

‘The role of universities in the development of Africa’

H Russel Botman

To be presented at ETH Zurich (the Swiss Federal Institute of Technology) on 22 May 2013.

Abstract

Africa’s strong economic growth in recent years has brought about a change in how the continent is seen by the rest of the world – and its own people – but challenges remain. Universities have a key role to play in taking the development of Africa forward. This will require greater relevance from universities, and improved collaboration to revitalise scholarship on the continent. Existing success stories and good practices provide a solid foundation to build on. Higher education in Africa should claim its rightful place by taking charge of its own destiny and stepping up to lead partnerships aimed at promoting its development.

Keywords

Africa, African Doctoral Academy, brain drain, development, food security, Graduate School, higher education, HOPE Project, housing, iShack, knowledge coalitions, PANGeA, SKA, sustainability, TsamaHub, universities, Small Business Academy.

* Professor H Russel Botman is Rector and Vice-Chancellor of Stellenbosch University, South Africa, and a Vice-President of the Association of African Universities. He holds a PhD in Theology from the University of the Western Cape. Address: Private Bag X1, Matieland, 7602, South Africa; Tel: +27 21 808 4490; Fax: +27 21 808 3714; Email: russelbotman@sun.ac.za

1. Introduction

Africa has in many respects become a good-news story. There is talk of the “African Lions” emulating the “Asian Tigers” in terms of economic growth.¹ Politically there are also encouraging signs, and socially the continent’s vibrancy and youthful vitality bodes well for the future. However, if its economies do not become more diversified and environmentally sustainable, the continent could find its prospects diminished. In addition, Africa needs to boost its levels of human development, which lags behind the rest of the world.

A crucial sector for the development of Africa is education – not only basic education, but also higher education. Whereas in the past very little empirical evidence showing the link between investment in higher education and economic growth and poverty-reduction existed, more recently evidence has emerged showing that tertiary study is both a determinant and result of higher levels of income. Higher education is not only a private good (e.g. better employment opportunities, higher salaries), but a public good too (greater tax revenue and investment, stronger entrepreneurship, reduced population growth, improved technology).²

Higher education in Africa has a long and proud history, but the state of scholarship and research on the continent is not nearly where it should be.³ This requires more attention to, investment in, and cooperation with and amongst Africa’s universities. The continent’s higher education institutions can advance by focusing on both academic excellence and societal relevance. These aspects will be explored in more detail below.

2. Africa’s development

Africa is increasingly being identified as a success story. Analysts have noted that “a new wave of optimism”⁴ is sweeping across the continent and that the international discourse has shifted “from Afro-pessimism to Afro-optimism”.⁵

¹ Mark Swilling and Eve Annecke. 2012. *Just Transitions: Explorations of sustainability in an unfair world*. New York: United Nations University Press. p. 94.

² H. Russel Botman, Arnold van Zyl, Ayesha Fakie and Christoff Pauw. 2009. “A Pedagogy of Hope: Stellenbosch University’s Vision for Higher Education and Sustainable Development”, In Pascal Hoba and Vera Doku (eds.). *12th General Conference of the Association of African Universities: Selected Papers*. Accra: Association of African Universities. pp.11-24.

³ Johann Mouton. 2011. “The state of doctoral training in sub-Saharan Africa: Statistics, Analysis and Challenges.” Presentation to the AAU meeting in Stellenbosch. Online: http://sun025.sun.ac.za/portal/page/portal/Arts/ADA/resources/Mouton_AAU_%202011_Doctoral%20training.pdf.

⁴ Mark Swilling. 2010. “Africa 2050 – Growth, Resource Productivity and Decoupling”. Policy brief for the 7th meeting of the International Panel for Sustainable Resource Management of the United Nations Environment Program, Stellenbosch. Online: www.learndev.org/dl/BtSM2011/Africa%20Policy%20Brief.pdf.

A lot of this has to do with the continent's good economic performance. Africa's growth has accelerated by an average of 5.7% since 2000, making it one of the fastest growing regions in the world, and increasingly an attractive investment destination.⁶

Although these levels of growth are not uniform across all of Africa's sub-regions, at the current pace gross domestic product (GDP) will reach US\$2.6 trillion by 2020.⁷ This is set to be underpinned by a youthful population that is rapidly urbanising and increasingly educated. Over 128 million households are expected to be moving into the middle class to become vibrant consumer spenders.⁸

Yet, Africa's growth has relied on the export of primary resources, especially to fast-industrialising countries such as China, India and Russia. Analysts speak of a "new scramble for Africa", and point out that the continent supplies more than a quarter of China's imported oil (28%, in 2008).⁹ Trade between Africa and China has increased by 22% per year for the past decade and reached a total of US\$ 200 billion in 2012. At this rate, Africa is set to replace the EU as China's largest trading partner before long.¹⁰

Primary resources still make up 80% of Africa's exports, though – the highest proportion in the world compared to other regions. The problem with resource dependence is that although it stimulates short-run growth, it tends to undermine long-term growth because the incentives to diversify are limited.¹¹

But exports do not tell the whole story. Only one third of Africa's growth the last decade came from resources. By far the biggest contributors to Africa's success have been agriculture, manufacturing, construction, and particularly services.¹²

⁵ Scarlett Cornelissen. 2011. *The start of history? The promises and limitations of emerging vectors in Africa's political economy*. Stellenbosch: Stellenbosch University Language Centre.

