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Impact of Technology Diffusion on the Innovation Capacity and Competitiveness of Automotive Components SME's in South Africa

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ABSTRACT

The automotive industry is an important bellwether for the manufacturing prowess of a country. Key to a globally competitive automotive industry is the presence of innovative, technology driven component manufacturers to provide inputs to the automotive assemblers and manufacturers. In this paper an empirical assessment of the innovative capacity of as well as efficacy of government funded instruments to enhance the innovative capacity of automotive component manufacturers, many of them Small and Medium sized Enterprises in South Africa is presented. The results show that most of the automotive component manufacturers are neither focusing on any in-house research, new to the market innovation activities nor seek assistance from these publicly funded instruments to improve their competitiveness through technology diffusion or intelligence. The long

term implications for these firms are that they could lose their place in the automotive supply chain in an industry where rationalization and global sourcing of technology inputs by automotive assemblers and manufacturers are fast becoming strategic imperatives.

Keywords: *Technology diffusion, Innovation, Small and medium sized enterprises (SME's), Automotive components*

INTRODUCTION

Central to global economic growth is the development of innovative Small and Medium sized Enterprises (SME's). It is for this reason that governments worldwide are putting in place policy instruments to facilitate the development of SME's to spur economic growth and employment creation. At a time when large multinational companies, for a long time a source of lifelong employment are shedding jobs due to rationalization and streamlining, SME's are now viewed as one of the few alternatives for sustainable employment and wealth creation. For example, in OECD countries over 95% of the companies fall under the category of SME's (up to 500 employees) and they account for well over 70% of the employment in these countries (OECD, 1996; OECD, 2000; Pike, 1997).

The influence of technology and innovation on SME growth and competitiveness is well documented. For example, the rapid growth of SME's in the Asia Pacific region where at least 90% of all enterprises are SME's is largely credited to technology assimilation by SME's (Schive, 1995). SME's in countries such as Taiwan laid the foundation for the country's economic growth in part due to them embracing technological innovation leading to the production and export of high value goods and services. These SME's have and continue to show

remarkable capacity to innovate and generate leading edge technologies over and above their flexibility and ability to withstand outside challenges such as changing market conditions and global competition (Roper, 1997). To have and sustain this growth, successful SME's worldwide have consistently shown remarkable capacity to embrace innovation. The innovation in this case encompasses the following:

- Technical improvement of existing products and processes
- Development of new and competitive products, processes and services
- Enhanced organizational, operational and marketing expertise

For technology based assistance to SME's to have the desired impact it must be appropriate for the needs of the SME's. Due to lack of capabilities and limited resources to closely monitor technology development, Rouach (2003) recommended that there is a need for sufficient internal or external resources for SME's to acquire, integrate and implement new technologies. For example, amongst industrialised countries, old traditional industries have seen a serious decline in activity in the advent of globalization. Innovative solutions were sought, at least in some areas in Europe where the traditional industries such as mining, steel and metals have fallen by the economic wayside. These include policy instruments focusing on improving the competitiveness of SME's through skills development and technology diffusion from local academic institutions (Kaufmann and Todtling, 2000; Hassink, 1996).

SME DEVELOPMENT THROUGH TECHNOLOGY DIFFUSION OR TRANSFER

The impetus for economic growth through innovations and technology transfer from higher educational institutions (HEI's) to SME's is

supported by the evolving regional policy imperatives in some of the industrialized countries. The involvement of HEI's in regional economic development is based on the realization by policy makers in these countries of the need to nurture high growth, technology intensive SME's. Globally, factors that are central to the development, growth and sustainability of these firms include spatial proximity to institutions engaged in Research and Development such as universities and publicly funded research institutions (Naretto, 2002).

As mentioned above, interest in this was due to the remarkable success of industrial regions such as Baden-Württemberg (Hassink, 1996) where the involvement of local institutions and technology centers (e.g. Steinbeis Centers) have been successful in assisting innovative SME's and start-ups through technology diffusion and transfer. The enhanced participation of universities in regional development is thought to have the same economic relevance as physical infrastructure (Chatterson and Goddard, 2000). Furthermore, the university-industry linkages have been promoted by some governments in the European Union to reduce inter-regional economic disparities in countries such as England (see for example Potts, 2002).

Technology Diffusion can be described as the spreading or usage of a technology within a society, organization or group of individuals (Rouach, 2003). Technology Transfer, which is often used interchangeably with Technology Diffusion, refers to the development of a technology in one setting before being transferred for use in another setting. Technology Diffusion is usually from higher educational institutions and other publicly funded institutions via some intermediary organizations. The use of Technology Diffusion from these institutions is based on the assumption that knowledge and technology generation and subsequent diffusion can enable industry (specifically SME's) to bridge the technology divide (Kaufmann and

Todtling, 2000). Although some of these are nominally independent agencies, for the purpose of this paper, the focus is on those which are linked to HEI's and are wholly or partly funded by regional or national governments.

