CONFERENCE: INNOVATIVE SOUTH AFRICA

The conference entitled "Innovative South Africa" was held from 26-27 June 2006 at the Sheraton Hotel, Place Ropier, in Brussels. It was well organized by members of the DST and Dr Mandy Mzimba from the SA Embassy in Brussels.

"Innovative South Africa" showcased innovation developments in South Africa and provided a platform for developing an innovation policy dialogue between South African and European partners. Recent trends in innovation policy were explored, South Africa's performance in terms of innovation indicators was considered and common benchmarks were discussed. A specific objective was to explore innovation cooperation and investment opportunities between South Africa and Europe (including collaboration within the Seventh Framework Programme of the EU).

Programme:

- Mr Mario Cervantes: Recent in Trends and Policies in Science, Technology and Innovation
- Mr William Blankley: Measuring Innovation in South Africa
- Dr Adi Paterson: Innovation Policy in South Africa
- Mr Jean-Eric Aubert: Innovation Policy – A World Bank Perspective
- Mr Cesar Santos: Innovation policy in the EU
- Dr Eugene Lottering: The Innovation Gateway
- Mr Sean O'Reagan: European Technology Platforms
- Prof Jorma Routti: Developing and Implementing Knowledge Strategies – Experiences in Finland
- Mr Stephan Lamprecht: A perspective on South African Innovation Technology Top 100
- Ms Britta Thomsen: European Cooperation in Innovation
- Mr Thierry Devars: FP7 Research cooperation opportunities
- Mr Johannes Potgieter: Innovation and Technology in South Africa – Enabling Conditions
- Mr Enver Fraser: Meraka Institute – SAP Research Unit for Technology Development
- Mr Jean Severijns: Innovative co-operation models – a regional approach in the Netherlands
- Mr Marc van Gastel: Attracting investment into innovative ventures in Belgium (Flanders)

South Africa was praised at the meeting for being an innovative country, both on the political- and science and technology fronts, in particular President Mbeki’s great

emphasis on science and technology to leapfrog SA into the high technology world. SA received credit for its leadership in Sasol's oil-from-coal technology, and in SA's Pebble Bed Modular Reactor Technology. Speakers from the EU reaffirmed their role as a trusted technology development partner to facilitate the further growth of the technology-based economy of South Africa.

Several outstanding lectures were presented by the South African delegation and these are readily available on the ESASTAB web page. In this report, however, I will only discuss the lectures given by the European delegates.

Recent Trends and Policies in Science, Technology and Innovation (Mr Mario Cervantes):

The EU15 countries with an R&D intensity (R&D spending as a percentage of GDP) of about 1.9% in 2003 are committed to increase their spending to 3% by 2010. In 2003, the OECD had a R&D intensity of 2.25%, whereas the USA and Japan had research intensities of 2.65% and 3.2%, respectively. The R&D intensity of SA is about 0.87%, and DST is committed to ensuring this intensity increases steadily to at least 1%. This growth is crucially important to ensure the continued and increasing international competitiveness of the country. While it is encouraging to note that SA's annual R&D expenditure for the period 1995 to 2005 increased by about 8%, that of China increased by about 19% over the same period. The lack of sufficient investment in R&D is evidenced in SA's poor R&D personnel intensity (% R&D personnel per 1 000 employed), which is less than 2%. This compares very unfavourably with the successful figures for Singapore (R&D personnel intensity of over 10%) and the OECD (8%).

In the OECD, industry still finances about 62% of total R&D, although that share has dropped since 2000. The OECD experienced a growth in government financing of research, particularly in the USA, Canada and Iceland, however, in Japan and Korea there was a slight decline in government spending. Venture capital financing of research is stabilizing, with a growth to US $22.4 bn for the USA in 2005, and a growth to Euro 11.4 bn for Europe. It is also noteworthy that universities in Japan, EU25, OECD and the USA dominate the public performance of R&D (i.e. R&C performed in higher education and government institutions). This important insight should be noted by SA policy makers: In the EU25 about 0.4% of GDP was spent in 2003 on R&D performed at higher education institutions, compared to 0.24% spent at government institutions.

