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The Evolving Role of Academic Institutions in Innovation Systems and Development

The Transformation of the Higher Education Sector & the National System of Innovation in South Africa

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The Transformation of the Higher Education Sector & the National System of Innovation in South Africa:

Universities in Development Working Paper

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Historical Background: Political Economy of South Africa

Introduction

The history of South Africa in the period after the settlement of Europeans on the Southern tip of the continent of Africa is synonymous with conquest and expansion. Commencing as a provisioning station on the Indian Ocean trade route to the East, the subsequent wars of conquest and land dispossession from the indigenous populations together with the conflict between the Boer Republics and British controlled territories, culminated in what came to be known as the Union of South Africa, a British Colony made up of four provinces.

The process of colonization which took almost three hundred years was characterised by the systematic expropriation of the capital resources of the indigenous people through the introduction of a variety of systemic and violent mechanisms designed to force the local population out of its agrarian existence into a role akin to that of an urban proletariat. These mechanisms included direct and forcible controls over the movement and allocation of labour to the emerging mining and the agricultural economy, the payment of a raft of taxes designed to push a rural population into wage labour, strong controls over the right to form trade unions and political organizations, and significantly the *racialization* of political and civic rights which were almost entirely limited to persons classified as 'white'[2]. These controls were rigorously enforced through an elaborate legal, administrative and judicial system and through the systematic process of classification creating the egregious racial categories which came to be the hallmark of South African history for the better part of the 20th century.

Capitalist development in South Africa is a direct consequence of the discovery of significant deposits of diamonds and gold in the second half of the 19th century. Large scale commercial mining of the diamond deposits of Southern Africa commenced in 1870 while gold mining operations began from 1885. Over the next 50 years an economy based on indigenous peasant based surplus production was almost completely substituted by modern capitalist production through the destruction of the capacity of the indigenous population as peasant producers. This destruction of the local economy was itself a consequence of the activities of the Dutch East India Company (DEIC) and its mercantile monopoly over the

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2 Throughout this paper the use of the *racialized* categories and the descriptions ascribed to the people of South Africa reflects the categorizations used by successive South African governments. Regrettably these descriptions continue to be pervasive even in the language and documentation of the post-apartheid state.

trade in the region. The power of the DEIC was however overtaken by British imperial interest through conquest. From the early 19th century it seized upon the opportunity to establish a base in the Cape as a part of its colonising project over the resources of the Indian sub-continent and South East Asia. The mercantile class which emerged out of the process of conquest consolidated its economic position and was able to enlarge its domain of activities developing the infrastructure for the further transformation of the Southern African economy. This it did through the development of banking, economic and trade services laying the basis for capital infusion, export agricultural production and trade aided by a further consolidation of the process of conquest through land ownership and the opening of rail and road links within the region.

New modes of production emerged to rapidly enhance the capacity of the mining economy acting as a supplier of services to this economy. This was accompanied by the appropriation, through a combination of political and economic force, of the surplus produced through the peasant economy. The enduring effect of this was the long term bifurcation of the South African economy and society through the continued and deliberate underdevelopment of the capacities of the indigenous population and the simultaneous extension of the rights and privileges of the European settler population, especially through the direct support for the establishment of the hegemonic position of the emerging agricultural and mining capitalist class.

The initial mode of production based on slavery and imported labour, was rapidly substituted in the second half of the 19th century by the emergence through a set of deliberate policies and the process of conquest of a black and largely urban proletariat (later augmented by the supply of Indentured Indian and Chinese labour in the latter half of the 19th and early 20th century). This process was fostered by the completion of the process of conquest through the various wars of dispossession of land and the introduction of a steady stream of laws designed to forcibly reduce access to land for the black population in favour of the emerging agricultural and mining capitalist class.

On this therefore was based the system of coercive laws for the evolution of a working class whose rights of movement into urban areas were severely limited while at the same time they were forced to engage in labour in the mines and farms of South Africa on the basis of a strictly regulated system of migratory labour controls. This together with the system of land ownership and control established over the next fifty years can be regarded as the foundation on which the edifice of capitalist production in South Africa was to evolve encouraged by ideologies of racial and class differentiation based on the ostensible identities of 'race' described principally as an attribute of colour. These processes of accumulation and their consolidation constituted the generative basis of capitalist accumulation not only in South Africa but also in the Southern African region as

a whole for the subsequent two centuries and more, and continue to have effects on the forms of accumulation taking place in the region to this day. The phenomenon of racial capitalism associated with the apartheid state was a direct expression of these earlier forms of conquest and accumulation and shaped the political economy of the region in ways which came to be recognised throughout the world as the racist system of political control based on the ascendancy of a privileged racial minority.

The Beginnings of the University System

The origins of South African university education can be traced to the establishment of the South African College in Cape Town in 1829 as a response to the need to negate the reliance on overseas study which was costly. The College initially had 115 students and students were prepared for the examinations of the University of London in the UK. By the 1870's a number of other similar Colleges were established because of the growing demand or higher levels of education beyond schooling. These included many institutions whose reputations and fame has grown over time, although not all have continued to provide University level education and many have simply concentrated on secondary education. In 1873 the University Incorporation Act was passed by the then Cape Government and the University of the Cape of Good Hope came into existence modelled on London University. It conducted examinations in a range of degrees including Law, Arts, Divinity, Agriculture and certificates in civil engineering, music and other courses. There was a great deal of growth in the colleges between 1874 and 1916 and various 'university colleges' came into being including the South African College, Stellenbosch College, Rhodes University College.

In 1896 a School of Mines was established in Kimberley but, for reasons which were to become obvious, was transferred to the burgeoning metropolis of Johannesburg in the Witwatersrand in 1903 and became the Transvaal University College. By 1910 it had become the South African School of Mines and Technology while at the same time the Transvaal University College came into being in Pretoria. The Natal University College was set up in 1909. Between 1918 and 1951 six of the seven university colleges originally established became fully-fledged universities and a period of rapid growth in university education took place. The University of Cape Town was established as a fully fledged University in April 1918[3] and the University of Witwatersrand came into being from the South African School of Mines and Technology by 1921. Parliament established the Potchefstroom University College as a part of UNISA which had been established earlier in 1916. The University of Pretoria was established in 1930

3 Phillips, H. (1993) The University of Cape Town: The formative years - 1918-1948, UCT Press, Cape Town

and in 1950 the University of Natal came about. Similar developments took place in other provinces of the then Union of South Africa.

In 1916, significantly, the South African Native College (so-called) was established growing out of the Lovedale Missionary Institution at the town of Fort Hare in the Eastern Cape region of the Union. It was founded on Christian principles yet was exclusively for black students becoming the University of Fort Hare in 1952.

Although a limited access was provided to black students at the Universities of Cape Town, Witwatersrand and Natal, strict segregation was practiced at all institutions in regard to a number of matters such as accommodation , sport and social function and indeed at the University of Natal even in relation to academic courses. A medical school was established for 'non-whites' for the first time at the University of Natal in 1950.

By 1955 the apartheid government began planning towards separate universities for 'non-whites' supporting its conceptions of race and ethnic difference and based on the work of a *Select Committee* of government's whose view was that

> *many educated Africans were not serving their communities because they had been educated along European lines; they were under-developed people who did not yet have the sense of responsibility, the initiative, or the necessary knowledge to found and control their own universities.. If the government of the Union of South Africa was in earnest about the full development of the Bantu, then the establishment of their own university colleges was imperative.*[4]

As a result the euphemistically called *Extension of University Education Act* was passed in 1959. By this Act various racially defined institutions were created between 1960 and 1961. These fell under the control of Ministries of Education also defined racially-such as the disreputable Ministry of Bantu Education. These took control over matters relating to the admission of students to the various types of universities established especially with a view to preventing access of blacks to white institutions and strictly directing students to institutions defined in terms of the particular racial categories conceived by the increasingly strident and racist apartheid government.[5]

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4 Behr and Macmillan (1971) Education in South Africa, van Schaik, Pretoria. The Report, it must be said, was opposed by the University of Witwatersrand: 238-9

5 For similar policies affecting Technikons – the technical education sector at higher education levels see Bot M. (1988) Training on Separate Tracks, SAIRR, Braamfontein Johannesburg, See also Pittendrich, A (1986) The Technikons in

The total number of students enrolled at these newly established university colleges for blacks was approximately 642 in 1960 rising to 3774 in 1969. White students at residential universities not including UNISA totalled 49604 in 1968.[6] There were funding and other disparities affecting these institutions. Teacher training also took place outside these universities in colleges for the purpose. It was this complex of institutions based on the perverted reasoning of the apartheid regime, and which Minister Asmal called the 'geo-political imagination of apartheid planners', that the post 1994 government set out to transform.[7]

The successful deep-level mining of gold and the expansion of diamond mining activities required the larger inputs of capital than were locally available by the beginning of the 20th century. This was the impetus for the 'importation' of capital mainly from Britain and the emergence of powerful mining houses that began to establish a powerful hold on the emerging capitalist system as a whole. These developments are mirrored in the histories of the De Beers diamond mining and other companies – which themselves developed agglomerated and interlocking interests over the next century. In the early period before 1900, less than 15% of the shares in these and other mining houses were held locally. The conflicting interests of local landowning classes and the mining houses whose interests were predominantly based in foreign hands was ultimately the cause of the 'Anglo-Boer War'. At the end of this war the dominance of a capitalist mode of production over the pre-existing feudal mode was firmly established in South Africa.[8]

South Africa, Submitted for the Degree of Doctor of Philosophy, Department of education, University of Natal, Durban [2 Volumes]

6 Ibid: 240 and 244. Of these (white students almost 15000 were in the Arts, 7100 in 'pure science', 8300 in commerce and public administration, 5300 in engineering and 1300 in law)

7 For a resume of apartheid higher education see Beale, M. A. (1994), Apartheid and university Education, 1948-1959, A Dissertation submitted to the University of Witwatersrand for the /degree of Masters of Arts, Johannesburg.

8 Legassick:1974, South Africa, Capital Accumulation and Violence, Economy and Society, London, Routledge, Vol. 2(3) 253-291; Thompson L, A History of South Africa, Yale University Press, New Haven, 1995; Wolpe Harold, Capitalism and Cheap Labour Power in South Africa: from segregation to apartheid, Economy and Society, Vol. 1(4), 1972; Legassick M, South Africa; Forced Labour, Industrialization and Racial Differentiation, Political Economy of Africa Ed. R Harris, Boston, Schenkman, 1975; Greenberg, S. Race and State in Capitalist Development, Raven Press, Johannesburg, 1980; Beinart, W and Delius, P [eds.]Putting a Plough to the Ground: Accumulation and Dispossession in rural South Africa 1850-1930, Raven Press, Johannesburg, 1986

Soon after the end of the War – by 1910, a formal Act of Union was promulgated constituting the Union of South Africa. The rapidly expanding economy and its demands for agricultural products and other services speeded up the processes of industrialisation and the pace of economic, commercial and now industrial activities and the new state played a powerful role by subsidising agricultural production and its consolidation in capitalist forms. Rail transport systems to assist capitalist farming and a nationalised Land Bank were established together with Marketing Boards for agricultural produce.

After the First World War increasing control over the mining industry began to be wrested from aboard by local mining capitalists and as an increasing amount of capital generated by mining remained in South Africa. In fact in 1920 the South African Reserve Bank was formed. It took to itself the power to sell gold – now an increasingly important exchange commodity – and began to regulate the supply of money in the economy. By 1930 40% of mining was under local share ownership as this came to be expressed in the establishment of the powerful Anglo-American Corporation (AAC) whose mining and industrial interests rapidly expanded to include operations throughout Southern Africa and beyond over the next fifty years.

After the Second World War, South Africa developed its industrial production capacities rapidly both in response to the demands of the mining and agricultural economies and the consequent processes of urbanisation and 'modernisation'. In the Witwatersrand area[9] secondary industries began to proliferate as a direct response to the demands of mining – which had now diversified into areas other than gold. These developments led to the formation of a construction industry because on the demand for cement and other construction materials, explosives and other engineering supplies. The largest explosives plant in the world came into being through the formation of the African Explosives and Chemical Industries Company (AECI) jointly owned at the time by the AAC and the British ICI.

The state supported the development of small scale industrialisation through tariff policies and huge investments in infrastructure development. Port cities and harbours grew rapidly both as a facility for the mining industry and as centres of local production in food possessing, textile, clothing, leather and small scale engineering. ESCOM – the state owned electricity generating company, ISCOR, the state owned Iron and Steel Corporation came into being in the interwar years. But even these state owned enterprises drew on foreign inflows of capital. It was in this period too that a number of foreign firms established local subsidiaries such as Ford and General Motors, Dunlop and Firestone, Siemens, Dorman Long and Stewards and Lloyds, Levers and General Electric amongst

9 Around the emerging city of Johannesburg

others. Most importantly the expansion of production was based on a rigid demarcation on skilled and unskilled labour along racially defined lines supported by strong legislation to ensure the protection of the rights of white workers in the economy.[10] And these processes of production and the consequences for labour controls were to expand dramatically after World War 2.

Indeed in the 1960s which followed on a period of relative stagnation in the 1950's, South Africa's growth was exceeded by Japan alone. Manufacturing overtook both mining and agriculture as a contributor to economic growth despite the huge growth of agricultural exports to Europe in the 1950s. The discovery of new goldfields and uranium extraction increased gold mining activity in the 1940s and in the 1960s mining expanded to iron, copper, zinc, magnesium, platinum, copper, chrome, asbestos and other minerals and increased coal mining. Yet the economy was largely labour-intensive and heavily dependent on the labour of semi and un-skilled operatives with a small but critical cohort of skilled artisans and professionals. In this period, and partly as a response to the needs of the developing Apartheid state (which had come into being in 1948), capital intensive growth also characterised economic activity through the growth of the auto-mobile, chemicals, pulp and paper, capital goods equipment, electronics and military hardware industries. The state expanded its role in the economy both through protective policies and national public enterprises and through the activities of the Industrial Development Corporation specially set up to finance and support the growth of industry. This meant for instance that state activities constituted as much as 40% of the economy in the 1960's.

The 1960s saw a greater convergence of private and state capital in new enterprises and in this period, significant loans were also garnered from international (mainly American) sources and the World Bank. After the Sharpeville massacre which was an aberrant period for foreign inflows, capital inflows gathered considerable momentum. A host of American led consortia began to operate in South Africa including such well known names like Johannesburg Consolidated Investments, US Steel, Union Corporation, Numont Mining, Rio Tinto Zinc and others. Added to this was the huge expansion in the automotive sector through General Motors and Ford, Chrysler, British-Leland, Nissan and Toyota, Citroen, Fiat, Mercedes Benz, Volkswagen and other companies. They achieved high rates of return on investment. Local companies too began to grow apace in the textile, canning, food, pharmaceuticals, printing, and industries and through a host of financial institutions, ships chandlers and other companies including the tobacco empire - Rembrandt. This period was also a period of great capital concentration and the beginnings of a longer term process of

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10 Lange, L. (2003) White, Poor and Angry: White working class families in Johannesburg, Ashgate Publishers.

agglomeration resulting in the establishment of a handful of powerful conglomerates which have come to dominate the South African economy.

The process of accumulation described was throughout buttressed by firm controls over the organisation, structure, political and organisational rights of the working class. An avalanche of repressive legislation characterised both the history of South Africa until the demise of apartheid. Its main thrust was to ensure the *rightlessness* of workers in particular and the black[11] population in general. Most importantly these repressive measures provide a basis for understanding issues about the quality, levels and possibilities for educational advancement of that majority, since it was an unequivocal policy of successive governments at the time to deny basic educational rights and opportunities to the black population. The consequence of this was not only the denial of the right to basic education but also had far reaching effects on the potential for the attainment of higher levels of education and training and professional qualifications. The exclusionary educational policies were not merely the function of differential funding (a ratio that was at times as high as 1:15 between 'African' and white children) but also in the racist cast of the curriculum, the poor training of teachers, and the absence of opportunities for acquiring knowledge in the science and technological fields in particular – since the acquisition of skills in the sciences was regarded by the architect of apartheid, Dr. Verwoerd, as of no value for black people who were regarded as no more than 'hewers of wood and drawers of water'[12]. The effects of these policies are clear to see to this day and have had enduring consequences for the advancement of the levels of literacy and numeracy in general and science and technology in particular.

For these reasons, the structural basis of the 'successful' apartheid economy must be regarded as having a tenuous and contradictory foundation. It was subject to both internal and external pressures which inevitably were unsustainable. Internally, there was the concentration of wealth and incomes in the hands of a few powerful conglomerates and the apartheid state on whose patronage whites in South Africa continued to rely. The draconian character of the state and its increasing violence against the black population and especially against any forms of organisation was however unsustainable. It gave rise inexorably to wave after wave of resistance leading to the demise of apartheid.

On the other hand the protective barriers, the costs of war against the frontline states and of the machinery of political repression ensured that the state was

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11 The word 'black' is used throughout this paper to refer to South Africans variously referred to in the apartheid lexicon as 'natives' or 'Bantu' or 'Africans', 'coloureds' and 'Indians'.