Perhaps the most well known technology driven instruments linked to higher education institutions are the German Steinbeis Centers. Established in 1971, their most celebrated and widely acknowledged contribution in the regional growth and innovation of SME's in Baden Wurttemberg, the automotive heartland of Germany (Cooke and Morgan, 1994). This region continues to be the prime exemplar of a network based innovation system where educational and social institutions are central to the enhanced competitiveness of local SME's (Raco, 1999).

SME DEVELOPMENT IN SOUTH AFRICA

In South Africa the imperative for rapid economic growth is even more acute hence the focus on SME development to address unemployment and economic disparities. However, just as in other countries, SME's in South Africa face a myriad of challenges at a macro economic level. Some of the challenges include but are not restricted to, bureaucratic red tape in terms of setting up and registration of businesses, lack of finance and un-coordinated government support programmes. Furthermore, SME development in South Africa is specifically hampered by low levels of technical and managerial skills as well as inadequate investment in new technology. South Africa's political isolation until 1994 has also adversely affected SME development as most of these firms were not exposed to developments in technologies and manufacturing expertise over the years. Specifically, the political and economic isolation of South Africa has also led, especially in the

manufacturing sector, to low levels of investments in high technology and expertise by SME's recent years (Fridge, 2005).

Compounding the situation was the deliberate exclusion of a majority of the citizens because of their race by the previous whites-only government from engaging in mainstream economic activities which has also greatly retarded entrepreneurial activity in South Africa. As a result, a number of South African government instruments have been initiated to address these challenges using higher education institutions as well as state funded research institutions to accelerate SME competitiveness in Africa's largest economy. For an overview of South African SME supporting instruments see (www.thedti.gov.za)

GLOBAL AUTOMOTIVE INDUSTRY- AN OVERVIEW

The importance of the automotive industry in the global economy is well documented. This is also evidenced by global automotive makers who are moving from their traditional base in Triad economies (namely, North America, Japan, Western Europe) to set up manufacturing centers in emerging markets (Humphrey, 2003). This has in turn led to intense competition and changes in the industry, profoundly altering sourcing and manufacturer-supplier relationships in the automotive industry (von Corswant and Fredriksson, 2002).

It is for these changes that small firms down the supply chain from the Original Equipment Manufacturers (OEM's) have been forced to enhance their in–house technological expertise and innovations to be competitive (Oakes and Lee, 1999). Some of the demands include OEM's outsourcing more of their designs and development work to component suppliers (Modularization) as well as sourcing from single rather than multiple suppliers (global sourcing).

Modularization in this case refers to the supply of complete systems or modules which are slotted onto platforms at the assembly lines of the automotive manufacturers (Humphrey, 2003). This is even more significant as the centralization tend to squeeze SME's out of the supply chain if they are uncompetitive or their product quality is deemed to be below standard. The trend for global sourcing using the same suppliers has also limited growth opportunities for most component suppliers, especially in the developing countries where centralization of procurement initiatives at the cost of local component production (ITC, 2004; Humphrey and Menedovic, 2003; Humphrey, 2003).

In response to these trends, SME's in this industry are now forced to look at enhancing research and innovation functions as well as strengthening regional technology support networks to remain competitive (Pike, 1997). This is anticipated to force move automotive component suppliers and SME's to move towards more value adding manufacturing underpinned by design, engineering, product diversification, technological innovation as well as cost reduction strategies to enhance their competitiveness and sustainability (Singh et al. 2004).

The challenges of globalization and the accompanying attributes such as competition from low cost countries and single sourcing are also faced by SME's operating in well established global automotive centers of production such as Baden-Württemberg in Germany, Wales in the United Kingdom and Michigan in the United States. In Britain, the core of the British automotive and related industry is the west Midland area which accounts for over 20% of the UK's employment in manufacturing in 2001 (Bailey, 2003). Within this region, small family owned SME's have also experienced difficulties due to globalization and consolidation by OEM's (Tilson, 2000).

In many of these traditional automotive and component producing regions, the issues of skills development and collaboration of the industry with academic institutions for technology diffusion or transfer is becoming more important. The ultimate challenge for automotive component suppliers, especially in middle income countries such as South Africa is their ability to compete for supply contracts in the global automotive value chain. In this context, according to Singh et al. (2004), firm competitiveness refers to the ability to design, produce and/or market products or services superior to those offered by competitors considering price and non-price qualities.

Although there has been an exponential increase in the production of automotives in emerging, low cost economies such as China, India and Thailand, these countries are also faced with challenges. Poor quality of automotive components as well as lack of appropriate technology has put a damper on the export potential for automotive components of SME's in these countries (Veloso and Kumar, 2002). This is important as the drive for competitiveness and export also bring to the fore global product standards and production practices for SME's in the automotive supply chain (Quadros, 2007).