⁶ Ibid.

⁷ Swilling and Annecke. 2012. *Just Transitions – Explorations of sustainability in an unfair world*. New York: United Nations University Press. p. 186.

⁸ McKinsey Global Institute. 2010. *Lions on the Move: The Progress and Potential of African Economies*. McKinsey Global Institute. Online: www.mckinsey.com/mgi.

⁹ Swilling and Annecke. *ibid.* pp. 186, 188.

¹⁰ Centre for Chinese Studies, Stellenbosch University. "The Weekly China Briefing", 12 April 2013. Online: www.ccs.org.za/wp-content/uploads/2013/04/CCS_Weekly_China_Briefing_12_April_Rob.pdf.

¹¹ Swilling and Annecke. *ibid.* pp. 186-187.

¹² *Ernst & Young's Attractiveness Survey – Africa 2013*. Online: [http://www.ey.com/Publication/vwLUAssets/Africa_Attract_2013_-_Getting_down_to_business/\\$FILE/Africa_attractiveness_2013_web.pdf](http://www.ey.com/Publication/vwLUAssets/Africa_Attract_2013_-_Getting_down_to_business/$FILE/Africa_attractiveness_2013_web.pdf)

None the less, Africa continues to face serious challenges. The continent still sits low on the Human Development Index of the United Nations Development Program (UNDP), which measures life expectancy, education and GDP. Of the world's 42 least-developed countries, 35 are African.¹³

Clearly, Africa is in need of more development, bearing in mind that the continent – the world's second-largest and second-most-populous – is not a homogenous whole, but a place of wide diversity and huge disparities between and within its 54 countries.

But how should we think of development, and what is its relationship to growth? According to the American organisational theorist Russell L. Ackoff,¹⁴ growth is not the same as development, and neither presupposes the other. He argues:

Rubbish heaps grow but do not develop. ... Some nations grow larger without developing and others develop without growing. Growth is an increase in size or number. Development is an increase in competence, the ability to satisfy one's needs and desires and those of others. ... Development is not a matter of how much one has but how much one can do with whatever one has.

Thanks to the impulse of altruism most of us have the urge to not only “satisfy [our own] needs and desires [but also] those of others” – at least some of the time. But how do we “increase [our] competence” in this regard? How do we build and master “the ability” to do this consistently? This is where education comes in – especially, I will argue, higher education.

3. Higher education and development

Higher education is generally considered to be the capstone of education in society. It forms a critical pillar of sustainable human development worldwide. The trained individuals it produces drive economies, make civil society strong and lead effective governments.¹⁵

But higher education has not always been seen in the same light. In the second half of the 20th century, there was a strong push for developing countries to place more emphasis on

¹³ United Nations Development Programme. 2010. *The Real Wealth of Nations: Pathways to Human Development*. New York: Palgrave Macmillan.

¹⁴ Russel L. Ackoff. 2004. “Transforming the Systems Movement”. Opening speech at the Third International Conference on Systems Thinking in Management (ICSTM '04), Philadelphia, 19 May 2004. Online: www.acasa.upenn.edu/RLAConfPaper.pdf .

¹⁵ Botman, et al. *ibid.*

primary and secondary education. At the same time, there was an assumption that higher education in Africa was of lesser importance; a luxury for the privileged few with private benefit that cannot be extrapolated to society as a whole.¹⁶

The World Bank decided that development efforts in Africa should be refocused on primary education, which resulted in a dramatic decrease of 82% in per capita public spending on higher education in Africa between 1980 and the first decade of the 21st century.¹⁷ This had a debilitating effect on the continent's universities and also delinked them from development.

When the world's nations formulated and agreed on the Millennium Development Goals (MDGs) in 2000, higher education was not included at all. In fact, the only reference to education is MDG No. 2, which is to “achieve universal primary education”, as well as in the associated target 2A, which is to “[e]nsure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling”.¹⁸

My point is that schooling – primary and secondary – is certainly very important in pursuit of development, but it would be a mistake to ignore tertiary education. It was a good thing, then, that eventually, arguments started to be made for the revitalisation of the African university and for relinking universities to development. In 2001, the World Bank itself, influenced by Castells' ground-breaking paper a decade before, *The University System: Engine of development in the new world economy*, started embracing the role of higher education in the knowledge economy.¹⁹

Castells described the “engine of development” role for higher education as follows:

In the current condition of the global knowledge economy, knowledge production and technological innovation become the most important productive forces. So, without at least some level of a national research system, which is comprised of universities, the private sector, public research

¹⁶ Ibid.

