

OECD Review of Higher Education in Regional and
City Development

Free State, South Africa



Assessment and recommendations

The Free State: from missed opportunities to inclusive growth

South Africa is Africa's largest economy, accounting for 40% of the Gross National Income (GNI) in sub-Saharan Africa. Although dependent on natural resources, it has one of the most diversified economies in Africa. Since the end of apartheid, South Africa has experienced a profound process of political democratisation and macro-economic stabilisation. Central government has implemented social and educational reforms to address long standing disparities. However, economic growth has not translated into adequate job creation and the economy remains vulnerable to external shocks.

With a population of over 48 million, South Africa continues to struggle to overcome the social and economic legacy of apartheid. A large part of the black working class continues to be excluded from the labour market. About 2.8 million young people are out of employment, training or education. The lack of skills is related to the failure of educational system that features deep disparities between population groups, low enrolments and high dropouts. Poverty, criminality and the impacts of HIV/AIDS are major national concerns. The persistent racial stratification and differences in social, economic and health outcomes between population groups are partly due to the apartheid education system, which served blacks and coloureds poorly.

The Free State Province is the third largest of South Africa's nine provinces, representing nearly 10.6% of the land area, but only 5.7% of the population (approximately 2.9 million). The Free State is losing ground to most other provinces due to outmigration and poor health outcomes, and has in fact lost prime members of its working force. There are high rates of unemployment and poverty that exceed national averages. Only one-third of the working age adults are employed. Long term unemployment rates are

above national averages with deep diversities between population groups. It is estimated that there are at least 150 000 unemployed youth who are neither in training or education in the Free State.

Centrally located and landlocked, the Free State lacks obvious regional assets and features a declining economy. It is the second lowest contributor to the South African Gross Domestic Product after Northern Cape. Historically based on agriculture and mining, the regional economy is on the decline as there has not been sufficient growth in industry or services. Except for the petrochemical industrial base in Sasolburg, the province has struggled to substitute its resource dependence or to build on linkages between the primary and secondary sectors. The shift from primary sector employment has reduced the employment possibilities for the low skilled population and resulted in exodus from rural areas and townships.

The Free State lags behind the national averages in key education indicators, which in turn are significantly below the OECD average. The Free State educational attainment rates at all levels are mostly below the national averages and participation levels to higher education are particularly low. The economic structure and the underinvestment in human capital development have resulted in low income levels, high poverty rates, underdevelopment and general social strife. In the South African context, although not the weakest performer, the Free State is a lagging and underperforming region.

In the context of the gaps in both economic development and education outcomes, the key challenges for the Free State and its higher education and training institutions (including colleges) are:

- How to develop a more inclusive labour market and education system?
- How to create an economy that can absorb both highly skilled and low skilled population?
- How to address long-term challenges of poverty, inequity and poor health?
- How to turn the potential of HE sector into an active asset for the regional development?

To address these challenges, the Free State needs joint efforts in regional development including a human capital and innovation strategy, with a vision, measurable goals, milestones, co-ordination measures and a robust evidence base. Long-term investments in education are necessary to lift up significant numbers of population from poverty. National and provincial authorities, higher education and training institutions (including vocational and FET colleges) and the private sector need to join efforts to improve

access and success in education by providing stronger academic, social and financial support for students and engaging in long-term collaboration with colleges and schools. Higher education provision needs to be better aligned with the needs of the Free State, by building stronger links between institutions and industries in the region, taking steps to create new enterprises and facilitating transition from informal to formal economy. Research, development and innovation efforts need to build on the existing and emerging challenges and advantages of the Free State. Universities should make job creation a key goal for innovation and human capital development and make the region a laboratory for education, research & innovation, particularly in the fields of health, learning outcomes, agriculture, water management and rural development. Universities in collaboration with regional stakeholders should rediscover and develop regional assets and use project approach and potential of flagship events to mobilise sustainable regional collaboration. Finally, the existing good practices in school/college collaboration, rural development, recognition of prior learning and industry engagement should be scaled up into a system within and between institutions.

Human capital and skills development in the Free State

Higher education and training in South Africa and the Free State has experienced expansion and transformation over the past two decades. Despite progress made, the human capital capacity remains low.

Since the end of apartheid, the South African higher education and training system has experienced expansion and widening access to a more diverse student population. The number of South African higher education institutions has been reduced from 36 to 23, largely by merging *technikons* and apartheid homeland universities as well as clustering 300 technical college campuses into 50 FET colleges. The university sector as a whole has expanded dramatically, with the number of students rising from 473 000 in 1993 to 761 000 by 2007. The rate of faculty growth has been slower and the student-faculty ratio has risen from 21:1 to 23:1 over four years. University faculty numbers grew from 20 500 in 2000 to 21 800 in 2003, an increase of 6%, compared with an increase of 22% (18% in full-time equivalents) in the size of the student body.

While the number of higher education and training students has increased, higher education (excluding training) attainment levels remain

low, 4.3%, (OECD Education at Glance 2011) and the gaps between population groups significant. During the period of 2004-07, the overall higher education (excluding training) participation rate stagnated around 16%, with African and Coloureds featuring about 40-30 percentage points lower participation rates (both 12%) than White (54%) and Indian (43%) students. The proportion of African students in South African universities increased from 49% in 1995 to 63% in 2007 and is presently about two-thirds of the total number of university students. African students have a higher likelihood of dropping out: while 63% of all enrolled students are African in public universities, they make up only 57% of the graduates.