12 Tabata I. B. (1959) Education for Barbarism, Prometheus Printers and Publishers, Durban

obliged to use more and more resources towards its military and 'defence' requirements. Externally the end of the gold standard in 1971 and the oil crisis of 1973 and subsequently of 1979 had far reaching consequences for the structure and growth of the South African military-energy complex. The shocks to the economy as a result of these developments were exacerbated by the liberalisation of international capital markets in the 1980s reducing the role of gold as a store of value, expressed through the stock market crisis of 1987 and later 1982 following the Gulf War. Added to this was the fact that South Africa's dominance in gold production was no longer secure given the entry of other sites of production in the world. The reliance of the South African economy on gold now made that economy more vulnerable to international developments. Both output and employment declined by the 1980s even while it remained behind protective tariff barriers.[13]

The combination of these factors and the growing campaign for disinvestment in South Africa by foreign firms strengthened considerably the power of local conglomerate enterprises over the economy. By the end of the 1990s a handful of such companies controlled as much as 90% of the South African stock exchange.[14] This was exacerbated by the sanctions against the apartheid regime resulting in the attempt by the regime to achieve domestic self sufficiency in food, energy infrastructure, weaponry and telecommunications equipment, converting more and more capital resources in the fight against popular revolt and the threat of armed struggle. This 'total strategy' on the part of the apartheid regime was funded by increasing debt resulting from increasing government expenditure relative to current revenue. Government expenditure at this time rose from 15% to 21% of the GDP over the ten years from 1983 to 1993. Similarly foreign debt to GDP ratios rose from 20% in 1980 to 50% in 1985 *and* from 56% to 149% as a percentage of exports of foreign goods, made worse by the withdrawals of capital and lines of credit following 1985.[15] The Reserve Banks attempts to provide stability in the light of capital flight was bound to fail because of the larger political issues which underlay the crisis of the apartheid South African state. Each attempt at providing stability gave rise to its own problems. Hence measures to protect gold from the vagaries of global developments had negative consequences for other parts of the economy especially in the absence of capital inflows to compensate for the large outflows of that time.

The consolidation of Afrikaner nationalism saw the elaboration and the implementation of the ideology of separate development in the form of apartheid. Most of these measures were organised around production and were aimed at maintaining a stable and steady availability of 'cheap labour'. This peculiar

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13 Hirsch, A. (2005) Season of Hope: Economic Reform under Mandela and Mbeki, UKZN Press, South Africa
14 COSATU 'Crisis in the South African Economy [circa 1985]
15 Hirsch supra:24

version of expanding capitalist relations of production had the effect of entrenching stagnation, resistance and ultimately a low intensity revolution with a negotiated transfer of power from the (now defunct) National Party to the pre-eminent national liberation movement, the African National Congress (ANC), at the beginning of the 1990's.

End of apartheid

The demise of apartheid has been open to much academic debate. Very little analytical work exists from the proponents and apologists of the Apartheid regime to indicate how their system would have continued to evolve beyond its own internally generated contradictions and externally imposed constraints. Opponents covering both the liberal and radical traditions have argued that the system of apartheid was unsustainable. For liberals, the scale of state intervention and its effect on the "free market" was a constraint on capitalist development. They foresaw the system collapsing under the weight of an increasingly ineffective bureaucracy and marked labour market distortions. For the radical school, apartheid and capitalist development in South Africa formed a mutually reinforcing cycle. Apartheid created the conditions of servitude and destitution necessary for lowering the cost of working class labour.

Measures such as the Group Areas and Land Acts, the Population Registration Act, systematic job reservation, the homelands policy, controls on movement by people and the separate and significantly unequal educational schemes all fed a post-colonial developmental state which sought to merely maintain the well-being of minority of the population within an enclave of prosperity. The fragmentation, uneven and combined development which this promoted was never seen as being particularly effective, and rather quite contrary, in addressing the aspirations of the vast majority of South Africans.

As repression expanded, resistance within the borders of the country increased. By the 1980's, the South African state had effectively being transformed into a military formation and promulgated successive states of emergency as a means to curbing resistance and opposition from all sectors of the oppressed majority. With the constant and rapidly increasing impact of economic sanctions, international isolation and a decrease in domestic support, the apartheid regime began to negotiate itself out of power. The end of apartheid may therefore be seen as resulting from a combination of both endogenous and exogenous factors.

Globalisation and Neo-liberalism

The energy crisis of the early seventies accelerated the process of consolidation and expansion in the financial sectors across the world. The increasing reliance on a variety of investment opportunities transformed the nature of production in

agriculture, energy, mining and industry. The service sector grew as opportunities for increasing returns shifted towards the developing countries. The sophistication of this process of integration was accompanied by the creation of currency markets wherein trader and investor sentiment became an important component of achieving value. Having a large deficit became very expensive for non-dollar economies. The increased role and engagement of creditor countries and multilateral agencies facilitated this expansion across the globe. South Africa itself was severely affected by the refusal of its key private financiers to provide any sort of debt relief or concessions.

The collapse of the monolithic Warsaw Pact realised the end of the 'cold war'. The use of non Warsaw Pact countries as surrogates in cold war conflict immediately created a lacuna. The post cold war period has seen the expansion of liberal democracies premised on multi-party political dispensations and normatively engaged through universal suffrage. Neither the consolidated state security system in South Africa nor the country's predatory regional stance was capable of being supported in an era where the threat of the communist threat (sic) no longer existed.

The elaboration of an ideological paradigm which venerated markets and sought the withdrawal of state intervention had become the norm throughout the Anglophone world. This was an impact created and consolidated by electoral victories by conservative political parties in both the United States and the United Kingdom. Under the mutually interchangeable nomenclature of *Thatcherism* and *Reaganonics*, the victory of neo-liberalism over all other alternatives precipitated the rather grandiose declaration of the end of history thesis.

Domestic Situation

By the 1980's, organisations opposed to apartheid had begun to consolidate their activities. The private sector and even formations from within the ruling political elite began to initiate talks with the national liberation movement in exile. This led to the National Party initiating a political transformation by the removal of restrictions on some anti-apartheid organisations and the release of prisoners incarcerated for political offences. Within the mass democratic movement (MDM), significant deliberation had been completed on the vision of a post-apartheid South Africa. In planning resistance, people had also begun to articulate how their futures should be organised without the features of apartheid.

As the period until 1990 was still tumultuous, very little movement was possible through a dialogue between belligerents. Rather, the discourse was engaged in through the proxy of non-governmental organisations and academic institutions

who were directly affiliated to the mass democratic movement or the direct machinery of the apartheid state and its agencies.

Growth through redistribution versus Redistribution through growth

The debate about the future economy of South Africa was sharply differentiated into two positions. On the one hand, there were those who argued that the scale and scope of industry would need to expand and through its growth increasingly incorporate those people historically disadvantaged. This trickledown effect, it was argued, would eventually eradicate the distortions of apartheid and ensure sustainability without further constrictions. In this case, the state would need to relegate itself to maintaining public order and withdraw from direct intervention in the economy through the privatising of state enterprises.

In contrast and opposition was the view that redistribution should be seen as an objective in itself. The pursuit of this would then generate the expansion from the historically privileged minority to the vast majority of South Africans. In this scenario it was proposed that redistribution would be the catalyst to growth and that the products of this growth would be redistributed to meet basic demands. In this case, the state would boost demand by redirecting incomes to the poor who would then increase their consumptive demands. The follow through would be an increase in domestic output and hence create the requisite conditions of growth.

The Transition to a Post-apartheid Dispensation

The political transition in South Africa became a public process when the then state president, FW de Klerk, formally announced the lifting on restrictions on banned organisations and began a selective release of its long imprisoned leaders. It was undoubtedly envisaged by him and his party that these interventions would usher in a period wherein South Africa would experience a negotiated transfer of power from a minority regime to a majority democracy over a long and protracted period of transition. The first stage of this process would have seen the establishment of a transitional authority which would frame a constitution and thereby lay the basis for a universally franchised election for a government of national unity.

The actual evolution of the transition did not proceed as planned as the political reality revealed a series of apartheid state sponsored and linked processes of destabilisation and an inept right-wing attempt at a coup. The Convention for a Democratic South Africa (CODESA) did however provide a forum through which representatives of the various constituencies began to negotiate the future of South Africa's democracy.

This provided the space for deeper constituency based developments to flourish. The returning exiled component of the national liberation movement was able to consolidate its base and integrate its cadres into a single formation. The mass democratic movement was therefore seen as an emergent de facto government-in-waiting. The cadres of the MDM who were deployed from a diversity of civil society organisations and the ranks of the military wing of the national liberation movements began to increasingly influence the individual sectoral deliberations about post apartheid South Africa. The country began to establish a variety of forums which sought to negotiate particular sectoral policies.

By early 1990, there had already emerged an Interim Science and Technology Group with the now legal ANC. By October of that year, this Group produced a 'draft position paper on science and technology policy'. This document was a combination of a critique of the existing system and proposals on the reform of the system. In a related process, the education sector had begun an extensive country wide investigation of the entire system of human resource development. This was conducted as a project of the national education coordinating committee. The aim was to generate information which could feed into deliberations on policy selection and also influence the course of policy research.

With respect to economic policy, the formation of the Macro-economic Research Group (MERG) by the African National Congress in 1991 was critical in gathering those sympathetic to the growth through redistribution thesis. The MERG report published in 1993 argued for a radical restructuring of the economy mainly through labour market interventions in education and training and skills development while simultaneously raising wages. Its report outlined a coherent programme of state intervention with high levels of regulation, taxation and competitiveness oversight. The MERG report also argued for the creation of tripartite supervisory boards for large companies.

A domestic progressive journal: Transformation, suggested that a symposium on the "role of research in transforming South Africa" be organised. The symposium occurred at the beginning of 1992 and is seen as providing the momentum for the creation of an external "Mission on Science and Technology Policy for a Democratic South Africa." This would later be funded by the International Development Research Centre through its wider support programme in aid of facilitating the transition period in South Africa. Hence, the Science and Technology Policy Transition Project was initiated. Similarly, Cosatu and the University of Cape Town jointly sponsored a Technology and Reconstruction colloquium in 1991. This proved another significant event in the policy interregnum.

While the debate within the MDM largely revolved around the nexus of economic policy, there was already a growing dissatisfaction within and amongst the apartheid-linked institutions and agencies. These had also begun a process of

seeking change from within the constraints of their origination and establishment. The Human Sciences Research Council organised a 'symposium on science policy and research management' in August of 1991. These occasions assisted with the further elaboration on the policy transition necessary for the science and technology sector.

The IDRC-sponsored Mission on Science and Technology Policy for a Democratic South Africa was a major milestone in the evolution of the policy trajectory. It was organised as an 'external examination' formatted along a methodology utilised by the Organisation for Economic Cooperation and Development (OECD). The Mission was led by James Mullin, the former chair of the OECD Committee on Science and Technology. He would continue to play an important and influential role in the transition and beyond.

The Mission had three stages. In the first stage the 'buy-in' and support of the heads of the existing science and technology institutions was sought. This was achieved with participation and the commissioning of a series of background papers. The second stage comprised a process of engagement through workshops and interviews, wherein Civil Society together with both public and private sectors were targeted. This allowed for open debate and mutual learning amongst different sectoral participants.

The third component of the Mission was designated by OECD lexicon as the 'confrontational' stage. In this period, two discrete though interconnected meetings took place: gathering of organisations aligned with the MDM and a meeting attended by government and business representatives. Following these meetings, the Mission completed a report "Towards a Science and Technology Policy for a Democratic South Africa" which was published in mid-1993.

The published Mission Report provided both an initial appraisal of the Science, Engineering and Technology Institutions (SETI's) in South Africa and introduced contemporary global innovations in policy terminology and vocabulary into the country. A concurrent follow-up on the Mission was the establishment of the Science and Technology Initiative (STI). This took the form of a Working Group which included representatives from both the MDM and the existing science and technology system. The co-chairs of the STI were Jayendra Naidoo of Cosatu and Brian Clark of the Council for Scientific and Industrial Research. The Working Group comprised representatives from the ANC, Cosatu, the Committee of University Principals, the Human Sciences Research Council and the Science Advisory Council.

The STI institutionalised the policy negotiating process and identified six priority issues which would guide future deliberations. These priority issues were: Information on the science and technology system; transparency and influence of the existing decision-making and advice-formulating process; a future science and

technology system and its decision-making process; enabling research establishments to respond to major issues; human resources development and governance.

While these developments within the domain of the NSI were emerging, the negotiation over the transfer from political power of the National Party to a democratically elected government was proceeding through CODESA. This process had deepened with preparations for a constituent assembly, the transitional executive authority and the drawing up of the bill of rights. The draft post-apartheid constitution was published shortly after the release of the Mission report.

It is estimated that by 1994 there were over 250 multi-stakeholder negotiating forums active in the country. This extensive engagement between stakeholders on reforming individual sectors liberated space for intensive policy research and formulation by stakeholders. The ANC, which was the leading constituent of the MDM, had already established and activated a research coordinating desk The science and technology group was able to draft policy proposals which were tabled as draft resolutions at the consecutive national and policy conferences of the ANC. These draft resolutions were debated by the rank and file membership and recommendations forwarded for discussion and ratification at the national conferences.

The ANC deliberations had begun to coalesce around an emerging programme focussed on reconstruction and development as the key features of the post-apartheid dispensation. The reconstruction and development programme (RDP) went through at least six draft versions prior to final adoption by the MDM. It would thereafter become the primary policy platform of the ANC for the 1994 elections.

The Reconstruction and Development Period

A series of consultations between the ANC, the National Party and the Inkatha Freedom Party (IFP) helped avert a potentially catastrophic situation in the country. The political posturing which precipitated this crisis was sharply contrasted to the open and constructive engagement between stakeholders on reforming individual sectors. The STI had continued its work and held its fifth plenary a month after the 1st democratic election in South Africa's history.

The ANC won a significant majority in the election and consistent with the inclusive ethos of the transition period inaugurated a government of national unity (GNU). The GNU adopted as its policy framework the RDP which by then had been issued as green and white papers. A single portfolio position was created in the first democratic cabinet for arts, culture, science and technology (DACST)

and bestowed upon a member of a minority partner in the GNU, Ben Ngubane of the IFP.

The immediate challenge of the newly formed GNU was to rapidly establish and enact new policies which would simultaneously seek to redress the inherited legacies from apartheid whilst also building a sustainable future for the country. There was also the need to ensure that the value of the numerous multi-stakeholder negotiating forums was not lost. Momentum had been generated through these processes and significant advances had already been achieved in re-conceptualising the post-apartheid form of state and governance strategies.

Both the new Minister and deputy Minister for Arts, Culture, Science and Technology were supportive of the STI and the proposals it was generating through its commissioned reports. It was proposed that the STI be reconstituted as a vehicle for consultation between the ministry and the science and technology community and that it be re-named the National Science and Technology Forum (NSTF) in 1994. A member of the STI was also appointed as Director General of the DACST, Roger Jardine.

With guidelines established by the RDP, DACST utilised the STI outputs to formulate its initial policy agenda. The IDRC supported this period by sponsoring the secretariat function in establishing the new policy programme in the form of the Science and Technology Policy Transition Project. This was at various times coordinated by Dave Kaplan, Rasigan Maharajh and Rajen Govender. The Science and Technology Policy Transition Project assembled together an international team of experts in the field of science and technology policy. This group augmented a local team who were appointed by the Ministry and who utilised an iterative methodology to draft a green paper.

The Green Paper on Science and Technology advanced the reports of the NSTF, the ANC Policy resolutions and the RDP. It was circulated for comment to the community of science and technology stakeholders and role-players. This ensured that a vibrant form of debate and engagement was created. The Green Paper suggested that the model of a transition in the mode of knowledge generation had been affected at a global level. This drew upon the research of Michael Gibbons who famously described a qualitative shift from the singular discipline based forms of research to a more dynamic multi-disciplinary and problem-orientated system. This was defined as a transition from mode one to mode two research practices.

The global discourse had also experienced a shift from earlier notions of a republic of science to the more pragmatic and integrated description of a system of innovation. Pioneering work in this field was published by Chris Freeman, Richard Nelson, Stanley Winter, Bengt-Ake Lundvall, Stan Metcalfe, Luc Soete and Luke Georgiou. Across Europe similar dissatisfaction with the neo-classical

disregard for the role of technological change in economic development had seen the rise of new institutional economics centred on the work of the Stanford economist, Paul Roemer. The Green Paper was able to draw attention to and focus this emerging body of literature for the national debates.

The Green Paper also compiled a domestic situational analysis based on the finding of the Mission and the STI-commissioned research papers. Combining both a philosophical and a pragmatic approach to redefining a contested domain ensured that the Green Paper transcends narrow sectoral interests and that of established role-players. It also posed a series of questions regarding both the orientation and the objectives of the future democratic science and technology regimen. A request for comments was issued and a new drafting team was appointed by the Ministry.

A Ministers Committee on Science and Technology was established as a sub-committee of Cabinet. The chair of this body was the then Deputy President, Thabo Mbeki and the committee in essence reflected a proto-form of current cabinet cluster structures. This ministerial team was linked to a committee of Directors General from each of the represented ministries. This body would play an important role in guiding the policy process and establishing the synergies proposed as a key requisite for the transition from a narrow science and technology policy perspective to the wider national system of innovation approach as advanced in the White Paper.

