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Compiled by Johann Mouton and Team

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SARUA is a not-for-profit leadership association of the heads of the public universities in the 14 countries of the SADC Region. Its mission is to promote, strengthen and increase higher education, research and innovation through expanded inter-institutional collaboration and capacity-building initiatives throughout the Region. It promotes universities as major contributors towards building knowledge economies, national and regional socio-economic and cultural development, and for the eradication of poverty.

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Foreword

Science and Technology is one of the most important vehicles for propelling Africa’s development and the creation of a knowledge society in Southern Africa

The critical importance of S&T to regional development is set out in the 2005 NEPAD document: Africa’s Science and Technology Consolidated Plan of Action (CPA). The CPA articulates Africa’s common objectives and commitment to collective action in order to develop and use S&T for the socioeconomic transformation of the African continent, and its integration into the global economy.

The continental commitment to S&T was highlighted at the 2007 Summit of the African Union Heads of State and Government, when its members declared 2007 as the launching year for building constituencies and champions for science, technology and innovation in Africa. This declaration called for the development and mobilisation of all segments of Africa’s population to contribute to the eradication of poverty, fighting diseases stemming environmental degradation and improving the global economic competitiveness of the continent through the application and development of Science and Technology.

The academic and development assistance literature contains numerous assertions broadly linking the building of research capacity in developing countries to long-term economic growth and sustainable development. Following this trend, many countries in Africa and elsewhere have undergone a process of reviewing and revising or designing new science, technology and innovation strategies and policies.

Traditionally, African universities have had the main responsibility for conducting both theoretical and applied research, and for producing a supply of well-trained researchers. In performing this role over the last four decades, most African universities have had to function in a severely constrained, and sometimes deteriorating environment with the result that the quality and quantity of research and researchers produced by some institutions was minimal.

In order to better understand the current state of S&T in the region, SARUA commissioned this study to provide a situational analysis of selected S&T topics and indicators across the 14 SADC countries. The study provides a “mapping” of the science systems of these countries, and makes some observations and comments on issues and priorities that arise from the findings.

The outcomes of the Study reveal that S&T capacity in the 14 SADC countries varies widely across systems. At one end of the spectrum are some Higher Education Institutions producing good results within relatively well-developed S&T systems, while at the other end are many more Higher Education Institutions and systems that are poorly resourced, where capacity and capability are minimal. The study also pinpoints some of the economic, political and resource factors that obstruct and impede the development of S&T, while noting that the existence of science policies in a country does not mean that they are either effectively pursued or clearly manifest in actual S&T performance.

As noted in the report: “The university is best positioned to establish and maintain links with the world’s scientific community and with the advancement of knowledge. It is most capable of doing whatever basic research is necessary, but also to mobilize its results and translate them into ideas for ‘strategic’ implementations”. This capability spans both the natural and human sciences and points to the need for Higher Education Institutions in the SADC region to find new ways of conceptualising how universities can contribute more effectively to the social and economic development of Southern Africa.

SARUA hopes that this Study, the first of more research by the Association on S&T for its members, will contribute to better regional understanding, needs analysis and planning for S&T. We welcome your comments and contributions to the issues, data and needs raised in this Study.

Piyushi Kotecha
Chief Executive Officer
SARUA

11 March 2008
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PREFACE

This report, and especially Section 2 on the individual Country reports, has benefited from various other studies and projects and the people involved in them. It is important to acknowledge the fact that the majority of the material presented in the individual country reports is sourced from country studies completed for a recent study commissioned by the South African Department of Science and Technology. This study, which was a partnership between the Centre for Research on Science and Technology at Stellenbosch and High Impact Innovation, produced original studies which formed the basis for many of the chapters in Section 2. The reports on Botswana, Malawi and Zambia were produced by staff at CREST, whereas staff at HII produced the original reports on Angola, DRC, Lesotho, Namibia, Tanzania and Zimbabwe. Four new reports were compiled for this report: two by Simone Esau (Madagascar and Swaziland) and two by Charline Mouton (South Africa and Mozambique). In all cases, data on research production and output as well as basic demographic information were updated by Charline Mouton and me. Nelius Boshoff provided valuable data on research output for Angola and the DRC. The individual (original) author of each country report is indicated in Section 2.

