualification, diploma or degree). The new tyre sub-sector has the lowest skills intensity (7.6% of workers have an FET qualification, diploma or degree) (DPRU, 2014).

While the demand for skilled workers in the sector is not increasing as rapidly as for the rest of the national economy, demand among the sectors for highly skilled workers is following roughly the same trend for all the merSETA sectors. merSETA industry representatives support findings from the 2013 Motor Chamber research which highlights the difference between 'qualified' workers and 'competent' workers. This distinction appears to be growing in SA, with qualifications not guaranteeing competence, thus industry calls of skills

scarcity areas increasingly related to the scarcity of competence rather than merely qualified workers. Figure 16 below, highlights these trends.

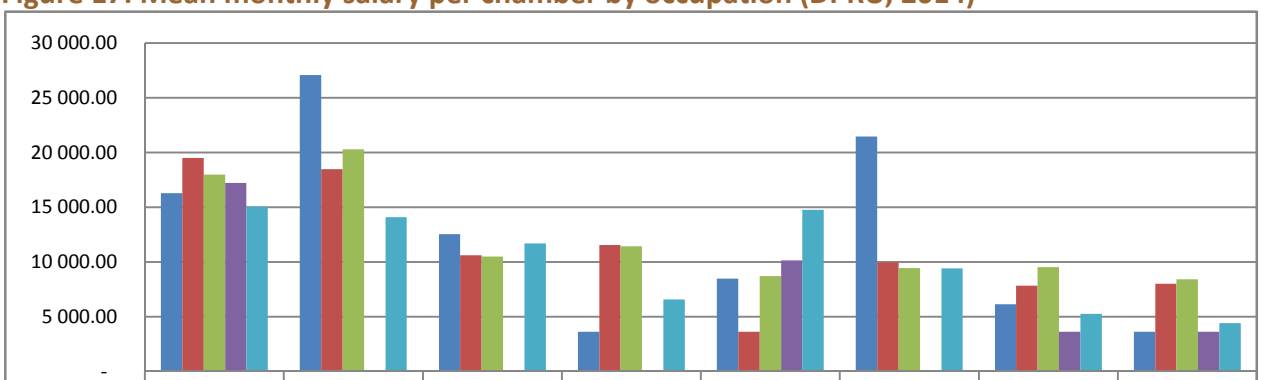
Figure 16: Demand for skilled labour in the manufacturing, engineering and related services sectors 2001-2013



3.2 OCCUPATIONAL WAGE TRENDS

Occupation specific remuneration data was obtained from the 2014 DPRU LMIP survey of merSETA firms (figure 17). The data obtained shows that the auto (R12 641) and motor (R11 676) subsectors have the highest mean monthly salary, followed by metal (R10 889) then plastics (R7488). The new tyre sub sector (R6514) has the lowest mean monthly average salary. The data show that highly skilled intensive sectors such as motor, metal and metal have higher mean monthly salaries compared to sectors such as new tyre that have the largest proportion of semi-skilled and unskilled workers. Occupational wage trends also show that professionals such as engineers and technologists in the auto and motor subsectors are the highest earning category. This is linked to the scarcity of skills in those occupational categories such as engineers. In other sectors managers tend to earn more that the other professional categories. Skilled and trade workers including artisans also tend to earn higher than managers and technicians in the auto sector, This can also be attributed to the scarcity of the skills in that occupational categories (see section on merSETA scarce skills list).

Figure 17: Mean monthly salary per chamber by occupation (DPRU, 2014)

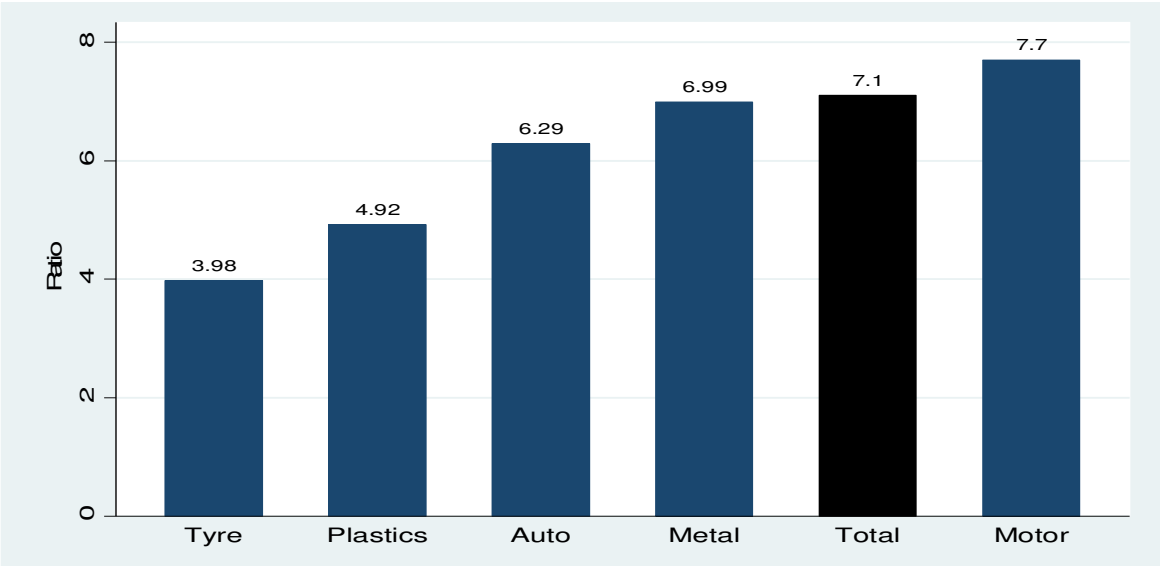


	MANAGERS	PROFESSIONALS	TECHNICIANS & ASSOC PROFESSIONALS	CLERICAL SUPPORT WORKERS	SERVICE & SALES	SKILLED AGRICULTURAL, FOSTERY, FISHERY, CRAFT & RELATED TRADES WORKERS	PLANT & MACHINE OPERATORS & ASSEMBLERS	ELEMENTARY OCCUPATIONS
Auto	16 272.29	27 089.67	12 545.27	3 636.50	8 485.11	21 453.56	6 136.33	3 636.50
Metal	19 516.33	18 477.48	10 616.83	11 563.43	3 636.50	9 959.18	7 840.07	7 997.49
Motor	17 987.23	20 292.51	10 489.90	11 446.91	8 714.87	9 451.53	9 527.09	8 407.18
New Tyre	17 235.90	-	-	-	10 151.67	-	3 636.50	3 636.50
Plastics	15 060.08	14 082.26	11 699.17	6 573.19	14 772.46	9 416.45	5 250.12	4 412.31

3.2.1 Income inequality within sector

According to preliminary findings from the DPRU LMIP survey, the averages of the top 20 percent of wages in the sector are seven times the average for the bottom 20 percent of incomes. The averages hide some of the distributional differences – the motor sector has a wider income distribution than the metal sector (DPRU, 2014). The chart below highlights income equality within each sector. The motor sector has the highest income inequality (7.7%) while the new tyre sub-sector has the lowest income inequality gap (3.98%), see figure 18.

Figure 18: Ration of top 20% of incomes to the bottom 20% of incomes in merSETA sub-sectors (DPRU, 2014)



3.3 CONDITIONS OF EMPLOYMENT

3.3.1 Labour unions strikes and industrial action

The workforce of the merSETA sectors is highly unionised. The National Union of Metalworkers of South Africa (NUMSA) is one of the biggest unions in the sector. NUMSA represents workers from the engineering (steel production), vehicle assembly, automotive components manufacturing, new tyre and electronics manufacturing subsectors. Other unions that play a significant role in the sector include Chemical Energy Paper Printing Wood and Allied workers Union CEPPWAWU (Plastics sector), Metal and Electrical Workers Union of South Africa (MEWUSA) (Plastics and Metal sector) and Solidarity that cut across all the sectors. Unions play a significant role in advocating and fighting for worker's rights, skills development and improving conditions of employment and advocating for transformation among other things.

Nationally, there was a reported increase in strike incidents from 99 strikes in 2012, to 114 strikes in 2013, and then a decrease in 2014 of 88 strikes recorded. However, the strikes recorded in 2014 lasted for long periods at a time, this may be why there was a decreases in the actual cases reported (DoL 2014).

The resultant effect was that a total of R6.7 billion in wages were lost 2013 due to the participation of workers in strikes as compared to the R6.6 billion in 2012 (DoL 2013). In 2014, the total wages lost due to strikes was estimated at around R6.1 billion. This decrease may also be due to the decrease in the number of strikes reported (DoL 2014). As has been the trend in the past, wages were still the main reason for workers to embark on strikes action at 76.6% working days lost in 2013 and 98.4% of working days lost in 2014 (DoL 2013, DOL 2014). It is shown that the cost of living keeps going up because of multiple factors from domestic and international markets. Indeed, workers will probably continue to strive for decent wages as it is framed in the Decent Work Country programme (DoL 2014).

Out of the total (114) strikes in 2013, 48% of the strike incidents as against 52% were protected strikes and out of the 88 recorded strikes in 2014, 48% were unprotected and 52% were protected (DoL 2014). Unprotected strikes have in the majority of cases resulted in job loses.

3.3.2 Casualisation of labour

Temporary staffing is an increasing phenomenon in international labour markets, and South Africa is demonstrating similar trends. As at June 2014, temporary work accounted for 31.1% of formal sector employment (Adcorp, 2014). Because the demand for the merSETA sector's products is closely linked to the performance of both the national and international economy, production is cyclical and temporary workers have been a long-standing labour phenomenon within the sector. Agreements with unions have however set limits to this type of employment; a key challenge for skills development for the sector related to the casualisation of labour is that these workers are not generally accommodated in skills planning and they make up a large proportion of the sector's workforce. Furthermore, these workers are considered to be more vulnerable than other workers and thus, need to be considered from the perspective of the sector's support for the principles of a 'developmental state' and social inclusion.

3.4 MIGRATION

Stats SA stopped recording **emigration** figures in 2003 and at this stage there is no single local data source that provides information on the movement of workers out of South Africa. In the absence of any empirical data, it is estimated that approximately 0.5% of managers and professionals of the sector are lost to the South African labour market as a result of emigration. It was assumed that emigration of the other occupational groups is negligible because of the lack of international demand for lower-level skills and the cost of emigration. The South African labour market is affected by migration of highly skilled people to overseas destinations such as Dubai and Quatar, places where qualified South African engineers and artisans are in high demand and are able to easily move to in order to work on high-paying and exciting projects. Similarly, the South African labour market is affected by demand emanating from other African - and especially other Southern African Development Community (SADC) – countries. Specific skills needed for development projects are attracted from our labour market and as South African companies deploy their staff in neighboring countries, the demand in South Africa is effectively increased. Economic growth in countries in close proximity to South Africa such as Mozambique is starting to have an effect on the local demand for skilled labour. This may very well continue into the future. Through these trends, skills are lost to the local, regional or national economy on either a temporary or a permanent basis.

With regards to **immigration**, of professional, technical, and artisanal qualified people, tracking is also difficult. The intention of the national Scarce Skills List is to assist the Department of Home Affairs to make decisions in issuing work permits to foreigners.

In terms of internal migration patterns, our two newly qualified artisan tracer studies (2012 and 2015) indicate generally higher levels of migration along the eastern parts of the country, and towards Gauteng, than in the western and southern parts of the country. It may be anticipated that as the SIP projects are commissioned, internal migration trends will also shift, to meet demand.

3.5 EXTENT AND NATURE OF SUPPLY

3.5.1 Current supply

The stock of skills available to the metals, automotive and plastics manufacturing sectors includes the group of people that are currently employed in addition to those that are currently unemployed but are available for work. Unemployed people who are currently unemployed but were previously employed in the sector must also be considered as part of the current supply of skills. The sector has shed many jobs since 2008 as a result of the economic recession, as well as some other recent factors that have served to constrain growth and profitability. In addition, labour unions have provided evidence that retrenchments in the sector are ongoing. This group of recently retrenched workers forms the pool of immediately available skills that can be drawn from to meet both new - and replacement demand.