As a result of mergers and institutional transformation, the Free State is endowed with two public universities based in Bloemfontein, each with diverse missions, student enrolment and resources: the University of the Free State is a research-based university with over 30 000 students whereas the Central University of Technology enrolls 11 500 students in vocational orientated education programmes. These two universities enrol altogether approximately 41 500 students. Vocational skills development is the responsibility of the further education and training (FET) sector which has less than 23 000 students (2010) and is in transition as a result of a merger into four diverse multi-site colleges and transfer under the national Department of Higher Education and Training (DHET).

Despite the fact that university students represent 2.4% of the regional population, the key education indicators in the Free State remain below the national averages with low higher education and training participation and attainment rates. In 2008, the Free State higher education and training attendance rate was only 9.2% among the 20 to 24-year-olds compared to 9.9% in the whole country. Enrolment in post graduate studies had dropped from 40% to 26% revealing a lack of capacity to train highly-specialised personnel for the regional economy.

Challenges in the higher education and training sector and economic development are linked to the underperforming school system and a massive school failure. Long term collaborative efforts are needed to improve the quality and learning outcomes of the education system.

Challenges in higher education and training in the Free State and South Africa in general are linked to the underperforming school system which features high dropout rates and poor learning outcomes. The efficiency of

the primary and secondary education system is low and many youth leave schools without adequate skills to enter the labour market or higher education. The Free State school enrolment rate is declining. Massive school failure undermines the efforts to enhance higher education and training systems participation and economic development.

Due to the insufficient preparation, early family responsibilities imposed on school age children (due to unemployment alcoholism, HIV/AIDS) and a lack of adequate student support, there is a high level of educational failure in higher education and training in the Free State and South Africa in general. The drop-out rate is estimated at 40% among the first year students in South African universities while only 15% of students complete their studies in the allotted time. The Free State higher education and training system demonstrates a low level of efficiency in graduate production. From 2000 to 2008, both universities underperformed in terms of students' success rates (72% for the University of the Free State and 74% for the Central University of Technology against the national target of 80%) but were still among the best performing South African universities. The four further education and training colleges have very low pass rates, below the South African average.

National, provincial and municipal (local) authorities need to address the quality and equity challenges in general and FET school/college education and training in a comprehensive manner, by improving the quality of the education offered and mobilising appropriate levels of financial resources. Universities and further education and training colleges should strengthen these efforts by engaging in long-term collaboration with schools in order to improve learning outcomes of students and the quality of teaching.

In the Free State, the two universities have each developed their own initiatives to improve access and success in education whereas wider collaborative action remains limited. Good practices include the University Preparation Programme of the University of the Free State which is based on a partnership with the further education and training colleges. The university is in the process of shifting its community engagement and service focus on closer collaboration with schools. It has launched innovative approaches such as long term collaboration with 20 most dysfunctional schools in the Free State and projects such as "Every Child Reads". In addition, to the Saturday and Winder Schools in mathematics, science, English and accounting, the Central University of Technology is launching in collaboration with Telcom (South African telecommunications company) a primary school teacher development and mentoring programme in STEM fields. What is missing is a system-wide long term public-private partnership to improve access and success in education. Inspiration could be drawn from the El Paso Collaborative for Academic Excellence that

encompasses all schools and higher education and training institutions, as well as public and private sector in long term collaborative action and has achieved measurable improvements in the learning outcomes of the low income population. New innovative learning models are needed in science and technology fields (see Chapter 2).

The education system needs to become better aligned with the needs of the region, its labour market and population. The Free State has a dual economy, dual labour markets and skill requirements. The modern sector must enhance its competitiveness on global markets while the traditional, mostly rural sector, requires anti-poverty programmes focused on job creation and the development of skills that can support rural livelihoods.

There is a mismatch between labour market demand and higher education and training supply that is undermining the Free State's growth and innovation potential, and has resulted not only in high unemployment but also skills shortages. The unemployment rate in the Free State reached 28% in the second quarter of 2010 (South Africa 26.5%), youth unemployment being at least double this rate (no robust data is available for the Free State, but for SA as a whole the rate was 47% in 2007). At the same time there is a dire shortage of technicians and low proportion of science and technology graduates from the universities. Youth unemployment, poor graduate employment outcomes, labour market mismatch and brain drain are challenges that the provincial government and the higher education and training system need to address.

Currently, education provision is biased towards humanities and social sciences. The University of the Free State is relatively strong in agriculture and natural sciences (15.4 %) reflecting the dominant place of the primary sector in the regional economy. At the same time, the needs of the health sector are not well covered and there are manpower shortages for certain professions (paramedical, pharmacist). Engineering as well as law, accounting and health professions are areas of scarce skills. The proportion of STEM students of the Central University of Technology stood at 45% of the total student headcounts in 2010 who are mainly in engineering, IT, the build environment, health and environmental science and education.

There is a lack of robust data about student progress, graduate performance, employment outcomes and graduate destinations (where

students find work) at the national, provincial and institutional levels. The provincial government does not have a mechanism to provide an adequate vision of graduate employment. The universities themselves have not yet established methods to track graduates as a way of informing curriculum development and better understanding how education meets the needs of society and the economy.

Universities in the Free State are primarily focused on national labour markets. There is a need to move towards a demand-led education provision, and the Central University of Technology has taken steps to this direction (STEPS process and nine new study programmes). There is also a need to strengthen the development of skills and competencies of the students, and to build stronger links between institutions and labour market. This could be achieved through a wide range of measures, including enhanced and better targeted academic, social and financial support for the first generation students, high quality work-based learning for all students that currently benefits only a small portion of students. For example, only 15% of students of Central University of Technology are involved in some type of work-based learning. While the small proportion is partly explained by the fact that the work-integrated learning takes place at the third year and embraces a much smaller cohort of students, there is a need for closer collaboration with the industry and other employers, participation of employers in the curriculum and course design, and tracking of student progress, achievement and labour market outcomes.