The White Paper Drafting Team was supported by a group of critical readers who responded to a series of draft chapters. This team consisted of Rob Adam, Jim Mullin, Mala Singh, Dave Walwyn, Adi Paterson and Rasigan Maharajh. The draft White Paper was also circulated for comment to role-players and a structured form of interaction saw the refining of the individual chapters based on comment and feedback. The Portfolio Committee also contributed to the process as did the NSTF through a series of public hearings and presentations.

Post apartheid South Africa: Some Economic Strategies and Issues

This was the reality inherited by the newly emergent democratic South African state in 1994. In presenting a 'balance sheet' on the legacy of the apartheid economy, Hirsch[16] points to several positive and negative attributes. The positive attributes relate to the availability of transport, communication infrastructure for both business and the white community, a sound financial sector and capital market, 'pockets of skilled labour and management', a disciplinary monetary policy with declining inflation, 'some good universities and science Councils', the strong export of primary goods , 'moderate' research capability and patent applications.

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16 Supra: page 25 et seq

The 'liabilities' relate on the other hand to such attributes as; poor transport and communications for black homes and farms and the lack of safe transport for workers in particular, low savings and in fact government dis-saving over ten consecutive years, poor black ownership of assets, finance institutions and land, poorly educated labour and the shortage of management skills, 'fiscal recklessness' arising from the apartheid states consumption expenditure, poor general education and especially low levels of mathematics and science competency, large expenditures in the defence industry and the uncompetitive market sector. These according to him, gave rise to a number of daunting challenges when it the democratically elected government assumed its role in 1994.[17]

As early as November 1994, some 6 months after the election of the first democratic government in South Africa, the Reconstruction and Development Programme (RDP) was published. It was declared to be 'a policy framework for integrated and coherent socio-economic progress' whose goal was 'to build a democratic, non-racial and non-sexist future and to represent a vision for the fundamental transformation of South Africa by:

> *developing strong and stable democratic institutions ensuring representivity and participation ensuring that SA becomes a fully democratic, non-racial and non-sexist society creating a sustainable and environmentally friendly growth and development path.*[18]

The RDP is, in the words of the programme:

> *an integrated, coherent socio-economic policy framework. It seeks to mobilise all our people, and our country's resources toward the final eradication of apartheid and the building of a democratic, non-racial and non-sexist future.*[19]

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17 Ibid:26

18 The Reconstruction and Development Programme, ANC, Umanyano Publications, Johannesburg, 1994: See Introduction

19 Page 1, The document refers to the objective of the RDP as follows: The central objective of our RDP is to improve the quality of life of all South Africans, and in particular the most poor and marginalised sections of our communities. The objective should be realised through a process of empowerment which gives the poor control over their lives and increases their ability to mobilise sufficient development resources, including from the democratic government where necessary.

The Macro-economic Stabilisation Period

The "Growth, Employment and Redistribution" (GEAR) strategy employed in 1996 by government was premised on the need to stabilise the macro-economic environment in the country. GEAR was positioned as an integrated strategy which spanned the multiple sectors of government. It sought to establish macroeconomic stability as the basis for enabling a sustainable platform for accelerating the rate of economic growth, and therefore social development. GERA introduced greater predictability and certainty into the economic policy and fiscal architecture and planning environment, mainly through maintaining fiscal discipline, reducing government debt and the implementation of the Medium Term Expenditure Framework. By 1999, government had ensured that the fundamental stabilising mechanisms in terms of macroeconomic policies were embedded in practice and institutionally.

It was upon this platform of stability that government assumed an expansionary stance whereby the constraints to growth would be redressed and the benefits of development more widely shared. It also pursued greater levels of integration and coordination within, across and between the different layers of government. A formal system of coordination for government business had been created and distributed into the following cabinet clusters:

- Economic, Investment and Employment
- Social
- Governance and Administration
- International Relations, Peace and Security
- Justice and Crime Prevention

The White Paper on Science and Technology (WPS&T) was adopted by the South African Cabinet in 1996. This document was subtitled "Preparing for the 21st Century" and was aligned to the Reconstruction and Development Programme of the first democratic government elected in 1994.

As a policy domain with considerable potential to contribute to the growth and development of the country, the WPS&T was premised on a view of the future where all South Africans could enjoy an improved and sustainable quality of life, while participating in a competitive economy by means of satisfying employment and thereby, share in a democratic culture. The desired future contemplated by the WPS&T is consistent with the aims of the South African Constitution. These aspirations are contained in the Preamble and read as:

- heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights
- improve the quality of life of all citizens and free the potential of each person

- lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by law
- build a united and democratic South Africa able to take its rightful place as a sovereign State in the family of nations. (1996)

The WPS&T suggested that the creative use and efficient management of innovation was imperative in order to achieve such a vision statement. This notion was translated by the WPS&T into the following three goals:

The establishment of an efficient, well co-ordinated and integrated system of technological and social innovation within which:

- stakeholders can forge collaborative partnerships and interact creatively in order to benefit themselves and the nation at large
- resources from engineering, the natural sciences, the health sciences, the environmental sciences and the human and social sciences are utilised for problem-solving in a multidisciplinary manner
- stakeholders, especially those who were formerly marginalised, are part of a more inclusive and consultative approach to policy decision-making and resource allocation for science and technology (S&T) activities.
- The development of a culture within which the advancement of knowledge is valued as an important component of national development.
- Improved support for all kinds of innovation which is fundamental to sustainable economic growth, employment creation, equity through redress and social development.

The achievement of these three goals stimulated the WPS&T to adopt a systemic approach towards restructuring the country's scientific and technological resources. The WPS&T therefore introduced the concept of a National System of Innovation (NSI) as an organising framework. The WPS&T defined the NSI as "a network of institutions in the public and private sectors whose activities and actions initiate, import, modify and diffuse new technologies." (DACST: 1996)

Within the framework of the NSI, the objectives of the WPS&T were articulated as:

- Promoting innovation and employment creation
- Enhancing quality of life
- Developing human resources
- Working towards environmental sustainability
- Promoting an information society
- Generation of knowledge

The framework established by the WPS&T sought to ensure that South Africa had a set of institutions, organisations and policies that would give effect to the various objectives and functions of the NSI. In order to assess the size, scale and scope of the agencies and institutions inherited the post-apartheid Government also proceeded with three further research exercises in support of the WPS&T. These were the following:

- National Research and Technology Foresight;
- National Science and Technology Audit; and
- Science, Engineering and Technology Institutional (SETI) Reviews.

The results of these inquiries provided the basis for the continued processes of restructuring and transformation of publicly funded research and development institutions. They also provided some baseline data on capacities and competencies inherited from the apartheid regime while simultaneously providing a methodology for determining trends and trajectories in a variety of science and technology domains.

The WPS&T also determined that line departments (those departments which manage a specific portfolio within government and who do not have a cross-cutting function) are often subject to policies determined in other departments. According to the WPS&T the science, engineering and technology requirements of line departments are usually fulfilled by outsourcing to performers who are better located and capacitated to manage the complexities of research and development.

While it was also recognised that the outsourcing of performance by line departments followed international trends; there were instances where government accountability required and determined higher levels of political control. The WPS&T therefore conceded that, within the NSI, the crucial requirement for line departments was that they retain the capacity for "intelligent buying" of research, development, science, engineering and technology services.

According to the WPS&T, government had the responsibility to establish laws and regulations, to allocate public resources according to defined priorities, and to initiate and implement programmes related to these functions. It saw Research and Technology Foresight and Audit exercises as examples of the functional deployment of the latter's key competency.

In accordance with this policy stance, DACST promulgated legislation for the establishment of the National Advisory Council on Innovation (NACI). The statutory power allocated to NACI was to advise the Minister responsible for Science and Technology and to play a role in overseeing the process of allocating public funds to the various research and development performers recognised

within the NSI. The secretarial function of NACI would be provided by DACST with the Director General assuming the role of Chief Executive Officer.

Another structural change which was suggested by the White Paper found support in the SETI Reviews. This provision recognised that the separate funding agencies for natural sciences, engineering, humanities and social sciences should be amalgamated into a single function. This saw legislation being introduced which would merge the Centre for Science Development with the Foundation for Research Development to form the National Research Foundation (NRF).

The SETI Reviews also offered views on the governance and missions of the various performing agencies. They also confirmed that performance according to well defined criteria would offer the system greater stability and the capacity for long term planning. Again, this was aligned with the Medium-Term Expenditure Framework (MTEF) and the Performance and Financial Management Act (PFMA) which were mechanisms of the National Treasury. With the need for Monitoring and Evaluation established as a form of good governance and transparency, DACST established a set of Key Performance Indicators for Science, Engineering and Technology Institutions. Agencies receiving public monies for conducting science and technology activities were expected to measure their performance according to the criteria established as an aid to the decisions regarding the allocation of those public resources.

A top-slicing of agency grants saw the creation of a fund which operated on a competitive basis and sought to increase collaboration between the various agencies. These challenge awards were set up with the objective of addressing significant national priorities and imperatives. This would later evolve into the Innovation Fund.

Post-apartheid Government Policies for Higher Education and Sectoral Policies

The election of the first democratic government of South Africa was a signal for the radical reform of the education system in the country. The context for its reform policies and interventions was shaped not only by the legacy it had inherited from apartheid but also by the constitutional imprimatur to transform the social system as a whole in ways that enhance the possibilities for social justice, human rights and democracy. And these goals had to be pursued in the context of a rapidly changing global environment in which new regimes of trade and finance and rapidly changing systems of information and other technologies made incessant and continuous demands on national states. Higher education in South Africa was also obliged to deal with the worldwide effects of the commoditisation and marketisation of educational services.[20]

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20 Burbules N and Torres CA (eds) (2000) Globalization and Education: Critical Perspectives, New York, Routledge; Delanty G (2001): Challenging Knowledge:

A raft of new legislation and policies laid out the agenda of transformation under the Presidency of Nelson Mandela. This legislation and the accompanying policies related to all arenas of education from early childhood to adult and from pre-primary to higher education. Higher Education was specifically dealt with in government's White Paper 3 of 1997 (WP3). In the Foreword to the WP3 the first Minister of Education of the democratically elected government, Professor Bengu, set out the view of government that:

> *The transformation of the higher education system to reflect the changes that are taking place in our society and to strengthen the values and practices of our new democracy is, as I have stated on many previous occasions, not negotiable. The higher education system must be transformed to redress past inequalities, to serve a new social order, to meet pressing national needs and to respond to new realities and opportunities.*

The White Paper outlined the framework for changing the HE system and declared that:

> *the higher education system must be planned, governed and funded as a single national co-ordinated system.*

This was necessary he said to deal with the:

> *fragmentation, inequality and inefficiency which are the legacy of the past, and create a learning society which releases the creative and intellectual energies of all our people towards meeting the goals of reconstruction and development.*

Higher Education Reform: Sustained Policy Development Post-apartheid[21]

The WP3 argued the purposes of higher education in the context of social transformation and the government's Reconstruction and Development Programme (RDP) and declared that these purposes are:

The University in the Knowledge Society, Buckingham, SRHE and Open University Press; Mittelman J H and Othman N (eds) (2001): Capturing Globalization, New York, Routledge; Muller J and Subotzky G (2001): 'What Knowledge is needed in the new millennium' in Organisation, 8 (2): 163 – 182; Altbach P. G Why Higher Education Is Not a Global Commodity Chronicle of Higher Education > May 11, 2001; Hill Dave, Educational Perversion and Global Neo-Liberalism: A Marxist Critique; Levidow Les, Marketizing Higher Education: Neoliberal Strategies And Counter-Strategies The Commoner N.3 January 2002 http://www.thecommoner.org

21 For a comprehensive review of this see CHE (2004). Higher education in the first Decade of Democracy, Pretoria, South Africa: Council of Higher Education.

- To meet the learning needs and aspirations of individuals through the development of their intellectual abilities and aptitudes throughout their lives. Higher education equips individuals to make the best use of their talents and of the opportunities offered by society for self-fulfilment. It is thus a key allocator of life chances and an important vehicle for achieving equity in the distribution of opportunity and achievement among South African citizens.

- To address the development needs of society and provide the labour market, in a knowledge-driven and knowledge-dependent society, with the ever-changing high-level competencies and expertise necessary for the growth and prosperity of a modern economy. Higher education teaches and trains people to fulfil specialised social functions, enter the learned professions, or pursue vocations in administration, trade, industry, science and technology and the arts.

- To contribute to the socialisation of enlightened, responsible and constructively critical citizens. Higher education encourages the development of a reflective capacity and a willingness to review and renew prevailing ideas, policies and practices based on a commitment to the common good.

- To contribute to the creation, sharing and evaluation of knowledge. Higher education engages in the pursuit of academic scholarship and intellectual inquiry in all fields of human understanding, through research, learning and teaching.

WP3 provided an analysis of the '*challenges*', '*vision*' and '*goals*' of the higher education system and affirmed its '*purposes*' as part of the broader process of South Africa's transition, and which included '*political democratisation, economic reconstruction and development, and redistributive social policies aimed at equity*'. Moreover these challenges were always to be met in a context of global developments and their effects on South Africa.

The Higher Education Act of 1997

The Higher Education Act of 1997 gave legislative authority to the intentions of the White Paper 3. It confirmed in particular the intentions of the WP in regards to the need to:

- Establish a single co-ordinated higher education system which promotes co-operative governance and provides for programme-based higher education;

- Restructure and transform programmes and institutions to respond better to the human resource, economic and development needs of the republic;
- Redress past discrimination and ensure representivity and equal access;
- Provide optimal opportunities for learning and the creation of knowledge;
- Promote the values which underlie an open and democratic society based on human dignity, equality and freedom;
- Respect freedom of religion, belief and opinion;
- Respect and encourage democracy, academic freedom, freedom of speech and expression, creativity, scholarship and research;
- Pursue excellence, promote the full realisation of the potential of every student and employee, tolerance of ideas and appreciation of diversity;
- Respond to the needs of the republic and of the communities served by the institutions;
- Contribute to the advancement of all forms of knowledge and scholarship, in keeping with international standards of academic quality;

Most importantly, it laid down the provisions that dealt with the establishment, governance, funding and merger of public higher education institutions. The Act also established the Council on Higher Education (CHE) and its permanent sub-committee the Higher Education Quality Committee (HEQC). The CHE was given a wide range of functions to:

- Advise the Minister on any aspect of higher education at the request of the Minister;
- Arrange and co-ordinate conferences;
- Promote quality assurance in higher education; through its permanent committee, the Higher Education Quality Committee-
- Audit the quality assurance mechanisms of higher education institutions; and
- Accredit programmes of higher education;
- Publish information regarding developments in higher education, including an annual report on the state of higher education, on a regular basis;
- Promote the access of students to higher education institutions; and
- Perform any other function conferred on or assigned to it in terms of this Act; delegated or assigned to it by the Minister by notice in the Gazette.

Section 7 of the Act dealt specifically with the 'permanent committee' of the CHE – the Higher Education Quality Committee [HEQC]. Its function in terms of

Section 7 of the Act was to 'perform the quality promotion and quality assurance functions of the CHE in terms of this Act'.

Towards a New Higher Education Landscape: Report of the CHE

Soon after taking office as Minister of Education, Professor Kader Asmal announced his intention to review the institutional landscape of higher education and in this regard requested the CHE (in January 2000) to provide him with:

> *A set of concrete proposals on the shape and size of the higher education system and not a set of general principles which serve as guidelines for restructuring. I cannot over-emphasise the importance of the point. Until and unless we reach finality on institutional restructuring, we cannot take action and put in place the steps necessary to ensure the long-term affordability and sustainability of the higher education system.*

The Minister believed that

> *The shape and size of the higher education system cannot be left to chance if we are to realise the vision of a rational, seamless higher education system, responsive to the needs of students of all ages and the intellectual challenges of the 21st century.*

Following the Minister's request, the CHE constituted a "Size and Shape" Task Team, with members drawn in their individual capacity from labour, business, universities and technikons, the Department of Education and the CHE. The brief given to the task team was to develop a set of concrete proposals on the reconfiguration of the higher education landscape. These proposals and recommendations are documented in the CHE Report of June 2000 - entitled "*Toward a New Higher Education Landscape: Meeting the Equity, Quality and Social Imperatives of South Africa in the 21st Century".*

The proposals advanced were occasioned by the weaknesses; fragmentation and inequalities in the system of higher education (HE) in South Africa and in recognition of the fact that unless these weaknesses were addressed, HE's prospect for meeting the challenges of the 21st Century would not be realised. The Report argued that

> *The country faces a challenge of immense significance in demonstrating the benefits of higher education planning that is informed by the requirements of democracy and socio-economic development. The reconfiguration of higher education must be seen as part of the process of constructing a seamless lifelong learning system that embraces schools, further education, higher education, workplace-based learning and non-formal learning. Such a system should provide ever greater levels of access to learning opportunities across a range of programmes and entry points in a way that forms the critical basis for social justice and economic revitalisation.*

The report also set out the 'case for higher education in South Africa', and addressed the 'goals, principles and values' which it regarded as necessary to the meet the challenges of the system. It also reiterated the injunctions of the White Paper 3. It's important point of departure was its intention not to be paralysed by the legacy of the past. Higher education institutions need to be liberated from such a past to enable them to meet societal goals.