In 2004, the countries in the lead, such as Sweden (2.95%), Finland, Japan, Korea, Switzerland, USA, Denmark, Germany, Luxembourg, Iceland, OECD, Austria, France, Belgium, and the UK (1.25%), had a Business Expenditure of R&D (BERD) between 3% and 1.25%.

In the OECD the number of private and public sector researchers continues to increase as R&D investments rise. This gives grave cause for concern about the future supply of scientists and engineers in those countries, as they are

simultaneously experiencing a declining number of S&T graduates. In addition, as the broader set of skills needed for an innovative economy have become more apparent, the need for well-qualified scientists and engineers in the OECD may well pose a potential threat to SA, since SA-trained researchers may accept attractive career opportunities in the OECD. This once again highlights the imperative to urgently increase R&D funding in SA.

A slower growth in patenting was observed internationally. The dominance of the EU, Japan and the USA is evident from their share of 92.7% of the global patent families in 2000.

In the OECD, national plans for priority setting remain an important means of making commitments and strategies visible, with strategic planning as an important tool at sub government level and, therefore, also at research funding agencies and universities. R&D targets continue to be catalysts for policy action and change within the OECD. The EU remains committed to increasing public R&D expenditures, as driven by the Barcelona targets and the Lisbon Agenda, to ensure that the best research is funded and that the research results contribute to social and economic goals. Universities in the OECD are frequently required to play a central role in the development of innovation clusters. In SA several of the programmes designed by DTI have similar goals in mind.

In the OECD, the overall prospects for science, technology and industry remain positive, but contingent on the global economic environment. The patterns of innovation are changing with the rise in university research, growth in services, globalization and so-called open innovation.

Innovation Policy in the EU (Cesar Santos):

Innovation is a top priority in the EU. The Innovation policy of the EU is based on Innovation Input: viz Innovation Drivers (5) (long term policy); Knowledge Creation (5) (middle term policy); Innovation and Entrepreneurship (6), (short term policy); and Innovation Output Innovation Applications (5) (firm level) and Intellectual Property (5). The numbers in brackets refer to the number of specific indicators per item. In the case of Knowledge Creation, the following important indicators are being used: Public R&D expenditures, Business R&D expenditures, Share of medium and high tech R&D; Share of firms receiving public funding; and University R&D financed by the private sector.

It is important to note that Sweden, Switzerland, Finland, Denmark, and Germany are regarded as the leaders of the innovation performance in Europe. An analysis of the average innovation performance by sector is highly relevant to and important for policy makers in the RSA. These were the highest sectors:

- Electrical and optical equipment;

- Information and communication technology;
- Computer services and related activities; and
- Chemicals and chemical products.

The following were ranked as the lowest:

- Electricity, gas and water supply;
- Textiles and textile products;
- Transport, storage and communication; and
- Mining and quarrying.

The EU is concerned about the so-called innovation gap between itself and countries like Japan and the USA, in the important areas of tertiary education, ICT expenditures, business R&D, and public R&D. In the EU, the greatest bottleneck in innovation performance is the lack of highly qualified people. (See also http://cordis.europa.eu.int/innovation/en/home.html.) South Africa, as a developing country, should consider its performance in commodity production or go directly to high technology products, as Finland has successfully done.

Innovation Policy: a World Bank Perspective (Jean-Eric Aubert):

The World Bank regards innovation as crucial for development. Innovation cannot be imposed from the top down, but can be efficiently stimulated by Government. Innovation policies of countries should not be in the form of an appendix to S&T policies or a new form of industrial policy. Innovation must be an integral part of the mindset at all levels of society, namely at (1) government, including local authorities; (2) firms, including foreign companies (private sector); (3) local communities (social and economic well being); and (4) knowledge institutions, such as universities (in service of development).

The information on the clusters on “Securing Competitiveness in the Forestry Industry” and “Putting Knowledge to Work in the Wine Industry in South Africa” are highly relevant to those South African industries.