As a legacy of apartheid that discouraged entrepreneurship among African population, the Free State has low levels of self-employed and a low rate of knowledge-based business creation. Finding ways of increasing entrepreneurship could be an effective strategy to facilitate graduate retention and job creation. There is scope to improve universities' contribution to entrepreneurship. The focus could be on the one hand on growth-oriented technology-based entrepreneurship, and on the other hand on social entrepreneurship and strategies that facilitate transition from the informal to formal economy.

The high levels of unemployment and a large number of population with low skills necessitate effective lifelong learning provision. Skills upgrading, re-skilling and other forms of lifelong learning are becoming increasingly important in many regions. In the Free State where the adult population has had limited

opportunities for education, they are a matter of urgency.

Public work programmes that support practical skills development are provided by the provincial government in health services, construction, maintenance and environmental projects (Operation Hlasela). Current skills development efforts could be strengthened through partnerships with local further education and training colleges, and universities.

While the focus on practical skills development is commendable, too narrow skills development schemes and short-term employment contracts will not serve the regional population in the long run. Stronger emphasis should be placed on general competencies allow people to gain the capacity for lifelong learning and to enter and to adjust to the changes in the labour market.

In the Free State, there is an overall lack of focus in the lifelong learning and limited co-ordination. To date, the universities in the Free State are geared more towards meeting the needs of traditional students than those of adult learners. The current mechanisms to recognise prior informal or non-formal learning remain project-based and do not satisfy the needs of the population. While the universities are aware of adults' needs, they target their continuing education narrowly to adult learners with university degrees. Not enough robust data is available to understand the needs of this population or the efficacy of higher education and training in meeting them.

To improve the synergy of the post-school education, the national authorities have transferred the further education and training sector to the National Department of Education and Training (DHET) from 2010, paving the way for a transformation that can make these colleges more responsive to the socio-economic needs of their regions. Universities could support the restructuring, expansion and quality improvement of the further education and training colleges in collaboration with the DHET and the provincial and municipal (local) governments by: *i*) training FET teachers; *ii*) establishing transparent articulation mechanisms and pathways between different levels of education; and *iii*) undertaking research to better understand the FET sector and providing labour market information to align programmes with the labour market needs.

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strategy for all educational institutions in the province.

One of the main factors impeding human capital development in the Free State is the absence of mechanisms to articulate a long-term vision and implement an integrated development strategy for all educational institutions in the province. The advantages of a system-wide governance model is the ability to plan more effectively for the higher education and training needs of the region, to co-ordinate missions and programmes, to encourage an appropriate division of labour among institutions and to provide transparent pathways for students through the education system. An important dimension of good governance consists of putting in place an adequate information system to monitor the performance of higher education and training in the Free State and benchmark its progress with appropriate comparators in South Africa and emerging economies.

The following measures would promote human capital development in the Free State:

Recommendations for national government

- Improve affordability of education in order not to price higher education attainment beyond the reach of students from low socio-economic backgrounds. The national government should develop the forms of cost sharing in higher education through means-tested scholarships, income contingent loans or other funding packages to complement the existing loan and grant schemes.

Recommendations for sub-national (provincial) entities

- In the interest of sustained regional development, make every effort to establish a co-operative culture among the post-school educational institutions, the governments and other public and private stakeholders in the region. To this end a post-school educational co-ordinating body should be constituted with representatives of all the relevant stakeholders including the Ministry of Higher Education and Training (MHET), business and industry. It would articulate a vision for the socio-economic development of the region, foster co-operative projects between institutions and other partners in the region. Among its goals should be the following:

- *i)* Lead the skills component of the regional strategy for development. Articulate a vision for the socio-economic development of the region. Jointly plan the offering of new programmes with the help of market
- research indicators. Plan for the provision of high level skills provision for the socio-economic development of the entire Free State.
- *ii)* Mobilise public and private stakeholders around educational projects for the region. Share strategies in mobilising private funding in addition to state funding for education projects. Foster co-operative education projects between institutions. Prioritise efforts and funds in accordance with long term educational goals.
- *iii)* Co-ordinate the provision of education and training from a coherent lifelong learning perspective. Develop a comprehensive long-term strategy to increase completion rates in secondary education and the preparation of both youth and adult population for further education and the labour market. Avoid duplication and overlap of educational programmes. Facilitate the joint provision by different stakeholders of training for continuing professional development. Articulate the FET and university offer through educational pathways and the accreditation of prior learning. Establish a management information system for post-school and higher education institutions of the region.
- Recognise the increasing relevance and importance of the further education and training sector for the long term development of the Free State, and support and encourage its restructuring and rejuvenation through collaboration with the higher education institutions. The development of the FET sector can make a crucial contribution to middle levels skills development by absorbing large numbers of out of school unemployed youth.
- In collaboration with higher education and training institutions, take steps to significantly expand educational opportunities for working age adults. These steps should create clear and transparent pathways to advanced education for adults, including the ability to attend multiple institutions, obtain short-term education and training that can later be applied to degrees, and re-skilling and up-skilling courses and programmes designed around the particular needs of adults who combine work and study or may lack entry level skills to education and the labour market. In addition to skills development, place emphasis on general competencies that will allow people to adjust to rapid changes in the labour market and develop the capacity for lifelong learning. In collaboration with the two universities and the Services Sector Education and Training Authority establish a provincial continuing

education centre, for example by developing the Free State Development Training Institute.

