SA it IS

South African
Information Technology Industry
Strategy Project

ICT Diffusion
and
ICT Applications in Usage Sectors
Executive Summary

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"Fuelling the Information Economy:
To develop a strong South African
ICT Sector to contribute to
sustainable economic growth,
social upliftment and

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Executive Summary

The South African Information Technology Industry Strategy Project (SAITIS) commissioned this study, which sets out to assess the application and diffusion of Information and Communications Technology (ICT) in eight economic sectors— Platinum Mining, Automotive Manufacturing, Clothing Manufacturing, the Deciduous Fruit Industry, Health Information Flows, Cultural Tourism, Multimedia, and Biotechnology. The sectors were chosen to create an international context for a follow-on DTI project—the Phase 2 study—to examine trends in the application of ICT and its diffusion into the same eight sectors of the South African economy and to consider potential applications and ways to enhance the diffusion of ICT into those sectors. A further objective is to recommend a methodology to gather qualitative data in South Africa for the DTI study and to interpret it within the international context.

The first chapter offers a definition of terms, examines prior related studies in South Africa, such as the National Research and Technology Foresight Study and SAITIS and then identifies four international studies of ICT Diffusion. A brief description of the eight sectors included in the study follows, along with a rationale for their selection.

Chapters Two, Three and Four contain material on the eight sectors chosen for this study and the DTI Phase 2 study. Each sectoral section offers a working definition for the sector, a perspective on sectoral applications and diffusion of ICT internationally, preliminary examples of ICT in the sector in South Africa and sector specific comments as to the proposed research methodology in Phase 2.

Chapter Two covers the four 'Traditional' Sectors in the study i.e. Platinum Mining, Deciduous Fruit, Automotive Manufacturing and Clothing Manufacturing and the following summarizes the conclusions of Chapter Two.

Platinum Mining

With the consumption of Platinum and Palladium growing by 5.7% and 11.6% respectively p.a. over the last 20 years, and with South Africa having over 90% of the world's reserves of PGM minerals, the importance of this industry can hardly be overestimated. The capital intensive nature of mining means that large companies (usually large multinationals) dominate the industry. ICT usage has often been very sophisticated and specialised in the core activities of the companies, with applications such as sub-surface mapping using geophysical techniques and real-time process control applications.

Total Platinum sales in 2000 amounted to R2.5 billion, up from R14.9 billion in 1999; the industry employed just over 96 000 people in 2000, about 8000 employees less than the peak in 1991.[1]

The new challenges relate to operating in a more safety—and environmentally conscious—age, the integration of key business processes across multiple mines, and, particularly in South Africa, finding mechanisms to involve local communities and disempowered groups in the benefits of Mining.

Deciduous Fruit

Approximately 65000 hectares of deciduous fruits are produced in South Africa, and the replacement value of the industry is estimated to be R8.1 billion. The industry creates approximately 170 000 job opportunities (85000 permanent and 85000 seasonal) with 365 000 dependants. The deciduous fruit industry in most developed countries has a long history of the use of specialised and often sophisticated software to support the business. Diffusion of the technology and the associ

[1] From South African Mining Industry Statistical Tables, 2000. SA Chamber of Mines at : www.bullion.org.za

ated knowledge has taken place over many years, with the support of government bodies, trade associations, ICT companies and others.

The use of ICT in the Industry can be divided into three categories: Geospatial technologies, involving Global Position Sensing, Remote sensing and weather forecasting systems; Product Management Technologies, involving farm operations support, field data collection and agricultural mapping; and advanced enabling systems such as distance learning, database management and enterprise systems.

Examples of many of these systems exist in developing countries, but they are often not widespread or are limited to select groups of more sophisticated farmers. One of the major needs in developing countries is empowerment, where groups of marginalised people are provided with the means to better themselves.

