

# **ELECTRONICS SECOND PAPER**

## **Policy Recommendations and Interventions**

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## EXECUTIVE SUMMARY

### State of the Sector

As reported in the first electronics sector paper, the electronics industry in the Western Cape is a small but innovative industry, which has proven itself as world-class in terms of innovation and niche production. It was determined that in 2004, the electronics sector in the Western Cape contributed approximately R13.6 billion to the total national electronics output of approximately R62 billion. The sector developed, similarly to Israel, out of a necessity due to the fact that stringent trade embargos limited international trading opportunities. The requirement at that time was also fuelled primarily by the defence and parastatal industries.

The Western Cape electronics sector consists mainly out of a handful of players with each a specific focus of production ranging from defence electronics to telecommunications and security and risk management related electronics. The sector in the Western Cape consists out of approximately 74 companies of which the majority focuses on manufacturing. Manufactured components include printed circuit boards, temperature systems, voltage sensors, battery chargers, heater controls and oxygen utilisation rate meters. Electronic systems are designed and produced to support a variety of industries including telecommunications, automotive, IT, consumer electronics, power electronics, defence, aerospace, security, and testing – most of these sub-sectors contain no more than five electronics companies.

Most of the companies in the sector are micro companies. The following table categorises some of the companies according to their sizes. These figures have been extrapolated from ratios obtained from the Research Study into the Contract Manufacturing sub-sector of the Electrotechnical industry in South Africa (2004) and normalised with industry interviews.

*Table 1: Number of Electronics companies in the Western Cape according to size*

	Number of companies
Large (> 200 employees)	4
Medium ( 51 - 200 employees)	12
Small( 20 - 50 employees)	22
Micro ( < 20 employees)	36
<b>Total number of companies</b>	<b>74</b>

Specific industry focus areas are also thin with each large manufacturer more or less focusing on its products with little or no local competition. The sector has some sophisticated manufacturing facilities

although a limited amount of large volume manufacturing is done. Production activities are more characterised by lower volume niche manufacturing activities.

The innovative spirit and capability of the province is fuelled by the proficiency of the skills base in the electronics industry consisting out of highly skilled engineers of world-class standard. The labour force and lower and middle management structures, although relative expensive compared to Asian counterparts, is experienced and also have a high base of technical expertise. The high level of expertise and knowledge in the sector can be contributed to the easy access to three top class tertiary institutions, not only contributing to the delivering of a good grade resource but also responsible for ground breaking research and development. The further stability of the labour force is seen to be a competitive advantage, with little staff turnover and high levels of employee satisfaction. However, due to the relative low economic activity in the electronics industry in the Western Cape, the sector does not seem to have the potential or capacity to create significant employment opportunities.

The high level of innovation in the electronics sector in the Western Cape is found in design, low-volume manufacturing, customisation and problem solving. Its propensity to satisfy customer needs, willingness to facilitate practices outside normal product offerings (in order to accommodate these needs) and flexible service delivery, can also contribute to competitiveness.

Although the national government is promoting the industrial and competitive growth of the economy by promoting research and development and innovation through a variety of programmes, the direct effect on the Western Cape electronics sector has been limited to date. This sector has however huge potential for growth as learned from experiences by other international players such as the Asian Tigers.

## **Challenges**

A number of factors has been identified that impact negatively on the ability of the electronics sector to compete:

- The South African electronics sector products are not price competitive with the low-cost imports from the Eastern countries. For this reason, the manufacturing of electronics has been declining steadily, forcing many companies to seek niche markets. The direct effect is that South Africa imports low volumes of electronic components for assembly in the country, contributing to the higher cost per unit of the final product.
- The cost of labour is high compared to other countries such as Malaysia. This cost leads to higher prices, hence lowering competitiveness. Labour rates range from as little as US\$0.70/hr in Asia comparing to approximately US\$3.75/hr in South Africa.
- Logistical difficulties arise as a result of SA's distance from significant electronics markets.

- A short-term view of research and sector development initiatives. For example, SPII only addresses the embryonic stages of product development, does not meet further direct costs, and the R1.5m ceiling is insufficient for most R&D expenses in the sector.
- The lack of communication between sector stakeholders - A lack of proper formal communication channels and resulting in ineffective cooperation, which inhibits the proper and effective functioning of the sub-sector as a whole. Many opportunities have been lost due to a lack of communication between original design houses, suppliers and contract manufacturers, when products and services were imported for local manufacturing or exported for further processing, rather than looking to local manufacturers, which could deliver the same functions at similar prices and quality standards.
- Industry fragmentation – Although an electronics industry body in the form of the EIF exists, companies typically do not give much support to the associations as they feel that it is a waste of time and that it does not add value to them as a business. For this reason, the EIF and other similar associations find it difficult to work as one body with one voice.
- Marketing and promotion -The Western Cape electronics sector does not enjoy adequate joint marketing and promotion. Efforts are largely focused on Gauteng and individual companies are responsible to promote themselves.
- Responsiveness to technological advancement – The local electronics industry is reactive rather than proactive compared to international market and technological trends. If the South African electronics industry wants to enter the high-value, low-volume, customised, flexible or design-oriented market, it is of the utmost importance that their products should be of high quality and comply with technologically advanced standards.
- Insufficient investment in research and development – Research and development is the cornerstone of any business that thrives on building a concern based on strengths such as design capabilities, customisation and flexibility in product offerings. The Western Cape electronics industry should therefore invest a similar or even larger proportion of its net profits in research and development, than is done internationally.
- The cumbersome application process for incentive programmes hampers investment flows into the Western Cape. Industry experts agree that the process is too time-consuming with too much “red-tape” and the process is daunting for potential applicants.

In response to these challenges identified a number of reactive initiatives could be proposed. It is however important to consider the policies and programmes that the National Government has launched to promote the development of innovation and advanced technological capacity in the knowledge intensive industries of the countries. The majority of these policies were not necessarily designed for the electronics sector in particular, although it is impacted and can benefit from it.

These policies include:

- The Integrated Manufacturing Strategy (IMS)
- The Advanced Manufacturing Technology Strategy (AMTS)
- The Provincial Advanced Manufacturing technology Strategy (PAMTS)
- The National Research and Development Strategy
- The Convergence Bill
- The Support Programme for Industrial Innovation (SPII)
- The Technology and Human Resources for Industry Programme (THRIP)

### **Proposed future steps**

Taking into account the disparate nature of the Western Cape electronics sector, with no clear areas of specialisation or differentiation and a relative low level of representation in a variety of different sub sectors, it is difficult to high-light a specific growth area.

Also considering the various current initiatives already implemented by the National Government to stimulate and promote the development of the industrial capability of the country, of which the Western Cape electronics sectors forms part and parcel. It is therefore not viable to recommend a specific growth strategy or policy for the Western Cape. It is rather recommended that a greater alignment and leveraging of national programmes should be pursued while maintaining the industry in terms of research and development, skills base and innovation, through generic strategies/policies:

- *Create an attractive environment for Multinational Companies (MNCs)*  
Various aspects such as incentives, infrastructure and risk finance need to be in place to attract MNCs. While incentives such as EMIA and FIG currently exist, the Western Cape Provincial Government should concentrate its initiatives rather on creating an environment conducive to attracting MNCs by amongst other initiatives pursuing the establishing a IDZ.
- *Maintain skills base*  
Continue to upgrade the services provided by ISETT SETA to support the requirements of the sector to enhance the skills of labour and lower management and also continue to upgrade research and development and design skills to stay in-line with the latest technology developments.
- *Maintain Research & Development and Innovative spirit*  
In order to stay abreast technology developments to identify development trends and growth opportunities, continued research and development should be promoted. The current AMTS, IMS,

SPII and THRIP programmes should be better utilised for this purpose. The provincial government could lobby *the dti* to streamline the delivery mechanism of these programmes to ensure better uptake by institutions and private firms.

- *Protect Intellectual Property*

A critical enabler of focused research and development is the assurance to innovators that their intellectual property will be protected. The issue of ownership of IP is also a critical inhibitor of collaboration between Universities and private firms. A recent study<sup>1</sup> found that adequate intellectual property protection is cumbersome for domestic investors to obtain. The study reviewed South Africa's IPR regime and revealed a rather mixed picture of the state of IPR protection in South Africa. IPR laws are considered 'state of the art', yet their implementation is often found wanting. In addition, whereas adequate intellectual property protection is cumbersome for domestic inventors to obtain, it is at times so ferociously defended when (mainly foreign) patent owners are involved, that technology dissemination could be hampered.

- *Stimulate the market*

The local electronics sector can be supported by promoting the products and services through and to trade delegations by Wesgro. Dissemination of international market information and trade practices will enable local companies to better position their offerings. The ability for local companies to interact with South African embassies abroad to obtain market information should also be encouraged and the vehicle and contact points for such interaction should be established.

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<sup>1</sup> Intellectual Property Rights in South Africa: An Economic Review of Policy

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## TABLE OF ACRONYMS AND DEFINITIONS

DEDT	Department of Economic Development and Tourism
MEDS	Micro Economic Development Strategy
TISA	Trade and Industry South Africa
CEM	Contract Electronics Manufacturers
R&D	Research and Development
DTI	Department of Trade and Industry
ISE	Innovation Support for Electronics Scheme
SPII	Support Programme for Industrial Innovation
IMS	Integrated Manufacturing Strategy
NACI	National Advisory Council on Innovation
NRDS	National Research and Development Strategy
AMTS	Advanced Manufacturing Technology Strategy
PAMTS	Provincial Advanced Manufacturing Technology Strategy
FTI	Foundations for Technological Innovation
NRF	National Research Foundation
THRIP	Technology and Human Resources for Industry Programme
TIPTOP	Technology Innovation Promotion through Transfer Of People
HDI	Historically Disadvantaged Institution
HEI	Higher Education Institution
MNC	Multinational Companies

TNC	Transnational Companies
NPDC	National Product Development Centre
FDI	Foreign Direct Investment

## LIST OF INTERVIEWS

CSIR Defencetek  
EBV Electrolink  
EDH  
Electronic Industries Federation (EIF)  
Elprom  
Microtronix  
Peralex  
Phoenix Contact  
Psitek  
Savant  
South African Electrotechnical Council  
Spescom  
Tellumat  
Tenesa  
Trax  
University of Stellenbosch  
Unistel  
Vektronix  
Ziton

## INTRODUCTION

As part of the electronics sector overview process, it was identified that the Western Cape electronics sector is a small industry compared to its national and international counterparts. Although some of players in the sector has a proven track record of product innovation and production with current lucrative export performance, the overall sector seems to be struggling to compete with low cost imported products. Apart from cost competitiveness a number of other issues are also hampering the sectors ability to grow and compete:

- High labour costs
- Logistic implications due to geographic separation from current electronic markets
- Short term focus of research and development
- Limited funding for research and development
- High level of fragmentation and disparity
- Cumbersome application processes for institutional support

Considering the huge economic growth experienced by other developing countries based upon the performance of their electronics industries through the inception of government, we have to consider the various policy levers to stimulate the industry and to address the existing challenges. The current policies affecting the electronics sector in the Western Cape are generic with limited impact on the sector. For example, the National Research and Development Strategy is aimed at stimulating general R&D regardless of sector, and the Convergence Bill is aimed at the telecommunications industry but within this industry, lies the electronic sector.

Companies that take advantage of incentives are few and far between with reasons cited being that the application processes are too lengthy and time-consuming. It is for these reasons that policies of foreign counterparts are analysed as well as the generic local policies.

The following report analyses the most relevant policies, strategies and incentives that impact on the electronics industry. Recommendations are formulated from these analyses coupled with challenges faced by the electronics sector.

## 1 LESSONS FROM FOREIGN COUNTERPARTS

The electronics industry has over time proven to be an important reference for the ability of a sector to influence economic growth in a region. The Asian Tigers probably presents the best examples of growth with the East Asian region excluding China accounted for only 7% of the world's manufactured exports in 1981 while its market share improved to 18% in 2000 totaling US\$878 billion, China in the same period increased its share of the world's exported manufactured products from 1% to 7%.<sup>2</sup>

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<sup>2</sup> Reinventing Industrial Strategy: The role of Government Policy in building industrial competitiveness, 2004. S. Lall

Although there are no common rule or strategy followed by the various countries in promoting their industries each case study presents interesting guides to consider in shaping a potential policy intervention strategy for the Western Cape.