¹⁷ World Bank. 2009. *Accelerating Catch-up: Tertiary Education for Growth in Sub-Saharan Africa*. World Bank. Online: <https://openknowledge.worldbank.org/handle/10986/2589> License: CC BY 3.0 Unported. p. xxvii.

¹⁸ www.un.org/millenniumgoals.

¹⁹ Nico Cloete, Tracy Bailey, Pundy Pillay, Ian Bunting and Peter Maassen. 2011. *Universities and economic development in Africa*. Wynberg, South Africa: CHET. p. 5.

*centres and external funding, no country, even the smallest country, can really participate in the global knowledge economy.*²⁰

Universities in Africa can identify with this “engine of development” role. The AAU, which has 280 members in 46 countries and plays a role in all five sub-regions of Africa, says in its mission statement it wants to strengthen the contribution of higher education to African development by, amongst others, raising its quality.²¹

So, let us take a look at the contribution of Africa to the international community of scholars and knowledge production in the context of the knowledge economy of the 21st century.

4. African scholarship

According to the AAU, Africa has about 800 universities and more than 1 500 institutions of higher learning, in which the percentage of private universities is sharply increasing.²²

A snapshot of sub-Saharan Africa’s contribution to world science output as measured in share of accredited journal publications shows a decrease from 1% in the mid-1980s to 0.7% a decade later. Africa has lost 11% of its share in global science since its peak in 1987; Sub-Saharan science has lost almost a third (31%).²³

Effectively, Africa is not coming up with enough home-grown solutions of the right kind – innovative and environmentally friendly – to its own developmental challenges.²⁴

As Tijssen²⁵ points out, though:

It is important to keep in mind that these diminishing shares of African science do not reflect a decrease in an absolute sense, but rather an increase less than

²⁰ Manuel Castells. 1991. *The University System: Engine of development in the new world economy*. Washington DC: The World Bank.

²¹ www.aau.org.

²² Olugbemiro Jegede. 2012. “The Status of Higher Education in Africa”. Input at a project of the Partnership for Higher Education in Africa, held at the Institute of International Education, New York. Online: www.iie.org/~media/Files/Corporate/Membership/Articles-and-Presentations/Jegede-PHEA-Launch.ashxorg.

²³ Robert J. W. Tijssen, “Africa’s contribution to the worldwide research literature: New analytical perspectives, trends, and performance indicators,” *Scientometrics* 71, no. 2 (May 2007): 303-327. Online: <http://www.springerlink.com/index/10.1007/s11192-007-1658-3>.

²⁴ H. Russel Botman. 2012. “Taking Africa beyond the MDGs – The Role of Higher Education in Development”. In Rorden Wilkinson and David Hume (eds.). *The Millennium Development Goals and Beyond – Global Development After 2015*. London: Routledge.

²⁵ Tijssen, *ibid*.

the worldwide growth rate. During the last 15 years, African output has in fact risen by 38%, up to some 46,000 articles in 2001-2004.

Africa not keeping pace with the rest of the world is a multifaceted problem that resists simple solutions. It has to do, amongst others, with the “massification” of higher education in Africa (lecture rooms are overcrowded and academics spend most of their time teaching and yet access to higher education remains painfully low); a lack of resources and the lure of better salaries and career opportunities in advanced nations (the “brain drain” out of Africa has reached unprecedented levels over the past decade); weak infrastructure that hampers scientific investigation, communication and access to information; and institutional bureaucracy and leadership styles that inhibit academic freedom.

Many of these challenges can be traced back to the debilitating effects of underdevelopment and the accelerated de-institutionalisation of science and scholarship in Africa over the last few decades.²⁶

An additional aspect that appears as an African anomaly is the very limited contact that scientists in Africa have with their colleagues in other African countries. Perhaps as a consequence of colonisation, higher education institutions have maintained contact with their former colonial powers post independence, but were slow to build ties with neighbouring institutions.

Lack of collaboration becomes even more pertinent when one considers the crucial role that collaboration has played in the history of knowledge. A recent report on worldwide scientific collaboration by the Royal Society emphasises that collaboration is becoming an important indicator of competitiveness since it enhances the quality of research, improves its efficiency and effectiveness, and is increasingly necessary as the scale of both budgets and research challenges grow.²⁷ It is only by reading, sharing, criticising and presenting ideas that they develop into meaningful human products. The ideal is to be tied into collaborative networks where one’s work is read and criticised, where one gains access to the most recent,

²⁶ Johann Mouton et al., “The State of Public Science in the SADC Region,” in *Towards a Common Future: Higher Education in the SADC Region*, ed. Piyushi Kotecha (Johannesburg: SARUA, 2008), pp. 197-302. Online: <http://www.sarua.org/?q=content/chapter-4-state-public-science-sadc-region>.

²⁷ The Royal Society. 2011. *Knowledge, networks and nations: Global scientific collaboration in the 21st century*. Online: <http://royalsociety.org/knowledge-networks-nations/>.

unpublished work of other researchers in one's field and where partners share access to resources and funding.²⁸

My institution, Stellenbosch University (SU), is developing sustainable and long-term academic networks that will contribute relevant knowledge for Africa's immense developmental potential in the decades to come. SU has agreements in place with around 137 foreign universities in 35 countries. In Africa, we have 126 active projects in 31 African countries, involving 478 African collaborators.