Automotive

The manufacture of motor vehicles includes the manufacture of motor vehicles for the transport of persons and goods, as well as tractors for semi-trailers, and engines for all of these. The vehicle components sector includes the manufacture of parts and accessories for motor vehicles and their engines (including electrical equipment) and the manufacture of vehicle bodies and trailers. Some basic 1999 statistics paint the picture of a very substantial sector in South Africa which employs 250 000 people, has projected revenues of $US20 bn and ranks 20th in the world.

The international automotive sector is undergoing profound change in two distinct areas: supplier and customer collaboration and telematics. ICT is central to both thrusts and the Internet is the core technology that the industry is using to meet these needs. For instance, industry analysts expect that, in the US at least, within the next couple of years upwards of 70% of firms will respond to bids and Requests for Quotation online.

The South African automotive industry must meet the challenge to become and thereafter remain a competitive production base within the global automotive industry and, equally importantly, how to enhance South Africa's attractiveness as a foreign investment destination.

Clothing

The clothing manufacturing industry consists of all activities directly involved in the manufacture of clothing and related articles. Clothing industry sales reached R 11 Billion in 1999, and have declined slightly since then. The industry currently employs about 135 000 people.

In developed countries, one of the questions being asked concerns the effect that ICT in general and in particular Business-to-Consumer (B2C) or Business-to-Business (B2B) E-Commerce will have on the Clothing sector. The large number of SME-sized enterprises, many of whom are small Cut Make and Trim (CMT) operators, is an important consideration that impacts on the diffusion of ICT in this sector.

The clothing industry is widely dispersed throughout Europe, but its contribution to GDP is only significant in few countries. Italy is a leader in the clothing and textile pipeline, and this industry has been at the forefront of embracing ICT in its design and production functions, as well as demand-supply chain integration. Quick-Response (QR) is one of the predominant strategic issues in the Italian clothing industry, with a number of large retail chains having developed QR systems with their major clothing manufacturers.

Chapter Three covers the Service Sectors i.e. Health and Cultural Tourism and the following summarizes the conclusions.

Health Sector

It is clear that health care has been brought forward both within the European Union and globally (G-8) as one of the sectors in society with great potential for ICT and with great benefits to be gained through their application in the Information Society. International surveys reveal a multitude of public sector and industry-based studies to raise awareness of the potential of ICT and encourage governments and in particular health ministries to facilitate the implementation of what is now commonly called "e-health"

> "The leveraging of information and communication technology (ICT) to connect provider and patients and governments; to educate and inform health care professionals, managers and consumers; to stimulate innovation in care delivery and health system management; and, to improve the health care system."

The very wide scope of Health is narrowed down for the purposes of this project to

> "Data, information and knowledge flows for relevant decision-making in the private and public health care services sectors."

Available information indicates that in South Africa there is a growing demand for improved ICT in the health sector, but this is impacted by various factors, one of which is the "digital divide." In many instances there is a lack of logical integration or interfacing of relevant systems and in some areas health services are supported by non-electronic information systems. The level of ICT diffusion also varies considerably between the public and private sector healthcare services, also with variations within these sectors.

Cultural Tourism

Tourism is not a well defined sector or industry, and Cultural Tourism is even less well-defined. Rather it is an aggregation of industries that includes elements of transportation, hotels and restaurants, recreational and cultural activities and travel operators and agents. The pervasive impact of the Internet (supplemented by Electronic Commerce), and the development of a myriad of multimedia technologies, virtual reality and digital image technologies, is dramatically changing the interactions between players. The value chain is in fact a value network or web in which multiple two-way relationships bring new services and opportunities to the market.

Apart from the traditional applications that underpin the Tourism industry such as Customer Reservation systems, some very innovative ICTs are being developed through EUROMAP, a European Union (EU) project that addresses ICT development specifically for Travel and Tourism. These include a multilingual speech recognition and synthesis system that will allow voice browsing on WAP–enabled devices; various cross-lingual searching tools that will allow users to search Websites in their own language; CRUMPET, a system that will allow the delivery of anytime, anywhere, intelligent information to tourists; and development of portable speech-to-speech translation systems.