### **Honk Kong**

Hong Kong combined free trade with an open door policy to FDI<sup>1</sup>. Hong Kong had unique initial conditions which included global trading links, established infrastructure of trade and finance, presence of large British companies which resulted in spillovers in skills and information, and influx of entrepreneurs, engineers and technicians (with considerable past learning) from the mainland. These conditions allowed Hong Kong to launch into light export-based manufacturing. The colonial government of the time intervened to help industry by allocating scarce land to manufacturers and setting up strong and well-funded support institutions like the Hong Kong Productivity Council, an export promotion agency, a technical university, and a technology park with co-financing for high-tech start-ups.

The absence of selective industrial policy, however, constrained the deepening and growth of manufacturing as inherited capabilities were 'used up'. Hong Kong started with and stayed with light labour-intensive activities where learning costs were relatively low. There was some progress in terms of product quality and diversification, but little industrial or technological deepening over time – in striking contrast to Singapore, a smaller economy that focused on strong industrial policy.

### **Singapore**

Similarly to the Western Cape, Singapore's economy was based in a free trade environment, which made it difficult to institute any import protectionist policies.

Singapore relied heavily on Multi National Companies (MNC) and the government actively sought and used FDI<sup>1</sup>. After a decade of light industrial activity, the government decided to shift its focus onto higher value-added specialised activities, and guided MNCs as such. It intervened extensively to create the specific skills needed and set up public enterprises to undertake activities considered in the country's strategic interests, these were further enhanced by attracting MNCs through offering incentives if they were willing to specialise in the development areas identified. In order to attract FDIs to Singapore the government offered capital contributions, tax concessions, infrastructure, education and skills training and a stable and friendly business environment.

The Singaporean government continuously updated its policies to adapt to changing environment such as rising labour and land costs, by encourageing MNCs to reconfigure their operations on a regional basis, relocating the lower end operations in other countries and making Singapore their regional headquarters to undertake the higher end manufacturing and other functions. The government offered various incentives under the regional headquarters scheme, the international procurement office scheme, the international logistics centre scheme and the approved trader scheme to promote this reconfiguration.

Although a similar approach is not necessarily feasible for the Western Cape Provincial Government it is good to keep in mind that industrial policy needs to be updated continuously.

### **Taiwan**

Taiwan's industrial growth was based on a policy including import protection, directed credit, selective FDI, support for indigenous skill, technology development and strong export promotion. Similarly to the Western Cape, Taiwan's industry was largely composed of SMEs and chose to support its industry through a sophisticated technology support system including research and development collaboration initiatives, innovation inducements and extension assistance<sup>3</sup>.

Given the disadvantages to technological activity inherent in small size<sup>1</sup>, it supported industry by a variety of R&D collaboration, innovation inducements and extension assistance. Taiwan has probably the developing world's most advanced system of technology support for SMEs, and one of the best anywhere. But it also built a large public sector in manufacturing, to set up facilities where private firms were unwilling or unable to do so.

Government intervention was also in areas of targeting specific areas where local manufacturers were not focusing and the result was that Taiwan received constructive foreign investment from the US and Japan. These foreign investors made it possible for local firms to access global production chains and implement new technologies. US companies invested in high levels of training and technology transfer for Taiwanese managerial staff and the dual regime of US and Japanese foreign investors provided education, improved the quality and efficiency of components production, supplied stable markets and improved international business linkages for local Taiwanese firms.

The Taiwanese government attracted FDI into activities in which domestic industry was weak, and used a variety of means to ensure that transnational companies (TNCs) transferred their technology to local suppliers. Like Korea, Taiwan directed FDI into areas where local firms lacked worldclass capabilities. The government played a very active role in helping SMEs to locate, purchase, diffuse and adapt new foreign technologies. Where necessary, the government itself entered into joint ventures, for instance to get into technologically very difficult areas such as semiconductors and aerospace.

The key to Taiwan's success has been their ability to rapidly adopt technology. Taiwan has not had the advantage of large international firms such as Korea and Japan but rather leveraged the entrepreneurial spirit and flexibility of the smaller organisations. This was successfully underpinned and support by their public sector research and development institutes such as Taiwan's Industrial Technology Research Institute (ITRI) similar to the South African Council for Scientific and Industrial Research (CSIR). The innovative ability of Taiwan was also a product of a system of consortia or alliances between private sector firms and public sector research institutes, trade associations and funding from government. The focus of these alliances was to increase technological learning and upgrading and catch –up industry creation<sup>1</sup>.

In summary the various industrial policy objectives of the various Asian Tigers are quite diverse in the methods followed to implement although the basic thrusts of advancing skill development, technology transfer, influencing trade mechanisms and institutional support was followed.

*Table 2: Industrial Policy Objectives of Asian Tigers<sup>1</sup>*

	Deepening industrial structure	Raising local content	FDI Strategy	Raising technological effort	Promotion of large local enterprises
Hong Kong	None	None	Passive open door	None except technology support for SMEs	None
Singapore	Very strong push into specialised high skill / tech industry without protection	Subcontracting promotion for SMEs	Aggressive targeting of TNCs direction into high value added activities	None for local firms but TNCs targeted to increase R&D	None but some public sector enterprises enter targeted areas
Taiwan	Strong push into capital, skill and technology intensive industry	Strong pressure for raising local content and subcontracting	Screening FDI, entry discouraged where local firms are strong. Local technology diffusion pushed	Strong technology support for local R&D and upgrading by SMEs. Government orchestrated high tech development	Sporadic: to enter heavy industry, mainly by public sector.

## **FOREIGN POLICIES ANALYSIS**

An analysis of the effective manipulation of the Tigers' industrial policies brings about the following lessons<sup>1</sup>:

- Be selective (pick a few activities at a time) rather than promote all industrial activities indiscriminately and in an open-ended way
- Pick activities and functions that offer significant technological benefits and linkages
- Force early entry into world markets, using exports as to discipline and monitor both bureaucrats and enterprises
- Give the lead role in productive activity to private enterprises but use public enterprises as needed to fill gaps and enter exceptionally risky areas

<sup>3</sup> NUMSA Sector Jobs Summit Project Electronic and Electrical Engineering Study, 2001. G. Phillips, J Xaba

- Invest massively in skill creation, infrastructure and support institutions, all carefully coordinated with interventions in product markets
- Use selectivity in FDI to help build local capabilities (by restricting FDI or imposing conditions on it) or to tap into dynamic, high technology value chains
- Centralise strategic decision-making in competent authorities who can take an economy-wide view and enforce policies on different ministries.
- Improve the quality of bureaucracy and governance, collect huge amounts of relevant information and learning lessons from technological leaders
- Ensure policy flexibility and learning, so that mistakes can be corrected *en route*, and involve private sector in strategy formulation and implementation

The case study of Hong Kong warns foreign counterparts of the perils of failure to develop selective industrial policies. It was for this reason that Hong Kong started with and stayed with light labour-intensive activities. Its passive open door policy toward FDI failed to attract the types of investors that could aid technology transfer and facilitate up-skilling of labour.

Conversely, Singapore actively sought strong industrial policy, and this deepened its technological and innovative capabilities. The Western Cape and Singapore are similar in terms of their high labour costs, free trade environment and their need to move to higher value-added specialised activities. However, Singapore made the successful “upgrade” to higher value-added specialised activities through intense government support and intervention to attract FDI. Singapore had first-mover advantages when it took advantage of the boom in investment offshore production by MNCs in the electronics industry in the 1970s and the early 1980s. Its speed and flexibility allowed the country to set up many advanced electronics related industries. These industries have been actively promoted by the government as part of a “clustering” approach to ensure the competitiveness of the downstream industries<sup>1</sup>.

Since FDI is attracted to clusters of industrial activity, this was advantageous to the Singaporean government in its drive to attract MNCs. The Western Cape on the other hand, has no clear cluster in its electronics industry. The industry is characterised by numerous SMEs playing in a variety of sub sectors with no cohesion and unity.

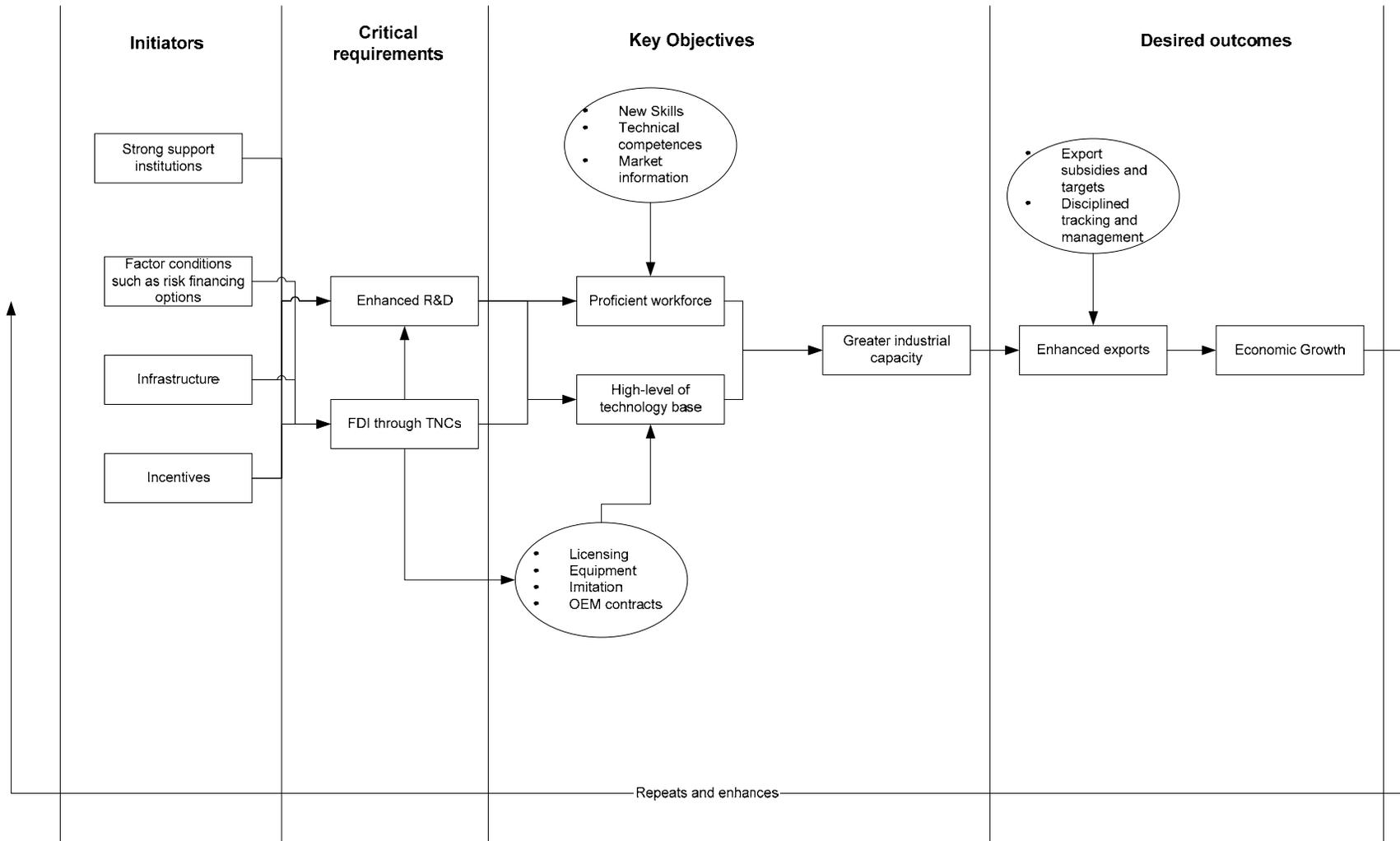
Taiwan’s focus was on the support of SMEs through FDI. FDI coupled with its public sector research and development institutes, the country managed to provide sophisticated technology support for its SMEs. With this same formula, the Western Cape has the potential to achieve success similar to that achieved by Taiwan, however the attraction FDI presents the biggest challenge to the Western Cape, of this two-prong approach. The R&D consortia developed by Taiwan brought together firms and public sector research institutes, trade associations and catalytic financial assistance from government. It was this type of clustering approach and the resultant technological learning, upgrading and catch-up industry creation that made the consortia a success.

## **2 POLICY FRAMEWORK**

There are various ways within which a sector's growth can be promoted. These ways include a variety of policy levers, strategies and interventions from government at national, provincial and local or municipal levels. We have learned from the successful interventions of the Asian Tiger's governments in trade, FDI, technology transfer and domestic resource allocation that it is not a matter of whether or not a government should intervene but rather how it should become involved.