5. Knowledge coalitions

Many international partnership-like associations exist in higher education. But, as Groenewald²⁹ points out, there is a "well-understood academic pecking order" in terms of which "scholarships, grants, academic opportunity, honours and credits flow mostly from Northern partners to institutions in the South, who are increasingly in a position of dependency".

Yet, there is no reason why African institutions cannot be the lead agents in the formation of better partnerships. "This requires a fundamental mind shift on both sides of the North-South divide, namely acceptance of the idea that Africans can take the lead; that they too are valued contributors – not only recipients – in partnerships; and that they can harness their assets and capabilities in pursuit of a common goal."³⁰

A case in point is the Square Kilometre Array Radio Telescope (SKA),³¹ two thirds of which will be built in Africa. It is mainly from African soil that we will be able to see further back in time than ever – more than 13 billion years, before the first stars and galaxies formed. And a lot of the expertise and high-level skills needed for this ambitious search for answers to the mysteries of the universe will come from Africa, which is quite fitting for the "cradle of humankind".

²⁸ K. Brad Wray, "The Epistemic Significance of Collaborative Research," *Philosophy of Science* 69, no. 1 (March 2002): pp. 150-168. Online: <http://www.journals.uchicago.edu/cgi-bin/resolve?id=doi:10.1086/338946>.

²⁹ Johann Groenewald, "Universities and the Millennium Development Goals: Rethinking partnerships in Africa", Background paper prepared for the signing of the PANGeA Memorandum of Understanding, Stellenbosch University, South Africa, November 2010.

³⁰ Ibid.

³¹ <http://www.ska.ac.za>.

5.1. Reaching for the stars

The SKA will be the world's biggest radio telescope upon its completion, scheduled for 2024. As one of the biggest scientific projects ever, it will rival the LHC (the Large Hadron Collider) of CERN (the European Organisation for Nuclear Research) in Switzerland.

In May 2012, following fierce competition, the SKA was awarded to both South Africa and Australia. But the majority of the SKA's thousands of antennas will go up in Africa. South Africa will not be the only player. Its eight partners – Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia – will also be participating.

Africa has already demonstrated its excellent science and engineering skills by designing and starting to build the 64-dish MeerKAT telescope – as a pathfinder to the SKA – in South Africa. The technology being developed is cutting-edge and the project is creating a large group of young scientists and engineers with world-class expertise in technologies that will be crucial for development. This includes very fast computing and very fast data transport.

Stellenbosch University is proud to be part of this project. We host an SKA research chair³² in our Department of Electrical and Electronic Engineering. And a team of full time academic staff members as well as post-graduate students and post-doctoral researchers are involved in SKA-related activities.

Since 2005, the African SKA Human Capital Development Programme has awarded 400 grants nationally for studies in astronomy and engineering from undergraduate to post-doctoral level, while also investing in training programmes for technicians.

We are confident that the SKA will help us slow the African “brain drain”, which has been caused by the continent's academics seeking better career prospects abroad. The SKA will address this problem by creating new opportunities in Africa.

I want to highlight another example of a progressive knowledge coalition in Africa, namely the Partnership for Africa's Next Generation of Academics.³³ Rather appropriately, this network's acronym, PANGeA, invokes the idea of Africa as a “supercontinent” – but this time of the future, not of the past.

³² In Electromagnetic Systems and Electromagnetic Interference Mitigation, held by Prof David Davidson. See www.ee.sun.ac.za/research/electronics-electromagnetics.

³³ www.pangeaonline.org.

5.2. Partnership for Africa's Next Generation of Academics

PANGeA was formally constituted on African University Day, 12 November, 2010.

Following negotiations going back to 2006, six African universities banded together in a collaborative network – in the arts, humanities and social sciences, for now. The participants are the universities of Botswana, Dar es Salaam, Makerere, Malawi, Nairobi and Stellenbosch. They have since been joined by the University of Ghana, and the network could expand further.

PANGeA's main initiative is building and sustaining world class doctoral programmes and scholarly communities through partnerships on the African continent. PANGeA can help us reclaim Africa's share in world science by increasing the continent's research output and PhD graduates.

PANGeA is linked to two other structures at Stellenbosch University, namely the African Doctoral Academy (ADA)³⁴ and the Graduate School³⁵, both located within our Faculty of Arts and Social Sciences. ADA offers short courses – organised in summer and winter schools – to current and prospective doctoral candidates from across the continent. The Graduate School offers full-time doctoral scholarships and co-ordinates a structured PhD-programme, including weekly seminars, workshops and a lecture series.