It dealt with the fact that all higher education institutions were products of segregation and apartheid, of the 'geo-political imagination of apartheid planners'. It examines questions of 'quality' and 'standards', 'excellence', efficiency' and 'effectiveness' and comments on the 'strategies and policy instruments and mechanisms advocated in the White Paper' in relation to its goals.

A significant part of its report argued the '*case for differentiation and diversity*' in the HE landscape in order to meet the wide-ranging challenges facing the system as a whole. It argued that this differentiation and diversity was necessary for a number of reasons. First, nothing is gained through a homogenous and uniform system in which all institutions have exactly the same mandates and missions and seek to be the same in all respects. Nor does homogeneity and aspirations to sameness result in institutional equality. Second, a differentiated and diverse system will over time enable certain critical outcomes that are strongly related to achieving quality higher education, ensuring more meaningful equity for historically disadvantaged students, enhancing the efficiency and effectiveness of the system, and meeting development needs of society.

This was necessary both to achieve 'a more rational landscape' for higher education and to ensure that:

> *the goals and objectives of higher education can exist in a distributed way across the entire system to enable a more appropriate allocation of resources in a rational landscape for higher education.*

The Report also provided a set of recommendations on the 'Shape' and the 'Size' of the HE system. It dealt with how the system should be reconfigured; the importance of establishing the missions and particular foci of these reconfigured institutions and suggested that 'the absolute number of institutions should be reduced through combination. Combination, it averred, offers the opportunity to create a more responsive higher education landscape than that created by apartheid'. In regard to the size question it recommended particular levels of participation in Higher Education and strategies for increasing the overall participation in the system. In addition it contained recommendations about the 'processes and procedures' to give effect to its proposals and dealt with the critical issue of resources.

The National Plan for Higher Education (NPHE)

In February 2001, the Ministry of Education produced the National Plan for Higher Education (NPHE). It too affirmed the premises of the White Paper and set out to the framework and mechanisms for implementing and realising the policy goals of the White Paper. As stated by Minister Asmal,

> *It (the NPHE) is far-reaching and visionary in its attempt to deal with the transformation of the higher education system as a whole. It is not aimed solely at addressing the crises in some parts of the system, although these must be overcome. It will impact on every institution, as the institutional landscape of higher education is a product of the geo-political imagination of apartheid planners. ……The National Plan therefore provides the strategic framework for re-engineering the higher education system for the 21st century.*

This was a critical document as it signalled for the first time the concrete measures to be undertaken by the Education Ministry towards achieving the goal of reconfiguring the higher education system.

The Plan did a number of things:

- It established the indicative targets for the size and shape of the higher education system, which included reference to the overall growth and participation rates, the institutional and programme mixes and the equity and efficiency goals of the system. It also instituted the three-year rolling plan as a mechanism for the restructuring of the institutional landscape.
- It proposed an increase in the participation rate to 20% in the long-term, 'to address both the imperative for equity, as well as changing human resource and labour needs'.
- It spoke of the need to increase the efficiency of the system through increasing graduate outputs and established graduation rate benchmarks that institutions would have to meet.
- It recognised the need for academic development programmes to be funded as an integral component of a new funding formula and accepted the need to review the National Student Financial Aid Scheme.
- It also recognised the need to recruit higher education students 'through recruiting workers, mature students, in particular women, and the disabled, as well recruiting students from the Southern African Development Community (SADC) countries as part of the SADC Protocol on Education'.
- It proposed a shift in the balance of enrolment in the medium term between the humanities, business and commerce and science,

engineering and technology from the then existing ratio of 49%: 26%: 25% to 40%: 30%: 30% respectively.

- It recognised also that 'irrespective of the balance in enrolments, the key issue is to ensure that all graduates are equipped with the skills and competencies necessary to function in modern society, in particular, computer literacy, information management, communication and analytical skills'.
- It emphasised the importance of equity of access, particularly in respect of black and women students in particular fields of study, as well as in postgraduate programmes in general.
- It reflected on the problem of throughput and graduation rates.
- It was concerned to establish equity targets with respect especially to programmes in which black and women students are under-represented and the development of strategies to ensure equity of outcomes.
- Similarly, it invoked changes to staff composition to reflect the demographic composition of the population and to deal with the problem that blacks and women remain under-represented in academic and professional positions, especially at senior levels. This would require the development of employment equity plans with clear targets for rectifying race and gender inequities.
- It addressed the question of a differentiated and diverse system through mission and programme differentiation based on the type and range of qualifications offered in particular to deal with the requirements of the Government's Human Resource Development Strategy.
- It lifted the moratorium on the introduction of new distance education programmes in contact institutions, which was imposed by the Minister in February 2000 and simultaneously a new approach to student funding for new distance education programmes, including programmes offered as part of public-private partnerships from 2002.
- It specifically linked redress in historically black institutions to agreed missions and programme profiles, including developmental strategies to build capacity, in particular, administrative, management, governance and academic structures.
- It proposed the establishment of a single dedicated distance education institution to address the opportunities presented by distance education for increasing access both locally and in the rest of Africa. This will be done through the merger of the University of South Africa and Technikon South Africa and the incorporation the distance education centre of Vista University into the merged institution.
- It proposed a new approach to research funding in the new funding formula. The purpose being to ensure greater accountability and the more efficient use of limited research resources. It proposes an

allocation of earmarked funds to build research capacity, including scholarships to promote postgraduate enrolments.

- It also proposed to address the racial fragmentation of the system, as well as administrative, human and financial capacity constraints through:
  - Institutional collaboration at the regional level in programme development, delivery and rationalisation, in particular, of small and costly programmes, which cannot be sustained across all the institutions.
  - Investigating the feasibility of a more rational arrangement for the consolidation of higher education provision through reducing, where appropriate, the number of institutions but not the number of delivery sites on a regional basis. An initial analysis of the available data suggests that the number of institutions can be reduced. The key issue is to determine the number and form that this should take.
  - Establishing a National Working Group [NWG] to undertake the investigation based on the principles and goals for the transformation of higher education system, as outlined in the White Paper.
- The National Plan also signalled the establishment of two National Institutes for Higher Education in Mpumalanga and the Northern Cape in order to facilitate access to higher education.

The importance of the National Plan cannot be overstated because in it the Ministry proclaimed its unequivocal intention to restructure the higher education system largely through the processes of incorporation and merger. The considerable public debate that followed the publication of the National Plan was testimony to the importance and potentially far-reaching consequences of the proposals of the National Plan. Although there was some disquiet from a few institutions about this Plan there is no doubt that most informed observers, institutional leaders and the public in general recognised that 'the writing was on the wall' and that the Ministry was not going to be deterred in its intentions.

Report of the National Working Group (NWG)

In March 2001, the Minister of Education established the National Working Group (NWG) to advise him on the appropriate arrangements for restructuring the provision of higher education on a regional basis through the development of new institutional and organisational forms, including institutional mergers and rationalisation of programme development and delivery. The NWG submitted its Report to the Minister in December 2001.

The Minister welcomed the Report of the NWG. He was confident that the Report provides the basis for taking forward the restructuring of the higher education

system to enable it to respond to the equity and developmental challenges that are critical for improving the quality of life of all the people of South Africa. The Minister was particularly impressed by the fact that while sensitive to the historical and political complexities involved, the NWG had not allowed those complexities to stand in the way of advancing a bold framework for the restructuring of the higher education system.

In summary, the NWG Report provided recommendations on the 'appropriate arrangements for consolidating the provision of higher education on a regional basis through establishing new institutional and organisational forms, including reducing the number of higher education institutions'. It took the NPHE's conception of "fitness for purpose" as its point of departure for its recommendations. After examining the relevant document on this and other issues and after consultations it came to a number of 'guiding principles to frame its work and shape its recommendations and developed an associated set of performance indicators and linked benchmarks'.

The recommendations were 'two-fold. The first related to general issues which cut across all regions. These related to such matters as regional collaboration, the view that universities and technikons should continue to operate as higher education institutions with distinct programmes and mission foci; 'comprehensive' institutions, the college and distance education sector and 'satellite' campuses. The second related to proposals and recommendations for the consolidation of higher education provision on a regional basis through establishing new institutional and organisational forms, including a reduction in the number of higher education institutions from 36 to 21 through mergers and incorporations.

The NWG stressed that the successful implementation of its recommendations required, amongst others:

- The commitment of the government to make available the necessary financial resources both to facilitate merger processes (including the removal of current debt burdens) and to implement the myriad consequences of mergers in particular, and to enable the higher education system to discharge its mandate in general. This requires the leveraging of additional resources from both the private and the public sectors, to ensure that the higher education system is adequately funded.
- The commitment and political will of the Government to restructuring. It requires the Ministry to act decisively in clarifying its response to the recommendations and in initiating the formal legal processes that are necessary to give effect to the merger proposals.
- The commitment of the institutions and institutional constituencies to the success of the merger process, as well as the engagement of expertise to facilitate and support the merger process.

- The setting of clear targets and time-frames for the different processes and phases of the merger process, both formal in terms of the establishment of the interim councils, as well as substantive in terms of the range of issues that have to be addressed.
- The development of a social plan, as proposed in the Council on Higher Education's report (June 2000) to provide a framework for addressing the human resource implications. These include developing measures to minimise job losses as well as a process for ensuring compliance with the obligations of the Labour Relations Act.

The NWG argued that the implementation of its recommendations would result in the fundamental restructuring of the higher education system and transform the apartheid edifice of the higher education system to lay the foundation for a higher education system that is consistent with the vision, values and principles of a young democratic order.

In June 2002, based on the advice received from the NWG the Ministry of Education released a set of proposals for the transformation and restructuring of the higher education system. The proposals are contained in the Government Gazette Notice, No. 23549, which is entitled "*Transformation and Restructuring: A New Institutional Landscape for Higher Education.*

In the introductory remarks, the Report states that the 'imperative for the transformation and restructuring of the higher education system is informed by the need to realise three fundamental objectives of the White Paper 3 of 1997'. These imperatives relate to the demands of social justice, to address the challenges associated with the phenomenon of globalisation, and to ensure the efficient and effective use of limited resources especially given the competing and equally pressing priorities in other social sectors. The Report also reiterated the National Plan's five policy goals and it's strategic objectives, which are critical for the transformation and reconstruction of the higher education system, including the need to build new institutional identities and organisational forms through restructuring the institutional landscape of the higher education system and transcending the fragmentation, inequalities and inefficiencies of the apartheid past and enabling the establishment of South African institutions consistent with the vision and values of a non-racial, non-sexist and democratic society.

Following a three-month period of public representations on the proposals, including providing further clarification of the proposals (cf: *Memorandum of Clarification on Transformation and Mergers in Higher Education, DoE)* the Ministry tabled its final set of proposals to Cabinet in November 2002. The proposals, which were approved by Cabinet, would result in the consolidation of higher education institutions from 35 to 22, through mergers of two or more public higher education institutions into single institutions as well as through the

incorporation of sub-divisions/campuses of existing higher education institutions into other higher education institutions. In total there were to be 10 mergers and 10 sub-divisions/campuses that were to be incorporated. Of the campuses to be incorporated, 5 were to be incorporated into institutions that are merging and the remaining 5 into institutions that were not merging. Several of these have now taken place as planned with a few being postponed for reasons of political expediency and capacity constraints.

Some Characteristics of the Higher Education System

Table: Overview of South African Higher Education institutions in 2005

Institution	Headcount Student Enrolments			Black Students as a Proportion of Headcount Totals (%)		Female Students as a Proportion of Headcount Totals (%)		Proportion of Contact & Distance Headcount Enrolments in Major Fields of Study (%)		
	Contact	Distance	Total	Contact	Distance	Contact	Distance	SET	Business	Humanities
CPUT	28,889	72	28,961	78	86	52	63	47	33	20
UCT	21,764	0	21,764	49	n.a.	51	n.a.	41	25	34
CUT	10,114	206	10,320	82	82	49	63	43	35	22
DUT	22,779	0	22,779	93	n.a.	50	n.a.	49	35	16
UFH	7,175	1,615	8,790	92	99	56	81	16	15	69
UFS	22,337	2,322	24,659	65	35	58	34	29	13	58
UJ	43,182	2,362	45,544	70	98	53	66	30	33	37
UKZN	35,208	5,496	40,704	83	89	54	59	30	26	44
UL	17,579	0	17,579	99	n.a.	51	n.a.	43	14	43
NMMU	19,928	4,229	24,157	69	97	51	72	30	24	47
NWU	27,092	11,504	38,596	52	94	59	68	21	17	61
UP	38,531	7,820	46,351	40	99	53	72	37	14	48
RU	6,045	277	6,322	52	100	57	74	21	15	64
UNISA	638	207,293	207,931	63	72	84	55	12	41	46
US	21,465	237	21,702	27	94	52	83	40	14	46
TUT	49,705	10,702	60,407	86	99	51	59	36	29	35
UV	10,497	0	10,497	100	n.a.	50	n.a.	28	22	49
VUT	17,408	0	17,408	94	n.a.	49	n.a.	44	50	6
WSUST	23,871	625	24,496	100	100	62	83	27	33	40
UWC	14,463	117	14,580	94	38	59	35	31	15	55
Wits	23,626	0	23,626	64	n.a.	50	n.a.	50	17	33
UZ	10,398	0	10,398	99	n.a.	65	n.a.	17	12	71
MT	9,901	0	9,901	100	n.a.	49	n.a.	57	31	12
Total/Average	482,595	254,877	737,472	74	76	53	57	29	29	42

According to Table 14 the total number of students enrolled at institutions was 737472. Of these, the majority (482595) were contact[22] students while there were

22 Those students registered mainly for courses in contact mode

also 252877 distance students of whom 207293 were at one institution alone – UNISA. Black students constituted 74% and 76% respectively of the contact and distance student population. Female students constituted 53% and 57% respectively of these categories while the distribution of students between SET[23], Business and the Humanities was 29%, 29% and 42% respectively. Institutional sizes ranged from almost 49000 students at the Tshwane University of Technology to 6045 at Rhodes University.

Table: Major Field of Study and Qualification Headcount

Institutions	Major Field of Study					Formal Qualifications						
	Science, Engineering & Technology	Business & Management	Education	All Other Humanities & Social Sciences	Total	Occasional Students	Three-Year Undergraduate Degrees & Diplomas	Professional Undergraduate Degrees	Postgraduate, Below Master's Level	Master's Degrees	Doctoral Degrees	Total
CPUT	13,690	9,448	2,788	3,035	28,961	226	21,877	5,643	645	503	67	28,961
UCT	8,891	5,372	494	7,007	21,764	1,012	7,429	7,118	2,075	3,160	970	21,764
CUT	4,446	3,606	562	1,706	10,320	127	7,938	1,632	339	205	79	10,320
DUT	11,137	7,891	468	3,283	22,779	271	18,959	3,179	33	295	42	22,779
UFH	1,449	1,320	2,325	3,697	8,790	12	4,328	3,396	607	363	84	8,790
UFS	7,041	3,206	4,807	9,606	24,659	1,363	10,011	5,424	4,744	2,573	544	24,659
UJ	13,494	15,025	7,332	9,693	45,544	1,102	31,694	5,235	5,059	1,891	563	45,544
UKZN	12,295	10,547	5,530	12,333	40,704	626	16,547	12,134	5,973	4,343	1,081	40,704
UL	7,612	2,467	3,265	4,235	17,579	5	8,496	5,879	1,201	1,831	167	17,579
NMMU	7,155	5,762	5,409	5,832	24,157	882	15,539	4,920	1,084	1,473	259	24,157
NWU	8,235	6,734	12,198	11,430	38,596	548	21,189	7,075	6,416	2,698	670	38,596
UP	17,380	6,504	11,720	10,747	46,351	562	21,881	11,155	5,493	5,714	1,546	46,351
RU	1,329	944	1,119	2,930	6,322	52	3,702	1,238	508	605	217	6,322
UNISA	25,871	85,639	23,641	72,780	207,931	10,124	126,306	49,124	15,506	5,877	994	207,931
US	8,651	3,001	1,238	8,812	21,702	566	7,826	5,662	2,891	3,953	804	21,702
TUT	21,697	17,328	10,680	10,702	60,407	239	46,249	9,514	2,062	2,226	117	60,407
UV	2,977	2,343	1,717	3,460	10,497	520	6,725	2,380	506	326	40	10,497
VUT	7,624	8,754	68	962	17,408	0	15,871	1,298	66	145	28	17,408
WSUST	6,520	8,126	5,159	4,691	24,496	746	19,510	3,722	417	100	1	24,496
UWC	4,477	2,150	1,307	6,647	14,580	0	6,739	4,792	1,523	1,205	321	14,580
Wits	11,714	4,004	1,828	6,080	23,626	288	7,501	8,107	2,413	4,620	697	23,626
UZ	1,728	1,243	3,850	3,578	10,398	0	4,613	3,154	2,061	427	143	10,398
MT	5,660	3,096	0	1,145	9,901	0	9,750	151	0	0	0	9,901
Totals	211,073	214,510	107,505	204,391	737,472	19,271	440,680	161,932	61,622	44,533	9,434	737,472

This table shows that students were distributed as follows in the major fields of study. SET numbers were 211069 (28.6%), while Business and Managements had

23 Majors in science, engineering and technology The sciences include health sciences, life sciences, physical sciences, computer sciences, and mathematical sciences

214509 (29.1%), Education 107503 (14.6%) and all other humanities and social sciences had 204391 (27.7%) students enrolled respectively.