- In collaboration with higher education and training institutions, develop and improve robust data on the regional context and on the situation of individual universities and further education and training colleges, particularly on labour market needs and trends and student access and progress, in order to support evidence-based decision making at the regional and institutional basis. The most effective region-wide graduate labour market systems are based on comprehensive labour market intelligence, on-line publication of the data in a single place to improve students' ability to make rational choices about their studies and to help graduates and employers to come together and increase students' chances of moving into employment. Finally, the data should be strategically used to identify regional priorities and to develop the provision of course offerings and employer-specific skills.
- Improve connectivity and mobility between the urban centre of Bloemfontein and the rural areas. Accessible public transport and high speed internet connections should be developed to enhance access to education and labour market in remote communities.

Recommendations for institutions

- Expand efforts to increase the enrolment of students from low socio-economic backgrounds as well as the efforts to improve their completion rates. These efforts should build upon international best practices of effective academic, social and financial support for students, long-term collaboration with schools and further education colleges to improve students' learning outcomes. To improve quality of teaching take a lead in designing induction and professional development programmes for new school teachers and leaders. Ease the financial burden of attending higher education and make bursaries and loans available to students.
- Provide comprehensive professional development programmes for university teachers, many of whom were educated during the segregated education system, in order to help them to address a larger and more diversified student population. The provision of regular short courses to improve teaching skills, assessment and feedback from students, attending seminars and workshops to improve teaching and learning, inclusion of state of the art information technology, and a provision of a teaching portfolio at the time of promotion would be important contributions to this direction.

- Work together with public and private sectors to improve the quality and labour market relevance of university education, and alignment with the regional needs in a systematic way. Focus on strengthening the regional employability and entrepreneurial skills of all graduates providing them with the skills and competencies needed in the globalised knowledge economy. Create ties between students and regional employers in fields of critical importance to the region through internships and co-op programmes. Ensure that all students have access to well organised high quality work- and problem-based learning opportunities to help improve graduate retention in the region. Monitor student progress, as well as students' labour market outcomes and graduate destinations.
- In collaboration with other institutions enhance lifelong learning provision to address in particular the needs of large numbers of unemployed, out of school youth and to ensure that courses are offered in the different geographical areas of the province, mobilise the outlying campuses in Qwaqwa and Welkom for lifelong learning. Use intellectual and physical resources in partnership with the Ministry of Higher Education and Training (MHET) and the provincial and municipal (local) governments to train FET college lecturers, establish articulation mechanisms between different levels of education and undertake research to provide labour market information in order to align FET programme offerings with the regional needs.
- Make stronger efforts to internationalise the region, through talent attraction and development programmes supporting key areas of development of the Free State, integration of international students and faculty in the academic and social life of their universities and the region by training them to become “ambassadors for the Free State”.

Innovation in the Free State

Although adjacent to the Gauteng Province and its large urban areas, the Free State does not sufficiently prioritise R&D investment and innovation. The Free State is a vast rural state whose economic framework conditions are uneven. The higher education and training sector has an important role to play in inducing changes and should be mobilised not only to better serve the needs of the regional labour market, but also to strengthen the regional

research base and improve its contribution to the knowledge economy.

As in the rest of South Africa, the Free State research and development (R&D) is relatively low, below 1%, as a share of GDP. R&D investment is mostly financed by the private sector. This high business expenditure on R&D (BERD) / Gross Domestic Expenditure on R&D (GERD) rate increases the opportunities for research to be translated into new products and processes. Higher Education Research and Development (HERD) remains modest in the Free State, but the share of university research funded by the private sector is important according to world standards. The two universities form a knowledge infrastructure which is a strength for the regional economy, albeit small in relation to the size of its population.

The Free State university system needs to improve its performance on several dimensions. Firstly, higher education institutions are educating a relatively low proportion of science and technology graduates. More focus on science and technology would increase the innovation capacity in the academic sector and subsequently in the medium term in the regional economy. Secondly, Masters and PhD graduates are limited in number in all disciplines. In the Central University of Technology, they only account for 2.6% of the students. In the University of the Free State, the figure is considerably higher, but still modest for a research-intensive university. There is a need to change this situation if productivity rates are to be upgraded. Thirdly, the supply of graduates is poorly aligned with provincial needs, particularly in the health, engineering, and law and accounting sectors. Technicians are said to be in high demand but the further education and training colleges have failed to deliver the intermediary skills that are being sought in the labour market. Bridging the gaps would help to reduce labour costs.

In internationalisation, both universities have room for improvement to boost their R&D capabilities. The Scimago classification, for example, places the University of the Free State as 1864th in rank for research output. The quality of its research has not yet reached international reputation in terms of the citation index. While the University of the Free State is not yet fully engaged in international co-operation, it is well-positioned in clinical medicine and animal science research. The younger and smaller Central University of Technology has more limited resources and does not appear in the rankings.

National policies do not yet sufficiently support regional innovation systems or clusters and innovation resources remain concentrated in Gauteng. This slows down the capacity building at the sub-national

(provincial) and municipal levels and affects provinces such as the Free State.

The universities in the Free State HEIs have to face a number of challenges linked to their weak internationalisation, modest R&D performance and technology transfer initiatives which are at early stages of development. Co-operation with local firms also remains a challenge. There is also a need for a more proactive strategy to inject dynamism and entrepreneurialism in the regional economy.

South Africa, and notably the Free State, have been isolated for a long period due to the apartheid and continue to lack strong engagement in international research and education networks. Both the University of the Free State and the Central University of Technology are making efforts to catch up. The University of the Free State has established a new directorate for international affairs which has a strong focus on research collaboration. It has established a number of co-operative links with European and US universities, notably in the agricultural sector to strengthen its research base and has also engaged in attracting top academics. This innovative approach could be targeted to support the Free State's regional development needs. The Central University of Technology has a wider portfolio of partnerships mainly with African countries but fewer students are involved in these collaborations.

