

EIZ Symposium

Foundry localisation strategy implementation as a vehicle to South African industrialisation: MCTS contribution

A F Mulaba-Bafubiandi¹, K Mageza², MF Varachia³

Abstract

Localisation strategy is one of the South Africa government strategies aimed at promoting economic growth and re-industrialization of the country through local content programme. The foundry sector is one of the foundation stones for metal related manufacturing and fortunately has been selected as one of the focus industries for localisation programme. However the economic sustainability of South Africa foundries have been in dramatic decline, South Africa had about 450 foundries in the 1980s, just over 200 were found in 2003 and about 170 were left in 2014. This dismal decline in foundries is due to years of underinvestment, a widening skills gap and import leakage. The South African government through its state departments had introduced localisation strategy initiative to promote procurement of local content produced locally for use in government initiated projects such as State Owned Enterprises (SOE) Infrastructure programme as a means of supporting local foundries' competitiveness. This paper highlighted the role of the MCTS in the broader South Africa Industrialisation strategy such as; human capital development, technology transfer, product and process improvement.

Keywords: Localisation strategy, Foundries, State Owned Enterprises.

¹ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6215; amulaba@uj.ac.za

² University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6952; kmageza@uj.ac.za

³ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6304; faroukv@uj.ac.za

1. Introduction

South Africa's socio-economic challenges have escalated in recent years, with the unemployment rate reaching 25% higher (Writer, 2015). The manufacturing's sector contribution to the Growth Domestic Products (GDP) had fallen from 20% in 1994 to 11% in 2015 (Viviers, 2016). This can be significantly attributed to the importation of high value added products into South Africa by from countries like China and India, therefore the need for more vigorous economic diversification and job creation fields has come into focus on the national agenda. The revitalisation of the manufacturing sector is one of the cornerstones of government's various economic policies and strategies (Viviers, 2016) The manufacturing sector provides a locus for stimulating the growth and achieving specific outcomes, such as job-creation and economic empowerment, thus accelerating the country's growth and development (Maponya, 2015).

The South African government has instituted two key national strategies that promote industrialisation and support the growth and diversification of South Africa manufacturing industry. The New Growth Path (NGP) and the Industrial Policy Action Plan (IPAP) to achieve high GDP and employment growth in South Africa through direct and indirect employment in the manufacturing sector. (The dti, 2013).

The New Growth Path (NGP) is a framework that seeks to address the issues surrounding unemployment, inequality, and poverty, through strategy implementation relating to job creation by attempting to restructure the South African economy to improve performance in relation to labour intensive and an improved growth rate (Government Communications, 2010). The Industrial Policy Action Plan (IPAP) on the other hand is a good step towards transforming South Africa's manufacturing sector which aims to ensure that stronger cohesion exists between macro and micro economic policies that relate to exchange and interest rates, inflation and trade balance requirements which is guided by the vision of National of National Industrial Policy Framework (Framework (NIPF) (Maponya, 2015).

The manufacturing sector revitalisation has also received support through the Preferential Procurement Policy Framework Act (PPPFA) changes, together with the NGP and IPAP II, which empowers the Department of Trade and Industry (DTI) to designate sectors and products that government departments and State-owned Enterprises (SOEs) should procure from local producers ,which with sets an aspirational target for government and large firms to buy goods and services from local industry (Makube, 2013) .

In a bid to increase the competitiveness of local foundries, the Metal Casting Technology Station (MCTS) within its mandate had been engaged with foundries and other key stakeholders in various activities such as Human capacity development, Technology Innovation and Process and product development. This paper will discuss the outcomes of the MCTS contribution toward improving the competitiveness of foundry to gain advantage on the localisation programme which will stimulate industrialisation and economic growth.

¹ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6215;amulaba@uj.ac.za

² University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6952;kmageza@uj.ac.za

³ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6304;faroukv@uj.ac.za

2. Current status of local foundry industry

The State Owned Enterprises (SOEs) are on the roll –out of large - scale infrastructure recapitalisation and expansion programmes. The Infrastructure programmes includes bulk freight transportation (port, rail and pipelines) by Transnet, electricity generation and distribution by Eskom on the new power infrastructure (DST, 2008). The two entities had committed to adherence of PPPFA and support of the development of the local supplier industries under the Customer Supplier Development Programme (CSDP) initiated by the Department of Public Enterprise (DPE). The SOEs had not built any major infrastructure in recent in a decade and the local supplying industry has not adequately invested in plant and technology to meet the SOEs latest requirements. The CSDP aimed at increasing the competitiveness, capacity and capability of the local supply base to optimise the development of competitive supplier industries and where possible build export capabilities (DPE, 2007).