It is clear from the lessons learnt from these globally competitive producers that by putting in place a few initiating elements such as sufficient infrastructure, focused incentives and strong support initiatives the industrial strategy can be implemented to attract the right kind of multi or transnational companies to leverage new technology development and skills enhancement from. This enhanced manufacturing capacity has the potential to boost exports while being promoted through the right kind of export subsidies and clearly defined targets. The resulting overall economic growth is not necessarily the end of the process and serves to better align policies, further enhance infrastructure and facilities to stimulate the local competence further and create more capacity and competence.

Figure 1-1: economic growth model through Industrial development



By studying the various types of interventions and areas requiring support, we recommend five focus areas of intervention. These areas include FDI, market, technology, skills and institutional. The five focus areas are not mutually exclusive but rather complementary to each other to promote a common goal of economic growth and competitiveness enhancement.

## **FDI**

The case studies proved that through the targeted attraction of the right kind of FDI, the necessary skills and technology can be leveraged to stimulate the growth of the industry. Local evidence of a MNC establishing export manufacturing capacity in the Western Cape is Tenesa, manufacturing and assembling PV panels locally for export to France and Germany. FDI can also be promoted through partnerships and joint ventures between MNCs and local sub-contractors, to leverage skills and technology transfer.

A critical aspect of leveraging knowledge a technology from MNCs is to ensure that proper transfer of technology takes place. This technology transfer can be promoted by applying a combination of policies such as the following policies governing:

- licensing of technology
- the introduction of new equipment
- imitation of technology
- original equipment manufacturing (OEM) contracts.

## **SKILLS**

The importance of human capital can not be underestimated and has long been recognised as an important catalyst for successful economic growth. The overall returns, for example, for an additional year of education has been estimated at 24 percent for primary education in Sub-Saharan Africa<sup>4</sup>. A similar multiplier is also relevant to a specific industry's development. Although unskilled labour influences the production cost competitiveness, the picture is different for high-technology industries, where production techniques have advanced and grown more capital intensive. The high international rate of development and competitiveness requires that the minimum "entry" skill levels and competence are much higher than originally when the South-Asian low labour rates could dominate the markets. In order to enter the highly competitive markets niche, competence in higher-technology field is a key requirement, making specialised education more important. Competitive wage rates, specifically for unskilled labour, will always be a critical requirement, although specialised skills are more sought after in the new economies.

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<sup>4</sup> More Instruments and Broader goals: Moving toward the Post-Washington consensus, J. Stiglitz

## INSTITUTIONS

The level of institutional support for companies operating in a sector is a further critical component in promoting the competitiveness of a sector. Institutional support for high-technology sectors such as electronics or biotechnology based on knowledge intensive activities is crucial in competing in cutting-edge markets. The types of support activities that can be leveraged from an institutional perspective include research and development of new technologies, productivity in the manufacturing environment through capacity optimisation and leveraging, economic research and market intelligence provision.

These activities are not only fostered through the interaction with tertiary education facilities but also the support from provincial governments to set up centres of excellence to promote research and development and technical skill promotion.

While the benefits of collaboration both nationally, locally or across international boundaries include the ability to:

1. Strengthened national firm competitiveness
2. Increased technological intensity
3. Spillovers and knowledge transfer

However the OECD SME Outlook 2002 concluded that, SMEs lack funding, management skills and experience of international laws and regulations among other things, which prevent them from participating in international collaboration. The results of two recent enterprise innovation surveys, Innobarometer 2003 and Community Innovation Survey 2004, concur with these findings. In these surveys SMEs rank lacking qualified personnel and problems with financing innovation activities as two important barriers to innovation. Taking into account the challenges mentioned we can conclude that SMEs, which forms the majority of the Western Cape electronics sector, face the following difficulties in forming collaborative groups:

- Finding appropriate partners
- Accessing the right skills
- Financing
- Manage risks associated with cooperation

In order to promote collaborative activity amongst the SMEs there are various policy levers that the applied. Through evaluating international measures in promoting clusters:

Table 3: policy measures designed and implemented to promote clustering for innovation

Measure	Country	Nature of instrument
K-plus centres of competence	Austria	Establish joint research centres
Innovation consortiums	Denmark	Develop generic technology platform
Competence heightening of technological competence programme	Estonia	Consulting and seminars to raise technology strategy planning competence
Trio programme	Finland	Promoting internationalisations and business environment
RARE	France	Network
Innovation plan	France	Increase the number of business angels and assistance for R&D projects
IGF-promotion of joint industrial research	Germany	Grants
Network of competence	Germany	Support establishment of internationally attractive networks
Advanced Technologies research programme 2001	Ireland	
REGINN	Norway	Regional industrial clusters
UK online for business	UK	Information service

Source: *The European Trend Chart on innovation Policy, 2004*

## TECHNOLOGY

The improvement in technology applied in an environment, country or sector, is probably the primary driver for economic growth. Solow (1957) attributed 87,5 percent of the output per man-hour between 1909 and 1949 to technical change<sup>1</sup>. While formulating a successful technology policy “is an art rather than a science”, as stated by Lall and Teubal (1998), one cannot omit the importance of including it as a critical component in formulating growth strategies.

For South African electronics producers specifically, access to new technologies is crucial. The key components include research and development, accessing skills to apply technologies effectively and initiating intelligent international partnerships to source technology.

While there are a variety of ways to access research and development, a choice has to be made as to the optimal vehicle or source of the necessary information<sup>5</sup>.

- The US has established successful industry-university relationships to form an important source of new technology. The Bayh-Dole Act promoted “marketable” technology development with federal funding
- Focused technology research initiatives through start-up or spin-off programmes from established larger corporations
- Cluster research projects formed between a combination of companies to promote a common goal
- Major companies will set-up technology development outposts to monitor developments and tap into distinctive pools of talent and technology around the world
- Country focused research and development through public laboratories and in support of industrial laboratories.

Taking into account some of the policy measures applied by European countries to promote technology development and adoption by SMEs, give us a perspective of the various options available to pursue.

*Table 4: Policy measures designed and implemented to promote the absorption of technologies by SMEs*

<b>Measure</b>	<b>Country</b>	<b>Nature of instrument</b>
Techinform	Austria	Databases
RIT Europe	Belgium	Support the hiring of a technological innovation manager in SMEs to undertake partnership research projects
Icebreaker projects	Denmark	Subsidies
InnoAwareness	Estonia	Publications, seminars and training programmes
Tekes Technology programmes	Finland	Funding
Support for technology transfer	France	Funding
Network technology subsidies	France	Networks
Information centres	Germany	Information Services

<sup>5</sup> Creating Value in a Digital Era, J. Zysman

InnoNet	Germany	Networks
FORBAIRT	Ireland	International research project to establish technology transfer
Innovation and SMEs	Italy	Creating a favourable external environment
ROZVOJ & THR	Czech Republic	Grants to innovation management tools
Support for integrated business planes for SMEs	Greece	Support elaboration and implementation of business plans
Certify yourself	Greece	Support to enhance quality standards
The support for purchase of innovative technologies and creations of quality management systems schemes	Slovak Republic	Grants
Voucher system for consultancy and training services	Slovenia	Consultancy and training services
Incentives for SMEs via incubators and technological parks	Slovenia	Co-finance the services in technological parks and company incubators
Plan for the strengthening and competitiveness of SMEs	Spain	Services

*Source: The European Trend Chart on innovation Policy, 2004*

## **MARKET**

Equally important to the other three areas, but probably one of the most complex focus areas include policy levers focus on promoting growth through addressing trade and market forces. Firstly several international agreements have to be considered such as the Washington Consensus which advocated the use of instruments such as macroeconomic stability, liberalised trade and privatisation to promote economic growth. For the South African and Western Cape electronics industry this should be seen in context that the country seems to have achieved macroeconomic stability, through a variety of Free Trade Agreements, have a liberal trade environment and since there is no real electronic organisation to be privatised, is not really relevant. Furthermore the Washington consensus was based on a rejection of the state's activist role and the promotion of a minimalist, non interventionist state, which is contrary to the role played by governments from Korea and Taiwan.

Currently South African electronics producers enjoy little or no import protection. In 1995 the South African government implemented the General Agreement on Trade and Tariffs (GATT), which opened the market to international consumer electronics competition. While the majority of consumer electronic

goods enjoy various levels of protection under GATT, South African import duties on these products have been reduced to zero.

The Marrakesh Protocol to GATT 1994 is the legal instrument that incorporates the schedules of concessions and commitments on goods negotiated under the Uruguay Round into GATT 1994, and establishes their authenticity and the modalities for their implementation. Included in Appendix 1 is a table which lists the product groups for which WTO binding tariff rates has been be matched with the current government-set rates.

### **3 DEPARTMENTS AND ORGANISATIONS INFLUENCING THE ELECTRONICS SECTOR**

There are various government departments, associations and organisations that have either a direct or an indirect influence on the electronics cluster in the Western Cape. In assessing the policy environment of sector it is important to take into account the role that these departments and organisations play in either providing structure or guidance to the electronics sector.

#### **THE DEPARTMENT OF TRADE AND INDUSTRY (*THE DTI*)**

The primary department tasked with the development of industry and promoting economic growth in the South Africa is the Department of Trade and Industry (*the dti*). According to their website, "*the dti's* vision is of a South Africa that has a vibrant economy, characterised by growth, employment and equity, built on the full potential of all South African citizens. To achieve this, *the dti* has become an outwardly-focused, customer-centric organisation."

*the dti* offers a wide range of services and products including incentives to stimulate the growth of certain sectors, assistance in starting up and growing a business, research reports, publications, information and advice on consumer rights, registrations and inspections. The package of incentives offered by *the dti* includes the following schemes:

- Investment support
- Small business development
- Competitiveness fund
- Innovation and technology
- Export assistance
- Industrial Development Zone programmes

A key criticism against the programmes such as SPII offered by *the dti*, is that the processes involved are to cumbersome and time consuming for the SMME in relation to the value that could be obtained from the programme. This is largely due to the limited resources available to *the dti* to administer and offer these services. A consideration would be if the delivery vehicles for these programmes are optimal. This would be an optimal area for the provincial government to play a role in administering and delivering these services due to the fact that it is closer aligned to the local industry, therefore understands the concerns and requirements better and is also easier to interact with.

A further obstacle for *the dti* in promoting investment and growth in the country is the fact that some of the primary obstacle for investment such as labour regulations, corporate taxes, crime and fluctuations in the exchange rate falls outside of their area of control and therefore has limited ability to institute policies to counter these constraints.

Due to *the dti's* focus on promoting economic growth, technology and innovation as well as exports, it plays an important role in the electronics sector.

## **THE DEPARTMENT OF SCIENCE AND TECHNOLOGY**

Previously part of the Department of Arts Culture, Science and Technology (DACST), the new Department of Science and Technology (the DST) "*strives towards introducing measures that put science and technology to work to make an impact on growth and development in a sustainable manner, in areas that matter to all the people of South Africa*".

Since technology transfer and development plays an important part in sustainable economic growth, the DST has an important role to play in furthering the research and development potential and capabilities of the country. The activities of the DST includes focused interventions, networking and acting as a catalyst for change in terms of both productive components of our economy, making it competitive in a globally competitive liberalised environment, and also in respect of the huge development backlog existing among the poorest components of our society.

One of the key focus areas for the DST is the development and resourcing strategies for the formation of science, engineering and technology human capital, democratisation of state and society, promotion of an information society and ensuring environmental sustainability in development programmes.

Continuous technology development is crucial for economic growth and sector competitiveness enhancement, therefore the activities of the DST in promoting research and development and innovation is critical to the electronics sector to ensure that it stays on the forefront of technological development.

## **THE DEPARTMENT OF COMMUNICATIONS**

The Department of Communications is the public service arm of the Ministry of Communications. It is a policy-making body for the post, telecommunications and broadcasting services in South Africa.

## **THE NATIONAL RESEARCH FOUNDATION**

The National Research Foundation (NRF) is a foundation dedicated to the funding and support of research in South Africa. The NRF offers incentives, research reports, research scholarships etc. One of the NRF's incentive programmes is the Technology and Human Resources for Industry Programme (THRIP), which is relevant to the Electronics sector.