Another objective pursued by the universities in the Free State need to upgrade and expand R&D activities. Efforts have been made to increase the number of accredited publications. For the University of the Free State, 2009 has seen an increase of nearly 20% in the number of articles published compared to the previous year. R&D investment continues to be supported by the central government with more than ZAR 50 million (South African rand) in 2009, while the Central University of Technology was relatively less favoured, receiving about ZAR 15 million. Opportunities for rapid development in this domain are limited due to the lack of involvement of the provincial government, its weak resources and a lack of guidance.

Despite this mitigated perspective, the transfer of research results to the innovation stage has been relatively well organised, but stronger efforts are needed to enhance the local impact of innovation activities. The Central University of Technology has built several units for this purpose including a Rapid Prototyping Centre, a Product Development Technology Station

(focused on materials application) and a fabrication laboratory FabLab aiming at fostering medical development. The University of the Free State's technology transfer of office is endowed with a staff of three and has a portfolio of 16 patents. While it has been successful with a number of start-ups, these do not generate royalties nor create jobs in the region. Furthermore, there is no venture capital or access to patenting advice from the law faculty.

The Free State universities have a significant record of co-operative agreements. The University of the Free State, for example, partners with a number of multinationals and large firms. Within the framework of the THRIP (Technology and Human Resource for Industry Programme), it has been engaged with 12 large companies, including Telkom, Xstrata, ARM Gold and Southern Sun. Collaboration may take the form of internships, which is a relatively widespread practice with banks and local government services companies. In the Central University of Technology, work-based learning has diffused to hospitals, the tourism industry and ICT but comparatively less to engineering and material sectors.

Collaboration with small firms remains a challenge and the interactions with new business limited. The Free State, and South Africa as a whole, lacks dynamic entrepreneurship (as shown by Global Entrepreneurship Monitor Studies). The Free State universities have taken steps to introduce entrepreneurship modules in a growing number of curricula. For example, the Central University of Technology has launched a flagship programme aiming at fostering African entrepreneurship. It also envisages setting up an entrepreneurship hub at the Welkom campus to facilitate practical entrepreneurship exposure of students. The University of the Free State is becoming committed to developing entrepreneurship-based curricula. At the same time, it is concerned with the need to address long term unemployment and aims to assist job creation in all population groups. It has a small unit in charge of specialised courses, training of entrepreneurs and business plan services. Both universities have programmes for new venture creation.

The Free State economy has a number of weaknesses and numerous gaps, with the most dynamic segments concentrated in a few large cities. Innovation infrastructure remains fragmented and underdeveloped. The higher education sector is not producing sufficient numbers of graduates particularly in science and technology fields, and has difficulties in responding to the labour market demand. As a whole, the economy is underperforming and the Free State productivity rate is lower than the national average. Of particular concern is the decline of educational attainment of the young age cohorts, especially within the 25-29 age group in the last decade.

There is an urgent need to strengthen the Regional Innovation System, the capabilities of the universities to generate jobs and skills, and the need to consolidate R&D policies, including better exploitation of the Free State's comparative advantages in a number of niches, including water management, agriculture, nanotechnologies and advanced molecular research. Furthermore, the Free State universities should make job creation a key goal for innovation and human capital development and make the region a laboratory for education, research & innovation, particularly in the fields of health, learning outcomes, agriculture, water management and rural development.

The following measures would promote regional innovation in the Free State:

- Recommendations for the national level
- Enhance the regional contribution of higher education institutions. Given the financial constraints, it is important to build on existing strengths and align research programmes with regional priorities to ensure future sustainability.
- Strengthen the Regional Innovation Systems by launching new initiatives at the national and local to help universities forge stronger links with the business sector. First, policy measures should be taken to improve university services to firms and to develop communication policies about research results. Second, an incentive system should be established to favour the development of contract research. Voucher systems (such as those operating in Netherlands or Italy) could be a way to link small and medium-sized enterprises and the R&D units in the universities. Third, public grants to research programmes should be extended to priority sectors.
- In collaborative research, research awards and research collaboration, move away from direct allocations to competitive mechanisms in order to enhance outcomes and to increase overall productivity.
- To upgrade existing industry and to improve graduate retention, consider establishing specific people-based mobility programmes to link the students, graduates and post-graduates with the local business and industry in a more systematic way. Models for linking postgraduate students with the local industry include the Knowledge Transfer Partnership Scheme in the United Kingdom that has improved the competitiveness of the companies through introduction of innovation or

new technology and helped retain 75% of the postgraduate associates which participate in the projects.

- Provide opportunities for provincial governments to build innovation programmes involving the higher education sector and in particular to support these programmes in collaboration with neighbouring provinces. In South Africa, provinces have limited margin of manoeuvre and resources. In the case of the Free State, an overwhelming share of funds comes from the central government and is earmarked to national priorities, whereas only 3% *i.e.* ZAR 600 million go to regional development promotion. At the same time, The Free State Provincial Government is endowed with a growth and development strategy and the capacity to co-ordinate initiatives at regional level and agencies and state-owned corporations (*e.g.* the Free State Development Corporation to attract investment and the industrial and small enterprise development corporations to assist the business sector) have been established to translate the provincial strategy into action and to conduct the innovation policy. There is a need to link academia with state agencies, public corporations and special purpose vehicles in order to take advantage of the social capital in the regions and focus on collaboration in science, technology and innovation. University faculty could also participate on the board of agencies and public corporations and assist in soft co-ordination and evaluation of their activities in close collaboration with the private sector. The Free State would also benefit from joint efforts with neighbouring provinces to pool resources and to fund joint research programmes in areas of common interest. This would not only help to reach the critical mass in technological niches but would also encourage the international networking of universities.
- Enhance the co-operation between the universities at the local and regional level. Although industry co-operation seems central to the Central University of Technology's policy (business and industry are considered as primary partners for building strategic partnerships for broader societal development) as well as the University of the Free State policy (cluster initiative), there is very little evidence of research collaboration between the two universities which have embarked on numerous overlapping research areas. For example, the Central University of Technology has strengths in applied food science and biotechnology and nearly half of University of the Free State's research output is in natural and agricultural science. Moreover, there are few interactions between the University of the Free State and the SMMEs sector. Forming a consortium with the Central University of Technology would help the University of the Free State to take advantage of the CUT experience. The Regional Innovation Centre (RIC) offers an