Section 1 was written by me with technical assistance provided by Charline Mouton and Cornelia Jacobs from an earlier study which generated indicators for Section 1 of the report. As I have indicated in various parts in Section1, I was able to call upon various recent studies conducted by staff at CREST (including work for the EU and UNESCO) that I also wish to acknowledge.

Johann Mouton
Stellenbosch
January 2008
INTRODUCTION

The brief for this study was to undertake a “mapping” of the science systems of the 14 SADC countries. This mapping – according to themes discussed below – should also generate observations and comments on issues and priorities that would inform SARUA’s programmes and activities in this domain. We first present the main observations and findings on a number of key issues as these were extracted from the country reports. We then formulate a number of more strategic propositions as well as five recommendations for SARUA to consider.

SET CAPACITY

SET capacity in the 14 SADC countries varies hugely. At the one extreme one finds the well-developed, robust and highly articulate science and technology system of South Africa. A number of countries have capacities that can be regarded as minimally adequate to serve the local economy and society (Tanzania and to a lesser extent Malawi, Madagascar and Zimbabwe) but even in these cases the capacity is fragile in critical respects. Some countries have, through recent efforts, attempted to re-invigorate and strengthen their capacity (Mozambique and Botswana). For the remainder (Angola, DRC, Lesotho, Mauritius, Namibia, Swaziland and Zambia) SET capacity is minimal and highly concentrated in one or two public institutions.

As the scientific powerhouse in SADC South Africa increasingly attracts large numbers of students and researchers from SADC and elsewhere on the continent which further depletes the already weak capacity in many of these countries. Investment in S&T is generally very low which means that many of the SADC countries depend heavily on foreign agencies and donors for research funding. Although this support should be appreciated it means that the governments in these countries have little leverage to steer the science effort to serve the specific social, economic and development goals of their countries.

EXECUTIVE SUMMARY

KNOWLEDGE PRODUCTION AND RESEARCH OUTPUT

Total article output in ISI-journals by SADC countries for the period 2001 – 2007 came to nearly 48 000 papers (47 694). This equates to an annual average output of about 6 800 papers. South Africa completely dominates research output in the region having produced just over 80% (or 38 232) of this output. If one excludes South Africa from the overall picture, one sees a clearer distribution of the output across the remaining countries (Chart).

Our analysis shows that four countries (Tanzania, Zimbabwe, Botswana and Malawi) produced more than 1 000 papers in ISI-journals over the past seven years whereas another two (Zambia and Madagascar) produced more than 500 papers over the same period.

An important finding is that the majority of the science systems in the region produce negligible output. In many of these countries, the total annual output for the country is less than that of an active laboratory or university department in many other science systems.

1 Output in ISI-journals was used as the main indicator of knowledge production. We recognize that this is inadequate as it does not include other forms of output (books, chapters in books, theses). Neither does it recognize article output in local journals. In both cases the exclusion of these modes of dissemination translates into a very skewed output by scientific field as the production of the social sciences and humanities is therefore underrepresented (in fact nearly invisible!). The reality is that there are very few sources on these other modes of knowledge production. Where such sources are available, they would require a data management effort that was beyond the brief of this study.
GOVERNANCE OF SCIENCE

Our review of the 14 SADC countries suggests that it is possible to discern at least three very different trajectories as far as science policy development is concerned.

• The first trajectory refers to those countries which have gone through two waves of science policy development: during the first wave (not too long after acquiring independence) a first S&T policy was developed but during the subsequent years was allowed to become dormant and ineffectual. A second wave of policy revision was instigated more recently (1990s and after) in order to recapture the essence of the science policy goals (examples are South Africa and possibly Zimbabwe).

• The second consists of countries that established their first S&T policy documents in the 1990s and even more recently (after 2000): These include Botswana, Lesotho, Malawi, Mozambique, Namibia and Tanzania.

• A third, and small category, of countries in the region still does not have an S&T policy, viz. Angola, DRC, Madagascar, Mauritius and Swaziland.