The PhD candidates on this programme are encouraged to build collaborative academic relationships, and to return to their home institutions once they graduate in order to revitalise higher education across the continent. Since 2010, the Graduate School registered 88 PhD candidates from 14 African countries,³⁶ a third of whom are female. At our December 2012 and March 2013 graduation ceremonies we celebrated a major milestone with the capping of the first 19 PhD recipients from this programme.

PANGeA and the Graduate School and ADA exemplify the role that higher education can play in the development of Africa: Boosting human advancement by being a crucial partner in the discovery, transfer and application of relevant and reliable knowledge.

³⁴ <http://sun025.sun.ac.za/portal/page/portal/Arts/ADA>.

³⁵ http://sun025.sun.ac.za/portal/page/portal/Arts/graduate_school.

³⁶ Angola, Botswana, Congo, Gabon, Ghana, Kenya, Lesotho, Liberia, Malawi, Nigeria, South Africa, Tanzania, Uganda and Zimbabwe.

6. Higher education in South Africa

South Africa has 23 public universities, two national institutes, and 99 private higher education institutions (2010 figures).³⁷

An important challenge for universities is an increasingly differentiated higher education sector. In 2009, what used to be the government Department of Education was split into Basic Education, on the one hand, and Higher Education and Training on the other.³⁸ That is when the idea of a post-school education and training system – as opposed to just universities – really got momentum.

In the past it was easy to say the tertiary education sector consisted mainly of universities. But now there is a much broader concept. The South African government's Green Paper for Post-School Education and Training³⁹ comprehensively covers different kinds of universities, and also what are called Further Education and Training (FET) institutions, as well as adult education centres and levy-grant institutions, such as the Sector Education and Training Authorities (SETAs).

Most FET colleges in South Africa are vocational or occupational by nature. Students receive education and training with a view towards a specific range of jobs or employment possibilities.⁴⁰ Also included in this sector are public colleges, such as nursing and agricultural training centres.

There seems to be similarities between the aims of South Africa's post-school system and the dual education system found in Switzerland, Germany and other countries. In today's lifelong-learning framework, different kinds of post-school education and training provides not only the high-level skills required by the labour market but also the training essential for teachers, doctors, nurses, civil servants, engineers, humanists, entrepreneurs, natural and social scientists, and professionals in a variety of fields to play their roles in society.

Against this backdrop, the South African university sector had to grapple with what it is that differentiates a university from other forms of post-school training. How is the university pedagogically different? Fundamentally, the university brings together three functions –

³⁷ www.hesa.org.za.

³⁸ www.dhet.gov.za.

³⁹ www.dhet.gov.za/portals/0/Documents/GreenPaper.pdf.

⁴⁰ www.fetcolleges.co.za.

research, teaching and learning, as well as community interaction in a comprehensive way. Not only do we work for knowledge and the sharing of knowledge, but we go further and ask how to apply it in society.

At Stellenbosch University we differentiate further. We say our research and learning and teaching and community interaction is aimed at making a difference in society. In our new Vision 2030 statement we say that we pursue “knowledge in the service of all stakeholders.” This we achieve through, amongst others, aligning “our research with a wide-ranging spectrum of challenges facing the world, Africa, our country and the local community.”

More background on Stellenbosch University is necessary at this stage.

6.1. Stellenbosch University and its HOPE Project

Stellenbosch University,⁴¹ also known as “Maties”, is situated at the southern tip of Africa, in the historic town of Stellenbosch, 50km from Cape Town. It is the second oldest of South Africa’s universities. The country has a combined head count of 521 000 students in higher education contact tuition. SU has approximately 28 000 students (of which more than a third are at postgraduate level), 10 faculties, five campuses, and approximately 900 academic staff members.

There was a time when SU was known as the “cradle of apartheid” because it had produced a number of apartheid prime ministers and some academics at the institution had helped lay the intellectual foundations for the racial politics that would characterise South Africa in the 20th century. But it can no longer be characterised in this way.

In 1990, the year former President Nelson Mandela was released from prison, SU had 762 black students.⁴² By 2011, the annual enrolment of black students had risen to 9 278, equal to 33% of our student population. Extending access and improving our diversity remains a strategic priority. We have set ourselves the target of a 50:50 ratio of black to white students by 2018.

⁴¹ www.sun.ac.za.

⁴² “Black” is consistently used generically to refer to people previously classified as coloured, black African, and Indian. This is done in the South African context because under apartheid all groups not classified white were disadvantaged.

This new direction of ours was signalled by an important policy statement in the year 2000.⁴³ In it, “[t]he University acknowledges its contribution to the injustices of the past ... and commits itself to appropriate redress and development initiatives”.

When I was appointed Rector and Vice-Chancellor, I dedicated my time in office to the tangible realisation of this commitment. In my installation address⁴⁴ in 2007, I highlighted the work of Brazilian educator Paulo Freire.⁴⁵ He had argued that education should help change the world for the better.

Following broad consultation and engagement, the University subsequently launched its HOPE Project,⁴⁶ through which the institution’s core activities – research, teaching and community interaction – have been focused on eradicating poverty and related conditions, contributing to human dignity and health, consolidating democracy and human rights, promoting peace and security and balancing a sustainable environment with a competitive industry in South Africa and the rest of the continent.