## THE ELECTROTECHNICAL EXPORT COUNCIL

The Electrotechnical Export Council is a private-public partnership initiative with the backing of *the dti* and its mandate is to market and position the South African Electrotechnical sector in the global context by<sup>6</sup>:

- Identifying and creating export opportunities
- Notification of tenders
- Specialised inward and outward trade missions
- Participation at international exhibitions
- Participation in presidential, ministerial and technical missions
- Assistance and access to government export incentives
- Marketing and promotion of our sector and members
- Establishing new distribution channels
- Networking opportunities
- Sharing information, contracts and risks
- Market research and logistical support
- Access to professional export training
- Acting as a lobbying voice for policy affecting Electrotechnical sectors

The council was one of the first export councils to be established, and has in recent years has successes in establishing the South African Technology centre in Australia, to promote our electrotechnical expertise abroad. The council also reintroduced the South African electronics industry for the first time in ten years at the Washington technology exhibition.

Western Cape firms that are registered members of the Electrotechnical export council include Psitek, Tellumat and MLT Drives. All of these firms have a proven successful export track record.

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<sup>6</sup> South African Electrotechnical Export Council website - [www.saeec.org.za](http://www.saeec.org.za)

## 4 NATIONAL POLICIES INFLUENCING THE ELECTRONICS SECTOR

There are a limited number of policies focussing specifically on the electronics sector. Further general manufacturing and telecommunication policies relating to the sector has also been considered for the purposes of this analysis, including:

- The Integrated Manufacturing Strategy
- The Advanced Manufacturing Technology Strategy
- The Provincial Advanced Manufacturing technology Strategy
- The National Research and Development Strategy
- The Convergence Bill
- The Support Programme for Industrial Innovation (SPII)
- The Technology and Human Resources for Industry Programme (THRIP)

### INTEGRATED MANUFACTURING STRATEGY

The Integrated Manufacturing Strategy was released in 2002 by *the dti*. The integrated manufacturing strategy (IMS) is a strategy for all processes that transform natural products into manufactured products, and all associated processes, thus extending beyond the boundaries of what were traditionally considered to be industrial processes to include various related activities and services. These include the extraction of raw materials and procurement of inputs, the production of intermediate goods and final products, packaging, marketing, distribution and retail.

The IMS can be understood as the integration of interventions related to competitiveness. These interventions include:

- market access
- beneficiation and value addition
- regional production
- equity and economic participation
- knowledge-intensity and services integration
- development of integrated value matrices

Essentially, it is the integration of these six approaches that drives the IMS.

## **IMS ANALYSIS**

One of IMS's interventions is that of knowledge-intensity and services integration. This supports the electronics sector as it moves from low knowledge intensity to higher knowledge intensity. The IMS<sup>7</sup> states that *there is a range of business services which can improve our competitiveness if further supported, developed and integrated into the operation of value chain. These services might include engineering, project management, marketing, R&D and industrial design, financial service, freight, transport and logistics, and ICT services.*

This statement impacts the electronics sector positively as one of the problems identified was that the electronics sector is not adequately marketed and promoted. The IMS addresses this problem by integrating marketing as a service, into the value chain.

Another issue faced by the electronics sector that is addressed by the IMS is that of the lack of communication between industry stakeholders which leads to industry fragmentation. One of the IMS's interventions is integrating value matrices. The IMS stresses the importance of relationships between sectors and aims to improve these relationships through the use of value-matrix analysis.

Although the IMS deals with interventions that will be beneficial to the Electronics sector, these interventions are aimed at the manufacturing sector, which is very broad, encompassing a wide variety of sub-sectors. Furthermore the IMS also addresses issues such as international market access which could be very relevant.

## **ADVANCED MANUFACTURING TECHNOLOGY STRATEGY**

The National Advisory Council on Innovation (NACI) advises the Minister of Science and Technology on strategies for the promotion of technology innovation; international scientific liaison; science and technology policy and the co-ordination and stimulation of the National System of Innovation.

In May 2002, NACI identified the need for developing a National Advanced Manufacturing Technology Strategy for South Africa.

The goals and objectives of the National Advanced Manufacturing Technology Strategy are to:

- Develop a vision of the technological profile of the industrial sector in the year 2014
- Identify priority sectors which have the greatest potential for supporting relevant goals contained in the IMS and the NRDS. These goals include national and social goals such as job creation and equity
- Stimulate technological upgrading in industry

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<sup>7</sup> Accelerating growth and Development: The Contribution of an Integrated Manufacturing Strategy

- Facilitate the flow of technological resources to industry through new knowledge networks to foster innovation
- Facilitate the building of an environment conducive to innovation, particularly through the supply of skilled manpower, technology infrastructure and funds

The strategy implementation will be achieved through a combination of Centres of Innovation, Innovation Networks and specific initiatives or projects. Specific programmes such as focused human resource development will be driven through tertiary education institutions. The need to ensure provincial and metropolitan council alignment and support for initiatives is an essential part of implementation.

### **AMTS ANALYSIS**

One of the problems in the Electronics sector is its inability to move the product from the design and development phase through the commercialisation phase to large scale manufacturing. AMTS addresses this challenge to some extent by focusing on technology areas such as product technologies and production technologies to aid commercialisation.

As stated in the Department of Economic Development and Tourism (DEDT) Electronics report<sup>8</sup>, the Electronics sector does not compete in the low-technology, high volume arena, but rather focuses on the higher-technology, low-volume arena. The report recommended that the electronics sector should not try to compete with the major industrialised countries with large scale manufacturing capabilities but rather concentrate on niche product design and client-centric manufacturing of middle to low volume batch sizes. Due to the availability of good quality engineers, the sector has the ability to concentrate more on higher innovation phase electronics and thus has the further ability to develop in the high technology environment.

The AMTS acknowledges that high-technology manufacturing industries offer the greatest advantage for growth and that the requirement for South Africa to become competitive in these areas requires technology intensity, defined and measured by the technology spending per capita. The latter includes domestic R&D as well as the acquisition of foreign technology. Following these findings, the AMTS has included the stimulation of technological upgrading in industry as one of its goals in order to facilitate the adoption of high technology in industries including the Electronics industry. This may sound positive in theory, but unless electronics is identified as one of the priority areas that will be upgraded, it means little to the sector.

One of the relevant and existing innovation centres that the AMTS will strengthen is the National Product Development Centre (NPDC) which is a DST-funded and industry-supported centre managed by the CSIR. Technologies, methodologies and systems used to develop new products from concept through manufacture to usage, as well as the re-design and re-engineering of existing products are

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<sup>8</sup> Western Cape MEDS Electronics Research Studies for Western Cape - Department of Economic Development and Tourism

envisaged to impact on a number of sectors, including the Electronics sector. The use of the NPDC would assist the Electronics sector with its challenge of commercialising its innovations. The NPDC needs to be strengthened to provide R&D on emerging technology areas, such as Virtual Prototyping and improve (through a national programme) South African design competence and capacity thereby impacting on sectors ranging from high-tech aerospace and automotive to the comparably low-tech cultural and crafts sectors.

The AMTS is in the process of reviewing Innovation Networks, one of which is the Advanced Production Innovation Network. The complexity and fragmented nature of production environments, and their requirements for technological solutions have delayed the development of a specific and targeted set of interventions. A network approach, with contributions by both suppliers and consumers of technology is envisaged, but further analysis, lobbying and discussion is required.

Although the overall level of innovation in the Western Cape electronics sector was found to be adequate, precautionary measures should be put in place to ensure that this position remains in the future. The AMTS addresses this through the development of innovation centres and innovation networks. The challenge for the Western Cape would be to protect the intellectual property from these developments and to ensure that these innovations are leveraged in the province. The Western Cape must enjoy the full benefits of its innovations through the entire development and product life cycle.

The AMTS's initial focus included the automotive, cultural and craft, clothing and textiles, metals, chemicals, aerospace and capital goods sectors, but not specifically the Electronics sector. However, within the above-mentioned sectors, electronics aspects were included such as electronics relevant to the automotive sector and the aerospace sector.

### **THE PROVINCIAL ADVANCED MANUFACTURING TECHNOLOGY STRATEGY (PAMTS)**

As part of the national implementation of the AMTS, the Western Cape was selected as a pilot and electronics as the first potential technology group to define a strategy for. The objective of PAMTS is by focusing on technology areas such as advanced materials and advanced production technologies to formulate implementable actions and projects that encourage the respective industries to exploit new market opportunities. The process of formulating these plans is done through interactive multi party workshops with industry experts.

For the purposes of developing the Western Cape's manufacturing industry five key sectors were evaluated, these included: crafts, clothing and textiles, food, electronics and metals and engineering.

The Electronics Western Cape PAMTS is the most relevant and recent strategy to the electronics sector. The strategy is still in draft format and awaiting approval from critical stakeholders. The strategy is expected to be finalised in June. This strategy describes the Electronics sector in the Western Cape, identifies trends in the sector, defines the challenges faced by the sector and makes recommendations as to how to bridge these gaps.

The PAMTS developed through a process of interactive work-sessions between various industry stakeholders from private companies, tertiary institutions, the CSIR and provincial government, a set of broad policy recommendations to advance the electronics sector in the Western Cape.

*Table 5: PAMTS Broad Policy Recommendations<sup>9</sup>*

<b>Initiative</b>	<b>Activity</b>	<b>Priority</b>	<b>Cost</b>
Develop Collaboration Networks & clusters for local sector	<ul style="list-style-type: none"> <li>▪ Develop neutral body for industry and government collaboration</li> <li>▪ Develop processes and structures to allow SMMEs to cluster</li> <li>▪ Share good practice</li> </ul>	Very High	R1m to set up neutral body R1.5m pa for projects
Develop Strategy for Industry	<ul style="list-style-type: none"> <li>▪ Neutral body involving local industry and government to collaborate on a regional sector strategy- can use CITI method as example of how to work together</li> <li>▪ Precursor to the strategy is a proper understanding of the current sector dynamics.</li> </ul>	Very high	R150K for research R250K for strategy
Develop the Skills necessary for Innovation and growth of the sector	<ul style="list-style-type: none"> <li>▪ Develop projects and programmes for skills optimisation, including:               <ul style="list-style-type: none"> <li>○ design engineering incentivised</li> <li>○ new business development</li> <li>○ business rescue</li> <li>○ funding focus</li> <li>○ align teaching with industry needs a industry/ academia workshop</li> <li>○ bursaries</li> <li>○ streamlined easy use SETA's</li> <li>○ continuous learning ... in service training internship</li> </ul> </li> </ul>	High	Unknown-project dependant
Innovation Support activities	<ul style="list-style-type: none"> <li>▪ Develop projects and programmes for innovation support and bridging between research and commercial product, including:               <ul style="list-style-type: none"> <li>○ Industry input in academic programmes</li> <li>○ Research and development hub for SA in the Western Cape- a techno park</li> <li>○ Develop an Innovation support centre</li> </ul> </li> <li>▪ Develop Strategic research fund for specialised</li> </ul>	High	Dependant on projects

<sup>9</sup> Western Cape Provincial Manufacturing Technology Strategy- Electronics Sector, R. Naidoo

	<p>focus areas, including:</p> <ul style="list-style-type: none"> <li>○ flexible electronics</li> <li>○ nano materials</li> <li>○ wireless technology ... wireless</li> <li>○ bio integration</li> <li>○ miniaturisation</li> <li>○ software development</li> <li>○ photovoltaics ... low cost photovoltaics</li> </ul>		
Market Development	<ul style="list-style-type: none"> <li>▪ Improved market intelligence</li> <li>▪ Central marketing research – spotter</li> <li>▪ Niche gap analysis</li> </ul>	High	~R1.5m pa.

The programme also assessed the various current and potential electronics technologies at play in the Western Cape and shortlisted four most viable technologies for further analysis, energy, wireless, RFID and nanotechnology. From these four it was assessed that the energy electronics technologies present the biggest opportunity to the Western Cape, specifically renewable or alternate energy. Within this area the attention was focussed on solar technologies for which a clear strategy was developed from an in-depth value chain analysis.

*Table 6: PAMTS Solar Energy Electronics Strategy Recommendations<sup>9</sup>*

<b>Initiative</b>	<b>Activity</b>	<b>Priority</b>	<b>Cost</b>
Development of the Photovoltaic and Nano crystalline Industry	Provincial Government Western Cape (PGWC) and Wesgro to investigate the feasibility and viability of attracting a global technology player in photovoltaic to South Africa to build and operate a globally competitive Si Foundry	Very High	R0.5m
	PGWC and Wesgro to attract PV cell fabrication companies to SA. In addition, the establishment of local Cell fabrication companies is to be promoted.	High	R0.5m p/a
	PGWC to Develop a bridging programme for linking ongoing R&D in the Academic institutions with private investors and global players in the arena of photovoltaics.	high	R0.75m p/a
	Create a community of interest in nano crystalline electronics and products – include government and industry (a local industry body).	high	R1m p/a

## **PAMTS ANALYSIS**

This strategy has not yet taken effect and hence, its success can only be measured in a few years. Through the involvement of industry experts and critical stakeholders, the Electronics Western Cape PAMTS accurately identifies gaps experienced in the sector. The findings in this strategy are similar to those from DEDT's Electronics report.