No information is currently available on the current employment status of these workers specifically. It is however possible to analyse the Quarterly Labour Force Surveys (QLFS) data. In 2014, total number employed in the manufacturing industry was 1 213 560 with metals, metal products, machinery and equipment employing the largest number of people

(257 098 or 21%), followed by food products and beverages (231 320 or 19%), and then by coke, petroleum, chemical products, rubber and plastics (173 605 or 14%) (Stats SA, P3002, 2014). In the manufacturing industry, employment in has decreased by 2,4% per annum as compared with 2011 with a total of 1 304 576 employed (Stats SA, P3002, 2014).

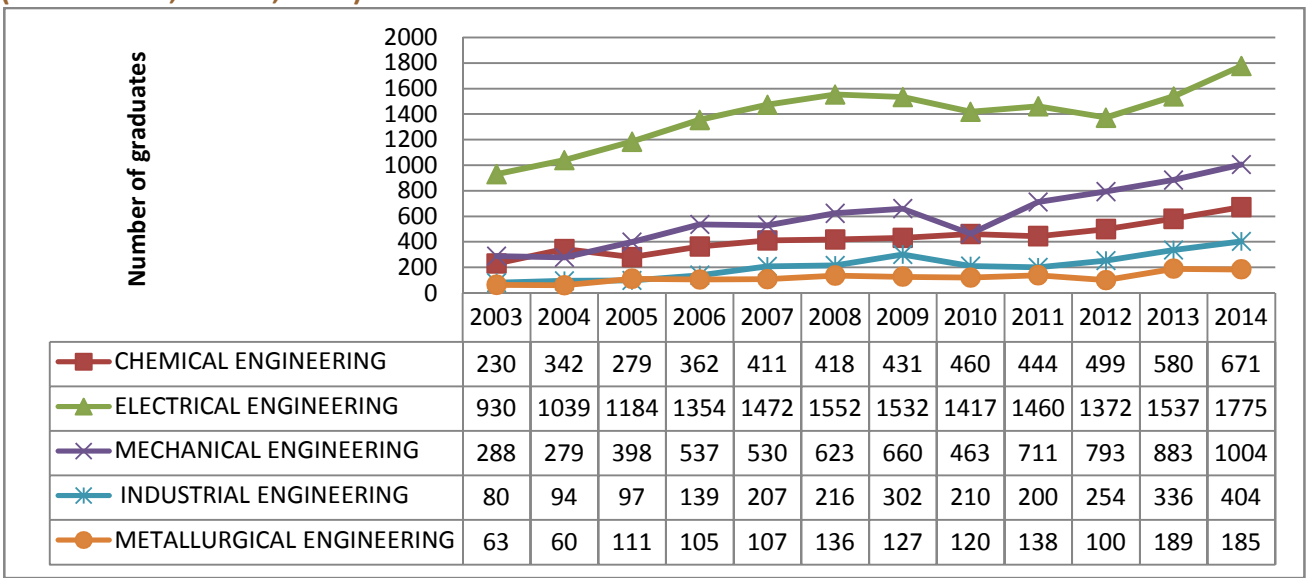
Upon comparison of the Q1 year on year QLFS data from March 2009 through March 2016, employment in the manufacturing sector has on average decreased by 4.12% on a yearly basis. More recently, employment in the manufacturing sector has decreased by 8% in quarter one of 2016 compared to quarter one of 2015 (QLFS 2009-2016).

3.5.2 Higher education and training

While a range of general qualifications from the Higher Education and Training (HET) sector in the areas of finance, accounting, human resources and Information and Computer Technology (ICT) are utilised in the merSETA sector, the output of engineers is most relevant; particularly in the fields of electrical engineering, mechanical engineering, chemical engineering, industrial engineering, and metallurgical engineering.

Figure 19 below, shows the total number of graduates with national diplomas in selected engineering fields from 2003 to 2014. These graduates become available to the national economy as engineering technicians in the relevant engineering disciplines. Electrical engineering has the highest output (1775 in 2014), followed by mechanical engineering (1004 in 2014) and chemical engineering (671 in 2014). Output from all fields has increased substantially over the twelve-year period, although a slight decrease in output was reported in all fields except chemical engineering in 2010. The average annual increase was greatest in industrial engineering (18.3%) followed by metallurgical engineering (15%), mechanical engineering (14.2%), chemical engineering (11.4%), and electrical engineering (6.3%).

Figure 19: Number of national diplomas awarded in selected engineering fields: 2003-2014 (Source: CHE, HEMIS, 2014)

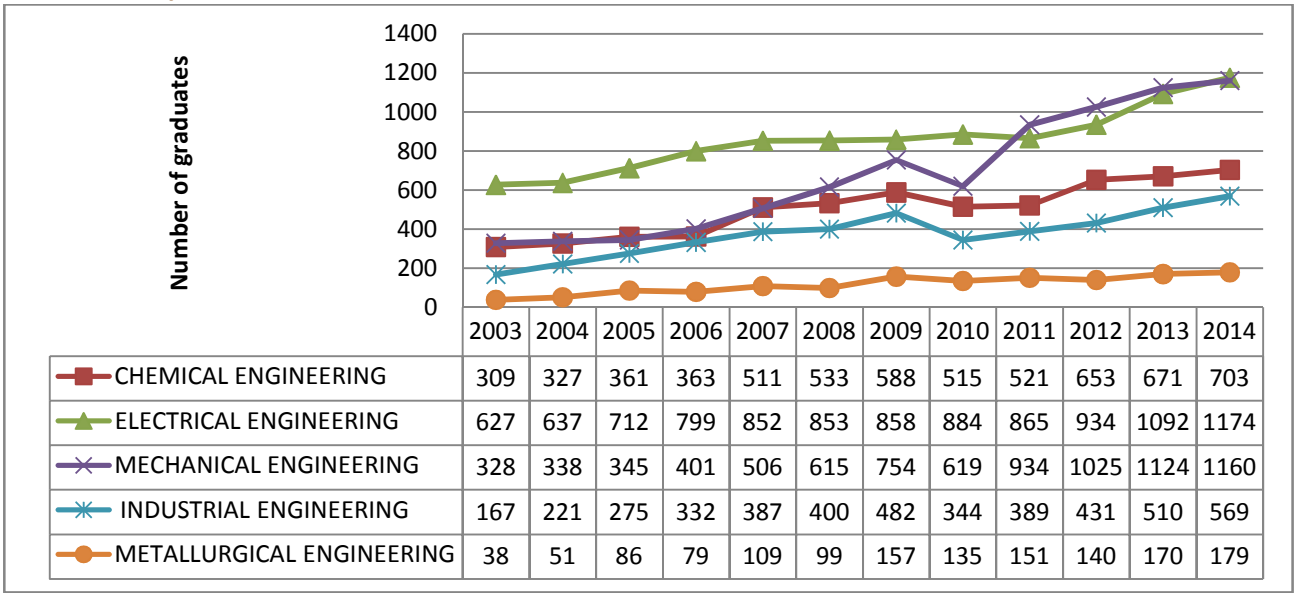


	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CHEMICAL ENGINEERING	230	342	279	362	411	418	431	460	444	499	580	671
ELECTRICAL ENGINEERING	930	1039	1184	1354	1472	1552	1532	1417	1460	1372	1537	1775
MECHANICAL ENGINEERING	288	279	398	537	530	623	660	463	711	793	883	1004
INDUSTRIAL ENGINEERING	80	94	97	139	207	216	302	210	200	254	336	404
METALLURGICAL ENGINEERING	63	60	111	105	107	136	127	120	138	100	189	185

Figure 20 below, shows the number of first degrees awarded in the same selected engineering fields during the ten year period of 2003-2014. Upon successful completion of their qualifications and a minimum three years practical experience, these graduates become available to the national economy as engineers or engineering technologists and can register with ECSA as professional engineers or engineering technologists in their

respective fields. In 2010, a decrease in total output was reported across all fields except electrical engineering which showed a 3% increase during the same year. In the following year (2011) increase in output was the greatest in electrical engineering (863), followed by mechanical engineering (775), and chemical engineering (519). The average annual increase was greatest in metallurgical engineering (18.1%) followed by mechanical engineering (13.4%), industrial engineering (13%), chemical engineering (8.5%) and lastly, electrical engineering (6%).

Figure 20: First degrees awarded in selected engineering fields: 2003-2014 (Source, CHE, HEMIS, 2014)



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CHEMICAL ENGINEERING	309	327	361	363	511	533	588	515	521	653	671	703
ELECTRICAL ENGINEERING	627	637	712	799	852	853	858	884	865	934	1092	1174
MECHANICAL ENGINEERING	328	338	345	401	506	615	754	619	934	1025	1124	1160
INDUSTRIAL ENGINEERING	167	221	275	332	387	400	482	344	389	431	510	569
METALLURGICAL ENGINEERING	38	51	86	79	109	99	157	135	151	140	170	179

Importantly, graduates with national diplomas and first degrees from the HET system have to meet the needs of all sectors of the national economy that require these skills, and not only the needs of the manufacturing, engineering and related services sectors. Competition between sectors is strong because, despite the positive growth in output in all fields, these increases have not been sufficient to alleviate the shortages of these skills in the country. As such, direct support for the generation of these skills through incentive schemes such as bursaries plays a critical role in channeling graduates into the manufacturing, engineering and related services sector. merSETA has awarded 1306 bursaries to date with 394 learners having successfully completed a qualifying programme in accordance with merSETA to date.

A study conducted by the Human Sciences Research Council (HSRC) found that the engineering skills development pipeline is not only long, but is also being adversely affected by a number of factors. One of these factors is the poor-quality schooling system in South Africa, with low enrolment in the critical subject areas of maths and physical science (combined with low-quality teaching and low pass rates in these subjects), which poses a fundamental challenge to growing the national pool of engineers. Engineering faculties also compete with other faculties for enrolments from a small pool of eligible school leavers, among whom Africans are still under-represented (HSRC, 2013).

Poor school preparation is a factor of poor engineering throughput rates, together with other issues such as the increased engineering class sizes; the difficulty some students have in accessing study finance; and limited workplace-training opportunities, which are compulsory for graduation for students from the universities of technology (Du Toit & Roodt, 2009). Another key factor is the difficulty that candidate engineers (having successfully passed their academic studies) have in obtaining mentorship support that

would allow them entry into and registration with ECSA. This challenge, arising out of historical racial and gender imbalances is a serious threat to retaining these high potential candidates for the sector.

3.5.1 Learnerships and apprenticeships

Since its inception, the merSETA has registered 73748 apprentices on apprenticeships and 73126 learners on learnerships. In the same period, a total of 42749 apprentices qualified as artisans in the sector and another 40408 learners successfully completed their learnerships (QMR 2016). The annual registration and completion figures for apprentices and learnerships since 2002 are shown in Figure 21 and Figure 22 below. It is clear that apprenticeships and learnerships form a crucial part of the supply of skills to the sector. Therefore, the merSETA continues to support the uptake of these learning pathways and continues to monitor trends in registrations and completions.

From outside the manufacturing, engineering and related services sector, the NGP aims to increase the number of artisans available to the SA economy as a whole through leveraging training from all state-owned enterprise (SOEs). From across Eskom, Transnet, South African Airways (SAA), Denel, Safcol, Alexcor and Infraco, the aim is to have at least 20 000 people enrolled in artisan-related apprenticeships and learnerships between 2011 and 2015 (EDD 2011).