opportunity to depart from the legacy of the past and to overcome the traditional barriers to co-operation. While incentives could come from R&D national funding agencies such as the Technology Innovation Agency or the National Research Foundation, the provincial government would be best placed to act as a mediator. It is necessary to change the *status quo* in order to better harness the research assets of the two institutions.

- Promote a research culture within universities and increase universities' R&D. The expansion of innovative activities throughout the South African economy requires considerable expansion of university research in order to provide the necessary research capable human resources at all levels of qualifications. This is particularly important in the Free State where the government and science council spending in R&D is relatively low (12% of provincial R&D, compared to 20% for the whole country). At the same time, the researcher population is ageing and mainly composed of white males, calling for more racially balanced replacement cohorts. Greater efforts are needed to make research activities more attractive, to reduce dropout rates and to encourage student intake of the most comprehensive curricula. The restructuring of R&D programmes along those lines imply a new funding approach with two focuses: concentration of funds and innovative project selection. Firstly, it is important that the central government and its agencies channel sufficient research money to university R&D programmes and avoid stretching resources too thinly over too many priorities. So far, among the 93 research niche areas identified by the National Research Fund, the region has accessed 12 and received ZAR 15 million. On average, this is about ZAR 1.25 million or EUR 125 000 per niche, which is a relatively low figure. Secondly, the focus should increasingly be on interdisciplinary R&D and the co-operation between art and design, and science, engineering and technology, or between health and environment and agriculture.
- Recommendations for the sub-national (provincial) level
- Encourage more systematic and institutional collaboration between higher education and training institutions and local firms. This collaboration should focus on areas where the Free State has a real or potential comparative advantage, rather than on a narrow sector specialisation. Technologies with cross-sector fertilisation potential should be promoted. Universities should work to ensure that local firms are aware of the benefits of hiring graduates.
- Recommendations for educational institutions

- Focus concerted university efforts on challenge-driven innovation on the key issues in the region, such as water, health and poverty reduction, and use the region as a “laboratory” for research, knowledge transfer and outreach to reach global levels of excellence. Job creation should be seen as the goal of innovation activities. Combining community outreach into training and challenge-driven research can generate improvements in life quality and low tech innovations.
- Broaden the understanding of knowledge transfer, knowledge utilisation and exploitation and place less emphasis on immediate and direct financial return to the university. By focusing on how the university research can support jobs, industry productivity and innovation in the region, the university technology transfer offices could move towards a system that is based on continuous collaboration with industry, government and other partners. Interventions with low revenue potential but high potential to yield societal returns in order to build support among broader segments within universities and within non-profit sectors in the region.
- Widen the innovation focus to low tech sectors and to organisational and social innovation, and align with regional priorities. The further education and training sector has an important role to play because it trains the technicians and middle management officers that are important to nurture the incremental innovation of a number of locally based industries. These industries – retail, transport and logistics, tourism, distribution – underpin the growth dynamics of the province. It is important to enhance the synergies between this sector and the universities, particularly the Central University of Technology, that provides part of the teaching staff for the further education and training colleges. Improving the information base about private FET sector is also necessary if the efficiency of the catch up strategy is to be improved.
- Strengthen and clearly articulate a demand-oriented technology transfer strategy in both universities. In its 2005-10 R&D Plan, the Central University of Technology has taken steps to cluster together academic research leading to qualifications, research outputs and commercialisation of R&D. Although the research cycle concept has merits, care needs to be taken not to overemphasise the technology push approach which involves risk of maladjustment to demand and may reduce the chances of success of R&D commercialisation. Bottom-up demand can be promoted through intermediary organisations such as CRPM or Fablab in the Central University of Technology. These structures respond to service demand for testing, prototyping and

technical assistance, and provide a good vehicle for innovation development, but would benefit for a stronger SMME customer base that would enhance the university's brokerage role. This would be facilitated if the technology transfer office could act as a forum for clusters and local firms and be an intermediary in building supply chain. More attention should be devoted to the incubation process which in both universities is generating few firms. Recourse to coaching and mentoring initiatives could be implemented to trigger off more significant outflows of new firms. Finally, the technology transfer strategy in both the University of the Free State and the Central University of Technology need to be conceived in a long term perspective integrating entrepreneurship teaching for students and linking it with incubation activities.