Government Support Programmes For Automotive Industry

Globally, governments with nascent or established automotive industries have devised programmes and incentives to improve competitiveness of automotive component suppliers, due to their importance in job creation and economic growth. Singh et al. (2004), has made the case that governments must provide for inputs such as testing and product development facilities, in light of the financial and resource constraints by SME's in emerging markets such as India. Another cited example of publicly funded program is the developments in the Styria region in Austria (Kaufmann and Todtling, 2000; 2002). Long reliance on industries such as iron, steel and other metals, a

general decline in these sectors led to a marked reduction in economic activity and employment opportunities in the region. The regional restructuring and revival in the context of Regional Systems of Innovation (RSI) was underpinned by key research institutions which supported and provided key technological inputs for the automotive industry in the region (Autio, 1998). Driving and coordinating these industry supporting activities is the Styrian Development Agency which provides funding for innovation projects, incubators and technology centers (Todtling and Trippl, 2004).

In the United Kingdom, the North East region has a vibrant automotive industry which also faces huge challenges. According to Pike (1997), for automotive component suppliers (SME's) to further enhance their competitive edge against foreign competition and rationalization they must constantly upgrading their Research and Development activities as well as establishing strong linkages with technology support infrastructure to meet these challenges. This has been highlighted by the strategic grouping of regional universities in this region of the United Kingdom to enhance design, engineering and technology upgrades among automotive component suppliers.

Specifically, in England, policy driven imperative to stimulate growth in poorer regions has focused on strengthening University–Industry linkages (Potts, 2002). This again highlights the importance of Technology Transfer from Universities and other Academic Institutions to SME's to enhance their competitiveness. In the Baden-Württemberg region, the government has established and strengthened linkages between SME's and regional support instruments such as the Franhofer Institutes and the Steinbeis Technology Transfer Center to strengthen the competitiveness of local SME's in the automotive industry in times of global competition and OEM rationalization.

The South African Automotive Industry

The South African Automotive Industry is the third largest sector of the economy after mining and financial services and contributes over 29% of the country's manufacturing output (DTI, 2002; Lorentzen, 2005). While it ranks 18th by size in the global automotive market, it still accounted for about 85% of the African continent's vehicle output in 2005 (MPL Consulting, 2005).

According to the National Association of Automobile Manufacturers of South Africa (see www.naamsa.co.za), there are twenty one full automotive assembling members on their registry. Included in the list are eight of the world's major motor vehicle manufacturers (OEMs) with their automotive assembly plants concentrated in three of the country's nine provinces. These OEM's include BMW, Nissan (which also assembles Fiat) and Ford (incorporating Mazda) which are operating in the province of Gauteng. Volkswagen, DaimlerChrysler and General Motors are based in the Eastern Cape Province while Toyota has a manufacturing base in the KwaZulu-Natal Province. Seven of these eight OEMs are wholly-owned subsidiaries of their parent companies, while Toyota is majority foreign-owned (i.e. It is partly owned by local South African investors (~25%). Other global companies, notably Renault, Peugeot-Citroen, Hyundai, Kia, Subaru, Daihatsu, Tata, Mahindra, Proton and Porsche import complete vehicles into South Africa. The automotive industry is also an important bellwether for other basic manufacturing activities in the country namely, steel and aluminium processing, rubber, textiles, plastics and paint and precious metal beneficiation (e.g. Platinum in catalytic converters).

Locally assembled vehicles and manufactured automotive components were exported to over 100 countries in 2006. Overall, Europe and specifically Germany, remains the automotive industry's main trading partner followed by Japan, the United States, the United Kingdom and

Australia. The EU accounts for almost 70% of component exports in value terms. After Germany, Spain, the United Kingdom, the United States and France and sub-Saharan Africa are the leading destinations for automotive components.

In line with national imperatives to establish competitive and sustainable industries in South Africa, the South African government through its Department of Trade and Industry (DTI), launched an ambitious programme to improve the export competitiveness in the automotive industry. The programme called the Motor Industry Development Programme (MIDP) focuses on a number of issues to accelerate the growth of the industry which for decades benefited from protective but unsustainable policies (Barnes and Lorentzen, 2004; Black, 2001). These include (a) Reduction in Import Tariff protection to encourage international competitiveness and Incentives to upgrade capacity of the auto industry in all production spheres referred to as Import-Export Credit Scheme (Barnes and Morris, 2004). The MIDP programme and its intended benefits is however not unique to South Africa. Worldwide, government policies aimed at promoting competitive local production and assembly of vehicles impacted or influenced the investment strategies of automotive companies in other emerging markets such as Brazil and India (Humphrey, 2003). The implication of these MIDP provisions for the local automotive components has been extensively reported (Barnes and Kaplinsky, 2000a; Barnes and Lorentzen, 2004; Black, 2001, Barnes and Kaplinsky, 2000b).