Figure 21: Apprenticeships entered and certified (merSETA QMR data, 2016)

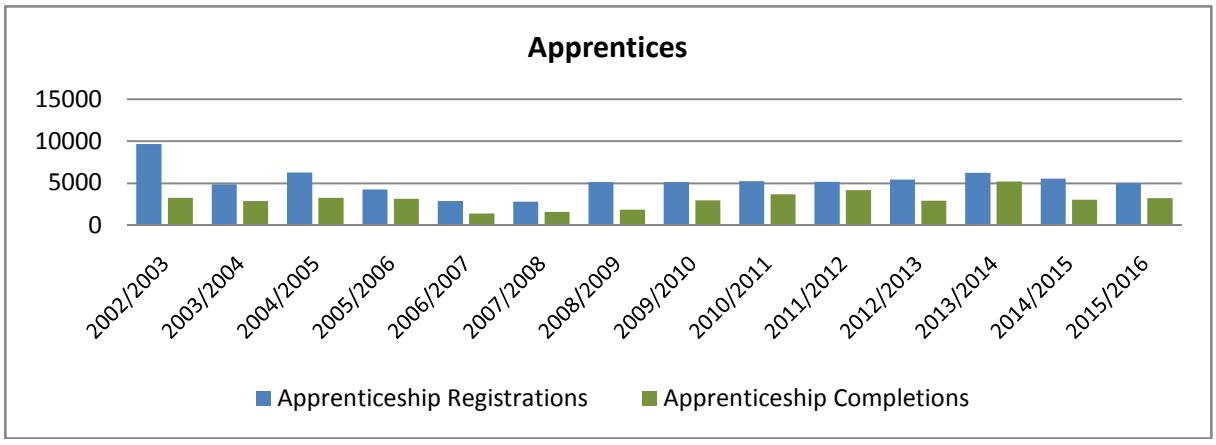
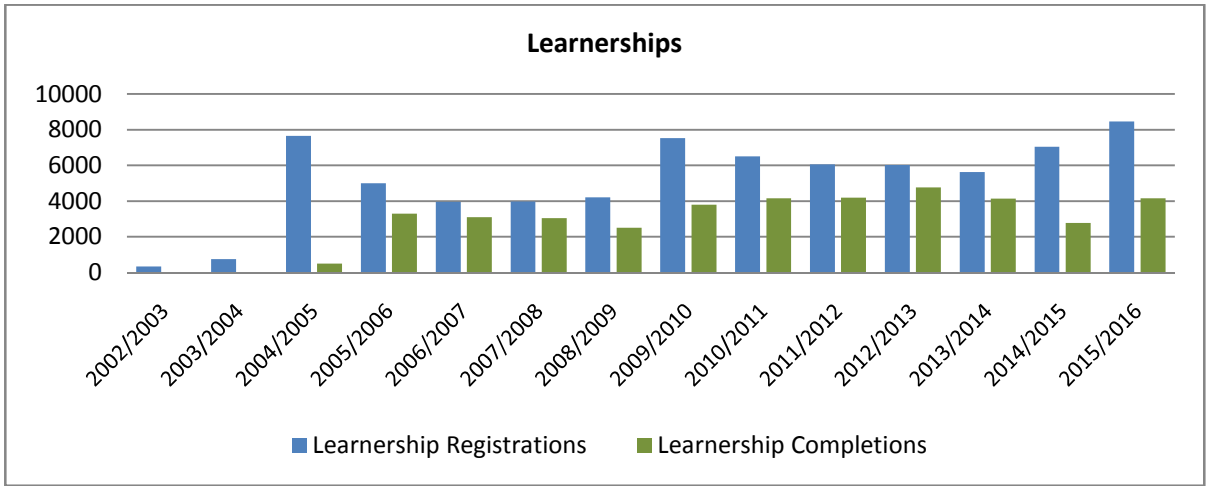


Figure 22: Learnerships entered and certified (merSETA QMR data, 2016)



3.5.2 TVET Colleges

Traditionally TVET college programmes in engineering have been very limited and narrow in content as they were designed to meet the demands of manual low-skill and low-wage industries. This has resulted in challenges for universities and universities of technology in their attempts to recognise these qualifications for articulation purposes. Additionally, as the work-experience component of training is not enforceable, employers have been reluctant to accept these students.

Despite this negative state of affairs, the tide is turning and TVET colleges form a critical component of the current training capacity of artisans. TVET colleges offer training for the NQF Level 4 National Certificate (Vocational) (NCV) and merSETA currently has relationships with 39 TVET colleges. Through partnerships with public TVET colleges, the merSETA is increasing the artisan development pipeline through the NCV artisan training programme. This programme has offered NCV learners an alternative pathway to becoming artisans, besides following the traditional apprenticeship pathway.

Government has highlighted the long-term importance of TVET colleges in generating the skills that will assist the nation in reducing poverty and unemployment, and their short-term importance in generating the skills required to support the SIPs. As such, the support and growth of this form of education and training has become a major focus of government intervention. The White Paper for Post school education and Training reiterates that the DHET's priority is to strengthen and expand public TVET colleges and turn them into institutions of choice for school leavers (DHET, 2013).
Therefore, while TVET colleges' contribution to meeting the skills demand for the manufacturing, engineering and related services sector has been limited in the past, the DHET is making huge efforts to change this. Through its Strategic Plan, the merSETA is supporting this objective. The Strategic Plan includes a directed focus on promoting the responsiveness of the TVET sector to meet the immediate skills needs of the metal, automotive and plastics industries. This will be done through participation in the revision and development of the relevant curricula and qualifications offered by TVET colleges; establishing partnerships that result in increased capacity at TVET colleges; and implementing mechanisms aimed at bridging the gap between industry and academic provision (see chapter 4).

3.5.3 Regional variation in skills supply

merSETA's focus on skills supply has generally considered the flow of skills into the labour market at a national level. The more localized perspective of skills demand has however been fore-fronted by an increasing focus on the SIPs, IDZs and SEZs with the result that skills supply must now also be considered at regional level. A research study commissioned by merSETA in 2013, highlights the regional variation in skills development opportunities in Gauteng province, the province that is considered to have the best skills development infrastructure in the country (Lolwana 2013). The spatial challenges encountered by particularly the poor in accessing education and training means that the issue of regional variation in skills supply needs to be considered more closely into the future. To support the regional variation in supply and skills development initiatives, the merSETA regional committees are focused on supporting the Provincial Human Resource Development Councils.

3.6 TRAINING AND DEVELOPMENT OF THE CURRENT WORKFORCE

This section describes initiatives that the merSETA has put in place to train and develop the sector's current workforce. While many of these initiatives do not address the issue of 'scarce' skills directly, they do however address the need for skills which industry considers as 'critical' to its continued operation and growth prospects.

3.6.1 Qualifications developed by the merSETA

Companies in the manufacturing, engineering and related services sector are involved in a range of training and development initiatives that focus on developing the skills of their employees (see table 11 below). Such initiatives supplement, but also build on the training that supplies new skills to the sector. This training and development of the current workforce forms a critical source of skills supply. merSETA qualifications registered with SAQA range from NQF Level 1 to Level 5. The majority of these qualifications are attained through learnerships. The merSETA skills programmes are made up of unit standards or groups of unit standards that belong to these qualifications.

Table 11: Qualifications developed by the merSETA

Occupational qualification	OFO Code	Development Quality Partner	Assessment Quality Partner	Status
Lift Mechanic	671204	merSETA	NAMB	Registered
Armature Winder	671207	merSETA	NAMB	Registered
Fitter and Turner	652303	merSETA	NAMB	Registered
Mechanical Fitter	653303	merSETA	NAMB	Registered
Metal Machinist	652301	merSETA	NAMB	Registered
Plastics Manufacturing and Setter	714208	merSETA	NAMB	Registered
Lubrication Equipment Mechanic	653310	merSETA	NAMB	Registered
Millwright	671002	merSETA	NAMB	Registered
Mechatronics Technician	671203	merSETA	NAMB	Development finalized, verification stage
Melter	684913	merSETA	NAMB	Registered
Moulder	651101	merSETA	NAMB	Registered
Patternmaker	652204	merSETA	NAMB	Registered
Electroplater	712201	merSETA	NAMB	Registered
Occupational Trainer		merSETA	SABPP	Registered
Wind Turbine Service Mechanic		merSETA	merSETA	In process at QCTO
Vehicle Damage Quantifier		merSETA	merSETA	In process at QCTO
Vehicle Painter	643202	merSETA	NAMB	Registered
Panel beater	684904	merSETA	NAMB	Registered
Ship Builder & Repair	684907	merSETA	NAMB	Registered
Automotive Electrician	671208	merSETA	NAMB	Registered
Automotive Machinist	652301	merSETA	NAMB	Registered
Solar Photovoltaic Service		merSETA	merSETA	In process at QCTO

Occupational qualification	OFO Code	Development Quality Partner	Assessment Quality Partner	Status
Technician				
Boat Builder and Repairer	684907	merSETA	NAMB	Registered
Automotive Motor Mechanic	653101	merSETA	NAMB	In process at SAQA
Diesel Mechanic	653306	merSETA	NAMB	In process at SAQA
Small Engine Mechanic	653305	merSETA	NAMB	In process at SAQA
Motor Cycle and Scooter Mechanic	6533103	merSETA	NAMB	In process at SAQA
Heavy equipment Mechanic	653307	merSETA	NAMB	In process at SAQA
Diesel Fitter	653304	merSETA	NAMB	In process at SAQA
Pipe Fitter	642607	merSETA	NAMB	In process at SAQA
Pressure Equipment Inspector	311502	merSETA	merSETA	In process at QCTO
Non Destructive Testing Technician (NDTT)	311702	merSETA	merSETA	In process at QCTO
Armature Winder (Heavy Coil Winder)	671207	merSETA	NAMB	In process at QCTO
Metal Manufacturing Production Process Controllers	311501	merSETA	merSETA	Finalization stage
Vehicle Trimmer	684906	merSETA	NAMB	In process at QCTO
Engineering Production Systems Worker (Machine Operator and assembler)	718905	merSETA	merSETA	In process at QCTO

3.6.2 Management and supervisory development

Managers and supervisors in the metals, automotive and plastics manufacturing sectors need a combination of industry-specific knowledge and technical knowledge of skills in the functional area to be managed, as well as supervisory and management skills. In most instances managers and supervisors are drawn from within the workforce (and therefore, already have technical and functional knowledge). Further skills development happens through combinations of formal training programmes such as Masters of Business Administration (MBA) programmes as well as short courses and in-service training. The limited supply of particularly black managers mean that a focus of this form of training for potential managers from previously disadvantaged backgrounds will remain critical into the foreseeable future. The merSETA's Women in Leadership programme is one such significant example of programmes aimed at developing potential managers and business leaders from previously disadvantaged backgrounds.

3.6.3 Continuous professional development

Table 12 appears to show that more white people are undertaking continuous professional development, however compared to the demographic profile of the occupational group 'Professionals' (see figure 9, Chapter 1) it is clear that black and coloured professionals are receiving focused attention in terms of professional development. Africans represent 27% of the total group of professionals and received 33.0% of CPD opportunities, while Coloured workers represent 7.9% of the total group of professionals and received 16% of CPD opportunities. The proportion of white professionals however is still quite sizable and a significant percentage (42%) of these workers also received CPD opportunities.