The role of government in innovation is very central, namely that of a catalyst ("animateur" - giving life), by providing appropriate incentives and stimulating interactions among the different role players, e.g. universities and firms, like SA's THRIP.

The institutional structures developed by Finland - a leading high technology country - are very relevant: Finland has a National Committee for Innovation at the centre, comprising key ministries such as Finance, knowledge institutions, business and civic society representatives, and connections to the Finnish Diaspora. In addition, and very importantly, local forums with key players are involved. The local forums include

key players who know the city's needs, stimulate activities between universities and local industries and are involved in overseeing the management of resources. The innovation policy should serve both the society and the economy, with core functions and linkages to other established policies. Innovation is like an orchestra: if you have only one instrument, you are seriously limited.

European Technology Platforms (Sean O'Reagan):

EU governments and their leaders have committed themselves to stimulating an increase in research and innovation. The purpose of this initiative – European Technology Platforms (ETP) is to strengthen the EU position as a technologically innovative economy, and it has been recognized that there is much to be gained by coordinating the activities with a wide stakeholder base at the European, national and regional levels.

The primary objective of an ETP, therefore, is to boost European industrial competitiveness within a sector by radical change and sustainable development. ETPs focus on areas of significant economic impact and high societal relevance where there is strong public interest and scope for genuine value added through a European level response. It is important for South Africa to note that the ETPs and the FP7 research themes impact positively at boosting *European* research efforts and efficiencies. These initiatives are thus very directed at benefiting the EU and South African managers should take cognisance of the publication “Second Status Report on European Technology Platforms of May 2006”. (See also http://europa.eu.int/comm/research/rtdinfo/index_en.html.) The publication contains an Annex: “Detailed Status Reports on Individual European Technology Platforms”, which lists 29 such ETPs. Three new technologies have been identified that have lead to radical change in a sector, viz:

- The European Hydrogen and Fuel Cell Technology Platform (HFP);
- Eurpean Nano-electronics Initiative Advisory Council (ENIAC); and
- NanoMedicine – Nanotechnologies for Medical Applications.

Developing and Implementing Knowledge Strategies – Experiences in Finland: An innovation Case Study (Professor Jorma Routti):

Based on the projected growth rates of countries for the period 2004-2015, it is predicted that China's GDP will exceed that of the USA by 2012, and that the GDP of India will also grow substantially by then. However, up until now the GDP of leading countries such as Japan, Canada, Germany, Italy, Brazil, UK, France, Mexico, and the Russian Federation has remained virtually constant.

A strong correlation between the GDP/capita and the so-called Knowledge Economy Index (KEI) was reported for 2002. Countries such as Finland (KEI of *ca* 9.15) and the USA (KEI of *ca* 8.80) also had the highest GDP per capita of *ca* $33 000. In contrast, South Africa with a KEI of *ca* 5.4 had a GDP per capita of *ca* $4 500. The data thus provides strong evidence for the need for investment in a knowledge-based economy in countries like South Africa. Finland is currently a prime example of a country that has been through the stages of industrial and economic development, namely from a resource-driven economy producing forest-based standard products, to an investment-driven economy producing differentiated products, to their current knowledge-driven economy, which is based on domestic knowledge generation and producing products that span completely new markets in the ICT, electronics, machinery and chemical industries. In case of the electronics, rapid and unabated production started around 1992 (production *ca* $1 bn) and this reached *ca* $10 bn in 2004, at 2000 prices. It is therefore not surprising that the exports of Finnish high tech products totalled Euro 9.9 bn in 2001, i.e. 21% of the total exports of goods – a truly remarkable achievement.

Finland has evidently successfully invested in the interconnected and interdependent Four Pillars of the Knowledge Economy, namely:

- Economic and Institutional Regime;
- Education;
- Information Infrastructure; and
- Innovation.

Finland is also the leading country in the EU with the highest number of innovative companies (about 53%) having co-operation agreements with universities for the period 1994-1996. Similarly, the number of innovative companies that had co-operation agreements with public research institutes exceeded 40% during the same period.