During the pre-1994 apartheid era, the South African government legislated local content provisions to protect the domestic component manufacturers from international competition. This was done through the imposition of high tariffs on full vehicle and component imports. In the MIDP era, the components suppliers are obliged to produce

globally competitive products or the OEM's could simply source their components elsewhere in the world. Underpinning these products are stringent requirements such as quality, cost, flexibility and innovative processes. Secondly and perhaps even more importantly, is the export drive of the South African government for automotive components, making the over reliance on local sales for their survival no longer viable. Barnes and Kaplinsky (2000a) have highlighted how local component suppliers are being squeezed out of the automotive supply chain in light of the changes in policy regarding trade barriers and tariffs.

Globally, there has been a marked decrease in the number of suppliers in the sector as SME's are either forced to move to high technology niches to survive or simply close down their operations resulting in huge job losses. Ulusoy et al. (2001), have estimated that of the 30 000 plus auto parts suppliers world wide in 1988, only about 4000 were still in business today. Furthermore, local SME's will not only have to produce world class products designs or services to have sustainable businesses, but they will be also be forced to use the OEM's not just as recipients of their output but also as conduits to facilitate the export and acceptance of their components in a highly competitive global market.

Although the disagreements about the benefits of the MIDP to South Africa still persists, what is generally agreed upon is that the South African automotive components suppliers remain internationally un-competitive (Kaplan, 2004). This is highlighted by the fact that even with the MIDP, there has been a marked decline in local content with OEM's relying heavily on global sourcing, putting considerable pressure on local suppliers. Secondly, as the hallmark of any competitive manufacturing industry is the export of high value, high technology products, it is noteworthy that the bulk of South African

automotive exports (up to 62%) are made up of low technology catalytic converters and stitched leather goods (Kaplan, 2004).

Considering for example that a typical motor vehicle consists of up to 12 000 individual parts which are provided by a network of suppliers (Autio, 1998), There are hence huge opportunities for South African SME's to enter the Global Value Chain for high value components to expand their product portfolio. This however requires that SME's move up the innovation value chain to capture any new opportunities in light of the industry's rationalization.

PROBLEM STATEMENT

The focus of this study is to look at the influence of Technology Diffusion to enhance SME competitiveness in the automotive industry and help identify bottlenecks to further enhance their sustainability. Although Technology Diffusion and Transfer from higher education institutions in South Africa is gaining currency there has not been any empirical study about the Impact of Technology Diffusion from these institutions on SME development and growth. In its White Paper on Science and Technology (DACST, 1997), the South African Government identified an inadequate use of the existing science and technology infrastructure at higher educational institutions as a major impediment for product and process innovation among South African SME's.

The Automotive component sector was specifically selected because of its unrivalled contribution to the economy as well as its inherent linkage to key sectors of the economy. In this paper an assessment of SME's in Automotive Component sector in South Africa, their technology requirements, linkages with universities and other research organizations is investigated. Although extensive work on the

technological prowess and the challenges the automotive component suppliers in South Africa face has been reported (see for example Lorentzen, 2005, Barnes and Kaplinsky, 2000a, Barnes and Lorentzen, 2004), there has been no empirical study of the efficacy of state funded Technology Diffusion initiatives in enhancing the competitiveness and innovative capacity of SME's in this particular sector.

Questions to be addressed by the Research

The research focuses on the impact of technology on SME growth as well as the view of the sector related to Governments Technology Intervention Instruments for SME competitiveness. The knowledge and understanding of SME's with regards to Technology Diffusion initiatives from Government agencies was also investigated. The last part of the survey looked at obstacles that stifle their growth and competitiveness.

As mentioned earlier (AIDC, 1999) none of the bodies in the automotive component sector has taken the primary role of harnessing the technical resources available within South Africa. There also appears to be little or no research on the impact of technology and innovation (be it in-house or via technology diffusion from higher educational institutions and publicly funded research entities). There are over 350 firms producing automotive components for both domestic and export markets (see for example, Black, 2001; www.naacam.co.za) the questions and issues which need to be addressed in this regards are what are the challenges in terms of in-house capacity, technology and skills to meet the needs the OEM's.

Methodology

Of the three hundred and fifty (350) dedicated component manufacturers in South Africa, a number of them (about 120) were subsidiaries of multinational firms and their reluctance to respond is

most likely because the targeted companies depend on their international partners as far as technology and innovation is concerned. The support from parent companies in terms of product and process innovation could also distort their response to questions and hence these were eliminated from the survey. Thus only 200 locally owned and managed firms were considered.

A total of one hundred and twenty (120) supplier based questionnaires were distributed were distributed via e-mails to automotive suppliers in the four key automotive centers in South Africa namely Pretoria, Durban, Port Elizabeth and East London. In some cases, one on one interviews with the owners or managers of the automotive suppliers were conducted. Although the responses to questionnaires was only 34%, it is felt that the opinion and trends expressed in this report reflect the status prevailing in the larger community of the SME's operating in this sector. In order to eliminate any bias a sample of twenty respondents was compared with that of twenty non-respondents. There was no difference between the two sampled groups. Furthermore, the twenty non-respondents were then contacted telephonically to establish the kind of products, their tier level within the industry, customers, employee skills levels as well as reasons for not responding to the questionnaires. Again no discernable difference between respondent and non-respondent firms. The major reason for not responding was due to time pressures.