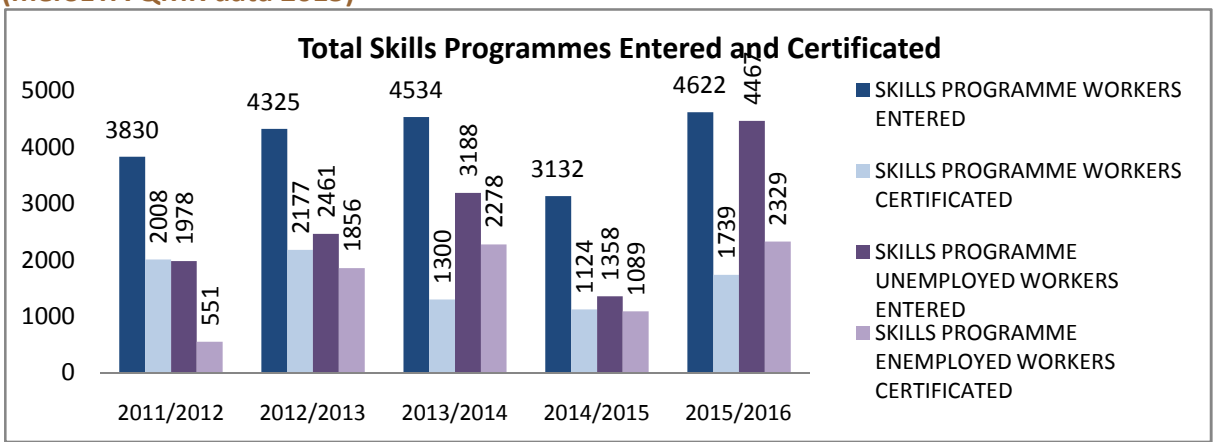
Table 12: Undertaking of continuous professional development (ATR, 2016)

	African	Coloured	Indian	White	Total	
Male	3404	1453	907	4147	9911	**77%**
Female	818	628	312	1257	3015	**23%**
Total	**4222**	**2081**	**1219**	**5404**	**12926**	**100%**
	33%	**16%**	**9%**	**42%**	**100%**	

3.6.4 Skills Programmes

A skills programme is a structured learning programme that comprises an agreed cluster of unit standards drawn from a NQF registered qualification. A skills programme may specify the sequence in which the unit standards must be achieved and the practical (workplace) experience that forms part of the programme. A completed skills programme therefore constitutes credits towards an NQF-registered qualification skills programmes continue to form an important part of the training and development of the occupational groups 'plant and machinery operators and assemblers' and 'elementary workers'. Registration in skills programmes has increased steadily. Between the 2011/12 and 2015/16 financial year a total of 33895 learners were registered in skills programmes with 16451 qualifying during the same period (see figure 23). This is possibly linked to the new focus on post qualification specialisations.

Figure 23: Skills programme registrations and completions: 2011/2012-2015/2016 (merSETA QMR data 2015)



3.6.5 Adult Education and Training (AET)

Adult Education and Training (AET) is especially prevalent among the relatively large group of lower skilled. A substantial 19% of the sector's employees are employed as elementary workers and are likely to have formal educational levels below NQF Level 1. A proportion of those employed as plant and machine operators and assemblers (especially older employees) are also likely to have comparatively low levels of formal education. For these groups, AET is critical to the sector's ongoing need to raise general skills levels and support the acquisition of critical core skills and health and safety skills. Table 13 shows the number of employees who completed completing AET in 2014. Employers that submitted Annual Training Reports (ATRs) for the year 2015/16 reported that 1487 workers completed AET programmes. Of the 1487 workers that completed AET, 84% were African, 11% were Coloured, 2% were Indian and 4% were white. Overall, 71% of those employees that completed AET were male and 29% were female.

Table 13: Employees who completed AET in the sector (ATR, 2016)

	African	Coloured	Indian	White	Total	
Male	924	84	8	37	1053	**71%**
Female	318	74	20	22	434	**29%**
Total	**1242**	**158**	**28**	**59**	**1487**	**100%**
	84%	**11%**	**2%**	**4%**	**100%**	

3.7 MERSETA'S SUPPORT FOR ARTISAN DEVELOPMENT

Artisan development has emerged as one of the government priorities in skills development. In 2014, DHET launched the decade of the artisan programme aimed to producing 30 000 artisans a year as prescribed by the National Development Plan (NDP) (Engineering News, 2014). The merSETA's core focus since its foundation has been to increase the supply of skills and alleviate skills shortages in the metal, automotive and plastics manufacturing sectors. Apart from the provision of bursaries and grants, the merSETA has also ensured that the necessary qualifications and learnerships are registered; has accredited providers; has supported the training and registration of assessors and moderators; has verified assessments and awarded qualifications; and has undertaken research to identify areas requiring focus as well as to uncover the impact of its existing and/or completed programmes. Together with government (including the NAMB) and a range of other stakeholders, the merSETA forms an integral part of the Artisan and Technician Development Technical Task Team (ATD-TTT). The ATD-TTT has identified major bottlenecks in respect of artisan development in South Africa and is in the process of setting in place mechanisms to address these.

3.7.1 A focus on what works with respect to artisan training

Since the implementation of the AATP project in 2009 where certain opportunities to further develop the quality of the merSETA's apprentice training system approaches were identified, the SETA has embarked on further research in partnership with the University of Bremen focusing on TVET research and development. The overall project is made up of three work streams namely:

I. ***Cost-benefit and quality research in in-company training focussed on answering what the real cost of artisan training is, how can the efficiencies of training expenditure be improved while simultaneously preserving and improving quality training*.** From this study the key findings include that the productivity of apprentices seems to be higher in three year apprenticeships than the four year equivalent; in-company training is more efficient where part-time trainers are employed opposed to full-time trainers; cost-benefit balance without subsidies is only reached in apprenticeships with a longer duration such as 3-4 years; SME companies achieved better net benefit and quality results that their larger counterparts; the quality of in-company training was not good on average and requires attention to improve the net benefits of training investments; the use of the CBQ consultancy instrument for initial diagnosis and implementation of recommendations, followed by a second event to measure improvements has increased the net benefit and quality of training investments in the participating company; It was also found that learner's training allowances vary to a significant extent in each learning year (sometimes as high as 4 times the lowest wage recorded and in some cases close to the wages of a skilled worker); subsidies were higher for training that took place in a short period (one or two yeas) than training that is implemented for a longer period.

II. ***Competence diagnostics and research & development.*** COMET is a diagnostic instrument used primarily for assessing how competence develops within a vocation during the learning period. The merSETA has completed four COMET test series to date. The first test done in 2012 (millwright) was used as a pilot project to test the use-value of COMET in South Africa; the second test series took place in 2014 focussing on the welder, electrician and mechatronics artisan; the third test series took place in 2015 for the motor mechanic occupation; and the fourth in April 2016 for welders focussing on implementing Dual System Apprenticeships. The following are preliminary high level research findings to the final report to be completed by September 2016.

a. Learners were highly motivated even though they had great difficulty solving their tasks or were aware of their weak performance; the large difference in the levels of competence within one test group highlights the problem of diversity in the learning environment; the competence of teachers and trainers were found to be alarmingly weak in some instances; stagnation of competence development is a one of the most severe problems that need to be addressed, particularly for occupations in engineering/ manufacturing sectors where technology innovation is required to support growth; it was also confirmed that reflected learning as anticipated in dual system apprenticeships (DSAP), raises the average competence of learners across all years with no identifiable conceptual development over all three or four learning years; while studies confirm that occupational commitment is essential for competence development, it seems as though learners are more committed to their employers than to an actual occupation.

3.8 SKILLS SUPPLY SIDE CHALLENGES

3.8.1 General Education and Training

The output of the General Education and Training (GET) sector to the overall supply of skills for the merSETA sector is important in two key ways. First, the number of learners graduating with maths and physical science as subjects at grades that support entry and success at higher education level in qualifications such as engineering has a direct impact on the ultimate availability of these high-level (and future management) skills for the national economy and the merSETA sector. Between 2013 and 2014, the maths pass rate dropped from 59.1% to 53.7% while the physical science pass rate dropped from 67.4 % to 61.5% (ENCA, 2015). These low percentages, combined with the absence of any clear improvement trends for these key subjects, is concerning and a factor that limits the higher education system from increasing access to and success in many of the high-level scarce-skill occupational qualifications.

3.8.2 Drop out rates

Drop out rates in engineering related qualifications as it is the case in other disciplines are high according to a DHET (2013) report on Statistics on Post-School Education and Training in South Africa. Recent evidence shows that on average 70% of the families of the higher education drop-outs surveyed were in the category “low economic status”. Many of those who dropped out indicated that they worked to augment their meagre financial resources, no doubt adding to their stress levels and distracting them from their studies (Letseka & Maile, 2008: 5). A recent survey by Statistics South Africa (2015) indicated that the cost of

education rose by 9, 3% in March 2015 compared with March 2014. This is 5, 3% percentage points higher than the headline CPI of 4, 0%. Rising education costs present a barrier for those seeking an education. Stats SA's latest *General Household Survey* reports that 33% of individuals aged 5–24 indicated that a lack of money was the reason they were not attending an educational institution. To improve the number of learners completing their studies, funding should reward graduate output without reducing the opportunities of learners from disadvantaged backgrounds (The Presidency, 2014).

3.8.3 Competition for skills with other sectors

The manufacturing and engineering sector competes with other sectors to attract engineering graduates whose skills are sought after in other sectors such as construction, finance, ICT, energy and mining etc. The movement of skilled artisans and engineers across the sectors also pose a supply-side challenge for the manufacturing, engineering and related services sector. Attractive working conditions in other sectors may be a pull factor for engineers, technicians, artisans and professionals in the merSETA sector. The decline of the manufacturing sector which has been coupled with declining employment in this sector as indicated in previous chapters has reduced the attractiveness of this sector.

3.8.4 Employability of merSETA graduates in in the labour market

Evidence from research on artisan employability conducted by the merSETA (2013), suggests that there is still a strong belief that apprenticeship graduates have a clear advantage over learnership graduates when entering the market. There is a general belief that companies still prefer the traditional route of studying and that apprenticeship graduates obtained more relevant skills. According to the merSETA 2015 tracer study, 84% of the learners who had completed apprenticeship programmes were employed. Of the 84% employed 49% were retained in full-time employment by their initial employer while 25% were employed full-time by a different employer. About 10% of the learners were employed part-time while 16% indicated they were still unemployed.

A recent report by the merSETA metal chamber expressed concern on the quality of graduates coming through the TVET system. Concerns are around the relevance and up to datedness of the curriculum, lack of practical work exposure of TVET college learners and lectures who lack industry exposure. This confirms earlier findings by the merSETA employability in engineering survey in 2013 that concluded that employers felt TVET college students lacked practical exposure to industry and also lacked the practical skills. This has affected the employability of TVET graduates. On the other hand, research revealed that employers however have high perceptions of university graduates and felt that their qualifications were of a higher standard as revealed by a merSETA (2013) study. This in turn has a huge positive impact in the employability of university engineering graduate students who are in high demand not only in the sector, but also other competing sectors such as ICT, finance and mining.

3.9 IDENTIFICATION OF SKILLS GAPS

The first part of the section considers the broad categories of skills development needs, as these emerge from the discussions in the previous chapters of this SSP. These broad categories include technical skills; fundamental work-readiness skills (the basic skills necessary for safe and efficient production); health and safety skills; HIV and AIDS awareness and prevention; AET; RPL; the development of black managers; environmental skills; and the training and development of retrenched workers.

The next section presents information on specific occupations in the sector that can be regarded as scarce or critical occupations. The 2016 merSETA Scarce and Critical Skills List involves substantial industry engagement despite having its base in the quantitative analysis of the merSETA 2016 WSP, findings were also incorporated from SIPs requirements, merSETA Chamber research, inputs from key stakeholders from subcommittees of the Accounting Authority and picking up key trends from industry conferences, colloquia and round tables.

3.9.1 BROAD CATEGORIES OF SKILL DEVELOPMENT NEEDS

The following categories of skills needs refers to both scarce and critical skills needs as highlighted by the sector.

Technical skills

The work environment for the majority of employees in the manufacturing, engineering and related services sector demands a sound level of technical knowledge and skills. These range from the more basic technical skills required by machine operators to the advanced technical skills demanded by artisans and engineers. In addition, globally the technology in the areas of materials, manufacturing, logistics, CNC and CAD are continually advancing, and regular updating of technical skills across all levels of employees is an ongoing skills development need for the sector. The focus should thus be developing skills that will be applicable in the future.

Fundamental work-readiness skills

"Fundamental work-readiness skills" refers to the skills necessary to utilise acquired theoretical and practical knowledge, and skills in support of efficient and profitable production and/or service delivery for the employer within the work environment. In the US technical colleges this group of skills is referred to as "critical core manufacturing skills" and includes both soft skills and fundamental skills. This skills group covers four key areas namely fundamental productivity skills (working productively, following directions, and maintaining a safe work environment); fundamental problem-solving skills (thinking critically, applying problem-solving strategies, and applying mathematical reasoning); fundamental team skills (working cooperatively in teams, communicating clearly, and listening effectively); and fundamental adaptability skills (demonstrating integrity, demonstrating a positive attitude, and adapting to change) (Fox Valley Technical College, 2011). The need for such skills is in line with the merSETA's finding that the skills most required by industry are "a positive attitude; solid work ethics; thinking skills related to maths and reading skills; problem-solving skills; and interpersonal and communication skills" (merSETA, 2010).