The foundry sector is one of the foundation stones for metal related manufacturing and fortunately has been identified as one of the focus industries for localisation programme. However the economic sustainability of South Africa foundries have been in dramatic decline, South Africa had about 450 foundries in the 1980s, just over 200 were found in 2003 and about 170 were left in 2014. This decline is due to high volume of import products, rapidly rising energy costs and energy inefficiency; the cost of compliance with environmental regulation, a widening skills gap (Mbanjwa, 2015).

The industry produces approximately 375 000 tons of ferrous and nonferrous products in 2014, and created direct and indirect employment of estimated 13100 (Davies, 2015). Most of the foundry industry is geographically located in Gauteng with more than 65% of those located in Ekurhuleni Municipality and the market share of the industry mainly serves the mining, automotive and general sector, with above 50% accounting between mining and automotive as shown in figure 1, (Davies, 2015).

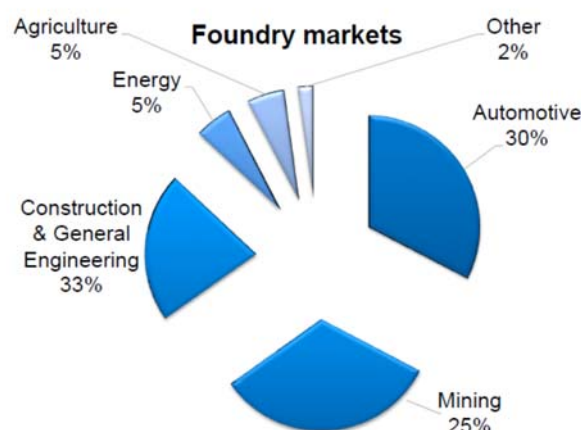


Figure 1: Shows the South African Foundry market share (Davies, 2015)

¹ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6215;amulaba@uj.ac.za

² University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6952;kmageza@uj.ac.za

³ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6304;faroukv@uj.ac.za

Foundries are mainly classified as tier 2 or 3 supplier in typical supply chain structure. With the Original Equipment Supply (OEM) being the tier 1 supplier. The tier 1 suppliers are direct suppliers of fit for purpose equipment and Second and third tier supplier are manufactures of assemblies and sub –assemblies or key maintenance/testing services (DST, 2008), However strategic approach will be to focus on tier 1 suppliers using its direct sphere of control to align the OEMs with appropriate tier 2 and recommend that tier 2 participate in supplier benchmarking as part of their commitment to continuous improvement. This process is aimed at developing the ability to deliver through leveraging of productive and technological capabilities according to specifications and the ability to provided total life cycle support, as reflected in figure 2 (DST, 2008).

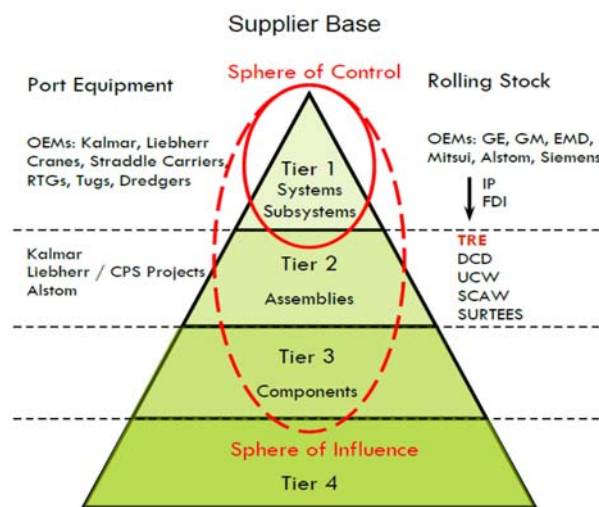


Figure 2: Show Typical supplier base (source: DST, 2008)

In 2009, foundry industry assessment and benchmarking analysis was conducted to evaluate the competitiveness and capabilities of the foundries. The foundry industry assessment and benchmarking analysis was conducted based on the review of various previous report from studies conducted in the industry as well as interviews of the key industry stakeholders (Decipher Consulting, 2009). The benchmarking provides details review of companies capabilities against buyer requirements and indicate performance gap to addressed and migrate to world class competitiveness.

The benchmarking report highlighted that foundry industry requires technological upgrades and human capital development to improve their production processes, to produce within OEMs specifications. (Decipher Consulting, 2009).