These themes have found practical expression in a number of academic initiatives with tangible impact on communities – from education, water, and food security to innovative sustainable housing and energy solutions.

I will now turn to Africa’s sustainability challenges and the knowledge it needs to generate to address these.

7. Africa’s sustainability challenges

The realisation is growing worldwide that humanity should be more circumspect in its use of natural resources. We should do less damage to the environment, and reduce our wastage. In short – our ecological footprint must become smaller and lighter.

Global warming of as much as 2% – exacerbated by an increase of up to 70% in greenhouse gas emissions between 1970 and 2004 – is an outcome of an unsustainable economy. As the 2007 Stern Report made clear, poorer countries, especially in Africa, will suffer “first and

⁴³ Stellenbosch University. 2000. “Strategic Framework for the Turn of the Century and Beyond”.

⁴⁴ Online at <http://hdl.handle.net/10019.1/21165>

⁴⁵ See particularly Freire, P. 1996 (1970). *Pedagogy of the oppressed*. London: Penguin, and Freire, P. 2004 (1992). *Pedagogy of hope: reliving Pedagogy of the oppressed*. London: Continuum.

⁴⁶ More information at www.thehopeproject.co.za.

foremost” from the consequences of global warming, even though they have “contributed least” to it.⁴⁷

However, this is not only a threat, but also an opportunity. Climate change can be a catalyst for change if Africa is prepared to build rapidly growing green economies instead of getting caught up in stages of industrial development that have been particularly destructive and resource intensive in the developed economies.⁴⁸ And again the university can be an “engine of development” in this regard.

7.1. Energy

Globally, renewable energy is high on the agenda, and solar power is one of the key focus areas for a world looking for sustainable solutions to its energy needs. Large parts of Africa have an abundance of sunshine, which puts the continent in an excellent position to make use of this resource. South Africa, for instance, receives 50% more sunshine than Spain, which is an advantage that we should make better use of.⁴⁹ We have to urgently fast-track our ability to sustainably exploit renewable energy. Stellenbosch University is proud to be a significant role player in renewable energy. Our Solar Thermal Energy Research Group (STERG)⁵⁰ is considered a major role player in the field.

The research potential of solar thermal energy is huge and, with limited resources, SU has strategically chosen key technologies to focus on. These include CSP (Concentrating Solar Power), which makes the most of South Africa’s abundance of top-quality solar energy. If we consider just the area near transmission lines, the country could generate 15 times its current electricity demand using solar thermal energy.⁵¹

Large solar thermal power stations use vast arrays of mirrors that focus sunlight to a point, creating a very high temperature on a receiver. One niche that STERG has carved out for itself is the development of heliostats – mirrors that track the sun to do exactly that. We are close to completing several infrastructure projects at Stellenbosch University that are

⁴⁷ Mark Swilling. “Africa’s development challenges in a resource-constrained world”. In *Matieland* Winter 2012. p. 12. Online: <http://www.myvirtualpaper.com/doc/stellenbosch-University/matieland-2012-1-english/2012082701/>.

⁴⁸ Ibid.

⁴⁹ <http://www.sun.ac.za/english/Documents/Rector/speeches/20120521%20H%20Russel%20Botman%20-%20SASEC%20-%20distribute.pdf>.

⁵⁰ <http://blogs.sun.ac.za/sterg>.

⁵¹ <http://thehopeproject.co.za/hope/blog/Lists/Posts/Post.aspx?ID=52>.

nationwide firsts, including a new 18 m tower to be used for heliostat research. And we are building expertise through postgraduate studies.

STERG forms part of an overarching structure at Stellenbosch University called the Centre for Renewable and Sustainable Energy Studies (CRSES)⁵² in our Faculty of Engineering, which was awarded the responsibility by South Africa's National Research Foundation (NRF) to host a Postgraduate Programme in Renewable and Sustainable Energy Studies. The Centre trains engineers and scientists, and provides research support to the industry.

CRSES has developed a strong academic network engaging a number of other universities, institutes and industry players – local and international. And it coordinates research in energy derived from solar, wind, ocean and biomass sources.⁵³

This ties in with the importance for universities to pursue not only excellence but also relevance. Tackling a major challenge that humanity is grappling with, such as sustainability, is a way of making a relevant contribution.

Let me give you another example, this time looking at food security. This involves research collaboration between, amongst others, the Institute of Agricultural Sciences at ETH Zurich⁵⁴ (*Eidgenössische Technische Hochschule*, or the Swiss Federal Institute of Technology) and the Institute of Plant Biotechnology⁵⁵ at SU.

7.2. Food security

According to the United Nations, hunger prevalence in sub-Saharan Africa is the highest in the world. “More than one in four Africans – close to 218 million people in 2006-2008 – are undernourished, and food security is precarious,” the United Nations Development Programme (UNDP) reported recently.⁵⁶

Even in South Africa, the economic powerhouse of Africa, there is a problem. In the 2005 National Food Consumption Survey it was found that one out of two households (51.6 %)

⁵² <http://www.crses.sun.ac.za>.