RESULTS

Following is a summary of responses to the key questions posed to the automotive component suppliers who participated in the survey. The questions were classified according to two categories: Technology and its impact on SME growth in the automotive sector as well as the

efficacy of government interventions on SME competitiveness in this sector.

Question 1: How do SME's view Technology and its impact on their growth?

The question was aimed at ascertaining the percentage of companies involved in high end innovation and technology development as well as their views on how these influenced their growth.

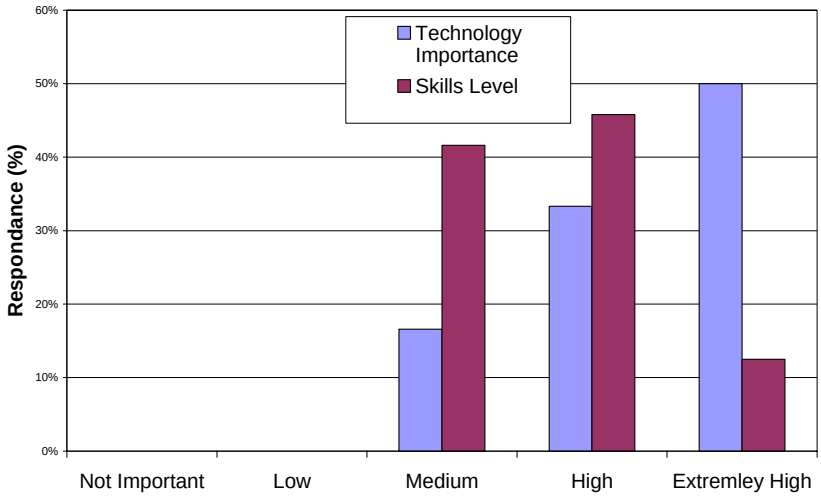

Figure 1. Importance of technology to the success of a business and the current skills level in the business

As shown in Figure 1, all the companies which responded consider technology and skills medium to highly important to sustainability and competitiveness. Furthermore these companies consider their staff at least in the medium to high skill level while few consider their staff extremely highly skilled.

Question 2: Do you have technically qualified people in your company i.e. designers, engineering graduates?

At least 95% of the companies surveyed indicated that they had technically qualified people employed and these people were all engaged in some form of development or research. This is to some extent encouraging as the presence of skilled personnel can accelerate the absorptive capacity of a firm, an important lynchpin for innovation and competitiveness. However, the in-house skilled personnel appear to focus on incremental, demand driven product improvement rather than new and radical innovations.

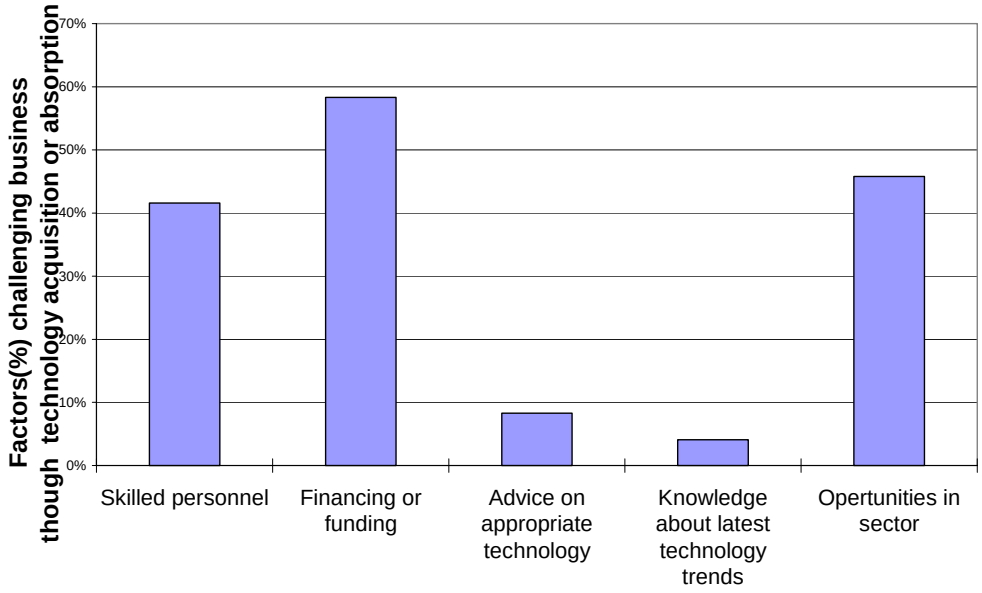

Figure 2. Major challenging to improving business through technology acquisition or absorption

The key challenges identified by the SME's related to skilled personnel, funding for business expansion and contract opportunities in the sector (Figure 2). Although the level of the workforce had already been identified as being skilled, it is evident that there was a lack of cutting edge skills such as designers and researchers among the SME's. The issue of high end skills is important as additional skilled personnel would be required to manage the acquisition, implementation and exploitation of new and radical technologies and innovations demanded by the OEM's. Furthermore both the lack of funding and lack of opportunities in the sector were shown to be limiting the development of the industry. The advice available on the technology as well as the lack of knowledge about the latest technology trends does not appear to be a factor in hindering growth.