Two interesting trends emerge from a cursory inspection of these science policy documents:

• The tendency to imitate – rather slavishly and uncritically – science, technology and innovation policy approaches and paradigms from elsewhere. It is evident in many of these documents that they aim to emulate and adopt the concept of “national systems of innovation” (NSI) to their own science systems. Such emulation is highly inappropriate given the early developmental state of local science systems. A derivative of this tendency has recently manifested itself in Southern Africa where some Southern African countries (most notably Lesotho, Namibia and Botswana) are “imitating” the science and technology policies of the South African government. This is perhaps not surprising given that experts from South Africa have been called in to assist in the development of these policies and plans (e.g. Botswana) and the close relations amongst these countries.

• A second pattern that has emerged is found at the substantive level where one finds a large degree of similarity in the content and emphasis in these documents. Again, this should not be surprising as most of these science policy documents have originated in a globalizing world where national boundaries and national goals are increasingly subsumed under inter-national interests. Most of the science policy documents crafted over the past decade or so therefore have very similar contents and identified priorities. They focus on science and technology for development and economic growth. There has been an adoption in many cases of the notion of a “national system of innovation”, linking science and technology with poverty reduction strategies and (more recently) with the Millennium Development Goals and at the substantive level, identifying biotechnology, ICT and nanotechnology as priority areas.

A few countries as yet have no science policy framework. It is clear that the non-existence of a science policy framework has various reasons. In Angola the devastating effects of a lengthy war have meant that attention to S&T has not been in the forefront until very recently. Swaziland has one of the lowest science bases in the region with a very small and concentrated research capacity at the University of Swaziland. This might be a case where a science policy framework was never deemed to be sufficiently urgent or requiring attention! There are now signs of an intention to develop such a policy.

A concluding comment: The existence of science policies in a country does not mean that these are either effectively pursued or clearly manifest in actual S&T performance. In many countries these policies are still rather “vacuous” (and merely “symbolic”) documents with little or no effect, mainly because of a lack of resources and (in some cases) lack of will to give expression to the goals and objectives of these documents. Perhaps the best illustration of this phenomenon is the fact that many of these policies and associated plans have set themselves the target of expending 1% of GDP on R&D. With the exception of South Africa (which is close to this magical target), not a single SADC country in sub-Saharan Africa has achieved this target yet or even come close to it.
SCIENCE AND TECHNOLOGY PRIORITIES

In a well-governed and well-resourced science system one would expect a huge degree of alignment between the theoretical and actual S&T priorities in a science system. However, even in well-developed systems, one finds that scientists and academics pursue their own research agendas despite or in ignorance of nationally stated priorities. This is a healthy situation because it speaks to both the autonomy of universities and the necessity for basic and fundamental science agendas.

But, where these conditions do not apply, it is not surprising that little alignment is visible. In the context of the SADC region one might not always expect a good fit between the theoretical and the actual for a number of reasons:

- **Resource constraints:** Governments often produce lists of S&T priorities (based on their readings of other similar documents) that refer to areas such as biotechnology, nanotechnology, infectious diseases, ICT and so on that need to be pursued. But research in many of these areas is costly and increasingly requires well-equipped laboratories and sophisticated equipment. Where there are insufficient resources to give expression to these priorities, they remain wish-lists.

- **Role of international agencies:** We have seen that many international donor agencies provide research funding to countries in the region and also have representative institutions in some countries. These agencies often pursue their own research priorities and agendas which may or may not coincide with those of the local government. Since many SADC countries are hugely dependent on this foreign funding, the S&T priorities expressed in local documents are often more representative of the goals and wishes of international agencies.

As a consequence it should not be surprising that many of the theoretical and actual S&T priorities of the SADC region are shared. The region’s scientists have to confront problems of improved plant production, animal diseases, infectious diseases (Malaria, TB and AIDS), migration, political instability, illiteracy, democracy, internet connectivity, environmental degradation, marine resources, water resources and desertification, wildlife conservation, astronomy and many more. Of course, it should also be emphasized that many of the topics mentioned above are continent-wide and even global challenges. It would be advisable not to take too much of a parochial view when addressing matters related to S&T priorities.