The recommendations made in the Electronics Western Cape PAMTS are very closely aligned to the findings of the NRDS programme by recommending the establishment of projects and programmes for innovation support to bridge the gap between research and commercial products.

The PAMTS further recommended the development of a neutral body for the industry and facilitating government collaboration. This supports the NRDS's objective of creating an effective government science and technology system.

Although the PAMTS initiative is the most relevant study to the Western Cape electronics sector of all the policies and strategies, it could further be enhanced by taking a slightly broader approach to the industry by focusing on electronics in sectors other than the energy sector, for example, telecommunications, security and automotive electronics. The focus of the PAMTS was on identifying specific technologies to promote new manufacturing opportunities in the Western Cape, while existing expertise in areas such as telecommunications or wire-less signal processing could be enhanced or promoted.

While the strategy gives an indication of the types of activities required but does not specify implementation timeframes and key performance measurement criteria to track implementation.

## **THE NATIONAL RESEARCH AND DEVELOPMENT STRATEGY (NRDS)**

The intention of the National Research and Development Strategy is to develop a strategic view of all actors, stakeholders and participants of the National System of Innovation through a single responsible department. This will allow better governance, more effective resource allocation and better outcomes in the short, medium and long term.

Three operational strategic objectives were defined as part of the NRDS, including:

1. Innovation must be facilitated through the technology missions
2. Human capital development and transformation must be an outcome
3. Creating an effective government science and technology system

The innovation "pillar" involves the establishment and funding of a range of technology missions that are critical to promote economic and social development.

The key objective of technology and innovation missions is acceleration of economic growth and the creation of wealth on a sustainable basis, and the improvement of the quality of life of South Africans. Such missions create conditions for accelerated innovation based on technology.

It is the aim of the NRDS to enable South African organisations which currently have little opportunity or resources for quantum innovation, to promote innovation. South African and more specifically the Western Cape electronics sector has shown signs of good technologies that are lost or not commercialised because of a lack of innovation resources..

The success of the NRDS will in the long run be measured by the overall South African:

- Improvement in quality of life through enhanced adoption of positive innovations.
- The ability to generate wealth and employment based on enhanced adoption of imported know-how, an increased rate of innovation and improvement, and the incubation and establishment of new enterprises.
- An increase in technological support to existing firms in the target domain.
- Increases in the number of science, engineering and technology human resources.
- Levels of, and increases in, foreign direct investment.
- Real increases in private sector R&D spending.
- South African controlled global intellectual property licenses.

## **NRDS ANALYSIS**

As with the AMTS, the NRDS also recognises that good technologies are lost or not commercialised because of a lack of innovation resources. This is a problem not unique to the Electronics sector. The NRDS has committed itself to alleviating this problem through the establishment of clear mandates and responsibilities within government regarding the promotion of the commercialisation of research results. Furthermore the NRDS aims to provide the assurance that the relevant research projects are adequately funded and effectively carried out.

However, a key member involved with the NRDS has indicated that the funding available will not be enough to achieve this goal as well as all the other milestones needed to be reached to achieve the NRDS's objectives. This is a problem that all sectors in the country experience in terms of R&D.

The NRDS<sup>10</sup> understands that funding of R&D is a problem and states that government needs an integrated R&D plan and consistent performance measurement in order to meet the requirements

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<sup>10</sup> The National Research and Development Strategy

relating to the optimisation of government's investment in research and development. The NRDS lists a number of initiatives to be undertaken for this to be effective, including, among others:

1. The respective line departments will set R&D goals and budgets for institutions reporting to them, within the standard framework described above. The budgets would specify the funds allocated to self-directed strategic research within the broad mandate of the institution and the proportion allocated to service work for the relevant line department. In this regard, each line department will have an R&D plan which forms part of the National R&D Plan.
2. In order to ensure effective integration and predictable financing and coherence, the Department of Science and Technology (DST) would assemble all inputs into a Science and Technology Budget, and through this instrument advise Treasury, the Cabinet and Parliament of the important dynamics in the system. DST would also advise Departments of risks associated with funding and outputs from institutions within the system.
3. Government will publish and annually update a three year R&D Plan aligned to the MTEF, capturing its R&D vision as well as key targets and investments. The R&D Plan will capture the programmes of each department, including the targets expected of parastatal institutions and the return on investment (ROI) expected from transfer payments. The drafting of this plan would be the responsibility of DST and it is envisaged that it would be tabled before Parliament on an annual basis.

It is clear that the AMTS and the NRDS both have similar objectives. Both strategies address the problem of commercialisation of innovations and the preservation of local innovation itself. While both strategies support each other, some duplication does occur. With regard to the commercialisation challenge, although both have the same goal, each has different strategies in reaching that goal. Strategies that complement each other such as the AMTS' plans on achieving its goal through product and production technologies and the NRDS's plans on doing so by targeting the government.

On the other hand, there is some duplication in terms of innovation. The NRDS proposes a Foundation for Technological Innovation (FTI) which will draw together and integrate the management of disparate innovation and incubation. This is similar to the Innovation Centres and Innovation Networks that the AMTS recommends.

## **CONVERGENCE BILL**

A Convergence Bill has been passed in the telecommunications industry to improve on the Telecommunications Act. This Convergence Bill addresses amongst others issues such as decisions about digital broadcasting, use of voice-over internet protocol (VOIP) and licensing of switched network architecture (SNA). Since electronics play an important role of the telecommunication industry, the implications of this bill will be directly applicable to the electronics sector.

## **CONVERGENCE BILL ANALYSIS**

The convergence bill states that *in controlling, planning, administering, managing and licensing the use of the radio frequency spectrum, the Authority must plan for the conversion of analogue uses of the radio frequency spectrum to digital, including the migration to digital broadcasting in the Authority's preparation and modification of the radio frequency spectrum plan.*

Digital broadcasting will add value to the consumer through its multi-functional aspect, for example, cell phones may pick up radio signals and the consumer can listen to the radio from their cell phones.

Similarly, the use of Voice-Over Internet Protocol (VoIP) will add value by allowing consumers to save money from the lower internet tariffs comparable to telephone and cell phone charges. VoIP is a technology whereby an organisation's Local Area Network (LAN) or Wide Area Network (WAN) can be used to transfer both data and voice.

The re-regulation of the telecommunications industry through the Convergence Bill will have both positive and negative impacts on the electronics industry. From a positive perspective, the industry stands to gain due to the increased demand of new value-added services and products and adoption rates of consumers. Conversely the impact on fixed line and traditional telecommunications could negatively impact on the traditional telecommunication electronics providers in the form of a loss in market share. The changes initiated by the Convergence Bill are being implemented at a fairly slow rate.

## **THE SUPPORT PROGRAMME FOR INDUSTRIAL INNOVATION (SPII)**

*the dti* introduced the Innovation Support for Electronics Scheme (ISE) in October 1989 to promote the local design and manufacture of innovative electronic products. Owing to the need to offer a wider support structure, the Support Programme for Industrial Innovation (SPII) replaced the original programme on 1 April 1993. SPII is designed to promote technology development in manufacturing industries in South Africa through support for innovation in competitive products and/or processes.

The SPII Programme offers three schemes, namely the Matching Scheme, the Feasibility Scheme and the Partnership Scheme.

1. The Matching Scheme gives a grant of 50% of the actual direct cost incurred in development activity, up to a maximum grant amount of R1.5 million per project. As of 1 January 2005, the Matching Scheme was exclusively available to SMEs.
2. The Feasibility Scheme supports the preparation of a feasibility study for potentially innovative projects by means of a grant of 50% of the costs of a consultant. The grant is limited to R30 000 and only SMMEs qualify for support.

3. The Partnership Scheme gives a grant of 50% of the actual direct cost incurred in development activity, with no maximum grant amount and with a repayment mechanism in the form of a levy on sales. The Partnership Fund is intended to fund large-scale R&D.

Since 2000, SPII has approved 184 applications received from companies from the Electronics sector nationally – no specific statistics could be obtained for the Western Cape portion of these applications.

### **THE TECHNOLOGY AND HUMAN RESOURCES FOR INDUSTRY PROGRAMME (THRIP)**

The Technology and Human Resources for Industry Programme (THRIP) aims to boost South African industry by supporting research and technology development, and by enhancing the quality and quantity of appropriately skilled people.

The following funding criteria currently apply:

- A maximum of R150 000 per SA student (at 4th year level of study or higher) involved (spending at least 20% of time on project) in the project.
- Matching of industrial partner's financial contribution according to approved ratio, for all the THRIPable costs of the project, except for intellectual property rights (IPR) funding, which works differently.
- Matching of contributions in kind (at historically disadvantaged institutions (HDIs) only), according to approved project support ratio, to a maximum of R1 million per project per year.
- A THRIP contribution to Technology Innovation Promotion through Transfer Of People (TIPTOP), according to the approved project support ratio, to a maximum annual package of R300 000.
- A once-off contribution to a SMME or to a project leader based at a Higher Education Institution (HEI), of a maximum of R10 000 towards the cost for legal advice on the development of an agreement on the treatment of IPR. This amount need not be matched by an industrial partner contribution.

### **THE SPII AND THRIP ANALYSIS**

The SPII and THRIP programmes offered by *the dti* and the NRF respectively assist companies in the early stages of product development, with companies having to accept the responsibilities for costs of the commercialisation stages. The Electronics report<sup>11</sup> found that the maximum grant amount of R1.5 million per project offered by SPII is insufficient for most R&D expenses in the Electronics sector. Since 2000, nearly 30 applications have been approved by THRIP in the Western Cape Electronics sector. Nationally, 184 electronics applications have been approved by SPII since 2000. The majority of respondents interviewed however indicated that their experience of applying for these incentive

programmes has been unsatisfactory. The process is extremely time-consuming with various information requests and qualification criteria required to be completed. SMEs normally end up making use of consultants, at a cost starting from a minimum of R 20 000 per application, to assist them in completing all the paperwork due to the fact that they do not have the capacity to get to everything. In the case that they do qualify for the incentives and it is approved it takes in some cases in excess of 18 months before they get the benefit from these incentives. The overall consensus was that the effort required to apply for these incentives is not worth the value of the final benefit.

## 5 OVERALL ANALYSIS

Applying the policy framework to the industrial environment in South Africa and relating it to the electronics sector indicates to us that there are currently already programmes, policies and incentives in place addressing each of the focus areas.

*Table 7: Applied Government policy levers*

Skills	Institutional
▪ Skills development act levy	▪ EIF
▪ Wage incentives	▪ Electro-technical export council
▪ ISETT SETA	
▪ MERSETA SETA	
▪ THRIP	
Market	Technology
▪ EMIA – Export assistance	▪ SPII
▪ Electro-technical export council	▪ THRIP
	▪ NRDS
	▪ PAMTS, AMTS, IMS
FDI	
▪ FIG	
▪ IDZ	

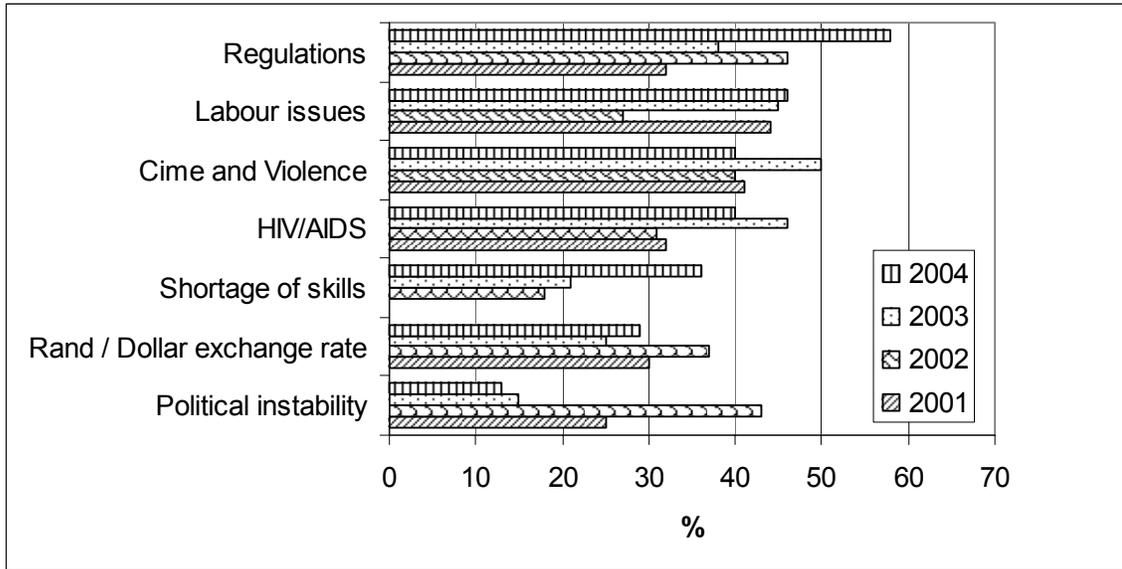
### FDI

From the case studies, it is clear that the pursuit of FDI is one of the primary drivers for enhanced manufacturing capacity. South Africa and the Western Cape have not been very successful in this regard. FDI into South Africa, which had averaged \$2.7 billion over five years (1997-2001), fell to just \$1.1 billion in 2003, while Australia attracted \$11 billion in 2003.