Health and safety

While also part of the group of core skills for the sector, health and safety skills require specific attention. Training in this area is legislated and includes both induction courses and regular refresher courses.

Adult Education and Training (AET)

A substantial 19% of the sector's employees are employed as elementary workers and are likely to have formal educational levels below NQF Level 1. A proportion of those employed as plant and machine operators and assemblers (especially older employees) are also likely to have comparatively low levels of formal education. For these groups, AET is critical to the

sector's ongoing need to raise general skills levels and support the acquisition of critical core skills and health and safety skills.

Recognition of Prior Learning (RPL)
While there are still numerous challenges to assessing the skills of all individual workers in the sector who have extensive experience but who have not had the opportunity to earn formal qualifications, one area in which RPL has now been institutionalised is the area of artisan training. The RPL route forms one of four routes through which artisans can acquire the practical knowledge needed to qualify to undertake a formal trade test.

The development of black managers/owners
In support of transformation efforts within the sector, the development of black managers remains critical. This will necessarily entail a focus on transformation at the level of professional employees, as these generally feed into management positions. Support by the merSETA of increased access for and graduation of black students, particularly in engineering qualifications, is thus imperative.

Environmental skills
Skills that support the development and use of 'greener' technologies and the Green Agenda more broadly are likely to become increasingly important in the sector and thus need to be considered among the merSETA's skills development priorities now. The merSETA Strategic Plan has prioritised skills for sustainable development.

Training and development of retrenched employees
The merSETA's sectors have suffered considerable levels of employee retrenchment since the start of the economic crisis in late 2008 and more critically in recent times due to the local and global climate. Many of the programmes undertaken by companies (either with or without merSETA or government support) should enable entrepreneurial and other skills necessary for self-employment or for employment in other sectors. The Retrenchment Assistance Plan (RAP) and Training and Layoff Scheme (TLS) are programmes aimed at the development of retrenched employees.

3.10 PIVOTAL LIST

A priority skills list is drawn up by the merSETA using a combination of statistical analysis of vacancy data from the WSP. Other national skills lists are also consulted, these include the Top 100 Occupations in High Demand produced by DHET, the SIPs scarce skills list and the Home Affairs list of scarce skills.

The methodology broadly comprises the following steps:

i. **Analysis of WSP vacancy data** to determine trends in vacant occupations (albeit very anecdotal, there is recognition of the fact that the data are not very reliable but it does serve as the best data available that can be attributed to the sector and subsectors). The analysis broadly incorporates filtering out difficult to fill positions relative to employment rates per occupation, the number of companies indicating difficult to fill vacancies and representation across the 5 merSETA subsectors.
ii. **Analysis of skills lists from DHET, Home Affairs and SIPs;** these lists were merged to form one master list of skills in high demand and was again merged with the list of skills from the WSP analysis.

iii. **Skills emerging form Chamber research reports and consultation with Chamber representatives,** chamber research reports were used to extract skills needs and merged with the master skills list. This list was then circulated to the chambers for consultation agreement on the skills highlighted.

iv. **Assessing demand for skills based on PIVOTAL Plans**, the extent of demand was determined from what stakeholders had indicated that they require for the next financial year on the PIVOTAL Plan.

v. **Determining PIVOTAL interventions,** the interventions were determined through analysis of the PIVOTAL Plan in terms of the type of intervention (apprentice ship, learnership, learning programme etc.) the interventions that appear most often against a particular OFO were determined to be in higher demand. These analyses also highlight sector trends in terms of skills sets and multi-skills but these would need further investigation to determine more concrete trends.

vi. **Determining the NQF level**, once again the PIVOTAL plan was used to determine the NQF level or range of NQF levels. The analyses also indicate sector trends in terms of demand for higher level skills as many were above NQF 4. The resultant NQF levels were determined based on the range (lowest to highest) the mode (most repeated level) and the average (average across the range).

The analyses as outlined above resulted in the following ranked list of scarce skills, specialisations, interventions and NQF levels (see table 14). The ranking is based on relative demand across the chambers with smaller sectors having their skills needs weighted up to ensure representation in terms of relative demand.

Table 14: merSETA PIVOTAL list

OFO	Occupation	Specialisation	PIVOTAL Intervention	NQF
214101	Industrial Engineer	Process Engineer	Bursary, Graduate Development	'6 - 7
214401	Mechanical Engineer	Automotive Engineer	Bursary, Skills Programme	'6 - 8
132102	Production / Operations Manager (Manufacturing)	Operations Manager (Production)	Bursary, Skills Programme	'6 - 8
132102	Production / Operations Manager (Manufacturing)	Plant Manager (Manufacturing)	Bursary, Skills Programme	'6 - 8
132102	Production / Operations Manager (Manufacturing)	Industrial Production Manager	Bursary, Skills Programme	'6 - 8
122102	Sales Manager	Sales Executive	Skills Programme	'4 - 6
652301	Metal Machinist	Fitter-machinist	Apprenticeship, Learnership	'2- 5
652301	Metal Machinist	Turner (Metal)	Apprenticeship, Learnership	'2- 5
671208	Transportation Electrician	Auto Electrician	Apprenticeship, Learnership, Skills Programme	'3 - 5
651302	Boiler Maker	Boilermaker-welder	Apprenticeship	'4
684904	Panelbeater	Automotive Body Repairer	Apprenticeship, Learnership	'1 - 5
714204	Plastics Production Machine Operator (General)	Extruding Machine Operator	Learnership, Skills Programme	'2 - 5
653101	Automotive Motor Mechanic	Automotive Mechanician	Apprenticeship	'4

The envisaged outcomes of the interventions are dependent on demand. The initial analyses point to a full qualification in instances of a bursary, apprenticeship or learnership (although the learnership model also lends itself to modular learning in terms of acquiring skills sets), Skills Programmes would result in a part qualification and does give support to the finding of

a higher need for workers with skills sets. All PIVOTAL interventions results in a full or part qualification aligned to NQF.

3.11 SKILLS REQUIRED TO SUPPORT THE SUCCESSFUL IMPLEMENTATION OF THE SIPS

The Presidential Infrastructure Coordination Commission (PICC) in 2013 released a SIPs Scarce Skills List, which all SETAs are asked to address in their SSPs. Specifically, government requires that SETAs indicate the way in which they are planning to address shortages in all the scarce skills relevant to their sector. In table 15 below, merSETA SIPs commitments are outlined. The development of skills relevant to these occupations will thus receive merSETA's direct attention and support.

Table 15: Scarce skills list for the Strategic Integrated projects (SIPs)

OFO	Trades Supported
671202	Millwright
651302	Boilermaker
651202	Welder
651501	Rigger
651101	Moulder
642607	Pipe Fitter

In addition to merSETA supporting the development of skills that have been identified by government as relevant to the SIPs, merSETA intends to provide channels through which unemployed graduates with relevant skills (but with relatively little experience) can be accessed by the private sector companies that win the tenders to undertake the SIPs projects.

3.12 IMPACT OF SKILLS SHORTAGES

Skills shortages have a far reaching negative impact in the sector. According to key findings of the merSETA (2014/15) chamber led research project, the following emerged as the impact of skills shortages on firms:

- One of the major risk facing firms is the inability to upgrade to new technology which required highly skilled people to operate. Consequently, firms have failed to take full advantage of newer technologies that bring with them advantages such as lower production costs. Higher production costs translate to low profit margins.
- There is decline productivity and higher production costs as firms are stuck with older technologies that are less efficient, more expensive to maintain and more labour intensive.
- The lower rate of innovation in the South African manufacturing and engineering sector can be attributed to the shortage of highly skilled people capable of coming up with innovative ideas. The failure to offer innovative products is a risk for South African firms as they face the risk of loosing business to competitors both locally and globally. This has resulted in South African firms loosing a market share to firms from other countries such as China and other developed countries.
- The shortage of skilled people has also resulted in some employees working longer hours. This has a negative impact on employee moral, motivation and turnover of skilled employees.

3.13 CONCLUSION

This chapter reflects on the categories of skills development needs in the merSETA sector that have been alluded to in the previous chapters of this SSP. In respect of the specific skills that need focused attention, merSETA's 2015 Draft on Scarce and Critical Skills List is included in this chapter. The SIPs Scarce Skills List released by government includes a number of occupations that have been identified by merSETA as part of its Scarce Skills List. The development of skills to match these occupations will thus receive direct support from the merSETA. Additionally, merSETA will develop ways in which employers on SIPs projects can access information about recent graduates with relevant skills. Such platforms are necessary in order to support and facilitate the provision of skills for these important projects and for maximizing employment opportunities for young people entering the sector.

4 PARTNERSHIPS

The purpose of this chapter is to assess the effectiveness of existing partnerships in the sector. The chapter will highlight the successes, challenges and propose best practices for strengthening partnerships. New partnerships needed in the sector will also be identified including the plan of action the merSETA is putting in place to ensure the successful establishment of these new partnerships.

4.1 STATE OF EXISTING PARTNERSHIPS AT THE MERSETA

Partnerships play a pivotal role in strengthening skills development interventions by creating and strengthening synergies among players in the skills development eco-system. NSDS lll clearly states that programmes contributing towards the revitalisation of vocational education and training, including the competence of lecturers and trainers to provide work-relevant education and training, as well as to promote occupationally directed research and innovation must be implemented.

For the merSETA, partnerships are a mechanism for achieving its strategic objectives and deliver services to its stakeholders and learner beneficiaries. To this end, the merSETA has established through partnerships a national footprint for implementing skills development initiatives especially those contributing towards the revitalisation of technical-vocational education and training including raising the competence of lecturers and trainers to provide work relevant education and skills development. merSETA has also put in place partnerships to increase research capability for technical-vocational education and skills development as well as for skills planning. A growing emerging partnership type is to avail innovation research and development skills for businesses operating in the manufacturing, engineering and related services sector through supporting post graduate scholarship at Masters, PhD and post doctorate level and also facilitating access for manufacturing, engineering and related services sector businesses to research capabilities of engineering departments of HEIs with which merSETA has partnership agreements. The merSETA agreements support local networks between industry, government and post school institutions resulting in the provision of work experience and work integrated learning opportunities for TVET colleges' and HEI students as well as enabling engagement between workplace trainers and occupational experts and college/HEI educators. The number of partnerships are categorised below. The current and new merSETA partnership agreements are with:

- 19 (19) National and provincial government department, including public entities
- Two (2) international organisations (1university and 1 British Council)
- 15 public higher education institutions
- Thirty eight (38) TVET College agreements
- Two (2) SETAs
- Five (5) trade unions
- Fifteen (15) not for profit organisations
- Five (5) employer organisations

The key success of merSETA partnerships has been merSETA exceeding its targets for training in some instances over 200% of targets reached in the key area of artisan training. This has been in spite of the decline being experienced in the manufacturing industries. In the previous year merSETA enabled close to 15 000 employed and unemployed people enter artisan training programmes either through learnerships, apprenticeships, RPL and its retrenchment assistance programme. Agreements with TVET colleges valued at R53 928

million will enable NCV learners to be placed into industry to obtain work integrated learning towards becoming qualified artisans. For high end engineering skills merSETA enabled close to one thousand university students access work integrated learning opportunities and internship opportunities. Partnerships with TVET colleges in all the nine provinces, as well as with Provincial Departments and not for profit organisations provided merSETA the opportunity to reach learners in rural areas and historically disadvantaged communities in urban areas.