FP7 Research Cooperation Opportunities (Thierry Devars):

The European Research Area was created in 2000, and the FP6 to the value of Euro 17.5 bn was managed between 2002 and 2006. The substantially increased FP7 (Euro 50.3 bn) will run from 2007-2013. (Note: the period of the FP7 is longer.) South Africa, China, India, Brazil and Russia are defined as emerging economies and are eligible to receive funding from and to collaborate on some of the FP undertakings. The procedures of the FP7 are intended to be substantially simpler than those of previous programmes.

The Framework Programmes have to serve two main objectives, almost exclusively directed at benefiting the EU. These are:

- To strengthen the scientific and technological bases of industry and encourages its international competitiveness; and
- To promote research activities in support of other EU policies.

The EU research activities are directed at:

- Supporting European competitiveness through strategic partnerships with third countries in selected fields of science;
- Addressing specific problems facing third countries on the basis of mutual interest and benefit;
- Addressing global competitiveness within the international commitment of the Community; and
- S&T Cooperation that will reinforce the community's external relations and other relevant policies.

It is of importance to note that 61% of the total FP7 budget, Euro 32.2 bn, will be directed at nine themes, namely:

- Health;
- Food, Agriculture and Biotechnology;
- Information and Communication Technology;
- Nanosciences, Nanotechnologies, Materials and New Production Technologies;
- Energy;
- Environment (including Climate Change);
- Transport (including Aeronautics);
- Socio-economic Sciences and the Humanities; and
- Security and Space.

South African scientists are encouraged to continue collaborating in the FP6 and also to actively participate in the forthcoming FP7. The collaboration involves not only funding for research, but more importantly, the experience of collaboration in large international research teams, and this experience provides insight into the research planning and thinking of top international researchers. Top-flight South African research groups should be aware of the Ideas SP, which provides the opportunity for individual research teams from the EU to invite researchers from third countries to participate on the basis of their scientific excellence. This provides a big challenge to South African policy makers and individual researchers to ensure that South African scientists are functioning at the level of international scientific excellence. The ongoing Marie Curie International Fellowships Programme also offers exchange opportunities for researchers.

For more information visit the IST Web http://www.cordis.lu/ist.

Innovative co-operation models – a regional approach in the Netherlands (Mr Jean Severijns):

The development of the DSM (Dutch State Mines) in the Maastricht area of Netherlands was discussed. DSM, a company comprising 900 researchers, was initially based on coal and coal products. It would appear that the petrochemical division of DSM was sold to Saudi Arabia, and the Maastricht area is now being totally renovated on the instructions/interventions of the Dutch ministry. At present, DSM offers R&D services for SMMEs in its environment, however, the SMMEs are not permitted to approach DSM directly, but need to work through local development agencies. This is a model that seems to have borne fruit and could thus be emulated by major companies such as SASOL, ESKOM, and the mining companies in South Africa. In a new approach, DSM also buys technologies from German Universities by using funds from the Dutch Government. Their approach to solving complex industrial problems by combining technologies seems to be a great success.

Attracting investment into innovative ventures in Begium (Flanders) (Mr Marc van Gastel):

In Belgium, industrial research funds are made available to both universities and industry, as well as for collaboration between universities and industries. It seems that government support for R&D is readily forthcoming once industry has identified the relevant strategic priorities. Biotechnology is one of the priorities in Flanders, and several of the initiatives coordinated by VITO have led to the establishment of ten biotechnology spin-off companies, which are performing well. The establishment of the innovative spin-off companies were encouraged by attractive tax breaks. In the case of Finland, company tax was reduced to 26%, bringing a multitude of benefits to industry.

Flanders has a lot of experience with SMMEs and is prepared to support the development of SMMEs in South Africa in the amount of Euro 1.0 m. As Belgium is being considered as a springboard for products and technologies into Europe, South Africa is seen as having the potential for a similar role in the African context.

Piet Steyn

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