Financial Mail delved into the reasons as to why foreign investors are not attracted to South Africa and the following graph depicts their findings:

<sup>11</sup> Western Cape MEDS Electronics Research Studies for Western Cape - Department of Economic Development and Tourism

Figure 1-2: Top 7 factors that hamper investment into South Africa



Source: Financial Mail

The following factors and trends explain why, despite SA's relative economic strength and lack of barriers to business, investment rates remain low:

**1. Regulatory and institutional conditions:**

This involves confidence and consistency in public policy reforms affecting business BEE requirements, and hidden transactional costs (i.e. logistical, transport and bureaucratic costs). Developing countries tend to regulate more. Heavier regulation is associated with greater inefficiency of public institutions and more corruption – but not with better quality of private or public goods<sup>12</sup>. Faced with a large regulatory burden and few incentives to become formal, entrepreneurs in many developing countries choose to operate in the unofficial economy. Bad institutions (cumbersome entry procedures, rigid employment laws, weak creditor rights, inefficient courts, and overly complex bankruptcy laws) simply do not get used. Instead, businesses use informal institutions, an improvement but a poor substitute for good practice regulation.

Some investors perceive that there has been deterioration in SA's institutional-regulatory environment<sup>13</sup>. However, AT Kearney (2000), suggests that SA's attractive regulatory and business environment is the main investment driver in SA<sup>14</sup>. The World Bank's World Business Environment Survey (WBES) also finds that the registration process for new businesses in SA is more efficient than in several other developed countries, with the overall number of procedures required to establish a business in South Africa being only nine and the time to set-up a business on average taking only 38 days. SA is assessed to be less efficient with respect to contract enforcement.

**2. Labour market issues<sup>15</sup>:**

<sup>12</sup> Doing Business in 2004: Understanding Regulation, 2004. World Bank, the International Finance Corporation and Oxford University Press  
<sup>13</sup> Foreign Companies in SA: Entry, Performance and Impact, 2002. Gelb, S. The Edge Institute  
<sup>14</sup> FDI Confidence Audit, 2000. AT Kearney  
<sup>15</sup> Investment Climate Reform in South Africa, 2003. Vickers, B.

SA's labour market is regularly cited as over-regulated and inflexible, and a significant constraint on investment. The SA National Enterprise Survey (2001) found that labour-related issues (regulations and costs) were the most important reasons for reducing employment levels, especially for small firms. However, the survey suggests that the perceptions about labour regulations are the problem rather than their actual impact on firm employment and profitability. The World Bank's WBES also finds that SA has the eighth least regulated labour market out of more than 130 countries.

### **3. Level of crime:**

The relatively high levels of crime in SA compared to other competing developing countries raises business costs (i.e. higher insurance costs, disruption in production activities, etc).

### **4. HIV/AIDS**

HIV/AIDS does not feature prominently in investor surveys on SA. The high incidence of HIV/AIDS in SA could contribute to a slowdown in multi-factor productivity growth and add to the erosion of SA's social capital. This is an important risk factor, which necessarily impacts on risk-adjusted rates of return on investment<sup>7</sup>.

### **5. Shortage of Skills**

There is no shortage of highly-skilled engineers in the Western Cape Electronics sector. The problem, albeit minor, lies in the skills in terms of the lower end of the scale, i.e. production and manufacturing skills.

### **6. Rand / Dollar Exchange rate**

There are two arguments to the effects of a strong rand. On the one hand, it is bad news for multinational investors who establish export operations in South Africa as well as the further negative impact of ever cheaper import on the local producers. On the other hand, the higher interest rates compared with the US and other countries lead to increased funds inflows from overseas investors.

### **7. Political Instability**

Investors look for stability in the sense that the likelihood of any abrupt regime change is small, as is the possibility of protracted political turmoil. Investors, no doubt, bracket stability with predictability in relation, for example, to the honouring of contracts, the security of property and person, and the independence of the judiciary.

South Africa must be classified as a 'transitional' state in the sense that it has moved out of an authoritarian past and assumed democratic forms that have not yet been fully tested for the depth of their roots. In other words, democratic consolidation is still in progress. Omega Investment Research is an international corporate advisory firm that offers services such as consulting, and business and product development. In 2004, the Foreign Direct Investment Project undertaken by Omega Investment Research found that no fewer than 78% of respondents viewed South Africa as having a "high level of political stability reinforced by the recent election". Broadly, the judgement is correct, and there is little on the political horizon that seems capable of overturning it.

Currently FDI is also promoted through incentives such as the Foreign Investment Grant (FIG) whereby international investors may qualify for an incentive of up to R3 million for companies operating in manufacturing and tourism sectors with foreign shareholding of at least 50%. This incentive is applicable for new machinery and equipment acquired from abroad and required to establish a

manufacturing project in South Africa. A key shortcoming of the Western Cape is the availability of an Industrial Development Zone (IDZ). There are currently five IDZs in South Africa, located in Gauteng (1), KwaZulu-Natal (2) and the Eastern Cape (2). An IDZ offers the following benefits to the investor:

- Direct links to an international port or airport
- World-class infrastructure, specially designed to attract tenants
- Suitability for export-oriented production
- Dedicated customs support services to expedite excise inspection and clearing
- Duty-free importation of production-related raw materials and inputs
- A zero rate of VAT on supplies procured from South African sources
- Import status for finished goods which are sold into South Africa
- Government incentive schemes
- Reduced taxation and exemption for some activities/products
- Access to the latest information technology for global communications

Foreign investors and MNCs looking for alternative sites for their operations, consider a number of criteria when evaluating potential options. The issues discussed initially play an important role as well as the following factors::

- Low overall manufacturing costs

This criteria focuses primarily on cost of wages of suitably qualified labour force. This is an area where the Western Cape could distinguish itself by offering rather cost effective engineering skills.

- Geographical location

This aspect affects time-to-market efficiency, distribution, after sales support and logistical effectiveness. A further important consideration is not only effective communication due to time zone similarities but also cultural and language alignment required for contract negotiation and delivery.

The Western Cape is not only well located to Europe but also to provide a good base to provide products and services to West Africa as proven by Psitech.

- Advanced infrastructure

MNCs further evaluate telecommunication, transportation, electric power, natural gas, available land, site preparation facilities, modernised harbours and airports as part of their selection criteria.

The Western Cape is has access to all of the above with continued exploration to promote natural gas resources.

- **Market access**

While the local South African market is not necessarily promising enough to convince an international giant to locate operations in the Western Cape, access to the largely untapped African market is a factor to be considered. The Western Cape is ideally located to serve as an export hub to the West African countries.

- **Access to suppliers and Value chain integration**

This is one of the negative aspects in the process of attracting MNCs to the Western Cape, while many of the SMEs could fulfill some of the product requirements of the large global players, to start of, a large volume of componentry and materials required in the manufacturing processes will have to be imported, until the local industry has sufficiently been mobilised to cater for the requirements.

Currently the Western Cape government is investigating the opportunity of establishing an IDZ in Saldanha and Cape Town to promote FDI.

## **SKILLS**

According to Trade and Investment South Africa, South Africa's manufacturing labour costs averages at US\$3.75 per hour compared to Philippines' US\$0.70/hr, India's US\$0.75/hr and Malaysia's US\$1.65/hr. South Africa has one of the most comprehensive sets of labour laws in the world guaranteeing the protection and rights of employees. Stringent health and safety regulations exist and the many labour unions in the country make sure that these laws and regulations are adhered to. For this reason, the cost of labour is considered high in comparison to countries such as India, Malaysia and China where such structures protecting employees do not exist.

As determined, low labour cost is a crucial competitive element required to enter especially low technology mass producing markets. The potential for South Africa to compete in these markets are limited due to the fact that the minimum labour rates will not likely be lowered nor will the safety standards and organised labour be changed to allow for lower labour and production costs. The best opportunity for the local electronics sector to compete will thus be to increase the skill and competency levels and enter into higher technology markets.

Skill development programmes promoted by EIF are supported by ISETT SETA, although electronics manufacturers can also approach MERSETA for training courses. A number of companies in the Western Cape have also remarked that in-house developed and presented courses are necessary to train employees in specialised manufacturing procedures such as PC board placement and welding. Although these requirements are focused around specific manufacturing practices and equipment, this could be an area that the SETAs would investigate to broaden their offering.

The government already initiated policies such as the Skill Development Act levy and incentives such as the Wage Incentive and Skill Support Programme to motivate companies to continuously development the skills base of their workforce.

The Western Cape is in the fortunate position of having three tertiary education institutions which forms a source of high quality engineers to the industry. The continued support of these institutions as well as the alignment of private firms and the universities to determine the skill requirements is critical to sustain the development of a competitive edge of the high technology capabilities.

## **INSTITUTIONS**

Of the 476 members of the Electronics Buyers' Guide, 74 are based in the Western Cape. Of these 74, approximately 50 companies are involved in manufacturing. Half of these manufacturers manufacture components such as printed circuit boards, temperature systems, voltage sensors, battery chargers, heater controls and oxygen utilisation rate meters. The other half are spread across many industries including telecommunications, automotive, IT, consumer electronics, power electronics, defence, aerospace, security, and testing – most of these sectors contain no more than five electronics companies. This thin spread shows that the industry is very fragmented with little cohesion and the lack of critical mass makes the establishment of a cluster difficult.

This proves to be a challenge for the sector in terms of establishing a unifying association as well as a cluster. Currently the Electronic Industries Federation (EIF) and the Electro-technical Export Council are the only representative bodies established to represent the electronics sector. The role that the EIF intends to play is focused on:

- Engaging government and key parastatals in the formulation of policy favourable to the development of a healthy, globally orientated electronics industry
- Capacity building in all value-add activities of the industry aligned to the total electronics value chain from research and development to marketing and distribution
- Facilitating the development of co-operative export ventures
- Facilitating the development of skills through close cooperation with ISETT SETA
- Setting up mechanisms for SMMEs to facilitate their access to available business and funding.

While these intentions of the EIF are very relevant and necessary there seems to be quite a bit of overlap with the Electrotechnical Export Council. Considering that the EIF has only 40 members it would seem as if it finds it difficult to get support from the industry. One of the reasons is that the electronics industry is such a diverse field, companies would rather support and be members of associations representing the immediate sector that they're in (e.g. telecommunications, IT, etc.) rather than waste their time supporting an electronics association that will not benefit them as much and with whom they tend to have very little in common. A further constraint is the fact that there is no local, Western Cape, based representation for the electronics sector, to promote the objectives as defined for the EIF. Both the institutions discussed are based in Gauteng and have a national focus.

While the diversity of the Western Cape electronics sector and the relative low level of representation of like industry or sub-sector firms may make the establishment of a Western Cape electronics Cluster unfeasible, there is merit in pursuing the objectives mentioned. This can be achieved through a closer alignment to the Electrotechnical Export Council and for instance Wesgro, to promote the competence and capabilities of the electronics sector in the Western Cape to trade delegations. This vehicle could also be used to disseminate business intelligence on potential international growth areas and markets.

## **TECHNOLOGY**

While this area enjoys considerable government support through various national programmes, the current national policies/strategies are all generic strategies aimed at the manufacturing industry with peripheral impact on the electronics sector.