¹ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6215;amulaba@uj.ac.za

² University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6952;kmageza@uj.ac.za

³ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6304;faroukv@uj.ac.za

3. Metal Casting Technology Station Contributions.

The MCTS mandates is to support the foundry industry with technology transfer and skills development through human resources and capacity development to improve the competitiveness of the foundries. In a bid to increase the competitiveness of local foundries, the Metal Casting Technology Station (MCTS) within its mandate had been engaged with foundries and other key stakeholders in various activities such as Human capacity development, Technology Innovation and Process and product development. The MCTS is an initiative of Department of Science and Technology (DST) managed through Technology Innovation Agency (TIA), hosted by University of Johannesburg under the Faculty of Engineering and the Built Environment (FEBE).

The MCTS assisted over 50 foundries with various interventions in a collaborative approach with number of stakeholder such as National Foundry Technology Network (NFTN, South Africa Institute of Foundryman (SAIF) and Technology Localisation Unit (TLIU).

3.1 Human capital development

The MCTS's main objective in addressing human capital in foundries is skills development aimed at closing the gap left by aging man power and years of neglect in training and upskilling shop floor operators by the foundry industry. This was implemented using three strategic initiatives, which are: internship, post graduate training and career path frame work. To create career path framework which was aimed at re-design the draft foundry qualifications (NQF Level 2 – 4) in accordance with the newly developed qualification design model and allow school leaver to be trained in three main areas of foundry operations, namely melting, moulding and pattern making processes, the MCTS collaborated with SAIF and NFTN. The MCTS supported SAIF with the establishment and commissioning of Gauteng Foundry Training Centre (GFTC) at Ekurhuleni East College which aimed at training moulder, melter and pattern maker using artisan training programme.

The MCTS participated in the implementation of the internship programme sponsored by the DST and managed by TIA. The internship programme was aimed at placing foundry metallurgy students at different foundries to assist student to gain work experience while creating capacity of young engineer in the foundry industry. The programme manage to place over 90 students within the foundries with an average of 60% being retained by the industry.

The MCTS collaborates with Freiberg University in Germany. The collaboration had resulted in 4 University of Johannesburg students being trained at Freiberg University at a Master degree level, 3 students from Freiberg visited MCTS under students exchange programme and 3 Freiberg university staff members came to work with MCTS staff on various projects to provide knowledge transfer.

¹ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6215;amulaba@uj.ac.za

² University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6952;kmageza@uj.ac.za

³ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6304;faroukv@uj.ac.za

3.2 Technology and Innovation

The MCTS objective with regards to technology and innovation transfer is to provide specialised knowledge and new technology to the foundry industry through technology demonstration and collaborations. The MCTS together with SAIF and NFTN organised the 1ST Metal Casting Conference in 2013, with more than 200 international and local delegates in attendance with over 20 papers presented by academics, industry and government institutions. This provided local foundries with opportunities to network, sharing information with international expertise and having an overview of the global market trends of foundry industries. The MCTS participated in Improvement of Energy, Material Efficiency and Recycling in South African Foundries which was titled EffSAfound. The project was funded by Germany Ministry and NFTN, was implemented by the German Institute of Foundry Technology (IfG). The research project was aimed at improving the material and energy efficiency of the South Africa foundries. The MCTS is technology partner with AMV solutions from Spain on ALEA software. The ALEA software is a raw material charge optimiser to reduce the cost of raw material inputs, quality and competitiveness of the foundry on inputs materials. The MCTS is a satellite site for Casting Simulation Network (CSN). The CSN is implemented by TLIU with aim of promoting access to casting simulation software to South Africa industry with the benefits of reduction of trials, reduction of scrap, cost reduction, improved product development cycle and improved product optimisation.

3.3 Product and Process Improvements

Here the objective is to enhance quality of products through continuous process and product improvement. The MCTS had conducted over 10 product and process improvements with various foundries. The projects range from sand reclamation, sand defects reductions, development of heat-treatment process and energy management. In Addition more than 100 tests have been conducted for foundries and supplier using state of the art equipment. One of the case studies of Product improvement is showed in Figure 3.