- Align skills development and higher education with regional needs. Teaching and education play an important role in innovation. Governments often focus on R&D conducted by academia, the development of university spinoffs and HEI patenting, whereas there is too little emphasis on skills development. Because undergraduates and graduates are the primary source of innovation in the organisations they join, it is crucial to consider the broader significance of labour market processes for the technological and organisational dynamisms of regions. In the Free State, this is all the more important as the skill potential is limited and seemingly not significantly expanding. The Central University of Technology provides dedicated degrees and certification courses to suit the needs of the local and regional markets as do most polytechnics and universities of applied sciences in the world. However, its yearly production of graduates is low: in 2010 only 198 Masters Degrees and 65 PhDs were awarded. While figures are ten times higher in the University of the Free State, a significant share of these graduates find jobs outside the Free State. The Central University of Technology has strengthened its co-operation with companies and engaged in placement arrangements but internships remain limited to a small number of sectors. These arrangements need to be expanded and organised on a more systematic basis. Both universities also need to build a strategic intelligence capacity in anticipating needs. The focus on regional engagement is fully compatible with both universities' focus on internationalisation. These two policies of regional and international engagement are in fact mutually reinforcing as a better understanding of labour market demand helps to identify the skills gaps and to focus international collaboration on foreign institutions supplying them.

Capacity building for regional development

While South Africa has made progress in developing place-based policies, the regional development policy and regional economic agenda remain largely defined and implemented in a top-down fashion, leaving limited leeway for regional initiative and capacity building.

The most notable policy instrument in the regional development of South Africa is the National Spatial Development Perspective (NSDP), drawn up in 2003 as an initiative from the Presidency. While it requires provincial governments to define and implement Provincial Growth and Development Strategies that follow the priorities and guidelines of the NSDP, no special national funding has been set aside for these strategies. Furthermore, higher education and training institutions do not have a clear role in the development and implementation of these strategies. Other policies, such as the science and technology policy, have a focus of supporting the development of the current growth centres in the country.

In the case of the Free State, critical framework conditions must be developed to move towards more inclusive regional development. These include: *i)* an inclusive labour market and an educational system that generates skilled workers; *ii)* a regional innovation system that matches the needs of the regional firms and is able to absorb the new skills; *iii)* public transportation and communication that help eliminate spatial and social mismatches; and *iv)* an improved environmental conditions that enhance the region's capacity to attract and retain talent and direct investments.

Higher education and training policy in South Africa lacks regional dimension. Regional engagement of universities could be fostered through quality assurance, funding allocation, and criteria and processes for faculty appointment, promotion and tenure.

Higher education and training policy in South Africa lacks regional dimension at the national, provincial and local contexts. The experience in the OECD countries indicates that it is a challenge for universities and other higher education institutions to be engaged with the regions unless policies at the institutional and national levels are aligned with this objective. Without policies and corresponding incentives universities and other higher education and training institutions are driven to satisfying their own self interest.

The current South African higher education and training policies do not recognise or reinforce initiatives by universities and further education and training institutions to relate their missions to regional issues. While there is an obligation for community engagement and some aspects of national policies may support regional engagement, regional development is left to the initiative of the individual institutions. Incentives for mobilising universities and further education and training colleges for regional and city development are limited.

Regional engagement of universities' core activities can be effectively fostered through quality assurance, funding allocation, as well as criteria and processes for faculty appointment, promotion and tenure. Funding policy is the most influential policy tool that governments can use to impact the behaviour of higher education institutions and their faculty. National and provincial governments in South Africa could consider the establishment of regional public-private investment funds to provide funding for building capacity within higher education institutions for regional engagement and for incentivising the institutions and individual faculty members for regional initiatives. In the United Kingdom, the Higher Education Innovation Fund contributed to a significant increase in the locally relevant activities of universities. Another source of funding for universities' regionally relevant work could come from charitable donations, trusts, persons of wealth and alumni. The universities in the Free State could make stronger efforts in this domain, for example, by engaging with their alumni and developing other systematic mechanisms that support voluntary giving.

Universities that want to mobilise their staff in support of the regional agenda need to ensure that the regional agenda is taken into consideration in the recruitment, hiring and reward systems as well as human resource development. Tangible rewards and incentives make it possible to change behaviours and ultimately attitudes and values. Employment and human resource management practices need to allow greater segregations of roles among university staff, with different kinds of workloads and reward systems. Universities in the Free State could find inspiration in the work of the University Rovira i Virgili (Spain), which has not only created incentives to encourage faculty contributions beyond the conventional arenas of research and teaching, but also created methods to evaluate those contributions.

Partnerships in the Free State between higher education and training institutions and the regional and local partners, acting in concert with each other, are key to addressing the

regional challenges, attracting talent and investments, and partnering with other regions and tertiary education institutions globally.

The challenges in the Free State are complicated, ranging from poverty, illiteracy, low educational attainment levels, unemployment, poor health outcomes and brain drain. No single university, FET-college, provincial government, organisation or agency has the capacity to address these issues alone. Broad-based collaboration among provincial and local governments, business and industry, universities or other higher education institutions is required. By working together these regional stakeholders could generate a greater dynamism and create change in the local economy and society.

Higher education and training institutions in the Free State are engaged in diverse collaboration with regional, local and industry partners. Much of this collaboration is at an *ad hoc* basis without long-term planning, adequate resources and monitoring of the results. Permanent long-term collaboration is needed to address the challenges and opportunities of the Free State. Some pioneering collaborative institutions have been established, such as the Provincial Planning Commission and the Provincial Skills Development Forum. There is a need to build on the experiences of these efforts, to learn from these experiences in order to build a permanent partnership structure that co-ordinates strategic collaboration between universities, industry and the provincial and municipal governments. Collaborative work should be supported by a detailed knowledge of the needs and opportunities in the province and the knowledge of the higher education institutions' research and education portfolio.

A regional plan for action would facilitate stakeholder mobilisation and increase citizen participation. Focusing collaboration on key issues such as environmental, educational, and health challenges in the region could help bring local and regional leaders together. They would also benefit from challenge-driven research and development conducted by universities which seek to increase the economic and social impact of universities.