Overall, the SPII and the THRIP programmes have not significantly benefited the sector in the Western Cape. Only a handful of companies use these programmes. For example, 26 applications have been approved by THRIP from 2000-2004 for Western Cape based companies and organisations, averaging at five applications per year, and these applications have come from only nine companies. Through interviews with industry experts, it was found that the application process for these and similar incentive programmes is too cumbersome.

Furthermore as mentioned previously, the AMTS aids the commercialisation of innovations through innovation centres such as the National Product Development Centre (NPDC). Judging from the number of innovations that have been commercialised in the Western Cape, it is clear that AMTS is yet to have a positive impact on the electronics sector in the province. One of the more well-known innovations that have successfully moved into commercialisation phase is SUNSAT. Designed and built almost in its entirety by postgraduate students from the University of Stellenbosch, SUNSAT-1 heralds South Africa's entry into the Space Age. Its primary purpose is to take low-cost, high-resolution photographs of South Africa.

However, it was launched in early 2000 prior to the launch of the AMTS in 2002, and hence, its commercialisation success cannot be attributed to AMTS. The same is true for the EDH speed gun which was invented in 1992 but was only launched in the country in 1996, still 6 years prior to the launch of the NRDS.

The current support programmes and incentives offered in the area of technology development and transfer addresses the one method of technology enhancement in the industry, being developing itself. The local universities again play an important role in this. Although the uptake of these existing programmes and incentives is slow it would not be feasible to offer any additional or alternative incentive or fund. It is rather advisable that the method of delivery of these incentives be streamlined to be more "customer friendly".

## **MARKET**

Since 1994 the South African government has actively pursued and implemented Free Trade Agreement principles in most industries across the world, with the result that import duties on electronic goods and components are in most cases zero, providing no import protection for local manufacturers. This position is not likely to change in the future. Implications of multilateral agreements to consider include:

- GATS governing transparency in supplying products to developed world and most-favoured-nation (MFN) treatment.
- Trade-related Investment Measures (TRIMs) prohibiting the use of tools to leverage FDI
- IP transfer inhibited or made more costly through TRIPS (Trade-related Aspects of Intellectual Property Rights) Agreement

In order to improve trade the focus has been on export promotion through programmes such as the Export Marketing and Investment Assistance (EMIA) programme which supports exporters with:

- Primary market research
- Foreign direct investment research
- Participation in national/mini-exhibition areas
- Inwards and outward trade missions
- Exporter training

The activities of the Electrotechnical Export Council in supporting local producers with market intelligence on international markets and opportunities can be further enhanced. In interviews with Western Cape producers a specific requirement was expressed for better support in breaking into new international markets by providing contact information and competitive intelligence on international producers and buyers as well as access to foreign market bids and tenders.

## **6 ELECTRONICS SECTOR POLICY AND STRATEGY RECOMMENDATIONS**

Taking into account the disparate nature of the Western Cape electronics sector, with no clear areas of specialisation or differentiation and a relative low level of representation in a variety of different sub sectors, it is difficult to high-light a specific growth area.

Also considering the various current initiatives already implemented by the National Government to stimulate and promote the development of the industrial capability of the country, of which the Western Cape electronics sectors forms part and parcel. It is therefore not viable to recommend a specific growth strategy or policy for the Western Cape. It is rather recommended that a greater alignment and leveraging of national programmes should be pursued while adopting a hold strategy to the electronics sector in the province, of maintaining the industry in terms of research and development, skills base and innovation, through generic strategies/policies.

### **FDI**

The value to be leverages from FDI in the Western Cape can never be ignored, and while there is no clear focus as to the type of MNC to target and attract, the province should focus on preparing the most conducive environment favourably compete with other regions nationally and internationally looking to attract similar FDI.

#### *Create an attractive environment for MNCs*

In order to attract FDI through MNCs various aspects as mentioned previously need to be in place, such as incentives, infrastructure and risk finance options to name a few. While incentives such as EMIA and FIG currently exist, the Western Cape Provincial Government should concentrate its initiatives rather on creating an environment conducive to attracting MNCs.

While the Western Cape can comply with most of the criteria mentioned, the establishment of an IDZ would place the province on par with other South African regions also looking at attracting FDI to stimulate economic development and growth. The Provincial Government should further investigate the possibility of establishing an IDZ in the province as well as targeting and approaching MNCs to locate in the Western Cape. The ability to successfully attract such MNCs has been proven through companies such as Tenesa..

### **SKILLS**

#### *Maintain skills base*

Continue to upgrade the services provided by ISETT SETA to support the requirements of the sector to enhance the skills of labour and lower management. Efficient service provision should also be addressed to ensure that the availability of services from the SETAs is enhanced and the interaction with private firms continues.

Research and development and design skills should continuously be upgraded to stay in-line with the latest technology developments, by the tertiary institutions. Healthy interaction between public private and tertiary institution to align with industry and provincial requirements should be encouraged. This relationship is not only important in determining the most relevant curricula but also in promoting research and development.

Similarly to Hong Kong and some of the Latin American Countries (LAC), the Western Cape needs to find a competitive advantage in either complex activities or high quality standards, to offset the relative high wage costs. One potential area where the Western Cape can differentiate itself is by branding as a high quality (“zero defect”) production region. Although most local manufacturers produce to international quality standards, several local system integration companies remarked during the interviews that quality of products produced does not match up to the ideal benchmark quality levels. The sector can enhance the quality of products delivered by defining and agreeing the quality standards to be adhered to and improving test and calibrations facilities as well as enhancing skill levels of operators and quality assurance managers.

Further knowledge areas that can be developed include areas relating to international practices and requirements for effective positioning of local products and services on the international markets. Specific areas of interest are:

- International marketing
- Common business practices
- Cultural business traits
- Legal requirements
- Financial and banking practices

These knowledge requirements can be incorporated with the MARKET recommendations. If it is not the focus areas of the SETAs to provide these development courses it could also be discussed with institutions such as Wesgro, which has knowledge of international trading and has access to the relevant information.

## **INSTITUTIONS**

### *Sub-sector workgroups*

While the high-level of fragmentation and disparity of the sector makes the formulation of an electronics cluster not viable, the potential to formulate sub-sector, such as telecommunications, automotive and security, workgroups to advance collaboration and development of specific technologies and offerings could be promoted. As in the case of the Durban Automotive cluster <sup>16</sup>, the value of clustering in enhancing quality standards, efficiency in the supply chain and operational performance, and knowledge through sharing experiences could be beneficial to the Western Cape electronics players as well.

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<sup>16</sup> Policy lessons in organising cooperation and facilitating networked learning in value chains and industrial clusters, Morris & Barnes

The establishment of these workgroups would not necessarily require full-time representation initially, but would rather function as a virtual organisation with representation of industry players, provincial government and institutions such as Wesgro, CSIR and the universities. The purpose of the workgroup would be to monitor and escalate common industry related issues such as human resource development, operational competitiveness, value chain aspects and new technology developments. While these individual workgroups could initially meet quarterly, opportunities for amalgamating workgroups could be explored if high-levels of commonality is identified.

## **TECHNOLOGY**

### *Maintain Research & Development and Innovative spirit*

In order to stay abreast technology developments to identify development trends and growth opportunities, continued research and development should be promoted. The current AMTS, IMS, SPII and THRIP programmes should be better utilised for this purpose. The provincial government could lobby *the dti* to streamline the delivery mechanism of these programmes to ensure better uptake by institutions and private firms.

Although programmes such as the development of the surveillance satellite is based upon strong collaboration between the University of Stellenbosch and Sunspace, further collaboration between private companies and the institutions is required to promote the technology advancement and innovation in the electronics sector. Successful collaborations require private companies, universities and public organisations such as the CSIR to overcome a number of barriers which make up what has come to be known as the “innovation chasm”. America and Singapore but to name a few countries have successfully managed to overcome the chasm.

Two of the barriers that need to be overcome to promote closer integration and collaboration include:

- **Cultural mismatch between universities and industry<sup>17</sup>**

There is a great misalignment between academia and entrepreneurs, due to the varying nature of definition of success in each field. University scientists is required to publish regularly in peer-reviewed academic journals and entrepreneurs has commercial gain as an objective. To encourage increased interaction between university and industry scientists, performance evaluation systems need to be adjusted to include weightings for patents and the establishment of spin-out companies. Furthermore it is recommended that scientists' performance evaluation criteria include measures for engaging in entrepreneurial activities as well.

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<sup>17</sup> The innovation chasm: how to make university-industry collaborations work By Rolene Liebenberg & Dr. Sharon Nicholson-Herbert

- **Upskilling of university administrators**<sup>17</sup>

Initiatives such as Unistel, a commercial investment and spin-off programme created by the University of Stellenbosch to help scientists and university research products commercialise viable projects, is positive step in promoting innovation. The Department of Science and Technology's (DST) is also focused on supporting and training and development of university administrators that are currently tasked with assisting scientists with the commercialisation of their research outputs. Several workshops have already been sponsored to provide technology transfer office managers, for example, with the development of specific skills such as negotiation, licensing, patenting, project management, marketing, and business development.

#### *Protect Intellectual Property*

A critical enabler of focused research and development is the assurance to innovators that their intellectual property will be protected. The issue of ownership of IP is also a critical inhibitor of collaboration between Universities and private firms. A recent study<sup>18</sup> found that adequate intellectual property protection is cumbersome for domestic investors to obtain. The study reviewed South Africa's IPR regime and revealed a rather mixed picture of the state of IPR protection in South Africa. IPR laws are considered 'state of the art', yet their implementation is often found wanting. In addition, whereas adequate intellectual property protection is cumbersome for domestic inventors to obtain, it is at times so ferociously defended when (mainly foreign) patent owners are involved, that technology dissemination could be hampered.

Trademark registration is crippled by severe administrative and judicial backlogs, rendering trademark protection irrelevant for some products or companies. The design law is cumbersome for innovators, and in need of reform by allowing for amongst other issues the combined registration of functions and design. Furthermore the registration of patents have proven hugely expensive both nationally and internationally, with an international patent costing approximately R500 000 to register. These problems limit the exploitation of patents, designs and trademarks by local inventors, designers and businesses, thereby significantly reducing the benefits of intellectual property protection, and hamper the innovative spirit required to promote continuous research and development.

The Provincial Government could intervene by conducting workshops with industry representatives and academia to formulate the most feasible solution and by lobbying national government to come to a positive conclusion to resolve IPR protection issue.

## **MARKET**

The local electronics sector can be supported by promoting the products and services through and to trade delegations by Wesgro. Dissemination of international market information and trade practices will enable local companies to better position their offerings. The ability for local companies to interact with

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<sup>18</sup> Intellectual Property Rights in South Africa: An Economic Review of Policy

South African embassies abroad to obtain market information should also be encouraged and the vehicle and contact points for such interaction should be established.

## **7 ELECTRONICS SECTOR POLICY AND STRATEGY RECOMMENDATIONS**

While the electronics sector in the Western Cape, currently does not present significant signs of growth, or employment, it is a sector with immense capacity for innovation due to the high level of skill knowledge vested there-in. As we have established from international references, the electronics industry has the potential to stimulate economic growth and therefore should be nurtured to maintain and grow from the current levels of proficiency.