4.1.1 TVET COLLEGE PARTNESHIPS

The merSETA, in response to the DHET's highest priority to strengthen and expand TVET colleges and turn them into attractive institutions of choice for school leavers as highlighted in the White Paper on Post School Education and Training, has increased and strengthened its partnerships with TVET colleges. The two main objectives of the TVET college partnerships are:

I. **Raising the quality and responsiveness of TVET teaching, learning and assessments through:**
    a. TVET lecturer and leadership development;
    b. piloting dual system apprenticeships approach to artisan development by linking TVET Colleges to workplaces for structured work-integrated- learning on a rotational plan;
    c. increasing collaboration between industry/ employer associations and TVET colleges.

II. **Facilitating access to WIL for TVET college graduates so that they can gain artisan status.**

In 2014/15, continuing into 2015/16, merSETA entered into 39 partnership agreements with TVET colleges. The number of agreements currently is 38 and these exclude the agreements where TVET colleges were identified as the preferred providers, for example in some of the agreements with provincial governments. The majority of these partnerships focus on learning pathways towards learners progressing to become trade-tested artisans. The agreements have a national TVET college footprint in all nine provinces, inclusive of agreements with colleges in rural areas. On completion of the National Vocational Certificate (NCV) in engineering studies, learners often have difficulty to find work due to a lack of work-integrated learning (WIL) during their studies. Through 22 of the partnership agreements, merSETA will establish a network between merSETA companies and the TVET colleges to engage the NCV learners in a further 18 months of WIL that ends in a trade test. The aim is to qualify 650 NCV learners as fully-fledged artisans in the next two years through this process, over and above the agreements where there is also an option for TVET college learners to access trade tests.

The merSETA supports lecturers at TVET colleges through several of the partnership agreements, aimed at the professional development of the lecturers in engineering studies. The support provides lecturers, who are not trade-tested artisans, to spend a period of 18 months in merSETA industries with the option of a trade test post the WIL intervention. The aim is to strengthen the TVET colleges and industry relationships and expose lecturers to technologies, productivity and quality standards in industry.

The merSETA has partnerships with the following colleges per province:

Table 16 College Partnerships by Province

PROVINCE	COLLEGE
EASTERN CAPE	Buffalo City TVET College; East Cape Training Centre; East Cape Milands TVET College; King Sabatha TVET College; Lovedale Public FET College
FREE STATE	Flavius Mareka TVET College; Goldfields Public TVET College; Maluti TVET College; Motheo TVET College
GAUTENG	Ekurhuleni East TVET College; Ekurhuleni West TVET College; Sedibeng TVET College; South West Gauteng TVET College; Tshwane North TVET College
KWA-ZULU NATAL	Coastal KZN Public FET; Eelangeni TVET College; Esayidi TVET College; Majuba TVET College; Umfolozi TVET College; Thekwini TVET College
LIMPOPO	Capricorn College; Lephalale Public TVET College; Mopani South East TVET College; Sekhukhune Public FET College; Letaba TVET College; Waterberg TVET College
MPUMALANGA	Ehlanzeni TVET College; Gert Sibande Public TVET College
NORTHERN CAPE	Northern Cape Urban FET College
NORTH WEST	Taletso TVET College; Vuselela TVET College; Orbit TVET College
WESTERN CAPE	Boland TVET College; College of Cape Town TVET; False Bay TVET College; North Link College; South Cape TVET College; West Coast TVET College

The merSETA has partnerships with the following national and provincial government departments:

Table 17 National and Provincial Government Partnerships

NATIONAL AND PROVINCIAL DEPARTMENT PARTNERSHIPS			
PARTNERSHIP	**OBJECTIVE**	**PARTNER**	**DURATION**
Artisan training	To support the training of skills development initiatives relating to engineering and manufacturing industry related trades	National Department of Public Works; Gauteng Department of Education; Limpopo Provincial Government; Kwa-Zulu Natal Provincial Government; Mpumalanga Department of Public Works; Western Cape Department of Economic Development and Tourism; Department of Corrections Gauteng and Northern Cape; Mpumalanga Department of Education; North West Provincial Government; Department of Military Veterans; DENEL Aviation; Department of Basic Education Technical Schools	Agreement end dates: 2018/19
A new multi-year agreement for development of people in the Eastern Cape	To place P1 & 2 learners from Walter Sisulu UoT on WIL, support apprenticeships training, and support SME business development processes	Office of the Premier in the Eastern Cape	Agreement end date: March 2021
Skills development for people with disabilities	To support WIL through TVET college for disadvantaged learners with learning difficulties	Western Cape Department of Education	Agreement end date: December

NATIONAL AND PROVINCIAL DEPARTMENT PARTNERSHIPS			
PARTNERSHIP	**OBJECTIVE**	**PARTNER**	**DURATION**
			2015
Development of SMEs, cooperatives and informal business	To support skills development initiatives relating to the engineering and manufacturing industry trades for SMMEs, cooperatives and non-levy paying companies in the informal sector	Department of Small Business Development	Agreement end date: March 2018
Training for retrenched workers and youth work seekers	To train retrenched workers and unemployed youth registered on the DoL ESSA database	UIF	Agreement end March 2018
Training Lay-off Scheme	To train workers of those companies that have been approved for the scheme whilst companies undergo business rescue/business improvement support in preparation for reverting to normal business operations	UIF (and 8 merSETA companies)	
Development of fabrication hub at local level	To train learners on fabrication related skills programmes to support the development of a fabrication hub in the IDZ	Saldhana Industrial Development Zone	Agreement ends March 2018
TVET leadership development	To support TVET leadership development in selected TVET colleges. In total, 15 TVET colleges are now benefiting from this programme.	British Council	Agreement end: March 2018
Bursaries	To provide bursaries to HEI students studying towards engineering qualifications	NSFAS	Agreement to end March 2018
Inter-SETA partnerships	Community project on solar geyser installation; Quality assurance of programmes that are cross sectored with Agriculture discipline	EW SETA Agri-SETA	Agreement ends: March 2018

The merSETA has partnerships with the following higher education institutions:

Table 18 Partnerships with Higher Education Institutions

PARTNERSHIPS WITH HIGHER EDUCATION INSTITUTIONS		
PARTNER	**OBJECTIVE**	**DURATION**
Cape Peninsula University of Technology (based at SARETEC a research institution of CPUT)	To pilot one of the first renewable energy qualifications in the QCTO's qualifications framework – service technician qualification. Significant progress has been made. Industry and a TVET college are on board with the roll-out of this project.	Agreement end date: September 2016
Central University of Technology (including CUT Services and Enterprise Trust)	To support maths and science at schools throughout the Free State; capacity building of 6 TVET college lecturers; women in engineering; access programme for CUT engineering qualifications; development of app for career guidance; development of Tax Incentive app	Agreement end date: 31 March 2018
Durban University of Technology	To fund Master's degree students and PhD students for merSETA research; Work Integrated learning (WIL) for engineering students; entrepreneurship training and supporting the formation of cooperatives for graduates; lecturer upgrading of university lecturers	Agreement end date: 31 March 2018
Mangosuthu University of Technology	To support enterprise development and incubation by training unemployed graduates; development of university staff to obtain competence at Master's degree and PhD level; alternative energy / green skills / innovation; WIL for engineering students	Agreement end date: 31 March 2018
Nelson Mandela Metropolitan University (NMMU)	To support mathematics and science tutoring for Grades 10, 11 and 12; upgrading of two technical high school technical laboratories; Women in Engineering programme (WELA); maths and science tutoring for TVET colleges; the development of marine engineers with a three-year degree in marine engineering; capacity building in marine engineering, research and international bench-marking. The agreement is in support of implementing Oceans Operation Phakisa.	Agreement end date: March 2018
University of Western Cape	To support human resource capacity at the university; access and throughput in engineering disciplines through supporting mentorship of undergraduate students in mathematics and science (engineering-related); training of teaching assistants in the Extended Curriculum Programme at the university; post-graduate bursary support and video technology for the science faculty; development of TVET lecturers through Post Graduate Diploma in TVET; collaboration with Wits (REAL) to offer Masters and PhD studies in TVET.	Agreement end date March 2018
Walter Sisulu University	To support growth of the engineering faculty through: establishing a funded Chair for Engineering and growing Masters and PhD scholars for academic and research; STEM support; WIL for learners; CPD for lecturers; linking with TVETs; light manufacturing and rural development through applied research	Agreement end date: March 2018
University of Venda	Academic and skills development support for the HEI through learner support for rural learners in mathematics, science and technology; development of the next generation of academics in engineering; and capacity building at TVET colleges; Supporting 10 University lecturers in Masters and PHD programmes	Agreement end date: March 2018
University of Johannesburg	Piloting work-integrated learning for P1 & P2 engineering diploma students in collaboration with the development of incubator where-in UJ experiential learners will be placed at the incubation hub for small businesses at Resolution Circle (which provides services to industry, as well as product and process development); placement of UJ experiential learners for work-integrated learning at merSETA companies; scholarship for post graduate studies.	Agreement end date: March 2017

PARTNERSHIPS WITH HIGHER EDUCATION INSTITUTIONS		
PARTNER	**OBJECTIVE**	**DURATION**
Tshwane University of Technology (TUT)	To support qualification development, industry-based research in new technologies, TVET lecturer development, women in engineering support and P1 and P1 WIL; establishment of Chair in Engineering - Identifying and supporting skills for technology gaps that will improve the competitiveness and sustainability of the South African manufacturing value chain. Masters, Doctoral and Post-doctoral candidates are to be hosted through this new research chair.	Agreement end date: 31 March 2018
Science Park at the VUT	Supporting the Science Park at VUT through a multi-year agreement for: cutting edge technology in additive manufacturing; human capital development of university staff; R&D regarding alternative energy inclusive of biogas diesel engine into milk pasteurizing plant, photo voltaic; fuel cell systems and proton exchange membrane; learning incubator and enterprise development.	Agreement end date: 31 March 2018
Mangosuthu University of Technology	Enterprise development and incubation for training unemployed graduates; human capital development of university staff to obtain competence at Master's degree and PhD level; R&D for alternative energy / green skills / innovation; WIL for engineering students.	Agreement end date: 31 March 2018
University of Cape Town	Supporting sector skills planning and LMI research - collaboration includes: review and evaluation of the annual merSETA research agenda, programme, and structural HE arrangements Masters qualification development specialising in the field of entrepreneurship linked to the industrialisation of Intellectual Property developed through HEIs in support of new manufacturing opportunities in SA	Agreement end date: March 2017 Agreement ended March 2016.
Wits University,	Masters, Doctoral and Post-doctoral academic program which seeks to integrate VET, industrial policy and evolutionary economics disciplines towards the new skills required by DHET for skills planning purposes through School of Education, Centre for Researching Education and Labour (REAL); Post Graduate Diploma for TVET lecturers and collaboration for Masters and PhD studies in TVET (REAL); WIL, bursaries, Masters and PhD; research skills development under the Faculty of Engineering.	Agreement ends: March 2018
University of Bremen	TVET Research and Development Project in three area: costs, benefits and quality associated with in-company training, particularly apprenticeships (CBQ); measurement of vocational competence development in engineering occupations(COMET); supervision of three Doctoral candidates for purposes of transferring the knowledge system associated with the research instruments into the SA TVET ecosystem	Agreement ends: September 2017

The merSETA also has had successful partnerships with the Public Works Department, National Institute for the Deaf and DEAFSA to train people with disabilities, with DEAFSA supporting rural learners in Limpopo and the North West. Some of the learners through the partnerships with these organisations completed full artisanal qualifications. The merSETA also has smaller scale partnerships with TVET colleges and private providers to develop qualifications and curriculum of new qualifications registered on the NQF through the QCTO processes.

The merSETA has supported the objectives of Worker Education as defined in the HRD-SA strategy through establishing partnership with five unions active in its sector. The focus of the partnerships is to train labour skills development facilitators to effectively execute their function effectively in the interest of employees as worker representatives on training committees in companies.

4.2 PARTNERSHIP SUCCESSES

The role of partnerships in enabling the merSETA to meet and exceed some of its skills development goals cannot be overemphasised. Some of the successes are highlighted below.