Question 3: Do you engage any Government or publicly funded agency for technology or innovation based assistance?

Government appears to have had some success with the impact on SME development, particularly the smaller enterprises, however, the consensus is that there appears to be a perception that government, in spite of its industry friendly policy efforts does not fully understanding the challenges faced by the small businesses (Figure 3). 50% of those SME's surveyed view the impact of government on SME development as low while 58% of the SME's felt that government, in spite of myriad of technology intervention measures do not understand the technological needs of SME's. More worrying, most businesses are not aware of all the avenues available to them, however some are aware but have no idea how to access the particular programs from government.

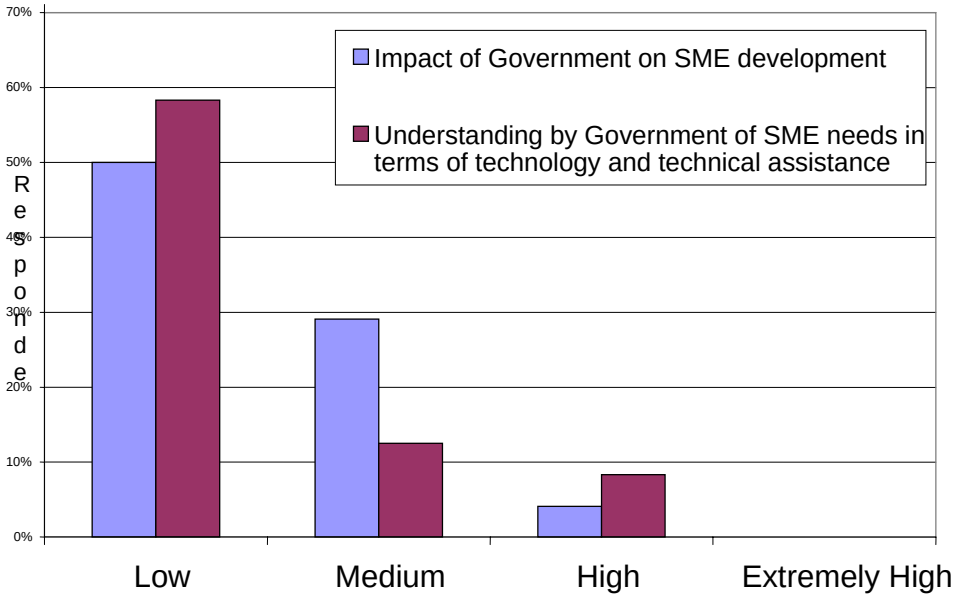

Figure 3. Government technology instruments to enhance business

Question 4 Are SME's specifically aware of publicly funded technology transfer instrument in the Automotive and related sectors?

From the survey, only 20% of the businesses questioned were aware of any private or public technology assistance centres in the automotive sector. However a large majority of SME's operating in the Eastern Cape were in general aware of the existence of the Tshumisano Trust's automotive specific Technology Transfer Center. The Tshumisano Trust is an agency of the national Department of Science and Technology set up to enhance the innovative capacity and competitiveness of SME's in areas of national priority (www.tshumisano.co.za). The Trust was modelled alongside the

German Steinbeis Foundation. The Trust and its activities focus on a number of industries including chemicals, automotives, plastics, metal processing, tooling, clothing and textiles among other focus areas. This particular center, called Automotive Components Technology Station (ACTS) is situated at a local University in Port Elizabeth, one of the aforementioned automotive manufacturing epicentres in South Africa.

Question 5: Government understanding of SME needs in terms of technology and technical assistance?

Only 45% of the businesses questioned had a relationship with a government funded Technology Transfer Center depending on their requirements. Most of the SME's (85%) who had a relationship with a Technology Transfer Center were all satisfied with their service and assistance. The centers had an impact on the businesses questioned with the following findings being evident. Over 70% of the businesses who responded and who had engaged with Technology Transfer centers said they benefited from technology advice, skills development or general consultancy services.

Question 6: What form of technology assistance did you obtain from any government funded Technology Transfer Centers?

Figure 4 shows the diversified assistance which was offered by the Technology Transfer Centers and that the type of advice offered is valued. The concern is that few companies are involved with new product development initiatives probably due to the lack of additional personnel with high end skills. This supports the conclusion in Question 2 where there appears to be less focus on new product development and more on incremental product or process improvements in response to the immediate needs of the OEM's (product upgrading than innovative, new to the market products).