In regard to formal qualifications the three year undergraduate qualifications were the preponderant majority of students – 440680 students. Professional undergraduate degrees constituted 161392 students. Master's and doctoral students constituted 44533 and 9434 respectively. The total of all post graduate degrees including post-graduate below Masters-level was 115589 students. As a proportion of the total this constituted about 15.6% of the student population. Some 59.9% were at the 3 year undergraduate level.

Table: Headcount Enrolment of Students

	Contact							Distance						
	Black							Black						
Institution	African	Coloured	Indian	White	Total	Female	Male	African	Coloured	Indian	White	Total	Female	Male
CPUT	13,244	9,060	326	6,259	28,889	15,005	13,884	51	11	0	10	72	45	27
UCT	6,003	2,921	1,737	10,486	21,764	11,005	10,759	0	0	0	0	0	0	0
CUT	7,837	382	41	1,854	10,114	4,971	5,143	133	33	3	37	206	130	76
DUT	16,302	379	4,558	1,486	22,779	11,361	11,418	0	0	0	0	0	0	0
UFH	6,383	127	72	591	7,175	4,053	3,122	1,572	16	4	23	1,615	1,305	310
UFS	12,861	1,147	419	7,909	22,337	13,011	9,326	482	132	190	1,517	2,322	790	1,532
UJ	26,764	1,214	2,319	12,885	43,182	22,957	20,225	2,275	33	14	40	2,362	1,549	813
UKZN	15,170	922	13,233	5,863	35,208	19,113	16,095	3,903	256	725	612	5,496	3,261	2,235
UL	17,070	36	216	256	17,579	8,923	8,656	0	0	0	0	0	0	0
NMMU	10,519	2,773	506	6,130	19,928	10,100	9,828	3,915	163	25	126	4,229	3,055	1,174
NWU	13,250	624	306	12,746	27,092	15,859	11,233	10,204	571	32	643	11,504	7,871	3,633
UP	13,216	642	1,718	22,954	38,531	20,476	18,055	7,638	70	54	57	7,820	5,631	2,189
RU	2,487	248	391	2,919	6,045	3,429	2,616	276	1	0	0	277	204	73
UNISA	34	369	1	233	638	534	104	116,829	12,165	21,088	56,931	207,292	113,764	93,528
US	2,361	3,076	439	15,589	21,465	11,066	10,399	211	8	4	14	237	196	41
TUT	41,685	521	435	7,064	49,705	25,161	24,544	10,362	173	55	112	10,702	6,264	4,438
UV	10,479	1	5	12	10,497	5,237	5,260	0	0	0	0	0	0	0
VUT	16,063	251	94	1,000	17,408	8,489	8,919	0	0	0	0	0	0	0
WSUST	23,641	52	92	86	23,871	14,912	8,959	624	1	0	0	625	518	107
UWC	4,868	7,311	1,439	690	14,463	8,466	5,997	5	4	35	69	117	41	76
Wits	11,029	626	3,418	8,548	23,626	11,842	11,784	0	0	0	0	0	0	0
UZ	9,615	33	616	134	10,398	6,784	3,614	0	0	0	0	0	0	0
MT	9,880	5	8	4	9,901	4,889	5,012	0	0	0	0	0	0	0
Totals	290,761	32,720	32,389	125,698	482,595	257,643	224,952	158,480	13,637	22,229	60,191	254,876	144,624	110,252
%	60	7	7	26	100	53	47	62	5	9	24	100	57	43

Black African students were 60% and 62% respectively of the contact and distance students enrolled while the percentage for white students was 26% and 24% respectively. The distribution between female and male students between

contact and distance students enrolled was 53% and 47% (contact) and 57% and 43% (distance) respectively. In total 54.5% of students were female while male students constituted 45.5%.

Table: Graduates/ Diplomats in Public Higher Education by Major Field of Study and Qualification

	Major Field of Study					Formal Qualification					
institution	Science, Engineering & Technology	Business & Management	Education	All Other Humanities & Social Sciences	Total	Three-Year Undergraduate Degrees & Diplomas	Professional Undergraduate Degrees	Postgraduate Below Master's Level	Master's Degrees	Doctoral Degrees	Total
CPUT	2,804	1,727	581	575	5,687	3,621	1,726	277	57	6	5,687
UCT	1,870	2,006	214	2,000	6,089	2,160	1,278	1,436	1,033	182	6,089
CUT	732	745	187	424	2,088	1,365	601	114	10	6	2,096
DUT	1,874	1,745	21	639	4,278	3,251	928	28	67	4	4,278
UFH	258	161	694	679	1,791	798	648	291	53	1	1,791
UFS	1,347	671	1,646	1,563	5,226	1,785	819	2,015	542	65	5,226
UJ	2,435	2,753	2,924	1,967	10,079	6,119	1,141	2,296	435	88	10,079
UKZN	2,079	2,324	1,551	2,365	8,318	3,586	1,765	2,174	695	98	8,318
UL	1,281	246	971	530	3,027	1,591	799	491	131	15	3,027
NMMU	1,317	1,151	1,830	1,149	5,446	3,250	1,301	558	307	30	5,446
NWU	1,674	1,440	2,569	2,063	7,746	4,103	1,167	1,694	700	82	7,746
UP	3,536	1,831	3,797	2,447	11,611	6,032	1,870	2,401	1,116	192	11,611
RU	394	257	578	855	2,083	1,241	219	425	167	31	2,083
UNISA	894	4,128	5,148	4,016	14,185	7,672	2,579	3,269	573	92	14,185
US	1,945	918	554	2,057	5,474	1,555	1,047	1,847	899	126	5,474
TUT	3,167	2,314	2,107	1,840	9,428	6,034	2,897	396	89	12	9,428
UV	477	224	436	471	1,608	1,118	291	160	36	3	1,608
VUT	716	1,394	13	161	2,284	1,889	372	10	11	2	2,284
WSUST	525	519	961	343	2,348	1,982	290	72	5	0	2,349
UWC	961	287	574	1,189	3,010	1,233	658	788	296	35	3,010
Wits	2,442	764	491	1,294	4,991	1,595	1,210	1,346	740	101	4,992
UZ	276	94	1,243	465	2,078	582	306	1,116	56	18	2,078
MT	550	428	0	200	1,178	1,140	38	0	0	0	1,178
Totals	33,554	28,127	29,090	29,292	120,053	63,702	23,950	23,204	8,018	1,189	120,063

The number of graduates by major field of study was distributed as follows: SET: 33561; Business and /Management: 28126; Education29086 and All other humanities and social sciences: 29290 making a total of 120053 students. Formal qualifications were concentrated in the three year undergraduate degrees and diplomas (63702) while Master and Doctoral qualifications numbered 8018 and 1189 respectively. There were 23950 qualifications at professional undergraduate level and 23204 at post graduate below Masters Level.

Table: Percentage Spread of Qualifications in 2005

Institution	Undergraduate Degrees & Diplomas	Master's Degrees	Doctoral Degrees
CPUT	19	11	9

UCT	24	33	19
CUT	21	5	8
DUT	19	23	10
UFH	19	15	1
UFS	17	21	12
UJ	20	23	16
UKZN	19	16	9
UL	17	7	9
NMMU	22	21	12
NWU	19	26	12
UP	24	20	12
RU	30	28	14
UNISA	6	10	9
US	19	23	16
TUT	16	4	10
UV	15	11	8
VUT	13	8	7
WSUST	10	5	0
UWC	16	25	11
Wits	18	16	14
UZ	11	13	13
MT	12	0	0
Average	15	18	13

In terms of Table 18 Undergraduate degrees and diplomas constituted 15%, Masters 18% and Doctorates 13% of the total graduation rates in public HE in South Africa. These rates are considerably below the 75% benchmarks set in the NPHE of the completion rates of any cohort of students entering a programme. The figures show that only 25% of contact students and 15% of distance students were meeting the benchmark for undergraduate studies while only 20% and 15% respectively were doing so for Doctoral students.

Table: Full Time Equivalent Enrolments of Contact and Distance Students

	Contact					Distance				
Institution	Science Engineering & Technology	Business & Management	Education	All Other Humanities & Social Sciences	Total	Science Engineering & Technology	Business & Management	Education	All Other Humanities & Social Sciences	Total
CPUT	9,872	5,686	1,773	4,810	22,142	44	0	0	0	44
UCT	7,074	3,213	294	7,306	17,886	0	0	0	0	0
CUT	3,124	2,352	411	2,072	7,959	17	58	0	85	159
DUT	7,312	5,557	188	4,073	17,130	0	0	0	0	0
UFH	1,237	1,143	555	3,249	6,184	0	0	632	0	632
UFS	5,544	2,536	2,366	6,457	16,902	61	168	0	1,053	1,283
UJ	10,359	9,969	2,901	9,844	33,073	117	0	1,105	7	1,229
UKZN	10,672	5,664	1,831	10,563	28,729	218	2,295	862	137	3,513
UL	6,150	1,396	1,876	4,655	14,077	0	0	0	0	0

NMMU	5,179	3,782	714	5,430	15,105	82	2	1,759	44	1,887
NWU	6,414	3,755	3,348	8,383	21,900	343	177	3,681	1,032	5,233
UP	12,583	5,792	2,389	9,070	29,833	5	0	3,119	1	3,125
RU	1,279	621	466	2,888	5,254	0	0	141	0	141
UNISA	0	0	0	451	451	11,747	34,498	9,693	44,487	100,424
US	7,150	2,845	915	6,828	17,738	1	0	52	0	53
TUT	15,716	12,236	729	12,880	41,560	114	123	3,604	1,956	5,798
UV	2,097	991	1,225	3,911	8,223	0	0	0	0	0
VUT	5,650	5,012	27	2,886	13,576	0	0	0	0	0
WSUST	5,384	7,169	3,085	5,085	20,722	194	0	653	0	847
UWC	4,073	1,113	773	5,468	11,428	59	0	0	0	59
Wits	8,202	2,695	1,064	5,947	17,908	0	0	0	0	0
UZ	1,572	990	2,772	3,410	8,744	0	0	0	0	0
MT	3,751	1,846	0	1,967	7,563	0	0	0	0	0
Totals	140,390	86,362	29,701	127,634	384,088	13,002	37,321	25,301	48,802	124,427

There were 384088 and 124427 students respectively in the contact and distance mode enrolled fulltime equivalent students in Higher Education in 2005. Here the picture is different showing that the largest proportion of students is in the SET field in the contact mode (37%0) and in the Humanities and social sciences in the distance mode (39%). Business and management constituted 22% and 30% respectively, for contact and distance FTE students in the system.

Table: Demographic Spread of Students

	Contact (%)					Distance (%)				
			Black					Black		
Institution	African	Coloured	Indian	White	Average	African	Coloured	Indian	White	Average
CPUT	70	77	81	86	76	56	67	n.a.	88	62
UCT	80	83	86	92	87	n.a.	n.a.	n.a.	n.a.	n.a.
CUT	74	72	87	82	75	75	75	87	80	76
DUT	73	76	76	85	74	n.a.	n.a.	n.a.	n.a.	n.a.
UFH	75	74	75	85	76	91	83	100	100	91
UFS	62	69	68	81	71	59	68	68	69	66
UJ	71	73	77	83	75	76	79	97	85	77
UKZN	73	80	78	90	78	84	82	95	90	84
UL	77	87	89	91	77	n.a.	n.a.	n.a.	n.a.	n.a.
NMMU	66	73	76	85	73	79	87	62	93	80
NWU	76	71	81	84	80	68	76	74	78	71
UP	75	81	81	86	83	84	90	96	95	84
RU	84	82	86	91	87	89	100	n.a.	n.a.	89
UNISA	97	86	0	89	87	49	51	56	62	54
US	67	69	73	83	80	n.a.	n.a.	n.a.	n.a.	n.a.
TUT	57	69	69	75	59	42	40	55	58	42
UV	78	25	70	75	78	n.a.	n.a.	n.a.	n.a.	n.a.
VUT	70	71	72	76	70	n.a.	n.a.	n.a.	n.a.	n.a.
WSUST	69	79	96	69	69	60	100	n.a.	n.a.	60
UWC	75	79	83	92	78	n.a.	n.a.	n.a.	n.a.	n.a.
Wits	74	77	80	89	80	n.a.	n.a.	n.a.	n.a.	n.a.

UZ	73	46	78	54	73	n.a.	n.a.	n.a.	n.a.	n.a.
MT	79	72	47	69	79	n.a.	n.a.	n.a.	n.a.	n.a.
Averages	70	76	79	84	75	52	54	56	63	55

In 2005 the average success rates of these students at undergraduate level were 75% and 55% for contact and distance students

Institution	Total Permanent Staff			% of Black Staff in Total			% of Female Staff in Total		
	Instruction & Research Staff	Administrative Staff	Service Staff	Instruction & Research Staff	Administrative Staff	Service Staff	Instruction & Research Staff	Administrative Staff	Service Staff
CPUT	621	758	167	44	74	98	38	55	31
UCT	829	1,512	253	21	58	96	35	66	30
CUT	203	333	181	28	48	92	40	59	53
DUT	537	625	122	61	86	99	44	52	20
UFH	230	434	53	65	82	100	35	54	15
UFS	620	690	327	17	29	98	43	63	56
UJ	917	1,427	528	29	43	93	41	60	25
UKZN	1,448	2,214	441	51	76	100	39	61	26
UL	804	787	517	74	76	100	37	56	41
NMMU	557	717	151	18	43	91	41	59	41
NWU	769	1,046	479	28	30	96	39	66	51
UP	1,575	1,323	575	15	24	89	45	69	31
RU	306	552	379	16	46	100	34	63	44
UNISA	1,308	2,642	232	26	48	100	52	57	25
US	818	1,348	344	12	30	99	39	60	31
TUT	880	1,319	430	39	55	98	39	55	53
UV	268	274	210	90	98	100	30	45	56
VUT	312	372	239	37	59	98	45	62	58
WSUST	531	501	206	82	92	100	42	60	41
UWC	465	629	105	58	94	100	46	58	27
Wits	952	1,413	372	25	62	100	46	68	33
UZ	219	276	195	67	82	99	42	48	38
MT	146	183	140	79	91	100	28	48	53
Totals	15,315	21,375	6,646	37	56	97	42	60	39

Table illustrates the high level of employment inequity in the higher education system in 2005 Black staff were only 36.8 percent of the permanently appointed academic staff posts while females staff composed 41.5% of these staff. Female staff was also preponderant in administrative functions – 60.2%.

Overall, it can be said that some important measures of progress have been achieved in the HE system in South Africa since 1994. For instance:

- Overall student enrolment (and within all racially specified and gender groups) has increased in both headcount and full-time-equivalent (FTE) terms; and student participation rates have increased from 14% to 18%

- There have been significant proportionate increase in the SET fields of study in accordance with the NPHE targets
- A small increase has been registered in postgraduate enrolments relative to overall enrolments
- Student graduate output has improved over time. Notably, 2002 for instance showed a rise of 24% compared to the figure for 1995; and
- The number of international students presently studying in South Africa has increased to a significant number of 53,000 students. These come to South Africa mostly from the SADC Region.