The following measures would promote regional capacity building in the Free State:

Recommendations for the national level

- Consider launching stronger regional development strategies and to enhance capacity building in regions. International experience shows that increased decision-making power at sub-national (Provincial) levels of government combined with co-ordination mechanisms can unleash the potential in the regions. As regional capacities are built through

“learning by doing”, increased responsibilities at the regional level are necessary to build skills and develop problem solving approach.

- Strengthen the links between the regional development and higher education and R&D to unleash the potential of South Africa’s diverse regional assets and characteristics. Achieving this goal would require: *i*) human capital policies that are sensitive to the characteristics of the regional environment; *ii*) greater participation of education institutions in regional development matters; and *iii*) stronger collaboration and links among higher education institutions, research centres, regional and local authorities, local businesses and regional development agencies. The goal should be to raise the quality and relevance of education, training and R&D, making them relevant to the local and regional economic and social needs of the Free State and oriented towards achieving the region’s potential.
- Make explicit in higher education and training legislation and policy, the regional and local engagement and, more specifically, its wide agenda for economic, social and cultural development. Regional engagement should be encouraged through strengthening the funding policies and incentives. Community engagement should be redefined to promote civic university that provides opportunities for the region, actively engages with the region, partners with other universities and FET-colleges in the region and operates on a global scale while using its location to form its unique identity.
- Provide incentives for higher education and training institutions’ regional engagement in the form of long-term core funding and strategic incentive-based funding schemes on a competitive basis. Consider following incentives: *i*) formulae for block grant funding that could include higher weights for enrolment of students from within the region, or for enrolments in academic programmes related to regional labour market needs; *ii*) policies governing tuition fees that could provide for lower fees for students from the region and policies for financial aid to students that could provide higher amounts for students from the region and special populations; *iii*) eligibility for special or “categorical” funding that could be contingent on evidence of regional engagement and focus; *iv*) requirements that institutions collaborate in order to obtain funding; *v*) special funding that could be established to provide matching of funding obtained by universities and FET colleges from contracts with regional employers for education and training services; *vi*) public-private regional investment fund that could help build capacity for regional engagement and provide incentive funds to institutions and individual faculty members for regional initiatives; and

vii) competitive funding schemes that could boost challenge-driven research projects.

- Strengthen universities' accountability to society by developing indicators and monitoring outcomes to assess the impact of the university on regional performance. Include the contribution of the universities to local and regional development in their annual evaluations.
- Ensure that the universities' programme review and approval process is streamlined to allow for responsiveness to regional needs. The process should be adapted to emphasise regional engagement through efforts to seek the advice of regional leaders (employers, community leaders, regional economic development officials) in the review process. Criteria emphasising regional engagement and responsiveness should be included in the review and approval process, for example: *i*) data documenting the gaps in access and opportunity for the population and important sub-groups; *ii*) data documenting relevant regional labour market needs and potential future needs arising from regional economic development plans; *iii*) evidence of the engagement of regional stakeholders (employers, community representatives and representatives of under-served sub-populations) in programme planning and design; and *iv*) emphasis on regional engagement (internships, community service, student research on regional issues) within the curricula and student experience.

Recommendations for the sub-national (provincial) levels

- Establish a high level forum bringing together university leaders and regional stakeholders to foster co-operative projects in regional development and to facilitate closer co-operation between the public and private sector and academia by presenting a holistic regional development approach in which key stakeholders would be called to co-operate. Develop a regional strategy platform to complement the current project-based approaches with a more system-based approach.
- Analyse regional engagement opportunities within universities and further education and training colleges on the basis of the Free State Development Growth Strategy (FSGDS) priorities. Consider drafting a regional development sub-strategy within the FSGDS harnessing higher education and training institutions potential to help in achieving its goals. Mobilise the joint resources of the universities for the preparation and implementation of regional and urban strategies and substantive

collaborative projects and programmes that address regional needs and opportunities.

- Improve the capacity for regional engagement among key public and private stakeholders, universities and further education and training colleges through forums for communication where good practices can be fostered and through targeted training programmes with focus on practical problem solving.
- Invest jointly with universities in programmes which bring benefit to regional businesses and community, for example translational research facilities which are aligned with the needs and opportunities of the region, advisory services for SMEs, professional development programmes, capacity building programmes for public and third sector employees, graduate retention and talent attraction programmes.
- Strengthen evidence-based decision making in the province by focusing on a dashboard of key indicators that the key regional stakeholders can monitor over time. This can result in a shared local knowledge base, which could galvanise the development of a strong local strategy for change.

Recommendations for institutions

- Review recruitment, hiring and reward systems to include regional development agenda. In order to strengthen the research base, to make universities more relevant for the region and to provide stronger incentives for regional engagement, criteria for faculty promotion and tenure could emphasise: *i*) research on issues relevant to the region, giving more emphasis on application, synthesis and integration than to discovery of new knowledge; *ii*) service to community, while requiring evidence that contributions to the community and the region are documented and externally validated; and *iii*) collaboration between the institutions in the Free State. Create mechanisms to monitor and evaluate the activities in this area, to share good practice within their institution and benchmark this experience with other organisations and localities.
- Building on existing links and initiatives that align higher education and training institutions with the regional needs, develop a common vision of local and regional development among the higher education and training system in the Free State, support this vision with a strategy and milestones and funding in order to ensure that regional and local engagement is part of institutional activities and reflected in the development plans.

- Develop senior management teams to deliver the corporate response expected by regional and local stakeholders without disincentivising entrepreneurial academic. Establish modern administration with human resources system and financial resources management system.