A first weighting of scientific priorities as evidenced in publication output in the region shows that much effort is being expended on the following areas: infectious diseases, tropical medicine, public and environmental health, ecology and environmental sciences, plant sciences and virology. This is not surprising as these topics reflect the reality of health, natural and social problems that these countries face.

Closer inspection of many of the publications in the field of the health sciences reveal extensive collaborations with scientists in Europe and the USA and with major institutions such as the National Institutes of Health, the World Health Organization and the London School of Hygiene and Tropical Medicine. Finer and more detailed bibliometric analysis is needed to look into these collaborations in more detail. This will also clarify whether there is sufficient inter-institutional collaboration with the region, as a first inspection of the ISI-date suggests very little intra-regional collaboration.

**National versus regional (and continental) priorities**

Scientific problems are very rarely confined to one country (except perhaps in the case of the social sciences and humanities). But most of the serious problems of a specific country, especially within a region, are shared with surrounding countries. Globalization has also meant that what was earlier regarded as a local problem and priority invariably has international dimensions.

We need to remind ourselves that output in the fields of the social sciences and humanities in ISI-journals will be minimal – hence the fact that none of the issues in these fields appear in our analysis.
INTERNATIONAL RESEARCH SUPPORT AND SCIENTIFIC COLLABORATION

Various international agencies are represented in Africa and support R&D on the continent. We distinguish between three kinds of actors:

• Countries that support S&T in Africa
• United Nations Agencies that support S&T in Africa
• Non-profit and philanthropic organizations that support S&T

In our country reports we have, where available, indicated the specific origins and amounts of support for S&T to each country by these agencies. However this coverage is incomplete on both counts (actors and amounts of funding) and a more detailed follow-up study is required involving the assistance of these agencies. What does emerge from the country reviews is the preference of certain countries and agencies to work with specific countries in the SADC region. These relationships are built on long-standing (colonial) traditions (e.g. France’s support for Madagascar; Belgium for the DRC, Germany for Namibia). They also reflect the specific funding philosophies of certain agencies such as Sida/Sarec’s (Sweden) long standing relationship with Tanzania and more recently Mozambique. Other kinds of support, for example, Brazil’s support of Angola, are more recent, but they reflect linguistic and cultural links that are long-standing.

BRAIN DRAIN

Although studies on the size and extent of the brain drain are constrained by the absence of reliable and systematic data on international migration the following figures are provided in order to give a flavour of the scale of the outflow of highly skilled personnel (HSP) from sub-Saharan Africa.

• The Commission for Africa (2005) estimates that around 70% of Ghanaian medical officers trained in the 1990s have left the country. Further, it has been estimated that there are more African scientists and engineers working in the USA than in the whole of Africa.

• The Zimbabwe National Association of Social Workers estimates that 1 500 of the country’s 3 000 trained social workers emigrated to the UK during a period of 10 years.

• On a more personal level, Teferra (2000) has mentioned that of the 20 members of the physics faculty at Addis Ababa University who left the country (the majority leaving for the US) to undertake their PhD studies, none has returned.

• A new United Nations report on International Migration presented before the 61st UN General Assembly in August 2006 points out that “Between 33 and 55 per cent of the highly-educated people of Angola, Burundi, Kenya, Mauritius, Mozambique, Sierra Leone, Uganda and the United Republic of Tanzania live in the countries of the Organisation for Economic Co-operation and Development (OECD).

Although this is one of those areas that is under-researched and where reliable empirical data is sketchy to say the least, there is an emerging phenomenon of an ‘internal brain drain’ from other Sub-Saharan (and in particular Anglophone) and especially SADC countries to South Africa. In addition within South Africa as in other developing countries of the world there is increasing evidence of an intra-country brain drain from academia to government and industry. Both of these developments are fuelled by the stagnant salaries in many higher education systems in Africa and, arguably, present a more serious, if not permanent, brain drain than the loss of the academic workforce to overseas higher education institutions since it is highly unlikely that those who have gone to industry and government will return to academia.