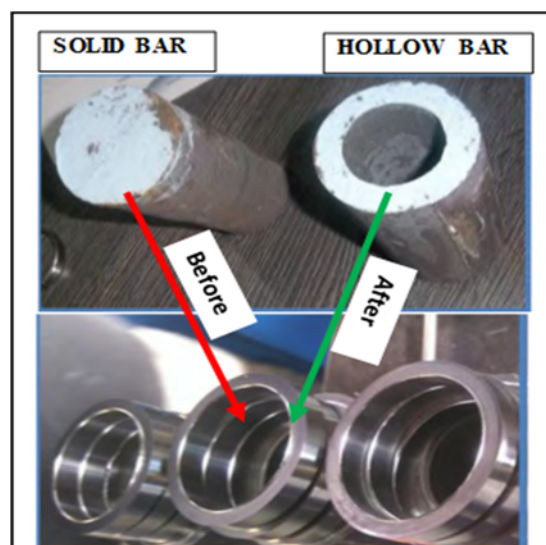


Fig.3: Solid and hollow bar for manufacturing valve seats

¹ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6215;amulaba@uj.ac.za

² University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6952;kmageza@uj.ac.za

³ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6304;faroukv@uj.ac.za

The foundry before the intervention was producing a solid bar to make valve seats. The MCTS with various stakeholder collaborated to assist the foundry with products improvement. The outcomes of the projects showed 37% material reduction, 33% reduction in operational cost. The outcomes provided the opportunity for the foundry to revised pricing and increase competitiveness.

This section in my view is the most important of the paper as it highlights the various contributions of the MCTS to the foundry localisation strategy. That is in line with title of the paper. Authors should outline mandate of the MCTS clearly in the first place.

Here MCTS has highlighted three main areas of contribution; (i) human capital development, (ii) technology and innovation and (iii) product and process improvement. Under each sub-section, the authors could start by stating the main objective (s) and followed by strategies to be employed to achieve the stated objectives. That can improve focus of the whole section. In addition figures on financial savings where possible can be included to convey a bigger story.

4. Conclusion

- Through the technology localisation and technical skills-knowledge transfer strategies, over 50 Foundries in South Africa had benefited from a wide range of interventions provided by the Metal Casting.
- In one of the interventions 37 % reduction in material cost and 33 % reduction in operational cost was achieved
- 90 students were placed in various foundries with an average of 60 % retention by industry.
- 4 masters students were trained and graduated in a Germany University and are now employed in different foundries as technology transfer agents.
- One international conference where 20 conference papers were presented in with over 200 delegates in attendance was organised in 2013.

5. Acknowledgements

The authors are thankful to the University Of Johannesburg, the Department of Science and Technology and the Technology Innovation Agency for the financial support. The important assistance received by the Metal Casting Technology Station from the South African Institute of Foundrymen, the National Foundry Technology Network Technology Localisation Unit and the foundry industry as a whole is here acknowledged.

¹ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6215; amulaba@uj.ac.za

² University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6952; kimageza@uj.ac.za

³ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6304; faroukv@uj.ac.za

6. References

1. Davies, J., 2015. *South African Foundry Industry: 2nd vamcosa foundries workshop*, Johannesburg: www.foundries.org.za.
2. Decipher Consulting, 2009. *Industry Assessment and Benchmarking Report*, Pretoria: DST.
3. Department of Public Enterprises: Republic of South Africa, 2007. *Competitive Supplier Development Programme*, Pretoria:
4. Department of Science and Technology, 2008. *Technology Localisation Plan a Framework for Engagement in National Technology Localisation Actions*, Pretoria:
5. Government Communications, 2010. *Cabinet statement on the new growth path*, Pretoria: s.n.
6. Makube, T., 2013. *Procurement and Localisation - Designation of Sectors*, Pretoria: The Department of Trade and Industry.
7. Maponya, C., 2015. <http://www.sanews.gov.za>. [Online] Available at: <http://www.sanews.gov.za/south-africa/manufacturing-sector-can-drive-south-africa%E2%80%99s-global-competitiveness>
8. Mbanjwa, X., 2015. Tough times ahead for foundries. 23 August.
9. The dti, 2013. *Industrial Policy Action Plan*, Pretoria: the dti.
10. Viviers, W., 2016. *Paving the way for South Africa's (re)industrialisation, including the 'local content' vs. the 'local spend' debate*, North-West: NWU - TRADE.
11. Writer, S, 2015. [Online] Available at:<http://businesstech.co.za/news/general/77737/south-africa-unemployment-1994-2015/>

¹ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6215;amulaba@uj.ac.za

² University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6952;kmageza@uj.ac.za

³ University Johannesburg; P.O Box 524, Auckland Park, 2006; +27 11 559 6304;faroukv@uj.ac.za