Capacity development of TVET Colleges through the lecturer development artisan training programme: This programme has been effective in equipping TVET college lecturers with the knowledge and skills to teach and train artisans. This was in response to the outcry by industry on the quality of learners coming through the TVET college system. Research conducted by the merSETA in 2013 on the employability of engineering graduates in the sector recommended retraining lectures as a way of improving the quality of teaching of technical and engineering courses.

Capacity development of TVET colleges through the TVET college leadership development including the partnership with British council: This programme is set to develop leadership capacity in TVET colleges. The selected TVET colleges have also benefited from an exchange programme with their counterparts in the United Kingdom.

Increasing the artisan development pipeline through the NCV artisan training programme: This programme has offered NCV learners an alternative to becoming artisans, alternative to the traditional apprenticeship pathway.

Increasing the quality of artisan training through the dual system apprenticeships approach to artisan development: This is a national DHET project that links TVET Colleges to workplaces for structured work-integrated- learning on a rotational plan.

Successful placement of learners: The successful placement of learners in workplace has increased as a result of increased collaboration due to strong partnerships. The merSETA assists TVET colleges in placing learners by linking them directly with employers that provide workplace learning spaces.

Improved learner success rates: Completion rates have also been increased due to a strong learner support system formed as a result of increased collaboration due to strong partnerships between the merSETA, industry and TVET colleges. More than ever, learners

can easily secure workplace learning with employers, a critical component for successful completion.

Increasing the throughput rate of engineering diploma students: This programme has contributed to the number of students gaining qualifications by accessing WIL, which is compulsory for completing the qualifications.

Increasing social partner collaboration: Partnerships have improved stakeholder participation by engaging industry associations, employer associations, organised labour, and sector bargaining councils to address bottlenecks in the system and work towards the mutual goals of increased levels of co-ordination and efficiency.

4.3 CHALLENGES EXPERIENCED WITH PARTNERSHIPS

Partnerships have presented the merSETA with some challenges that are worth mentioning. Through various interventions that will be discussed in the following section, merSETA has come up with innovative ways and best practices for dealing with these challenges. The challenges identified include:

There is a lack of administrative capacity in some TVET colleges. This is a serious challenge considering that partnerships require a lot of administration, which includes but is not limited to; finance management, procurement and reporting. Challenges such as late reporting, poor records management and poor finance management are some of the few examples of challenges the SETA has been confronted with.

The success of partnerships arguably depends to a large extent on good project management. Poor project management practices in some TVET colleges have added to the challenges the merSETA is facing. This has resulted in some projects failing to be completed on schedule without any valid reason, poor project reporting, and poor implementation and monitoring of projects.

The merSETA is beginning to experience challenges with regard to project management of partnerships. In the main, this is due to the high number of partnership agreements that have been established, many of which are multifaceted, particularly the HEI and government partnerships. With a number of the current agreements due to be completed in March 2018, there will be an imperative for the merSETA to deliver not only effectively and efficiently on the agreements, but also within agreed timeframes. The merSETA will be considering whether there may be a need for additional project management capability to see through these current agreements and new ones that will in all likelihood emerge.

The lack of technical capability or expertise within the TVET colleges has presented the merSETA with some serious challenges. There has been a tendency by some TVET colleges to outsource projects to external providers despite the fact that the expectations are that the TVET College will conduct the work and take ownership of the projects. The involvement of third parties has created some administrative and project management problems.

A lack of available and suitably qualified professors: Evidence from data collected through the assessment of some partnerships with universities has found that work programs are also sometimes delayed by the lack of the availability of suitably qualified Professors (PhD/DPhil) to lead the programs.

Low uptake of Masters and PhD scholarship: HEIs are not able to recruit at the rate required due to the challenge above, i.e. limited professor capacity to supervise post graduate Masters and PhDs.

4.4 BEST PRACTICES IN STRENGTHENING PARTNERSHIPS

Good project management practices such as project finance management, project risk management and project time management are important to ensure the success of partnerships. Good project management results in the completion of projects within time and within the allocated resources. The risk of overspending or under- spending and project delays is therefore minimised. The merSETA will need to determine the level of good project management needed to ensure that the large portfolio of partnerships it has in place will be managed successfully and have the desired impact required for the "mer" sector.

Monitoring and evaluation (M&E) is an important element that needs to be built into all partnership agreements. The merSETA is in the process of implementing an organisation-wide M&E framework to monitor and report on skills development interventions being implemented, organisational performance in general, as well as to assess the quality, effectiveness, efficiency, and impact of its projects including partnership agreements.

The involvement and commitment of management and executive leadership is critical to ensure the success of partnerships. The merSETA management has established a protocol of establishing project steering committees and project work teams that include partners. The roles are project work teams monitoring and ensuring the implementation of partnership agreements, while the steering committees offer strategic guidance in the conceptualisation and implementation of partnerships through resources allocation; and, clarifying the goals and expectation of the partnerships.

The effective management of partnership contracts play a significant role in managing partnerships. Although there is contract management capability in the merSETA, there may be a need to review whether the current capability suffices, especially if merSETA is to ensure that deliverables are clearly articulated, as the clarity of roles for all parties involved in the partnerships; and to minimise the risk of misaligned expectations.

The role of industry in partnerships needs to be emphasised as it is the industry that provides workplace learning opportunities. Partnerships are therefore incomplete without the support of industry. There is agreement with the Chambers that inputs from employers and worker organisations in industry are acquired upfront during planning.

Furthermore, there is also a need to revisit the notion of the workplace, which more often than not is narrowly defined. This is especially problematic in rural areas where in some cases there is little or no presence of industry. Innovative approaches to providing workplace experience need to be explored in partnership with other relevant SETAs and local government.

4.5 CONCLUSION

This chapter has highlighted the partnerships which the merSETA currently has, as well as new partnerships which will further cement the merSETA's efforts for collaboration to close the skills gap.

merSETA has seen many successes as a result of partnerships that have yielded tangible returns in the skills development arena, these include efforts to support teaching and learning at TVET Colleges; brokering relationships between the education sector and the private sector; improving quality of teaching and learning; and increasing learner success rates.

Partnerships are fraught with challenges. A major contributor to these is capacity limitations in managing, implementing, monitoring and evaluating key outputs and milestones. To this end the merSETA has endeavoured to implement measures to ensure successful outcomes of partnerships including the implementation of monitoring and evaluation; putting in place steering committees; ensuring effective contract management through clearly defined deliverables and roles including financial management and ensuring that all parties are on board and committed from the time of inception.

5 SKILLS PRIORITY ACTIONS

This chapter consolidates and presents the findings from previous chapters, these are reviewed in light of the current merSETA strategy and makes recommendations in terms of priority skills development actions. The first section of this chapter discusses the key strategic issues that arise from the analysis undertaken for this SSP. The discussion of key strategic issues is followed by an explanation of the merSETA's skills development priorities.

5.1 FINDINGS FROM PREVIOUS CHAPTERS

The SSP has highlighted key issues that must be considered for skills development in the manufacturing, engineering and related services sector.

The sector profile highlighted key contextual elements that contributes to skills supply and demand issues. The sector is currently subjected to high volatility due to the economic climate and the structural changes within manufacturing. It was also found that doing business in the current environment is difficult due to cost of energy, cost of materials and cost of labour. To remain relevant and competitive, firms tend to adopt higher tech intensive and lowered labour intensive manufacturing; coupled with global economic uncertainty this has resulted in job losses and business closures. This will impact the labour market such that more retrenched workers may resort to informal employment opportunities.

The sector at a high level seems to require trade support due to cross border trade and the high cost of doing business. This is compounded by the trend to increasing demand for higher level skills even at entry level positions, workers thus need to acquire skills sets and be multi-skilled in order to access employment opportunities. As the sector evolves with newer and faster technologies, workers who are not up-skilled and re-skilled run the risk of becoming irrelevant in terms of the skills that they possess.

Interim efforts must be put in place to absorb the negative effects of the current economic downturn. Community development initiatives are needed to sustain decent livelihoods. The sector and indeed government and SETAs must recognise growth and development opportunities, particularly in sectors that have shown potential despite the difficult times.

The sector has seen a rise in the number of small and medium enterprises; this is possibly due to big business not being able to absorb as many workers from the labour market and the increasing trend to entrepreneurship amongst the youth. Small business needs support to be able to thrive and make employment opportunities available, particularly to young people. SETAs could also leverage more skills development opportunities through these organisations, ensuring that workplaces are made available for work based learning and higher employability.

Transformation has remained slow as reflected in the sector profile. There needs to be more efforts to up-skill previously disadvantaged people, women and people with disabilities. The sector requires individuals with educational qualifications above NQF 4 if we are to meet the needs of future skills requirements as reported by the new industrial era and the move towards advanced manufacturing. Coupled with this is the need to ensure professionalisation of the sector.

In terms of skills issues highlighted in the SSP; the main skills driver is advancements in technology and the requirements of STEM, critical thinking and problem solving. Re-industrialisation will depend on these fundamentals being in place to ensure that the community advances with business in the future. Organisations in the sector must be made aware of the opportunities presented in the green and blue economies and the requisite skills required to take up those opportunities.

In terms of skills mismatches, the age-old argument of the education sector not producing the skills required by industry still prevails. A key focus here is that the quality of education is low and therefore the output of quality graduates is also low. Across all the sectors mentioned, there is a tendency towards the majority of the workforce having semi or high level skills. The quality of provision is critical.

With the demand for high level skills comes the demand from those who possess high level skills for higher wages. We have noted the wage differential between high and low skill level occupations. As the sector goes through this structural change, opportunities will become available to those with the requisite skills and the wage differential should normalise over time with sectoral growth. These highly qualified workers do require particular support at post graduate level and training in specialised areas where there is a need for specialised skills sets. The sector has also indicated that skills sets make workers more agile, and thus better able to navigate the sector in terms of employment opportunities, even across other sectors as well.

5.1.1 KEY STRATEGIC ISSUES

The findings within the SSP has highlighted sector challenges, opportunities and demands. As the merSETA embarks on its strategic planning processes going forward in line with national strategies, particularly the policy levers highlighted in the IPAP, the following global (macro-level) issues must be taken into consideration:

Grappling with de-industrialisation: South Africa finds itself facing the dangers of de-industrialisation amid job losses and factory closures in the manufacturing sector along with rising imports and declining exports of some manufactured products. This results in a struggling manufacturing sector with a decreasing demand for semi-skilled workers. Increasingly, more skilled and highly skills workers are required in the manufacturing industry; this has the potential to negatively impact the labour force resulting in even more job losses over time.

Beneficiation**:** High value added manufacturing (final manufactured products) has been identified as an important mechanism to further diversify South Africa's economy, and thereby to also create jobs. However, for this to succeed concerted efforts are needed within viable sectors who aim to beneficiate locally. Greater efforts are needed to gain insight into what skills are needed.

Advanced manufacturing**:** This requires a futures-oriented focus. Advanced manufacturing, including the production of advanced materials and the use of advanced manufacturing techniques, can create new employment opportunities through the creation and growth of new industries and markets.

The *Strategic Integrated Projects (SIPS):* SIPs are key for national growth. The strategic aim of the merSETA in responding to the Strategic Infrastructure Projects, IDZs, and SEZs, is to

leverage the potential for growth and localisation that they offer merSETA industry component manufacturers and downstream suppliers, and in turn to grow employment in these sectors.

***SMEs and the informal sector**:* The SMEs and the informal sector in the rural areas and as part of urban renewal, is viewed as an opportunity for growth through skills development. This is particularly true of the motor sector, but also of the metal and plastics sectors. The merSETA's approach to SME support and development is inclusive of co-operatives.

The Green Economy: The Green Economy has been identified as a significant growth area as a result of the rapid expansion of the green manufacturing industry, e.g. photovoltaic and wind-farms and although prospects for large scale employment creation in these areas remain uncertain, there will nevertheless there will be an increasing need for maintenance technicians in the years to come. The new business opportunities (and job opportunities) associated with a low carbon economy and new forms of environmental management have led the manufacturing industry to take a more proactive role in the development of cleaner manufacturing processes and the design of recyclable products, where the waste from one process becomes the raw material for another in a large cycle.