We could only find quantitative data on brain drain statistics in four of our country studies: Botswana, Mauritius, South Africa and Zimbabwe. Even where such figures are found, they are rather impressionistic and possibly unreliable. The fact that we could not collect information on brain drain data from the majority of the countries in the region reflects the real situation on the ground. Countries in Africa do not keep good statistics on emigration and immigration flows. Most statistical agencies also do not have disaggregated data by professional category for emigrating citizens. It would require a separate and huge effort to properly map brain circulation patterns and trends within the region and external to the region.

3 A recently launched project on Brain drain statistics in Africa by ICSU will hopefully start to address some of the gaps in the data.
STRATEGIC IMPLICATIONS AND RECOMMENDATIONS TO SARUA

We highlight six strategic issues as they have emerged from our analysis and conclude with some recommendations to SARUA. In each case we have formulated one or more propositions that capture the essence of our statement.

- The fragility of science systems and the need for institution building in the region
- Globalization, structural adjustment policies and economic decline
- International research and funding agencies and national research agendas
- The role of universities in these science systems
- On modes of knowledge production
- The need for more (qualitative) research on SADC science systems

The fragility of science systems and the need for institution building

Proposition 1: The real challenge for science development in the region does not lie in individual or even institutional capacity-building but in building (and nurturing) robust and sustainable institutions of science. The need to build strong research institutions has different implications and requires different strategies from those needed to build scientific capacity.

Proposition 2: The imperatives associated with institution-building concern addressing the enabling conditions that make institutions (universities, research centres and laboratories) robust and viable. It speaks to conditions associated with the autonomy and research freedom enjoyed by such institutions, the value and recognition accorded them within the national ethos, adequate resourcing within national budgets for such institutions as well as adequate recognition and reward of staff who contribute to institution-building through research and (graduate) programmes that are cumulative over time.

Proposition 3: The status of the scientific or scholarly community is one manifestation of the institution of science. Within the African context in general and specifically within the SADC region, there is insufficient support given to the development and expansion of scientific communities. It is essential that all aspects of scientific community: informal meetings and conferencing, communication through journals, networking through scientific societies and associations and the inscription of the value of science in a national academy receive attention.

Globalization, structural adjustment policies and economic decline

Proposition 4: International economic and trade policies (such as the structural adjustment example) can have both beneficial and disastrous effects on higher education institutions – especially in developing countries of the South. Universities in these countries are often already susceptible to political and regime changes and budget cuts. In the modern knowledge economies of the North and other emerging markets, it is easy to argue for the strategic role of a university in knowledge production, innovation and high skills training. In many of the countries in the SADC region the universities do not in fact perform all of these functions. This implies that we perhaps need new ways of thinking about the role of universities in such systems.

International research and funding agencies and national research agendas

Proposition 5: The role of various international actors in the science systems of the SADC region has to be properly researched and interpreted. Such a study would include researching the role of development agencies, donor agencies, foundations, governments and international bodies such as the United Nations and how they contribute to shaping a national research agenda, whether they contribute to institution-building in science or in fact to the converse: the de-institutionalization of science in these countries.

The role of universities in these science systems

Proposition 6: The raison d’être of university research
in developing countries exceeds much of its traditional justification (enhance the quality of training and ensure the reproduction of the academy). These are two important goals; but the need for academic research goes beyond these traditional functions. The university is best positioned to establish and maintain links with the world’s scientific community and with the advancement of knowledge. It is most capable of doing whatever basic research is necessary, but also to mobilize its results and translate them into ideas for “strategic” implementations.

On modes of knowledge production

Proposition 7: Traditional classifications of research into basic, applied and strategic are inadequate to capture the different modes of knowledge production typically found in developing countries of the world. The kinds of research are a mix of academic, consultancy and mission-orientated research. In many of these institutions there is a lack of funding and interest in classic fundamental science which builds a knowledge-base in a discipline, very little output in academic journals and insufficient attention to the reproduction of scientific capacity through doctoral and post-doctoral programmes. Advancement of personal careers and reputations are often paramount which in turn is a further contributing cause to the widespread de-institutionalization of science in the region.

The need for more (qualitative) research on SADC science systems

Proposition 8: If we wish to advance our understanding of the research and science systems of the SADC countries, it is necessary to (1) develop new and innovative indicators and descriptors of such systems; and (2) consider conducting qualitative country studies that are more anthropological in nature and which generate understanding not only of surface level phenomena but the deeper dynamics and meaning of how these systems work.