## 8 REFERENCES

1. Convergence bill [http://www.isoc.org.za/documents/convergencebill\\_fromparliamentweb.pdf](http://www.isoc.org.za/documents/convergencebill_fromparliamentweb.pdf)  
Accessed May 10, 2005
2. Coote E and Coetzee K, 2005. Western Cape MEDS Electronics Research Studies for Western Cape - Department of Economic Development and Tourism.
3. Dataweek , 2005. Electronics Buyers Guide.
4. Department of Science and Technology: Vision, Mission and Corporate Values,  
[http://www.dst.gov.za/about\\_us/mission/mission\\_corp\\_values.htm](http://www.dst.gov.za/about_us/mission/mission_corp_values.htm) Accessed May 4, 2005
5. Evaluation of the Innovation Fund Programme, 1998-2001, Rounds 1-3  
<http://www.innovationfund.ac.za/pdf/Evaluation%20of%20IF.pdf> Accessed May 4, 2005
6. Kaplan D, 2003. Manufacturing Performance and Policy in South-A Review.
7. Lall S, 2004. Reinventing Industrial strategy: The role of government policy in building industrial competitiveness, Trade and Industry South Africa.
8. Morris M and Barnes J, 2004. Policy Lessons In Organising Cooperation And Facilitating Networked Learning In Value Chains And Industrial Clusters.
9. Naidoo R, April 2005. Western Cape Advanced Manufacturing Technology Strategy – Electronics Sector.
10. National Advanced Manufacturing Technology Strategy for South Africa (AMTS),  
[www.naci.org.za/pdfs/amts\\_112003.pdf](http://www.naci.org.za/pdfs/amts_112003.pdf) Accessed May 5, 2005
11. Phillips and Xaba, 2001. NUMSA Sector Jobs Summit Project, Electronic and Electrical Engineering Study Report B, NUMSA
12. Policy directions issued by minister of communications  
<http://www.polity.org.za/html/govdocs/policy/telecomms.html> Accessed 10 May, 2005
13. Skills Development Amendment Act 2003. <http://www.polity.org.za/pdf/SkillsDevelopmentAA31.pdf>  
Accessed May 19, 2005
14. Stiglitz J, 1998. More Instruments and Broader Goals: Moving Toward the Post-Washington Consensus.
15. Support Programme for Industrial Innovation website, <http://www.spii.co.za/> Accessed May 4, 2005

16. Teljeur E, 2002. Intellectual Property Rights in South Africa: An Economic Review of Policy and Impact, The Edge Institute.
17. The Department of Trade and Industry, 2004. Research Study into the Contract Manufacturing Sub-Sector Of The Electrotechnical Industry in South Africa, *the dti*
18. The Department of Trade and Industry, A Practical Guide to Cluster Development [http://www.dti.gov.uk/clusters/ecotec-report/dti\\_clusters.pdf](http://www.dti.gov.uk/clusters/ecotec-report/dti_clusters.pdf) Accessed May 10, 2005
19. The Department of Trade and Industry, Accelerating Growth and Development: The Contribution of an Integrated Manufacturing Strategy <http://www.dti.gov.za/downloads/IntegratedManufacturingStrategy.pdf> Accessed May 6, 2005
20. The link between Quality and Global competitiveness [http://www.saqi.co.za/QE\\_ar\\_1003\\_2.htm](http://www.saqi.co.za/QE_ar_1003_2.htm) Accessed May 5, 2005
21. The National Research and Development Strategy, [www.dst.gov.za/legislation\\_policies/strategic\\_reps/sa\\_nat\\_rd\\_strat.htm](http://www.dst.gov.za/legislation_policies/strategic_reps/sa_nat_rd_strat.htm) Accessed May 4, 2005
22. Zysman J, 2005. Creating Value in a Digital Era, Available from: [brie.berkeley.edu/~briewww/WP%20166.pdf](http://brie.berkeley.edu/~briewww/WP%20166.pdf)

## APPENDIX 1

Table 8: Comparison of World Trade Organisation and the Department of Trade and Industry tariff figures

HS Code	WTO rate of duty	Current DTI duty	Higher tariff
85181000	15.0%	0.0%	WTO
85182100	15.0%	0.0%	WTO
85182900	15.0%	0.0%	WTO
85182910	15.0%	0.0%	WTO
85183000	15.0%	0.0%	WTO
85184000	15.0%	0.0%	WTO
85185000	15.0%	0.0%	WTO
85189010	15.0%	0.0%	WTO
85189090	15.0%	0.0%	WTO
85191000	20.0%	0.0%	WTO
85192100	20.0%	0.0%	WTO
85192900	20.0%	0.0%	WTO
85193100	20.0%	0.0%	WTO
85193110	20.0%	0.0%	WTO
85193120	20.0%	0.0%	WTO
85193900	20.0%	0.0%	WTO
85193910	20.0%	0.0%	WTO
85193920	20.0%	0.0%	WTO
85194000	20.0%	0.0%	WTO
85199910	20.0%	0.0%	WTO
85201000	15.0%	0.0%	WTO
85202000	15.0%	0.0%	WTO
85203900	15.0%	0.0%	WTO
85209030	15.0%	0.0%	WTO
85209090	15.0%	0.0%	WTO
85211015	20.0%	0.0%	WTO
85211090	20.0%	0.0%	WTO
85219000	20.0%	0.0%	WTO
85221000	10.0%	0.0%	WTO
85229010	10.0%	0.0%	WTO
85229020	10.0%	0.0%	WTO
85229090	10.0%	0.0%	WTO
85231100	15.0%	0.0%	WTO
85231110	15.0%	0.0%	WTO
85231120	15.0%	0.0%	WTO
85231200	15.0%	0.0%	WTO
85231210	15.0%	0.0%	WTO
85231220	15.0%	0.0%	WTO
85231280	15.0%	0.0%	WTO
85231290	15.0%	0.0%	WTO
85231300	15.0%	0.0%	WTO
85232010	15.0%	0.0%	WTO

85232090	15.0%	0.0%	WTO
85239000	15.0%	0.0%	WTO
85241010	15.0%	0.0%	WTO
85241020	15.0%	0.0%	WTO
85241090	15.0%	0.0%	WTO
85242310	15.0%	0.0%	WTO
85242320	15.0%	0.0%	WTO
85242390	15.0%	0.0%	WTO
85252010	15.0%	0.0%	WTO
85252020	15.0%	0.0%	WTO
85252030	15.0%	0.0%	WTO
85252035	15.0%	0.0%	WTO
85252040	15.0%	0.0%	WTO
85252045	15.0%	0.0%	WTO
85252050	15.0%	0.0%	WTO
85252090	15.0%	0.0%	WTO
85253000	15.0%	0.0%	WTO
85261000	15.0%	0.0%	WTO
85269100	15.0%	0.0%	WTO
85269200	15.0%	0.0%	WTO
85269210	15.0%	0.0%	WTO
85269290	15.0%	0.0%	WTO
85273100	30.0%	0.0%	WTO
85273110	30.0%	0.0%	WTO
85273120	30.0%	0.0%	WTO
85273130	30.0%	0.0%	WTO
85273190	30.0%	0.0%	WTO
85273200	30.0%	0.0%	WTO
85273900	30.0%	0.0%	WTO
85279010	30.0%	0.0%	WTO
85279090	30.0%	0.0%	WTO
85291090	20.0%	0.0%	WTO
85299020	20.0%	0.0%	WTO
85299050	20.0%	0.0%	WTO
85299060	20.0%	0.0%	WTO
85299070	20.0%	0.0%	WTO
85299090	20.0%	0.0%	WTO
85301010	15.0%	0.0%	WTO
85309010	15.0%	0.0%	WTO
85311010	15.0%	0.0%	WTO
85311090	15.0%	0.0%	WTO
85312000	15.0%	0.0%	WTO
85318010	15.0%	0.0%	WTO
85318090	15.0%	0.0%	WTO
85319010	15.0%	0.0%	WTO
85319020	15.0%	0.0%	WTO
85319090	15.0%	0.0%	WTO
85321010	15.0%	0.0%	WTO

85321020	15.0%	0.0%	WTO
85322100	15.0%	0.0%	WTO
85322200	15.0%	0.0%	WTO
85322300	15.0%	0.0%	WTO
85322400	15.0%	0.0%	WTO
85322500	15.0%	0.0%	WTO
85323000	15.0%	0.0%	WTO
85331000	10.0%	0.0%	WTO
85332100	10.0%	0.0%	WTO
85332900	10.0%	0.0%	WTO
85333100	10.0%	0.0%	WTO
85333900	10.0%	0.0%	WTO
85334000	10.0%	0.0%	WTO
85339000	10.0%	0.0%	WTO
85361010	15.0%	0.0%	WTO
85361030	15.0%	0.0%	WTO
85361090	15.0%	0.0%	WTO
85362090	15.0%	0.0%	WTO
85365010	15.0%	0.0%	WTO
85365040	15.0%	0.0%	WTO
85366110	15.0%	0.0%	WTO
85369010	15.0%	0.0%	WTO
85381010	10.0%	0.0%	WTO
85381020	30.0%	0.0%	WTO
85381090	10.0%	0.0%	WTO
85389090	10.0%	0.0%	WTO
85392190	20.0%	0.0%	WTO
85392220	20.0%	0.0%	WTO
85392910	20.0%	0.0%	WTO
85392915	20.0%	0.0%	WTO
85392920	20.0%	0.0%	WTO
85392925	20.0%	0.0%	WTO
85392960	20.0%	0.0%	WTO
85402010	10.0%	0.0%	WTO
85402090	10.0%	0.0%	WTO
85408100	10.0%	0.0%	WTO
85408110	10.0%	0.0%	WTO
85408190	10.0%	0.0%	WTO
85411000	10.0%	0.0%	WTO
85412100	10.0%	0.0%	WTO
85412900	10.0%	0.0%	WTO
85413000	10.0%	0.0%	WTO
85414000	10.0%	0.0%	WTO
85415000	10.0%	0.0%	WTO
85416000	10.0%	0.0%	WTO
85419000	10.0%	0.0%	WTO
85421900	15.0%	0.0%	WTO
85429000	15.0%	0.0%	WTO

85322900	15.0%	0% to 15%	WTO
85329000	15.0%	0% to 15%	WTO
85172000	20.0%	5.0%	WTO
85173000	20.0%	5.0%	WTO
85351000	15.0%	5.0%	WTO
85352130	15.0%	5.0%	WTO
85352190	15.0%	5.0%	WTO
85352900	15.0%	5.0%	WTO
85353090	15.0%	5.0%	WTO
85354010	15.0%	5.0%	WTO
85354020	15.0%	5.0%	WTO
85359090	15.0%	5.0%	WTO
85363090	15.0%	5.0%	WTO
85364110	15.0%	5.0%	WTO
85364120	15.0%	5.0%	WTO
85364130	15.0%	5.0%	WTO
85364910	15.0%	5.0%	WTO
85365090	15.0%	5.0%	WTO
85366190	15.0%	5.0%	WTO
85366990	15.0%	5.0%	WTO
85369090	15.0%	5.0%	WTO
85371090	15.0%	5.0%	WTO
85372090	15.0%	5.0%	WTO
85409100	10.0%	5.0%	WTO
85409900	10.0%	5.0%	WTO
85291010	30.0%	10.0%	WTO
85309090	15.0%	10.0%	WTO
85363010	15.0%	10.0%	WTO
85363020	30.0%	10.0%	WTO
85363030	15.0%	10.0%	WTO
85366120	30.0%	10.0%	WTO
85366130	15.0%	10.0%	WTO
85365140	15.0%	10.0%	WTO
85366910	15.0%	10.0%	WTO
85366930	30.0%	10.0%	WTO
85369020	30.0%	10.0%	WTO
85369030	15.0%	10.0%	WTO
85369040	15.0%	10.0%	WTO
85389048	10.0%	11.0%	DTI
85389045	10.0%	12.0%	DTI
85171000	20.0%	12.5%	WTO
85271900	30.0%	12.5%	WTO
85271910	30.0%	12.5%	WTO
85271920	30.0%	12.5%	WTO
85271930	30.0%	12.5%	WTO
85271940	30.0%	12.5%	WTO
85271990	30.0%	12.5%	WTO
85272100	30.0%	12.5%	WTO

85272900	30.0%	12.5%	WTO
85251010	15.0%	15.0%	EQUAL
85321090	15.0%	15.0%	EQUAL
85352105	15.0%	15.0%	EQUAL
85352110	15.0%	15.0%	EQUAL
85352120	15.0%	15.0%	EQUAL
85352140	15.0%	15.0%	EQUAL
85359010	15.0%	15.0%	EQUAL
85371020	30.0%	15.0%	WTO
85372010	15.0%	15.0%	EQUAL
85372020	15.0%	15.0%	EQUAL
85372040	15.0%	15.0%	EQUAL
85393190	20.0%	15.0%	WTO
85393990	20.0%	15.0%	WTO
85399010	20.0%	15.0%	WTO
85399020	20.0%	15.0%	WTO
85399090	20.0%	15.0%	WTO
85392120	30.0%	20.0%	WTO
85392145	20.0%	20.0%	EQUAL
85392150	20.0%	20.0%	EQUAL
85392245	20.0%	20.0%	EQUAL
85392290	20.0%	20.0%	EQUAL
85392950	20.0%	20.0%	EQUAL
85392957	20.0%	20.0%	EQUAL
85392990	20.0%	20.0%	EQUAL
85393145	20.0%	20.0%	EQUAL
85393945	20.0%	20.0%	EQUAL
85392945	20.0%	21.0%	DTI
85299080	20.0%	25.0%	DTI
85401100	30.0%	25.0%	WTO
85401200	30.0%	25.0%	WTO