Use of ICT is increasingly being incorporated into cultural, educational and outdoors vacations. For example, the Canadian Ecology Centre in Northern Ontario includes the use of various types of ICTs into its wilderness experience e.g. navigation in the wilderness using GPS, listening to wildlife at night with parabolic antennae, navigating and wildlife spotting using night vision equipment, and outdoor digital photography.

At the end of August 2001, Africa accounted for only 4% of International Tourism arrivals with South Africa actually showing a decline over the year. The sector therefore offers an important opportunity to better exploit ICT.

Chapter Four covers the 'New Economy' Sectors i.e. Biotechnology and Multimedia and the following summarizes the conclusions.

Biotechnology

"Biotechnology" was a term first coined towards the latter part of 1918 to refer to intensive agricultural methods. The OECD is currently attempting to define the Biotechnology sector in the same way that it has done for the ICT and the content sector and is suggesting:

> "The application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services."

South Africa only now understands the role of biotechnology in economic development with the government publishing a draft National Biotechnology Strategy in 2001. The total spend on biotechnology R&D was R100 million until 1997 and is now estimated at approx. R200 million. This means that the development of biotechnology even as a sector is very immature in South Africa.

While many biotechnology-related companies in South Africa are multi-nationals, some local companies are actively applying the technology.

Internationally the most well-known biotechnology project has been IBM's "Blue Gene" project, in which a supercomputer with petaflop capacity is being used to uncover the mechanisms underlying the protein folding process; IBM is also working on the collaborative Human Genome Project (HGP) to sequence the entire human genome; Compaq is investing US$100 million in early-stage life sciences companies devoted to genomics and bioinformatics; and Motorola and Hewlett-Packard's Agilent spin-off company are involved in the development of silicon biochips as research tools for analysing thousands of DNA samples at once and rapidly generating large amounts of genetic data.

Multimedia

'Multimedia' is also a relatively new and therefore poorly defined sector. For the purposes of this study, the following definition of multimedia technologies has been developed:

> "Multimedia technologies are systems, products and services—particularly interactive ones—that combine at least three of the following: sound, text, video and graphics."

Generally the generation of multimedia content and the production of multimedia products has been associated with the developed world, where access to the platforms to experience such products and the mechanisms to distribute them (including the Internet) has been more prevalent.

Within the more affluent and business sectors of South African society, the availability of computing and similar platforms required to 'play' multimedia products is reasonably widely available. Content for these products is generally imported, however, with the exception of local business web sites. A wide range of public and private initiatives such as the Multi Purpose Community Centre Program, the Schools Programmes and SchoolNet are further contributing to the potential emergence of a multimedia industry. And are improving the opportunities for access in rural and public areas in South Africa.

Chapter Five provides an overall perspective on the International Scan. Specifically, it identifies a number of key emerging application technologies, such as wireless networks, monitoring and sensing and geo-spatial technologies, which are driving the diffusion of ICT in other sectors of the economy. It also assesses the international adoption of these technologies in the targeted industrial sectors. The intent is to provide a yardstick against which the diffusion and application of ICT in South Africa can be assessed.

The chapter proposes various frameworks to highlight and summarise sector characteristics and support the focus on possible areas of intervention. These frameworks or 'mappings' include the broad applicability of emerging application technologies such as E-Commerce and ERP on the target sectors; categorisation of the target sectors into those that are dominated by large or small companies, with high, low or emerging ICT usage profiles; and categorisation of the target sectors in terms of the benefits to be derived from ICT usage i.e. those sectors most likely to derive revenue benefits such as Product Innovation or cost benefits such as Improved Resource Management.

Chapter Six describes the proposed Research Methodology for the Phase 2 Local Study. It poses the fundamental question to be answered in Phase 2 and examines the research objectives and expected outcomes. It describes the survey process using a questionnaire containing those components that are common to all sectors plus sector-specific questions targeted at the unique characteristics of each sector. A draft questionnaire is included.

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