Funding and Finance of Higher Education

Table: Research Outputs of Universities

UNIVERSITY	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
Durban-Westville	66.18	75.23	79.74	100.34	107.37	89.88	126.15	126.67	132.37	126.01	124.47	120.00	120.30	106.53	126.68	74	1.4%
Fort Hare	27.51	32.3	42.6	21.76	28.61	32.61	29.37	22.42	31.78	47.89	36.54	34.40	46.15	0.00	54.94	79	1.5%
Cape Town	822.22	758.14	797.25	830.48	831.48	774.25	793.86	702.32	711.02	623.86	601.07	552.00	766.01	652.18	710.27	564	10.5%
Medunsa	42.6	35.2	26.5	53.26	29.37	32.61	37.61	52.26	46.35	48.38	38.33	36.00	45.22	31.08	37.48	50	0.9%
North										67.82	84.52	84.50	82.27	98.38	72.5	63	1.2%
Natal	468.32	500.67	479.34	521.16	476.74	514.12	552.58	555.33	590.64	625.4	511.22	478.66	487.01	499.89	566.99	630	11.7%
North West							40.11	51.08	62.76	14.56	8.91	27.30	4.33	0.50	11.99	1	0.0%
Free State	295.67	253.09	300.43	315.07	300.57	330.52	321.89	298.15	290.11	264.88	265.8	276.00	317.38	293.42	365.73	334	6.2%
Port Elizabeth	125.51	97.58	81.83	107.8	107.03	70.74	90.68	82.37	101.63	104.89	99.54	96.00	103.37	126.69	105.66	123	2.3%
Potchefstroom	227.48	200.18	241.98	199.46	230.58	193.1	191.29	171.41	183.25	159.26	155.61	173.00	202.18	186.69	209.98	266	4.9%
Pretoria	657.5	710.39	767.23	706.34	746.73	752.77	706.25	749.92	742.60	770.72	769.68	769.40	832.75	882.21	954.18	954	17.7%
RAU	230.64	285.58	282.74	270.36	363.73	348.89	306.06	316.40	333.68	330.86	306.94	259.00	291.46	310.95	267.46	277	5.1%
Rhodes	157.89	162.9	173.84	170.58	160.24	156.49	157.1	174.56	182.12	183.18	211.74	208.20	233.25	210.16	206.64	165	3.1%
Stellenbosch	455.03	460.8	458.36	465.39	487.42	401.91	616.9	589.20	585.55	462.27	528.82	520.00	626.85	589.58	633.96	624	11.6%
Transkei								40.91	60.92	74.73	80.95	0.00	16.16	15.17	10.9	14	0.3%
Unisa	266.56	264.98	333.01	365.83	394.58	426.14	408.46	406.57	422.85	379.99	315.76	334.00	296.76	333.93	391.57	403	7.5%
Venda											0	0.00	1.12	11.43	13.96	24	0.4%
Vista	22.5	38.24	34.33	47.03	59.43	59.45	59.12	48.97	37.00	38.88	58.93	60.30	67.35	51.42	58.76	21	0.4%
Western Cape	45.82	65.06	46.53	66.13	82	120.92	126.87	144.21	146.55	136.79	133.77	133.00	103.27	157.98	113.59	106	2.0%
Witwatersrand	1026.48	934.67	1008.72	819.75	860.62	768.78	867.57	788.79	791.13	720.61	656.02	685.00	666.19	709.52	632.89	557	10.3%
Zululand	28.04	30.98	19.91	31.51	39.67	36.18	48.78	45.07	50.64	58.98	55.88	46.10	74.65	43.37	58.15	61	1.1%
TOTALS	3911.43	3940.34	4145.71	4240.99	4405.88	4304.4	4564.3	5366.61	5502.95	5239.96	5044.50	4892.86	5384.03	5311.08	5604.28	5390	100.0%

Source: University of Pretoria: Bureau for Institutional Research and Planning

Pouris',[24] investigation relates to the disciplinary strengths of six South African institutions included in the top 1% of the world's institutions on the Essential Science Indicators database of the Institute for Scientific Information These institutions include University of Cape Town, University of Pretoria, Orange Free State University, University of Witwatersrand, University of Natal and University of Stellenbosch. His analysis in Table below shows that 'the country has citation footprints in only nine of the 22 broad scientific disciplines'.

Table: Number of citation of SA institutions in ISI database (Jan 1995–April 2005)

Scientific field	UCT	UP	Orange Free State	Wits	Natal	US
Biology & biochemistry	5,763					
Chemistry				3,714		
Clinical medicine	12,577	3,807	1,217	10,351	4,695	6,936
Engineering		1,086		711		
Environment/ecology	4,932	2,152			1,403	
Geosciences	3,597			4,314		
Materials science				783		
Plant & animal	4,947	4,633	1,620	1,459	3,357	1,998
Social science gen.	1,033			1,266	360	

The Micro-economic Reform Process

But the tenure of the RDP was short-lived and largely unfulfilled as many commentators have argued. It was substituted by a much more conservative and fiscally disciplinary economic policy framework (GEAR)[25] which was intent on exercising greater fiscal control, lower inflation targets and strategies for privatisation. It argued that unemployment will be addressed by engineering greater economic growth and through "accelerated labour-based infrastructural development and maintenance of public works in urban and rural areas" and "from institutional reforms in the labour market, employment enhancing policy shifts and private sector wage moderation".[26]

As Southall has argued however, the effects of this policy were that

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24 Pouris A, The International Performance Of The South African Academic Institutions: A Citation Assessment: The International Journal Of Higher Education And Educational Planning Published Online: 14 September 2006
25 Department of Finance 1996, Growth, Employment and Redistribution: A Macroeconomic Strategy (GEAR)
26 ibid: Introduction

> *growth and investment did not follow because the macroeconomic formula was not backed by deregulation of the micro-economy and labour markets. Private fixed investment lagged, labour absorption fell, and mass poverty and inequality deepened. As a result, ANC popularity slumped in the opinion polls, and protests by COSATU and the SACP signalled mass discontent, with the result that the government swung left in anticipation of the 2004 general election. Subsequently, privatisation has stalled, the state has re-asserted its economic role, corporations are increasingly subject to a maze of legislation about BEE, and all spheres of life are progressively being subjected to regulation. In short, the ANC's version of the developmental state will fail to bring sustained investment, technological innovation and growth and will condemn South Africa to 'mediocrity in perpetuity'.*[27]

In regard to education in particular it has also been argued that the adoption of GEAR has had major repercussions for the funding of education and has served as a constraint to the achievement of equity in the redistribution of resources amongst schools. The reliance on the mobilisation of private resources and the market for educational services was likely to exacerbate privilege further and erode the possibilities for social justice and equity.[28]

Having achieved macro-economic stability through GEAR, the second post-apartheid government began a process of deepening and widening its efforts in transforming South Africa. Attention now shifted to levers which could unlock higher growth rates and also spread the public good benefits of state interventions. The Microeconomic Reform Strategy (MRS) was announced in 2000 and articulated a medium- to long-term vision for South Africa. This reads as: "By 2014, following the successful implementation of the microeconomic reform strategy and complemented by continued macroeconomic stability and process of sustainable social development, South Africa will have a structured and adaptive economy characterised by growth, employment and equity, built on the full potential of all persons, communities and geographic areas".

The MRS identified the following prerequisites for the attainment of the 2014 Vision:

- A geographic spread of social and productive investment
- A high degree of knowledge and technology capacity

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27 Southall R, Introduction: Can South Africa be a developmental state, State of the Nation: South Africa 2005-6, Buhlungu S, Daniel J, Southall R, and Lutchman J, HSRC Press 2006: Page xxiii.

28 Nicolaou, K. The link between macroeconomic policies, education policies and the education budget, in Motala E and Pampallis J, The State, Education and Equity in Post-Apartheid South Africa: The impact of state policies, Ashgate 2002

- Greater diversity of enterprise type and size
- An integrated manufacturing economy capable of high degrees of value added
- Skilled, informed and adaptable citizens
- An extensive ICT and logistics system capable of speed and flexibility

Aspects of this policy stance were devolved to line and cross-cutting departments now organised as cabinet clusters. Science and Technology became a cross-cutting and enabling element of the Integrated Action Plan in 2001. In a statement at the conclusion of the debate on the state of the nation address, made to the National Assembly on the 14th of February 2002, President Thabo Mbeki announced that: *"… government will undertake a comprehensive review of this important sector to ensure that we correctly position and resource science and technology, research and development as a central driver in the process of the modernisation of our country and the creation of a better life for all.*"

An expanded definition of NSI was adopted which was based on global empirical and theoretical developments. From 2002, the NSI has been recognised as "a system of interacting private and public firms (either large or small), universities and government agencies aiming at the production of science and technology within national borders. Interaction among these units may be technical, commercial, legal, social and financial, inasmuch as the goal of interaction is the development, protection, financing or regulation of new science and technology to enhance the quality of life and sustainable economic growth".

The National Research and Development Strategy (NR&DS) was accepted by Cabinet in 2002 as the basis for further development of the NSI and to address key challenges to the development of the system's robustness and effectiveness. According to Dr Rob Adam "*The R&D Strategy, …, represents the way forward for publicly financed science and technology and for creating an enabling environment for the National System of Innovation as a whole.*" (2002) DACST was also restructured into two stand-alone departments. The Department of Science and Technology (DST), with a dedicated bureaucracy and full Ministry was established. DST would retain custodianship over the NSI and become the implementation vehicle for governments NR&DS.

The NR&DS is structured on an evidence-based indicator system of monitoring and evaluation. At a high level of aggregation it is based on a dynamic interaction of policies, strategies, plans, institutions, utilities and functionalities. The NR&DS, in accordance with the constitutionally determined role of the South African state as a key motive force in social development, is focussed on improving the quality of life of all its citizens. It qualifies this by emphasising that the creation of wealth in modern economies is increasingly dependent on innovation, research and development. It therefore proposes that South Africa

must grow its investment in this domain and strategically target resources to meet its objectives.

The high-level goals of the NR&DS are articulated as the improvement of the quality of life and wealth creation. These objectives are served by three key processes: business performance, technical progress which incorporates innovation and improvement, and effective and growing science, engineering and technology human capital. Sustaining these intermediate processes and objectives are the fundamental activities related to the acquisition, generation and application of knowledge, namely: imported know-how, current R&D capacity and future R&D capacity.

The NR&DS is aimed at solving the following identified and quantified problems:

- Low investment in R&D
- Strategic vulnerability of economy
- Loss of missions
- Weak human resources base and "Frozen" demographics
- Declining private sector R&D
- Inadequate intellectual property framework
- Fragmented governance

The three operational objectives for the implementation of the NR&DS are:

- Achieving mastery of technological change in our economy and society (Innovation)
- Increasing investment in South Africa's Science base (Human Capital and Transformation)
- Strengthening the government S&T system (Alignment and Delivery)

DST also established strategic interventions in the fields of Biotechnology, Advanced Manufacturing, Information and Communications Technologies, and Nanotechnology. These new missions would soon be augmented by the re-establishment of an Energy Research competency by government and a variety of collaborative international ventures supported by multilateral and bilateral programmes.

DST also contributed to the evolution of the New Partnership for Africa's Development (NePAD). Its contribution to the World Summit on Sustainable Development ensured that the use of NSI resources in underpinning development in an appropriately relevant form would not be lost on the environment. Additionally, DST led consultation processes across the continent and assisted with the establishment of the Science, Technology and Development focus area within the aegis of NePAD. After a succession of workshops, an Africa-wide Ministers Committee on Science and Technology held its inaugural gathering in

2003. This ministerial group is supported by a team of senior public officials and has adopted a target of one percent of GDP as investment in respective National Systems of Innovation.

A Review of the 1st Decade Post apartheid

The government's own analysis of the economic situation and its future prospects is contained its end-of-a decade(post apartheid) review *Towards a Ten Year Review*[29] according to which it had set out to deal with these challenges through, inter alia, policies for macro-economic stability; trade and access in the context of competition internationally; industrial policies to increase competitiveness and productivity and for export promotion; the encouragement of foreign direct investment (FDI); strong competition policies to improve competitiveness and roll-back white minority control of the economy and to encourage Small and Medium Macro Enterprises (SMMEs), especially black-owned companies; the promotion of skills development, including occupational skills and adult basic education and training for affirmative action and employment; the reduction of inequalities through affirmative action (later called empowerment) and land reform; and support for innovation, research and development.[30]

The *Review* points to a number of statistics which attest to the 'successes' of the unfolding strategies of the post-apartheid state. For instance by 2003 the budget deficit had come down from 9.5% of gross domestic product (GDP) (including the deficits incurred by the Bantustans) in 1993 to fractionally over 1% in 2002/03.Total public-sector debt fell from over 60% of GDP in 1994 to barely 50% of GDP in 2002/03 while the net open forward position of the Reserve Bank fell from $25 billion in 1994 to zero in 2003, and foreign reserves had risen from one month's import cover to two and half month's cover in that time. In its view substantial macroeconomic stability had been achieved.

This has laid the foundation for social service expenditure and for a reduction of the costs and risks of investing in the economy and for promoting vigorous

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29 Towards a Ten Year Review, GCIS, Presidency, Pretoria 2003. It goes without saying that there have been serious contestations over the government's policies and especially in regard to its departure from what were regarded as the 'redistributive' intentions of the initial RDP programme in favour of what is regarded as more 'conservative' GEAR policies.

30 It goes without saying that there have been serious contestations over the government's policies and especially in regard to its departure from what were regarded as the 'redistributive' intentions of the initial RDP programme in favour of what is regarded as a more 'conservative' GEAR policy. Especially the trade Union COSATU and other social movements have been vocal in this regard and there is a wide range of writings setting out this critique.

growth.[31] It concedes however that investment as a percentage of GDP has averaged around 16 – 17%, which is relatively low for developing countries, given that in the 1960s it has actually reached 27% and even higher. In the late 1990s investment reached historically low levels largely because of tight fiscal policies and investment by parastatals was constrained by the restructuring of the State Owned Enterprises. Table 1 below is shows the low levels of gross fixed capital formation relative to GDP in the early years of this century, which in 2004 was 16.12%.

Table: Ratio of Gross Fixed Capital Formation to GDP (%)	
2000	15.14
2001	15.05
2002	15.02
2003	15.82
2004	16.12
Annual Rate of Growth	*1.3%*
Source: South African Reserve Bank	

This low aggregate level of fixed capital formation was no doubt exacerbated by the adverse ratio of inflows to outflows of capital at this time as the Table 2 below indicates.

Table: FDI inflows and outflows in South Africa					
	2000	2001	2002	2003	2004
FDI inflows	888	6789	757	720	585
FDI outflows	271	-3180	-399	577	1606
Unit: Millions US Dollars Source: UNCTAD					

The *Review* argues that this trend has begun to be reversed through relatively larger social expenditures and the planned infrastructural investments for road, harbour and rail transportation, for electricity supply and other investments linked to large developments such as Gautrain, COEGA and the Dube Trade port[32] and the holding of the football World Cup in 2010.

The Review acknowledges that concerns over the

> *credibility of macro-economic reforms resulted in strongly risk averse behaviour, especially in respect of the rate of inflation, and hence to tight monetary conditions. Several of these factors have eased, and the country has entered a period of higher private -sector investment .Since the*

31 Towards a Ten Year Review, GCIS, Presidency, Pretoria 2003
32 The high-speed rail link to and from Johannesburg's international airport and the development projects around the port cities of Port Elizabeth and Durban respectively

immediate pre-1994 period, the country's net FDI has been positive on balance, which is a turnaround from the massive outflows of the 1980s and early 1990s. Significant foreign investments have been seen in such sectors as the motor industry, the chemicals sector, mining, and dairy products…'[33]

Since 1994 in addition the economy has grown at the average rate of 2.8%, reversing the negative trends of the pre-apartheid period and even real per capita growth has been slightly over 1% since 1994, which is relatively low compared to other developing economies, but is a reversal of the trend during the latter years of apartheid.

As Table 3 below suggests there has been a steady growth in all sectors but that the services sector was by far the largest contributor to the GDP with Manufacturing represented in 2005 about half the value of services. Although construction was the smallest of the sectors it is likely to grow considerably in the coming years because of the large infrastructure projects planned.

Table : GDP by Sector Aggregated Quarterly

Year	Quarter	Agriculture and mining	Manufacturing	Construction	Services	Total RSA
2000	1	19,533	36,399	5,371	132,846	213,682
	2	25,622	37,973	5,311	137,831	232,359
	3	24,901	41,834	5,235	145,196	242,067
	4	20,785	42,900	5,197	151,285	240,952
2001	1	23,864	41,942	5,668	148,555	243,893
	2	32,166	42,659	5,679	151,262	263,932
	3	28,922	45,104	5,553	155,671	264,172
	4	24,850	47,201	5,515	163,601	266,017
2002	1	28,144	47,626	6,084	164,179	274,177
	2	40,958	50,811	6,036	168,480	307,243
	3	37,727	54,621	5,979	174,258	310,312
	4	29,465	56,546	6,020	186,949	308,445
2003	1	27,636	53,472	6,910	185,396	301,050
	2	37,293	53,726	6,790	188,566	323,668
	3	34,484	56,478	6,709	192,706	324,861
	4	25,738	57,976	6,538	200,715	316,705
2004	1	26,871	56,341	7,432	201,418	318,933
	2	36,614	56,970	7,312	206,707	344,217
	3	35,289	60,959	7,360	217,867	356,764
	4	26,666	62,553	7,078	225,426	348,389
2005	1	27,827	58,900	8,090	222,281	344,925
	2	35,642	61,099	8,420	227,032	367,835
	3	36,461	65,662	8,590	237,164	384,338

33 Towards a Ten Year Review, GCIS, Presidency, Pretoria 2003:

Unit: Million Rand, current prices Source: Statistics South Africa

Gross per capita incomes have similarly increased as Table 4 below indicates. However this does not indicate levels of distribution in wealth and incomes and access to services which continue to show considerable inequalities for the population as a whole.