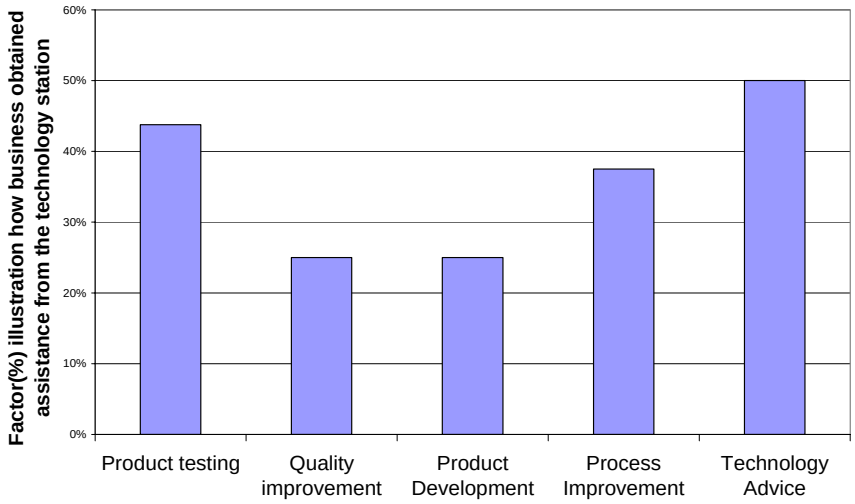

Figure 4. Types of assistance obtained by SME's from technology transfer centers

Question 7: What was the outcome of the intervention from government funded Technology Transfer Centers?

About 20% of the respondents who benefited from this interaction have seen some tangible benefits be them in terms of new supplier contracts form OEM's or increased product export contracts (Figure 5). Only about 6% of those firms surveyed indicated any employment creation as a result of the assistance they obtained from the centers. An appreciable number (about 43%) of the SME's said they interacted with the centers said they have benefited from product improvement assistance provided. These trends are specifically as a result of clear improvement in the quality of the products manufactured, which make the SME outputs acceptable in the market. As expected, none of the SME's reported any effect on their turnover. As privately held

companies, they are not obliged to report on their financial performance to the general public.

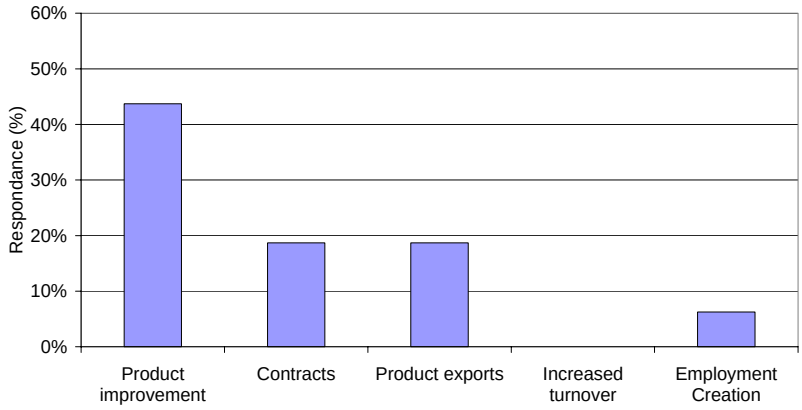

Figure 5. Outcomes of the intervention and assistance by technology transfer centers.

DISCUSSION

For South African automotive SME's to enhance their global competitiveness over and above the MIDP incentives, there is a need to enhance the technology infrastructure such as those under the Tshumisano Trust. This can only help with enhancing innovation and advanced skills to meet the stringent requirements of OEM's (Deniozos, 1994). As stated by Hassink (1996), only SME's who engage in Research, Development and Innovation initiatives are able to meet the stringent customer demands such as quality and rate of delivery. Not surprising, most SME's seem to view financial assistance to be of great importance than technology or innovation for their business. Also SME's do not view government support in a favourable light. This apparent lack of faith in government driven interventions is of concern

in light of policy instruments such as the MIDP. This should be addressed as any investment in infrastructure to assist SME's is not worthwhile if SME's themselves are reluctant to use them for assistance.

The results also points to a lack of ground breaking product or process development or radical innovations among most SME's in this important, technology driven sector. Most of the SME's, especially those assisted with focus on incremental innovation as opposed to innovative, "new to the market" product development crucial in a competitive industry such as automotive manufacturing. This is underscored by the absence of any R & D initiatives at most of the surveyed firms. This is a challenge for South African automotive suppliers considering the competition from low cost manufacturing hubs in Asia which continue to undercut the local SME's production outputs.

For SME's in South Africa to thrive amidst these challenges, it is imperative for them upgrade their technology base to produce innovative products, processes or services to the industry. With the in-house constraints faced by the SME's, strong external linkages to facilitate this technology and skills upgrade will become more important. This is illustrated by the reported success in the growth of automotive component suppliers in regions such as Baden-Württemberg.