⁵³ <http://www.crses.sun.ac.za/home-collaborators.php>.

⁵⁴ http://www.ias.ethz.ch/index_EN.

⁵⁵ <http://academic.sun.ac.za/ipb>.

⁵⁶ UNDP. 2012. *Africa Human Development Report 2012: Towards a Food Secure Future*. New York: United Nations Publications. p. 8. Online: www.undp.org/content/dam/undp/library/corporate/HDR/Africa%20HDR/UNDP-Africa%20HDR-2012-EN.pdf

experienced hunger, one out of three was at risk of hunger, and only one out of five appeared to be food secure.⁵⁷

What we have done to tackle this problem is to form the Stellenbosch University Food Security Initiative (FSI).⁵⁸ This initiative combines the expertise of leading researchers from five of our 10 faculties – Medicine and Health Sciences, Arts and Social Sciences, AgriSciences, Engineering, as well as the Faculty of Science. They have adopted a multi- and transdisciplinary food-systems approach to tackling the multifaceted challenges of food security, which is a worldwide problem and therefore requires collaboration not only across disciplines but also across national borders.

A recent study by Samuel Zeeman of ETH Zurich, Jens Kossmann of Stellenbosch University and Alison Smith of the United Kingdom's John Innes Centre demonstrates collaboration.⁵⁹ Their paper is on starch, the most widespread carbohydrate in plants. Starch is a staple food the world over. But it also has unique properties that make it valuable to industry, including sectors involved in bioethanol production and utilisation. Better knowledge about starch therefore has implications for both food security and biofuels.

According to Scopus data, this paper has been cited 91 times since 2010, which means it is having a good impact in an increasingly important field of science.

Next, I turn to an example of local research that has the potential to have a positive effect globally, this time in the field of housing.

7.3. Housing

No less than 62% of all urban dwellers in sub-Saharan Africa live in slums.⁶⁰ South African policy regarding human settlements is shifting from a once off housing intervention to an incremental approach of *in situ* infrastructure upgrading. But the problem is that people wait a long time for the energy and water grids to arrive, and thereafter for housing to be constructed.⁶¹ What is needed are partnerships between local residents, the authorities at local

⁵⁷ Scott Drimie and Milla McLachlan. 2013. Food security in South Africa – first steps toward a transdisciplinary approach. *Food Security* Vol. 5 No. 1. Springer. Online: <http://link.springer.com/article/10.1007/s12571-013-0241-4>

⁵⁸ <http://thehopeproject.co.za/hope/projects/academic/StellenboschUniversityFoodSecurityInitiative/Pages/default.aspx>.

⁵⁹ Samuel Zeeman, Jens Kossmann and Alison Smith. 2010. "Starch: Its metabolism, evolution, and biotechnological modification in plants". *Annual Review of Plant Biology*. Vol 61:209-234. Online: www.annualreviews.org/doi/full/10.1146/annurev-arplant-042809-112301.

⁶⁰ UN-HABITAT. 2008. *State of the World's Cities 2008/2009: Harmonious Cities*. London: Earthscan.

⁶¹ <http://thehopeproject.co.za/hope/blog/Lists/Posts/Post.aspx?ID=149>.

level and researchers leaving the ivory tower and getting their hands dirty as they struggle with real-world challenges at grassroots level.

At Stellenbosch University, post-graduate students⁶² have come up with sustainable improvements to the basic corrugated iron shack commonly found in informal settlements in developing nations that can improve lives the world over. Our students call their eco-friendly dwelling the iShack.⁶³ The “i” in iShack stands for “improved”, and it entails cost-effective and incremental modifications to a basic shack. It has been designed to protect its occupants from extreme temperatures, and it features a solar panel for basic electricity needs. The roof is slanted for rainwater harvesting.

It is the result of an 18-month transdisciplinary research project by SU’s TsamaHub,⁶⁴ which is an initiative of the HOPE Project. Three postgraduate students stayed in the informal settlement of Enkanini on the outskirts of Stellenbosch to collaborate with local residents on the design in a study funded by the National Research Foundation (NRF).

ETH Zurich researchers Drs Michael Stauffacher and Christian Pohl⁶⁵ helped conceptualise the TsamaHub’s community engagement project as a transdisciplinary case study – a research method that they have developed quite extensively at the Transdisciplinarity Laboratory of the Department of Environmental Systems Science (D-USYS).⁶⁶ This translated into a successful proposal to the NRF’s Community Engagement Programme.

The estimated 9 000 people who live in Enkanini have to make do with 36 taps, 60 toilets, no electricity, inadequate waste disposal and flimsy dwellings. The iShack address some of these problems. It is north facing with a roof overhang – to maximise passive heating potential in winter and provide shade in summer. Windows are strategically placed, and a lining of disused cardboard boxes against the walls and roof provides insulation.