Other areas of concern identified in previous chapters relate to the need for competiveness enhancement in the manufacturing sector. Besides support for productivity focussed initiatives, this includes industry leadership programmes, and initiatives to boost efficiencies and effect cost savings for industry sustainability under adverse economic conditions, while retaining commitment and awareness of issues around technology and innovation.

In order to attract the right calibre of candidates to studies linked to the manufacturing and engineering sector, through career guidance and development, there is a universal need to sustain the learner pipeline through Science, Technology, Engineering and Mathematics (STEM) and other programmes.

The sector recognises that there is a need to increase the efficiency of its spend on training. Improving the efficiency and economy of skills development efforts in the sector will make it easier to raise funding from other sources, as well as improve the impact of its skills development support in the sector. Key initiatives to address these concerns will include the broader roll-out of applied apprenticeship research linked to quality, cost, productivity, as well as learner tracer studies. The development of an integrated monitoring and evaluation system at all structural levels is envisaged.

In summary, the key strategic issues facing the merSETA and its sector are about:

- Addressing strategic skills development challenges to drive employment and economic growth.
- Supporting opportunities for innovation in products, services, operations and business approaches.
- Balancing competing short and longer-term skills development needs for the sector.
- Enhancing merSETA’s capacity to respond to the skills development needs which includes the partnership mechanism to achieve envisioned outcomes.

The role of partnerships cannot be understated as the SETA embarks on a plan to assist the sector though its skills development efforts. These efforts must result in more research and development in areas of sector growth, the production of high quality labour market participants able to access employment and improved livelihoods.

There are however challenges faced within partnership efforts relating to effective management of contracts as well as ensuring that all parties are willing to see the contract through to fruition. Therefore, the merSETA must foster stronger, more focussed, and programmatic partnerships between industry and TVET colleges; develop greater synergy between skills demand and supply; counter negative perceptions by developing more relevant skills for the industry and the broader economy and ensure that the TVET College sector is well positioned to support the unique skills requirements of SMEs and the informal sector.

5.2 RECOMMENDED ACTIONS

To ensure that the merSETA effectively delivers on its mandates given the findings outlined in the SSP, the organisation itself must ensure that it is efficient and functions optimally. To do this the SETA must be able to anticipate and respond to sector skills needs in a timeous manner. Greater efforts are required in terms of internal systems, data analytics and data centricity within the organisation.

Secondly, the merSETA has committed to assisting in the production of a skilled and capable workforce that can drive the sector to new heights. There is recognition of the need for higher level skills in the sector while at the same time recognising skills that are still relevant for continued sector successes. In line with key policy levers in the NDP, the SIPs and IPAP, there should be a continued support for artisan development and recognising the needs in industry for particular types of skilled trades workers.

In line with the sentiments of the BBBEE, there should be continued focus and effort to promote transformation in the sector promoting previously disadvantaged people, particularly women in artisanal professions, in management and business development. In addition, transformational efforts are needed to assist with the development of black industrialists through partnering with government organisations. There is a need to support businesses and skills needs for entrepreneurship, localisation of skills for community development and efforts for research and development in support of local beneficiation and manufacturing of products for export.

The negative impact of the current economic climate should also be recognised. Workers who have been retrenched, graduates who remain unemployed and discouraged work seekers do present a pool of skills on the supply side. Efforts must be made to seek opportunities through skills development to assist these individuals in accessing decent work.

Furthermore, the merSETA must ensure that research is supported for evidence based decision making, harnessing the potential of data analytics to more effectively assist the sector through skills development. This requires effective partnerships, good monitoring and evaluation across the organisation and continued support for effective labour market intelligence.

5.3 CONCLUSION

This chapter forms the conclusion of the 2016 update of the merSETA SSP for the period through to 2021. The skills development priorities identified by the merSETA represent the culmination of the sector analysis and stakeholder-consultation processes and are intended to guide the merSETA's strategic actions.

The implementation of these skills development priorities are linked to a range of inter-related strategic issues that arise from the sector analysis, including the cross-cutting imperatives of rural development, sustainable green skills development, and skills development of PWD. In this regard, the importance of appropriate local and regional level skills development support to support the informal, emerging and SME sector has been noted.

Finally, the merSETA's skills development priorities have been developed and refined after merSETA's responsibilities have been taken into consideration, not only to the manufacturing, engineering and related services sectors, but also to national social and economic development objectives as outlined in relevant government policies and strategies.

BIBLIOGRAPHY

1. Automotive Industry Export Council (AIEC). (2015) Automotive Export Manual 2015. South Africa. Web address: Bureau for Economic Research, (2015). Manufacturing Survey: Quarterly Analysis of Manufacturing Activity. Publishe by: University of Stellenbosch; Volume.30, Issue No. 1
2. BusinessTech. (2016). Electricity tariff hike will cripple SA. http://businesstech.co.za/news/energy/90760/electricity-tariff-hike-will-cripple-sa/
3. Creamer, T. (2011). SA to insist that Kumba Honours Cost-Plus-Iron-Ore-Deal. [Online] Available at: http://www.engineeringnews.co.za/article/sa-to-insist-that-kumba-honours-cost-plus-iron-ore-deal-2011-04-06 .
4. Creamer, T. (2014). Zuma Places Ocean Economy at Cross Chairs as Operation Phakisa is Launched. [Online] Available at: http://www.engineeringnews.co.za/article/zuma-places-ocean-economy-in-crosshairs-as-operation-phakisa-launched-2014-10-15/rep_id:4136 . [Accessed date].
5. Department of Higher Education ND Training (DHET). (2013). Address by the Deputy Minister of Higher Education and Training, the Honourable Mr. Mduduzi Manana: BHP Billiton Skills Development Summit. [Online] Available at: http://www.skillssummit.co.za/presentations/2013/Mr_Mduduzi_Manana_speech.pdf .
6. Department of Labour (DoL) (2016) Basic Guides to Bargaining Councils. http://www.labour.gov.za/DOL/legislation/acts/basic-guides/basic-guide-to-bargaining-councils.
7. Department of Labour (DoL). (2013). Annual Industrial Action Report. Published by: Department of Labour. Pretoria, South Africa
8. Department of Labour (DoL). (2014). Annual Industrial Action Report. http://www.labour.gov.za/DOL/downloads/documents/annual-reports/industrial-action-annual-report/2014/industrialaction2014.pdf
9. Du Toit, R. and Roodt, J. (2009). Engineers in a Developing Country: The Profession and Education of Engineering Professionals in South Africa. Cape Town: HSRC Press.
10. Economic Development Department (EDD). (2011). New Growth Path: Accord 1, National Skills Accord. [Online] Available at: http://www.economic.gov.za/communications/publications/new-growth-path-series.
11. Economic Development Department (EDD). 2011. New Growth Path: Accord 1: National Skills Accord.
12. Economic Focus. (2015). SA recorded a record trade deficit of -R24.2 billion in January 2015.
13. Elsley, T. and Mthethwa, G., (2014). Wage determination In South Africa Since 1994. *Bargaining Indicators 2014*, p.9.
14. Engineering Council of South Africa (ECSA). (2012) Annual Report 2012/2013. Engineering Council of South Africa. Johannesburg.
15. Engineering News. (2016). South Africa's auto exports rose strongly in 2015 to nearly R152bn. Accessed: http://www.engineeringnews.co.za/article/auto-industry-2016-04-29-2/rep_id:4136 http://www.aiec.co.za/Reports/AutomotiveExportManual2015.pdf http://www.dhet.gov.za/Booklets/National%20Skills%20Accord.pdf http://www.labour.gov.za/DOL/downloads/documents/annual-reports/industrial-action-annual-report/2013/industrialactionreport2013.pdf http://www.stanlib.com/ECONOMICFOCUS/Pages/SArecordtradedeficitJan2015.aspx
16. Industrial Development Corporation (IDC). (2013). Annual report: Integrated Report for the year ended March 2013. Advancing industrial Development. Address: http://www.idc.co.za/IR2013/index.php.
17. Industrial Development Corporation (IDC). (2015). Annual report. Integrated Report for the year ended 31 March 2015. Advancing Industrial Development. Accessed: http://www.idc.co.za/ir2015/.
18. Kagiso Asset Management (2013), UP_October 2013: Kagiso Asset Management. Quarterly; Cape Town.Downloaded:http://www.kagisoam.com/wp-content/uploads/2013/10/UP_October_2013_LR.pdf .
19. King, D. (2011). 7TH Annual State of Logistics Survey for South Africa 2010. [Online] Available at: http://www.csir.co.za/sol/. [Accessed 13 September 2011].
20. Letseka, M. and Maile, S., (2008). High university drop-out rates: A threat to South Africa's future. Pretoria: Human Sciences Research Council.
21. Manufacturing Engineering and Related service Skills Education Training Authority (merSETA). (2012). *Plastic Chamber Research Project* - Final Report. [Online] available: http://www.merseta.org.za/Portals/0/Plastics%20Chamber%20-%20Phase%201%20-%20Research%20Report%20-%202012.pdf.
22. Manufacturing Engineering and Related service Skills Education Training Authority (merSETA). (2013). *Motor Research Project Employment and Educational and Skills Audit of the merSETA Motor Chamber: Third and Final Report: Implementation Strategy*. [Online] Available at: http://www.merseta.org.za/LinkClick.aspx?fileticket=bSiYM5Wn2WM%3d&tabid=394&mid=1172.
23. Manufacturing, Engineering and Related Services Skills Education and Training Authority (merSETA). (2014). Metal Chamber Research Report. [Online] Available at: http://www.merseta.org.za/Knowledgerepository/ChamberandLabourResearch/MetalChamber.aspx .
24. Mpofu, T.R. (2013). Real Exchange Rate Volatility and Employment Growth in South Africa: The Case of Manufacturing. Cape Town: University of Cape Town.

25. My broad band. (2015). SA Bottom of global Maths and Science List. Business Tech. [Online] Available at: http://businesstech.co.za/news/general/85021/sa-bottom-of-global-maths-and-science-list/. [Accessed 2 June 2016].
26. National Union of Metal Workers South Africa (NUMSA). (2014). Numsa Memorandum of Employer Representative in the Metal and Engineering Industries Bargaining Council. . [Online] Available at: http://www.numsa.org.za/article/numsa-memorandum-employer-representatives-metal-engineering-industrustries-bargaining-council/ .
27. Norton, K. (2014) Adcorp Employment Index: Marginal Growth in South African Job Market. ADCORP. Available at: http://www.dav.co.za/blog/2014/07/11/adcorp-employment-index-marginal-growth-in-sa-job-market/.
28. Nzukuma, K.C.C. and Bussin, M. (2011). Job-hopping among African Black Senior Management in South Africa. *SA Journal of Human Resource Management/SA Tydskirif vir Manslikehulpbronbestuur*, (Online) Volume 9(1), p. 12. Available at: http://dx.doi.org/10.4102/sajhrm.v9i1.360.
29. Plastics SA. (2015). Plastics Recycling in South Africa: Survey of the South African Plastic Recycling Industry in 2014. [Online] Available at: http://www.plasticsinfo.co.za/wp-content/uploads/2015/06/Executive-Summary-May-2015.pdf .
30. SEIFSA (2016). Press Release - 2016/02/06: High Electricity Price Increases Will Have A Crippling Effect Of The Already Embattled Metals And Engineering Sector (http://www.seifsa.co.za/15-industry-news/509-press-release-2016-02-06-high-electricity-price-increases-will-have-a-crippling-effect-of-the-already-embattled-metals-and-engineering-sector-2.html.
31. Skills Portal. (2012). Zuma Stresses the importance of FET Colleges. [Online] Available at: http://www.skillsportal.co.za/content/zuma-stresses-importance-fet-colleges.
32. Statistics South Africa (Stats SA) 2014. P3002 - Manufacturing industry, 2014 http://www.statssa.gov.za/?page_id=1854&PPN=P3002&SCH=6366.