The desired output of this study was twofold. Firstly, to assess the innovative activities of automotive suppliers in South Africa against increased rationalization and global sourcing by the OEM's. Secondly, to gauge the efficacy of Government funded instruments in assisting SME's in this critical sector for technology based solutions. Based on the results, the authors argue for the expansion and marketing of

Technology Diffusion initiatives in recognition of the inherent challenges faced by small firms in terms of technology and skills in South Africa and other countries (Oakes and Lee, 1999). Investments in local production infrastructure, although welcomed is not the panacea for improving SME innovation and competitiveness. Sourcing of local components will provide technological opportunities only to the firms with adequate in-house capacity to absorb new knowledge and practices.

The lack of enthusiasm for government funded programmes is noteworthy considering the challenges faced by automotive component suppliers in the lower tiers of the industry. This is however not unique to South Africa. Studies on high growth firms have shown firm owners and external resource providers invariably believe that government and its role either have a limited or no influence to play in rapid, high technology firms (see for example, Fischer and Reuben, 2003). Although globalization and access to new markets offer opportunities to these suppliers, it also opens up challenges in terms of management competencies and technological capabilities. The SME's appears not to be enthusiastic about engaging universities and publicly funded institutions for assistance. This is important as local "embeddedness" within a geographic set-up or cluster of SME's and related institutions such as regional universities has been highlighted as critical for the growth and sustainability of the firms in terms of access to new innovative ideas or technologies (Keeble et al. 1998). Hoffman et al (1998) have further noted that because SME's do not necessarily innovate in a formerly recognized way, some tend to use external linkages to enhance product and process linkages.

The key questions addressed by this study is important in that even in established economies such as Austria, SME's rarely interact with universities and Technology Transfer Centers to improve their

innovative capacity and competitiveness (Kaufmann and Tödtling, 2000). These trends have also been highlighted by Hassink (1997) where the efficacy of Technology Transfer Agencies in Western Europe was questioned as most SME's rank customers and suppliers much more important than universities and other research institutions in enhancing their innovative capacity.

The approach taken with this paper is in recognition that public technology support for SME's adopting a top down, supply push approach has proven to be less effective (Romijn, 2001). The research was hence more demand driven to gain an understanding of what industry wants and its views. This is even more critical as in the absence of tariffs and open global markets, South African based OEM's are able to pick and choose their suppliers anywhere in the world. Conventional wisdom is that they will focus on cost, reliability and quality of supply. This feeds into the Super Component Suppliers ideal where economies of scale and scope mitigate any supply risk and the installation of specialised and state of the art equipment can only be justified by large orders (Ulusoy et al. 2001).

CONCLUSIONS

This paper's main aim was to assess whether automotive component suppliers in South Africa engage government agencies in their quest to enhance their innovative capacity and competitiveness. The observations from this study are important from a government policy perspective. For example, among newer initiatives, the government through Tshumisano Trust has recently launched three Institutes for Advanced Tooling (IAT's) as part of the response to curb the decline in the innovation and skills decline in the South African Tooling Industry, a key input into the automotive component sector. At present, South

Africa is a net importer of tools costing the country over hundreds of millions of U.S. dollars a year in foreign exchange (Fridge, 2005). Key recommendation is that technology based support instruments should make a concerted effort to market their offering and expertise, especially amongst SME's which lack internal capabilities to pursue research and innovation products. SME's themselves should move away from incremental product innovation and leapfrog to more new, first to the market products and processes. This will not only be informed by adequate absorptive capacity of the SME's, but also enhanced linkages with external innovation sources such as universities and institutions where adequate laboratories, skilled scientists and experts are available for developing, testing and certifying high value products (Lorentzen, 2005).

This is important as Kaufmann and Tödtling (2002) noted that SME's in general have latent strategic, organizational and technological shortcomings which they are unfortunately not aware off. This can have long term adverse effect on SME's when changes in requirements from OEM's cannot be met. The success of these newly established centers, which focus on design, Research, Development and Technology Transfer for SME's in this sector will only be enhanced by knowledge of the needs of the industry. Going forward, there would be a need to enhance technology diffusion activities around automotive and related industries to encourage innovation. As SME's focus on meeting these requirements, they are forced to upgrade the quality of their outputs to meet the stringent OEM requirements, especially if their intended products are for the export market. This will have other long term benefits for the automotive component industry.

Over and above the industry buy-in required for Technology Diffusion initiatives to be optimised, the Technology Transfer agencies must also employ properly trained and experienced managers. The results

presented here clearly show that technology driven interventions, whether by public or privately funded instruments can enhance product development and innovation for the relevant SME's. Concerted efforts are hence required for these kind of initiatives, based on sector specific needs, should be expanded if key SME's in critical sectors such as automotive manufacturing are to grow and strive in an increasingly competitive global economy.

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