Table: Gross per Capita Income	
Year	Gross per capita Income
2000	20,599.9
2001	22,176.9
2002	25,131.3
2003	26,537.2
2004	29,082.3
Annual growth rate	5.9%
Unit: Rand, current prices Source: South Africa Reserve Bank	

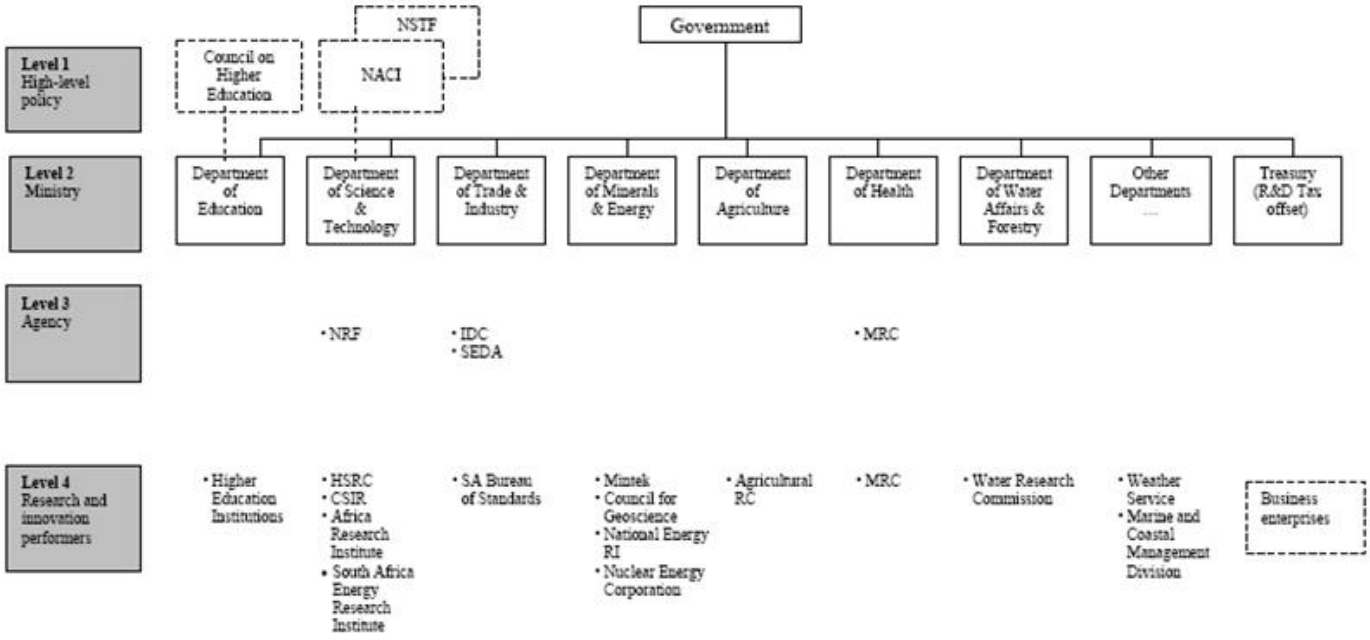
In 2002 the R&D Strategy established new missions for the national system of innovation, and made these operational under amongst others, the Biotechnology Strategy. The *Review* argues that the competitiveness of the economy has improved since the early 1990s. This is attributable both to improvements in export capability and labour productivity.

The *Review* concludes that despite its 'successful' macro-economic policy and improvements in the trade regime, the country's skills base, and other factors such as exchange rate volatility, the cost of transport and telecommunications, perceptions about the continent and an uncompetitive domestic market continue to be a problem. It speaks to a number of social and economic challenges and governments unfolding strategies, such as public works programmes, the better delivery of social grants to rural communities and a strategy for HIV/AIDS, housing and skills strategies together with a range of economic strategies to increase participation and growth in the economy.[34]

Figure 1: South Africa's National System of Innovation[35]

34 Review Supra: Page 114-5

35 Source: Organisation for Economic Co-operation and Development (2007): Review of South Africa's Innovation Policy, Directorate for Science, Technology and Industry, Committee for Scientific and Technological Policy, DSTI/STP (2007)12.



In addition to the 23 public institutions for higher education, public research and development institutions also takes place in Public Research Institutions (Science Councils). Collectively they comprise a significant portion of the National System of Innovation (NSI). The South African Government adopted the NSI framework in its White Paper on Science and Technology issued in 1996. This document outlines government's commitment to Science & Technology in the following main sections:

- Promoting competitiveness and employment creation
- Enhancing quality of life
- Developing human resources
- Working towards environmental sustainability
- Promoting an information society

Most of the attention of the White Paper is directed at the current seven Science Councils in South Africa. Only three of these reports directly to the Department of Science and Technology, whilst the other three are accountable to their respective sectoral ministries (Agriculture, Health, Minerals & Energy). These are listed below:

- Agricultural Research Council (ARC) for promoting agriculture and related sectors through research, technology development and technology transfer;
- Council for Geosciences (CGS) for Geological, geophysical and paleontological research supplying geological information to the Government and the public;

- Council for Mineral Technology (Mintek) dedicated to enabling the minerals industry to operate more effectively, by developing and making available the most appropriate and cost-effective technology;
- Human Sciences Research Council (HSRC) whose role is to facilitate problem solving and enhancing decision making through research excellence in the human sciences;
- Medical Research Council (MRC) responsible for improving the nation's health status and quality of life through relevant and excellent health research aimed at promoting equity and development;
- National Research Foundation (NRF) South Africa's premier agent for investing in knowledge and innovation across all disciplines of the natural sciences and engineering, as well as social sciences and humanities; and
- South African Bureau of Standards (SABS) responsible for the development and publication of standards for products and services.

The CSIR is by far the leading public-sector performer of research and development in South Africa. Up until 2005, it existed as an agency of the Department of Trade and Industry and was constituted by an Act of Parliament in 1945. Recent data confirms that it is one of the leading scientific and technological research, development and implementation organisations in Africa[36]. It was originally conceived of as necessary to dealing with the country's problems of 'hunger, shelter and health'.[37] It is based in Tshwane and is also present in most of the nine provinces of South Africa through regional offices. It undertakes directed and multidisciplinary research, technological innovation as well as industrial and scientific development to improve the quality of life of the South Africa's people. It is committed to supporting innovation in South Africa to improve national competitiveness in the global economy. Science and technology (S&T) services and solutions are provided in support of various stakeholders, and opportunities are identified where new technologies can be further developed and exploited in the private and public sectors for commercial and social benefit. Its parliamentary grant makes up approximately 40% of its total income while it also

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36 The CSIR's mandate is as stipulated in the Scientific Research Council Act (Act 46 of 1988, as amended by Act 71 of 1990), section 3: Objects of the CSIR: "The objects of the CSIR are, through directed and particularly multi-disciplinary research and technological innovation, to foster, in the national interest and in fields which in its opinion should receive preference, industrial and scientific development, either by itself or in co-operation with principals from the private or public sectors, and thereby to contribute to the improvement of the quality of life of the people of the Republic, and to perform any other functions that may be assigned to the CSIR by or under this Act."

37Kahn M and Blankley W, The state of Research and Experimental Development: moving to a higher gear, in State of the Nation, South Africa 2005-2006 Buhlungu S et al (Eds), HSRC Press 2006 – page 270.

generates income from research contracts, royalties, licences and dividends to its intellectual property and other commercial operations. Its parliamentary grant is used to generate 'pre-competitive' research not likely to be privately funded and for the training of young researchers.

The Department of Science and Technology itself is shepherding the countries bid to host the Square Kilometre Array radio telescope, estimated to cost US$1, 5 billion and probably, the largest in the world – in the Northern Cape. Recently Southern African Large Telescope was launched and there are plans to build the Square Kilometre Array Telescope in the Northern Cape by 2009. Other cross-cutting initiatives, such as the Innovation Fund and the Centres of Excellence and Research Chairs programmes, have also been initiated. The department acknowledges that *at the heart of these challenges is educating a new generation of scientists and skilled technical professionals. At the moment, there are too few students entering science and engineering programmes in higher education. Moreover, a very low proportion of these undergraduates move into related post-graduate research. … We have to find ways to tap into our existing resources (at universities and science councils) with innovative thinking to make sure we increase the numbers.*[38]

For this purpose the South African Agency for Science and Technology Advancement (SAASTA) builds the potential pool of human resources for R&D through science education, science awareness and science communication. These activities engage learning in science and public awareness of scientific issues. Support for students has been enhanced. For example the amount spent on student support increased to R 91, 2 million (2004/05: R 86, 6 million) and the number of students supported increased to 4, 450 (2004/05: 4, 419). Women students supported increased by 3 percent to 2, 181 (2004/05: 2, 108) and now constitutes 49 % of all students supported. During 2005/06, 1, 173 doctoral students were supported and the number of black doctoral students increased by 10 percent to 511 and Black students funded through the Scarce Skills Fund of the Department of Labour increased to 312, constituting 69.4 percent of the total. At master's level black students constitute 75 percent of the total supported and women students constitute 50 percent of the total. Some 1 617 (2004/05: 1, 481) researchers/grant holders were supported with significant increase for both women and black researchers. In addition the average grant size has increased by 13 %. Research funded by Research and Innovation Support Agency (RISA) through its Focus Areas resulted in the following scientific output by RISA stakeholders.[39]

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38 Annual Report of the Department of Science and Technology, in terms of the Public Finance Management Act (1999).
39 Annual Report of the Department of Science and Technology, in terms of the Public Finance Management Act (1999)

South Africa adopted an innovation systems approach to reforming the country's public resources in research, development, science and technology. This position was adopted through the White Paper on Science and Technology in 1996[40]. Subsequent to the establishment of this framework as the key organising tool for managing the transition, a number of institutional and sectoral interventions were generated including the establishment of a single executing agency for the Government of South Africa: the Department of Science and Technology.[41] The vast array of new instruments are manifested through strategies, programmes and projects which collectively seek to improve the quality of life of all South Africans through improving the competitive performance of business enterprises (both public and private). This array includes the: National Research and Technology Audit (1997), Review of the Science and Technology Institutions in SA (1998), National Research and Technology Foresight (1999), NACI/ NSTF report: Growth and Innovation (2000), National Biotechnology Strategy (2001), National Research and Technology Development Strategy (2002), Advanced Manufacturing Technology Strategy (2003), Indigenous Knowledge Strategy (2005), R&D Tax Incentives (2006) and the recently released 10 Year Plan: Innovation towards a Knowledge-based Economy (2007).

President Mbeki thanked members of parliament "*for raising the important issue of science and technology and its relevance to the struggle for development and pushing back the frontiers of poverty and underdevelopment*" and committed the government to "*undertake a comprehensive review of this important sector to ensure that we correctly position and resource science and technology, research and development as a central driver in the process of the modernisation of our country and the creation of a better life for all*[42]." This seemed to reinforce the perception that whilst the ability of technological progress and innovation to improve the conditions of existence of people was internalised, questions about the institutional capacity to deliver this public good remained to be evidenced. In the next section we consider some of the measured outputs of the NSI.

The State of Research and Experimentation

According to Kahn and Blankley the main institutions which constitute the NSI in South Arica are the research universities (six of these), some government research agencies and museums, the science councils and some firms. According to them South Africa's share of world technology exports 'appears to relate a dismal tale. For instance in regard to high technology that share is no more than

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40 www.dst.gov.za/publications-policies/legislation/white_papers/Science_Technology_White_Paper.pdf
41 www.dst.gov.za
42 Statement at the Conclusion of the Debate on the State of the Nation Address, National Assembly: 14 February 2002

0.07 in 2002 while for low technology it is only 0.30. The top ten manufactured exports show however that they are of the medium-technology type and suggest a 'story of export-led growth'. They also indicate that more important than the rankings in 2002 is the change in rankings indicative of shifts towards: 'weapons and ammunition, electronic components, petroleum refineries/synthesisers, engines and turbines, and television and radio receivers'[43] were experiencing the highest increases.

Acknowledging the problems of measuring R&D because while R&D measures have been conducted along the lines of the Frascati Manual Series of the OECD[44], they are not adequate for the purposes of capturing the difficulties in measuring innovation activities accurately particularly since, as they argue, it bears little reference to 'the measurement of R&D in the service sector'. [45] According to the OECD 2005, calculations of Gross Expenditure on Research and Development as a percentage of GDP, for the period 1983-2003, the median level of expenditure on R&D was 0.76 and this improved to 0.86 in 2003. This means that it had not yet reached the 1% target set by government but comparable to countries like Portugal, Poland and Hungary.[46]

The sectoral distribution of R&D shows that Business and Not for Profit research accounted for 57.4% of the share of R&D expenditure, Government and the Science Councils 22% and Higher education 20.6% respectively from a total expenditure of 10.081 billion Rand in 2003/4[47]. By 2003/4 the major fields of R&D investment were the Engineering sciences (24.8%), Natural Sciences (21.9%) Medical and Health sciences (13.5%) while the social sciences and humanities accounted for 11.8% of expenditure in that year. Interestingly the applied and engineering science spend has grown by 10% over a decade. Patents of South African granted in the US have increased from 89 in 1993 to 112 in 2003.[48] Their data suggests that there is a small increase in aggregate numbers of 'researcher full time equivalents' between 1992 and 2004 namely from 9, 454 to 10, 127 the country being a victim as much of its own failure to produce good school leaving candidates for universities and of researcher mobility.

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43 ibid 273-4
44 Blankley, W.; Scerri, M.; Molotja, N.; & Imraan Saloojee (2006) Measuring Innovation in OECD and NON-OECD Countries: Selected Seminar Papers, HSRC Press, Tshwane
45 Ibid:275 They illustrate this view by reference to particular examples.
46 Ibid: page 278, See Figure 1
47 Khan and Blankley:279, Table 11.3
48 Ibid: 280

Expenditure on R&D

Table : Historical Trends in R&D Expenditure[49]				
Year	**R&D Expenditure (R millions)**	**R&D as % of GDP**	**Revised GERD**	**Comments**
1966/67	36.5	0.40		NS&E only
1969/70	59.2	0.50		NS&E only
1971/72	75.3	0.53		NS&E only
1973/74	93.8	0.47		NS&E only
1975/76	141.9	0.54		NS&E only
1977/78	225	0.65		
1979/80	310	0.64		
1981/82	497	0.74		
1983/84	769	0.93	0.82	
1985/86	1077	0.96	0.84	
1987/88	1329	0.88	0.76	
1989/90	1775	0.86	0.71	
1991/92	2786	1.04	0.84	
1993/94	2594	0.75	0.61	
1997/98	4103	0.69	0.60	
2001/02	7488	0.76	0.73	
2003/04	10082	0.81	0.80	
2004/05	12010	0.87	0.86	
2005/06	14149	0.92	0.92	

South African expenditure on R&D has been steadily increasing over the last three decades. Revisions were made to the estimation of GDP by the national statistical agency which then caused the GERD figures to be revised downwards. According to these statistics, South Africa is yet to meet its declared commitment to investing 1% of GDP in R&D. These aggregates however mask intra-national discrepancies. With the majority of Science Councils, major corporate offices and nearly 6 Universities based in the Province of Gauteng, this region has well exceeded the target at the cost of the rest of the country.

Concentration in the sector, as is the case more generally in South Africa, is heavily path dependent, contingent on post apartheid transformation and most especially, influenced by historical accumulation. It is therefore unsurprising that five universities the (Cape Town, Natal, Pretoria, Stellenbosch and the Witwatersrand) accounted for 61% the 1991/2 R&D expenditure in higher education. By 2001/2, these five whilst still dominant, had lost 4% to now command only 57% of the total[50].

49 Derived from Blankley, W. & Michael Kahn (2005)
50 Ibid: 155

AsgiSA – governments 'high growth' strategy and programme

More recently the government has unfurled its development programme the Accelerated Strategy for Growth and Investment in South Africa (AsgiSA).[51] The Deputy President's team, supported by a small group of specialists from various government departments and coordinated by The Presidency, created a framework document and set the overarching objectives for AsgiSA which intends to:

- Reduce the unemployment rate from 30% to 15% by 2014.
- Reduce poverty from one-third to one-sixth of the population by 2014.
- Increase the annual GDP growth rate from the then average of 3% to 4,5% per year for the period 2005 to 2009 and to 6% for the period 2010 to 2014, towards a sustainable annual growth rate of 6%.

In the Foreword to the ASGISA Report itself, the Deputy President informs the reader that AsgiSA was a response to the failure of government to respond adequately to some of its most pressing challenges. Its focus is to provide a basis for higher level public and private investment, which is both 'targeted and efficient.' The programme specifically avowed the need to engage all social sectors in the achievement of its objectives through a communication strategy for that purpose.[52] As the report acknowledges, perhaps the most intractable challenges facing the economy and society relate however to employment, poverty and inequality and skills development. In spite of considerable progress, poverty and unemployment remain unacceptably high. The best solution is to increase the rate of job creation. Additionally, the economic benefits of having a higher number of South Africans employed can be redistributed as better social services and other social transfers. AsgiSA is an essential pillar of our democracy. [53]

It concludes by pointing to the need for continued support for the programme which 'provides a platform for all stakeholders to review AsgiSA's progress and to renew commitments'. She argues that it presents opportunities to fight against both poverty and unemployment arguing that its programmes are the result of 'earlier' policies which had built the necessary basis for shared growth and progress in accelerating growth.

Persistent Post-apartheid Challenges

Yet in some respects the situation has not improved significantly, or at all, since the earlier pronouncements in GEAR that

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51 ASGISA First Annual Report: (2007) for detailed description of infrastructure expenditure
52 AsgiSA supra: See Foreword
53 Ibid: Page 2

> *Employment growth in the formal sector of the economy has stagnated over the past decade and private sector employment has fallen. It is apparent that unregulated low wage employment has increased significantly since the 1970s.....In addition, a large pool of unemployed men and women, who earn no income or derive sporadic earnings from informal self-employment, make up about a third of the potential labour force.*[54]

Despite the 'successes' of the post-apartheid government, there remain serious challenges relating to unemployment and poverty compounded by the high levels of inequality. These issues together with the 'skills challenge' constitute serious barriers to long term and sustainable development and the evolution of a stable democracy in South Africa because they continue to evince many of the very characteristics of the apartheid state. We deal with each of these in turn.