The iShack has a small photovoltaic panel on the roof for two interior lights, a motion sensitive exterior light and a cellphone charger. Enkanini residents have been trained to install and maintain the solar system. It is envisaged that they will become energy entrepreneurs serving the community.

⁶² Mr Andreas Keller, Ms Lauren Tavener-Smith and Mr Berry Wessels, led by Prof Mark Swilling.

⁶³ <http://thehopeproject.co.za/hope/blog/Lists/Posts/Post.aspx?ID=54>.

⁶⁴ <http://thehopeproject.co.za/hope/projects/academic/TsamaHub/pages/about.aspx>.

⁶⁵ Both also serve as Extra-Ordinary Associate Professors in the School of Public Leadership of SU’s Faculty of Economics and Management Sciences.

⁶⁶ See www.tdlab.usys.ethz.ch.

This brings me to my final example, which has to do with promoting entrepreneurship in communities.

8. Higher education and the business sector

The SMME (small, medium and micro enterprises) sector is vital to the South African economy. It contributes as much as 56% of private sector employment and 36% of the GDP. Yet up to 75% of SMMEs in the country do not make it, which is one of the highest failure rates in the world.⁶⁷

Clearly we need more support for small businesses, which is where a new project by the University of Stellenbosch Business School (USB)⁶⁸ comes in. It has made its mark as a leading provider of internationally accredited postgraduate management degrees and executive education in South Africa. Now it has launched the Small Business Academy (SBA)⁶⁹ to supporting emerging businessmen and women with training and mentoring to unleash the power of entrepreneurship.

The USB works with corporate sponsors and other stakeholders to develop a skill set for small business owners, and to support and guide them for eight to nine months. The first group of participants from Khayelitsha, a township with more than 300 000 habitants in Cape Town, started at the SBA in April 2013. The initiative will be extended to other areas in years to come. The participants will work toward graduating with a certificate at the end of the year.

Participants are guided and supported with an intense programme, which includes training aligned with their competence level and needs. Such subjects as financial management, human resource legislation, proposal writing for funding, structuring of a business, personal development and business plans are offered. Some training will take place on campus and some training in the community.

The programme also entails mentoring by USB alumni and coaching by senior USB students doing their MPhil in Management Coaching. And the USB's MBA students will assist small

⁶⁷ Julian Smith. 2013. Remarks at ceremony to mark the first intake of the Small Business Academy (SBA) of the University of Stellenbosch Business School (USB), Lookout Hill, Khayelitsha, 27 March 2013. Unpublished.

⁶⁸ www.usb.ac.za.

⁶⁹ www.usb.ac.za/sba.

business owners with their business plans. Participants will have access to the considerable information resources and facilities of the USB and SU.

This programme and all the others I have mentioned demonstrate my point that universities should not be ivory towers, but should be of service to the people by seeking solutions to the challenges they face. This relates to universities globally, in both the developed and developing world – and is especially true for Africa, which is in great need of sustainable development.

9. Conclusion

In December 2011, *The Economist* published a special report entitled, “Africa rising”.⁷⁰ The magazine said, “After decades of slow growth, Africa has a real chance to follow in the footsteps of Asia.”

The subheading of the story was very interesting. Reversing its decision a decade before to label Africa “the hopeless continent”, the magazine now called Africa “the hopeful continent”. How could they say that? After all, isn’t Africa still a struggling, developing continent?

Yes, this is true. But what is also true, is that Africans themselves are doing something about it. From Addis Ababa to Cape Town, from Nairobi to Lagos, African governments and regional bodies and NGOs – and universities – are collaborating to tackle developmental challenges.

As a Vice-President of the Association of African Universities, I am witness to this energy throughout our continent. But there is also evidence beyond the anecdotal. In a recent survey it was found that 84% of Africans were optimistic about the future.⁷¹ And another survey showed that 86% of multinationals already doing business in Africa were optimistic about the continent’s growth prospects (in contrast to those without any presence in Africa, who saw the continent as “the least attractive investment destination in the world.”).⁷²

⁷⁰ www.economist.com/node/21541015.

⁷¹ Damian Hattingh, Bill Russo and Ade Sun-Basorun. “Betting on Africa’s potential”. In *McKinsey Quarterly* 2013 Number 2. McKinsey&Company.

⁷² Ernst & Young’s Attractiveness Survey – Africa 2013. Online: [http://www.ey.com/Publication/vwLUAssets/Africa_Attract_2013_-_Getting_down_to_business/\\$FILE/Africa_attractiveness_2013_web.pdf](http://www.ey.com/Publication/vwLUAssets/Africa_Attract_2013_-_Getting_down_to_business/$FILE/Africa_attractiveness_2013_web.pdf)

Education makes people positive about the future, and universities can honour this trust by putting themselves at the service of society. This, more than anything, will strengthen the space for higher education in Africa.

Collaboration will be crucial for this to succeed – collaboration among higher education institutions in Africa, and also with our partners and supporters in Europe, the Americas, Asia and elsewhere. Collaboratively we must carve out the space for higher education by demonstrating our relevance to society.