Employment

The *Review* acknowledges employment trends as amongst the most troublesome features of the post-apartheid reform process. As it says,

> *between 1995 and 2002, the number of people employed in South Africa grew from 9 557 185 to 11 157 818.This represents 1 600 633 net new jobs. However, during the same period, the number of unemployed people grew from 1 909 468 to 4 271 302, an increase of 2 361 834 according to the strict definition. This includes an increase in the base numbers of those seeking work, which, now includes a greater proportion of women from rural areas. 2002 figures show that out of a total of 8.9 million workers (i.e. excluding employers, self employed and those working without pay) 1 115 000 were temporary (12.5%), 567 000 were 'casual' 365 000 had fixed term contracts (4.1%) and 62 000 were seasonal (0.7%).*[55]

It also suggests that employers in both the public and private sphere have not taken up the opportunities for training. The percentage of unemployed tertiary institution graduates actually increased from 6% in 1995 to 15% in 2002. The reason for this, it argues, is the poor work preparation for the labour market and the lack of guidance for school leavers regarding career choices.

As the Table 5 below shows the official unemployment rate in 2004 was 27.1 percent. These figures must be viewed against the disputes about the interpretation of unemployment statistics especially in relation to the unregistered unemployed i.e. those who are no longer registered as job-seekers but remain unemployed. The unofficial figures suggest levels as high as 40% on average with higher levels in some regions like the Eastern Cape and in rural areas more generally. Indeed the mismatch between new employment

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54 GEAR: 16
55 Ibid:

possibilities and new entrants into the labour market is very significant and continues to exacerbate the situation.

Table: Employment by Sector						
	2000	2001	2002	2003	2004	*Annual rate of growth*
Agriculture, forestry and fishing	882,914	870,265	840,266	830,800	815,264	*-1.6%*
Coal mining	53,965	53,500	52,347	54,209	55,162	*0.4%*
Gold mining	216,014	201,301	196,270	194,472	192,490	*-2.3%*
Other mining and quarrying	156,049	162,518	173,779	179,961	188,526	*3.9%*
Food, beverages and tobacco	186,976	182,718	179,132	170,745	165,891	*-2.4%*
Textiles, clothing and leather goods	213,736	202,431	201,892	197,480	193,717	*-1.9%*
Wood and paper; publishing and printing	170,451	162,892	162,361	167,990	173,166	*0.3%*
Petroleum products, chemicals, rubber and plastic	166,267	157,762	159,608	159,983	157,807	*-1.0%*
Other non-metal mineral products	56,764	55,931	55,943	58,358	60,467	*1.3%*
Metals, metal products, machinery and equipment	230,271	233,443	242,170	247,245	250,117	*1.7%*
Electrical machinery and apparatus	41,871	38,035	36,212	34,088	33,936	*-4.1%*
Radio, TV, instruments, watches and clocks	24,165	22,230	21,875	22,981	23,126	*-0.9%*
Transport equipment	92,651	95,996	95,394	94,813	95,250	*0.6%*
Furniture and other manufacturing	85,798	87,696	94,690	96,579	95,284	*2.1%*
Electricity	44,207	42,676	41,038	39,272	39,109	*-2.4%*
Water	5,663	5,466	5,257	5,030	5,009	*-2.4%*
Construction	355,426	361,201	360,712	342,647	323,093	*-1.9%*
Wholesale & retail trade	1,041,342	1,071,547	1,090,559	1,117,422	1,127,031	*1.6%*
Catering and accommodation	177,224	167,374	161,531	167,794	165,212	*-1.4%*
Transport	145,847	133,962	131,643	135,599	137,730	*-1.1%*
Communication	73,100	72,987	77,440	70,089	68,445	*-1.3%*
Finance and insurance	333,737	339,610	339,159	350,568	341,526	*0.5%*
Business services	625,532	688,056	810,800	821,926	825,467	*5.7%*
Community, social and other personal services	1,246,581	1,273,657	1,310,944	1,307,898	1,341,724	*1.5%*
General government services	1,424,154	1,402,303	1,411,756	1,438,126	1,441,063	*0.2%*
Total Formal	8,050,702	8,085,554	8,252,776	8,306,076	8,315,612	*0.6%*
Informal	2,717,767	2,807,887	2,895,249	2,981,806	3,199,388	*3.3%*
Total	10,768,469	10,893,441	11,148,025	11,287,882	11,515,000	*1.3%*
Labour Force	14,975,799	15,209,540	15,420,886	15,612,246	15,786,500	*1.1%*
Unemployment	4,207,330	4,316,099	4,272,860	4,324,364	4,271,500	*0.3%*
Unemployment rate %	28.1	28.4	27.7	27.7	27.1	*-0.7%*
Source: Department of Labour, South Africa						

Poverty and Inequality

South Africa's record in respect of Human Development (Table 6 below) is hardly exemplary with several indicators worsening over the period 2000 to 2004 according to UNDP data below. Very worrisome are the increasing rates of

mortality and in respect of life expectancy. The explanation for both these must be found in the high rates of HIV/AIDS prevalence in the country associated with high levels of poverty and unemployment. In regard to HIV/AIDS however, there are now important signs of a turnaround in policy and the expectation that the problem of HIV/AIDS prevalence will be tackled comprehensively and with conviction.[56]

Table: Human Development Indicators					
	2000	2001	2002	2003	2004
Life expectancy at birth (years)	53.2	51.4	48.8	48.4	47
Birth rate, crude (per 1000 people)			25	24.9	
Death rate, crude (per 1,000 people)			19.6	19.96	
Mortality rate (under 5)*	63	64	65	66	67
Prevalence of HIV**	24.5	24.8	26.5	27.9	29.5
* Avert.org ** State of the World for Children (UNICEF) Source: Human Development Reports (UNDP)					

This poor showing on the human development indices are exemplified in Table 7 by reference to the low levels of social services available to the population as a whole in the period 1995-2005 and although these must be attributed primarily to the legacy of apartheid and its racist policies towards the majority of the population, continue to evince such low levels some 7 years into the post-apartheid period.

Table: Access to Services 1995-2000						
Social Service	1995	1996	1997	1998	1999	2000
% in formal housing	65.8	63.8	70.9	66.7	69.9	70.8
% with clean water	78.5	82.2	82.4	81.0	83.4	84.6
% electricity for cooking	55.4	51.0	54.3	52.9	53.0	54.6
% refuse by local authority	55.4	55.1	55.5	54.7	55.3	58.3
% telephone in dwelling	29.1	31.1	29.7	28.4	34.9	38.5
%flush, chemical, pit toilet	86.6	84.8	87.7	83.4	86.8	86.8
(Source: Budlender 2003)						

Race remains a major factor in the distribution of both poverty and inequality. 52% of the African population were below the household poverty line of US$220 per month in 1999 while 95% of whom 95% were African (Woolard, 2002; Bhorat et al, 2000)[57].

56 The recent policy changes and announcements about how the pandemic will be confronted are notable.

57 Referred to in Gelb S, Inequality in South Africa: Nature, causes and responses, Forum Paper 2004, 13-15 October 2004 Lord Charles Hotel Somerset West, South Africa

Table 8 below shows that the Gini coefficient for South Africa. This shows a shift from the top quintile to the middle 40% in particular. For the bottom 40% the income distribution overall had deteriorated significantly between 1975 and 1991 for the bottom 40%. The situation had improved throughout the 1990s. The share of total income to the bottom quintile however actually declined between 1995 (1.9%) and 2000 (1.6%)

Table: Indicators of household inequality: Total Population						
	1975	1991	1995		2000	
Gini coefficient, all households	0.68	0.67	0.56		0.57	
Percent of total income going to: Top deciles	49.2	51.2	46.8		45.2	
Bottom deciles	n.a	n.a.	0.5		0.4	
Percent of total income going to: Top quintile	70.9	70.5	65		64.9	
2nd Top quintile	23.9	25.6	18.2	27.8	20.1	29.0
Middle quintile			9.6		8.9	
2nd Bottom quintile	5.2	3.9	5.4	7.3	4.5	6.1
Bottom quintile			1.9		1.6	
Sources: 1975 & 1991: McGrath & Whiteford (1994), pp13, 17; 1995 & 2000: Stats SA (2002a), p47.						

The Skills Challenge

The AsgiSA Annual Report referred to above also suggests that huge infrastructural investments are anticipated and these will accentuate the undersupply of skills in critical areas. These shortages affect the construction of infrastructure in particular. It is acknowledged that the problem of scare skills is a world-wide phenomenon in developed and developing countries and that there is high competition for scarce skills. This has direct consequences for growth in the economy. In particular there is a widely accepted evidence of the direct relationship between investment in infrastructure and growth in economies more generally,[58] and that the investments being made by the State Owned enterprises like ESKOM and TRANSNET[59] will be important to the stimulation of economic

58 See in particular DBSA Infrastructure Barometer 2226: Economic and Municipal Infrastructure in South Africa, DBSA 2006. In particular the Report deals with the historical background to economic infrastructure in South Africa and refers in particular to the evolution of transport, energy, water and sanitation and IT. In subsequent Chapters it deals with the operating environment, the state of infrastructure, and issues affecting Municipal infrastructure. It provides a clear argument for the relationship between infrastructure investment and development

59 The electricity and transport parastatals respectively

growth and social development more generally and could play a large role in meeting the goals of governments AsgiSA strategy.

The demand for skills relates to a wide range and level of skills affecting these areas. A number of reports speak to the critical importance of skills acquisition to development and identify the key areas of skills required.[60] For example, according the SAICE/Lawless Report, all civil engineering sectors reported staff shortages and this was so

> *particularly of experienced mid-career professionals who are required to execute major projects and transfer knowledge to junior staff. Further, the current ration of university to technikon graduates does not match the number absorbed in industry and points to a need to produce more university graduates … The consulting sector reports that the current workload and continual reduction in staff has meant that capacity utilisation is now over 90% on average and in excess of 100% in many practices. Over 80% of the consulting practices were seeking experienced engineers. In terms of equity goals, all were searching for black engineers. Fifty percent were also seeking for technicians and technologists.*[61]

In terms of equity goals, the report notes the search for black engineers. Fifty percent of employers were also seeking for technicians and technologists. The Report continues

> *The Department of Transport alone estimates that 'an additional 945 to 1890 staff will be required by consulting practices in the private sector within the next few years … They also suggest that an additional 310- 3060 highly skilled staff would be required by contracting companies in the private sector… This could mean 100-1000 more engineers technologists and technicians … employed in civil engineering contracting.*[62]

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60 See in particular: 1] The HSRC Development Review 2003; Kraak and Lauder, Debating high Skills, HSRC 2006; SAICE/Lawless, Numbers and Needs: Addressing the Imbalances in the Engineering Profession, SAICE 2005; Kraak, A., An Overview of South African Human Resource Development, HSRC 2004; H Bhorat in The Development Decade; Economic and social change in south Africa, 1994-2004 [Ed. Padayachee V], HSRC Press, 2006

61 SAICE Lawless Report : 4-5

62 Page 4-5: Very importantly, the Report notes that the vacancies are of such a magnitude that for example, Spoornet currently employs less than half the number employed on the construction of Witbank-Richards Bay coal line alone. Overall it therefore estimates that 3000-6000 additional civil engineers alone needed in the next few years. On the supply side the Report notes that in civil engineering there are currently 15000 civil engineers in practice in SA. It refers to other challenges such as: demographic change in the profile of civil engineers

The Joint Initiative on Priority Skills (JIPSA)

Building on its Human Resource Development Strategy and its Skills Development Strategy[63], the state's new initiative, the so-called Joint Initiative on Priority Skills Acquisition (JIPSA)[64] identifies five high profile skills areas for immediate JIPSA engagement. These include:

- High level, world class engineering and planning skills for the 'network industries' – transport, communications, energy.
- City, urban and regional planning and engineering skills
- Artisanal and technical skills, with priority attention to infrastructure development, housing and energy; and in other areas of FET provision identified as being in strong demand in the labour market
- Management and planning skills in education and health
- Mathematics, science and language competence in public schooling.

JIPSA intends to facilitate and augment state support for these priority skills areas by bringing to gather industry, government and education and training providers to meet the skills supply challenge and to devise other strategies, including the importation of critical skills, for the purpose. Only time will tell whether these strategies will meet the expectations placed on them.

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although it notes that in 2004 78% of civil engineering students black students and 25% women.

63 www. gov.za

64 JIPSA: Proposal on Priority Skills: 13 March 2006

Conclusions: Enduring Challenges for Higher Education & the System of Innovation in South Africa

Growth, Development and the Persistence of Poverty

The challenges of the planet, people, prosperity and progress continue to raise the demands on the NSI across the continent and in the developing world in general. After a variety of structural adjustments, most economies and countries utilise similar policy instruments. While this has in many instances led to higher growth rates, evidence continues to be generated which suggests that while wealth is indeed being generated, poverty continues to persist.

The South African variety of this bifurcation is now commonly described as a dualism where a first and second economy exists simultaneously and in a parallel arrangement. There appears to be little which bridges these two worlds. Systems of Innovation offer the potential to effectively redistribute public goods and thereby alleviate the factors and circumstances which perpetuate this dualism and the lived impact on the citizenry. With the third post-apartheid government now it remains to be seen see how the NSI would be reinterpreted to play a positive role resolving this dilemma. Importantly, the NSI should not become a means of further escalating the gap between the wealthy and the poor. The NSI and its policy formulations should rather seek to expand so that in further developing its vast and complex competency platforms, it better appreciates the context within which it operates and the nature of the developmental challenges experienced by the very public who fund it.

An ancillary set of challenges will emerge from the African Union. Other regional entities have been able to utilise their productive resource-bases for the benefit of both growth and development. A pertinent question to be posed within this opportunity space is the significance of the National in Systems of Innovation Policies framed upon illusory nation-states.

However several problems continue to bedevil the system as a whole including the relatively low throughput and graduation rates of all students (contact and distance, under- and post-graduate).

Governance remains a vexed question. WP3 had instituted a system which was based on the assumption that the structures of governance would provide for cooperative decision making based on *'separate but functionally independent stakeholders who recognise their different identities, interests and freedoms… '*

This model of governance has been the subject of considerable interrogation both because of the questions of public accountability and academic freedom associated

with issues of governance.[65] On the one hand it is alleged that recent amendments to the higher education laws have considerably strengthened the Minister's authority to intervene in the affairs of individual institutions while on the other there is evidence of high levels of dysfunction in some institutions arising from such issues as disputes between Councils within governing Councils, between them and the Management of institutions, poor management of student affairs, poor quality educational outcomes and research outputs and even grave financial irregularities. Attempts at defining the nature of the relationship between the state and higher education institutions continue to be riddled by the contradictory approaches of those involved.

While the system is clearly beginning to respond to some of the apartheid legacies such as in regard to the student profile and the distribution, there are still questions about the quality of throughputs and outputs, of teaching and learning and the curriculum, the effectiveness of its management (often compounded by the lack of systemic data for planning) and governance, research and post-graduate outputs and staffing equity. Institutional cultures continue to act as barriers to the transformation of many institutions or of elements within them.

The quality of HE programmes evinces huge variations compounded by the absence of meaningful mechanisms for quality assurance at universities and other institutions. The Higher Education Quality Committee (HEQC) of the CHE has the responsibility to implement a national system of for this purpose and has now developed rigorous and well regarded systems for quality assurance dealing with issues of accreditation, auditing and evaluation, and quality promotion and capacity development. It has taken forward its review processes vigorously over the last few years and is having a significant impact on the system as a whole – this notwithstanding the initial reservations about the quality assurance system and its mechanisms.

The problem of quality has been exacerbated by the increasing homogeneity of institutions especially after the abolition of the two tier University/Technikon systems and its replacement by a new typology of institutions since these different types of institutions have sometimes aspired to emulate the offerings of each other. Traditional universities seeking to enter the market for work related course and Universities of Technology seeking to drift towards standards which are largely inappropriate for them instead of concentrating on what might be meaningful for each and their core constituencies. This tendency has, it argued, is largely an unintended consequence of policies such as the granting of degree awarding powers to technikons and the nomenclature changes in respect of the former Technikons. These developments have in fact militated against the idea of institutional diversity and differentiation.

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65 In this regard see recent CHE conference papers: [reference]

Increasingly, as in other systems internationally the issue of the marketisation of education and its effects on educational management – managerialism, is now a persistent complaint by academics and even by managers themselves. The commoditisation of education and its effects on scholarship, the role of higher education, academic freedom is the subject of debate and discussion as are questions about the financing of education.

There also concerns about how the 'next generation' of researchers can be secured given the ostensibly ageing researcher population and the difficulty of replacing the pool of existing researchers. And questions about financing are uppermost in the minds of many educational administrators and managers. Over the last few years in particular there has been much discussion about the issue of the 'responsiveness;' of higher education in South Africa. This discussion is bedevilled by different approaches to the role of higher education in society. The main issue of contestation relates to conceptions about the 'human capital formation' role ascribed to higher education - often to the exclusion of the broader social, intellectual, cultural and other demands on its remit. Furthermore it is alleged that narrower conceptions of the role of higher education are an extension of the managerialist and anti-intellectual interpretations of higher education's purposes and privilege particular aspects of the work of these institutions to the exclusion of other functions. The Presidency itself has begun to convene discussions with the institutions about these issues and these discussions are continuing apace even now.[66]

66 Singh M, Universities and Society: Whose Terms of Engagement? Council on Higher Education, Pretoria South Africa 2003; Lange, "Critical Reflections on the Notion of Engagement" Council on Higher Education, Pretoria, 2003

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