Our final section is devoted to a number of recommendations that are based on the propositions outlined above as well as the general conclusions researched in this study. I have organized these recommendations around five modes of intervention that might be appropriate to SARUA’s mission.

- Advocacy and lobbying
- Facilitation
- Networking and liaison
- Support
- Research and analysis

Recommendation 1 (Advocacy and lobbying)

Given its mission and membership it is highly appropriate for SARUA to advocate and lobby on behalf of higher education and universities specifically in the region. Although the tide has turned since the late nineties, it is still not the case that universities are generally recognized for the crucial (and in some of these countries – indispensable) role they play in knowledge production, dissemination and utilization. The first recommendation, therefore, is that SARUA intensifies its current efforts in this domain and devises strategies of advocating and lobbying on behalf of universities in the region. Such efforts should target different categories of stakeholders nationally (within the region), regionally and on the African continent as well as internationally (donors and foundations). SARUA can and should continue to make the case for universities and university research.

Recommendation 2 (Facilitation)

SARUA is ideally positioned to facilitate new ventures and initiatives in the region. It should, through its membership, give attention to facilitating and “brokering” new initiatives that could be funded elsewhere. Our review of the state of science and research in the region has identified many areas that could and should require follow-up, e.g.

- The imperative for institution-building in the region
- A new thinking about the role of universities and university research in the science systems of these countries
- Understanding networks and intra-regional and inter-regional scientific collaboration
- Facing the ongoing challenge of the external and internal mobility of scientists
- The lack of robust and sustainable scientific communities in many of these countries
- The role of international scientific, funding and donor agencies in these countries

Our recommendation is that SARUA should engage in a number of facilitating/brokering activities which will help put
and keep issues such as these on the regional agenda. Various modes of facilitation could be considered: commissioning think pieces on specific issues, organizing round table discussions and dialogue forums, conceptualizing new projects and presenting these to potential funders and initiating actions to disseminate information about HE in the region more actively and visibly.

**Recommendation 3 (Networking and liaison)**

There are currently many international, continental and regional bodies involved in promoting and supporting HE and higher education research on the African continent. Some of these actors have organized themselves in clusters or groupings that regularly meet. We think here of the Foundation Partnership in the USA, an informal forum of development agencies in northern Europe, UNESCO through the inter-sectoral Forum on Higher Education, Research and Knowledge and NEPAD which has also launched a whole range of initiatives in the field of S&T mostly with UK and North American funding support. We recommend that SARUA undertake a mapping exercise to establish what the current clusters of actors in this area are, establish their priorities and ways of working, and then develop its own strategy of networking and liaising with these actors.

**Recommendation 4 (Support)**

It is highly desirable that SARUA consider supporting directly (on its own or in partnership with other bodies) universities in the region. We do not recommend direct funding of projects or programmes but rather supporting institutions and individuals through workshops, training courses, international study tours and related modes. There is a long list of areas where universities and academics in the region could benefit from such support activities and which all directly or indirectly impact on the quality of science in these institutions:

- Research and project management
- HE leadership and governance
- HE management and planning
- Science communication
- Scientific report writing and publishing
- Postgraduate supervision
- Research methodology and statistics
- Intellectual property management
- Journal publishing and peer review
- Integrity in research

Our recommendation is that SARUA consider doing a scoping survey to establish the need for support in these and related areas and then develop a support and training programme – preferably in partnership with other actors – that would address the most urgent needs.

**Recommendation 5 (Research and analysis)**

This review of the science systems of the 14 SADC countries is a first step. It raises more questions than answers on the nature and state of research in the region. We therefore strongly recommend that SARUA considers following up this study with further commissioned studies. Some of the topics for such studies that we have identified in this project are:

- Improving the quality of S&T statistics and developing new indicators for research in developing countries
- Understanding the nature of scientific communities in the region: What is the status of science and the scientific profession in these countries? What value and recognition are given to science by governments in these countries?
- In-depth case studies of the role of major international agencies (research and funding) in the region and how they influence and possibly shape the research agenda at universities in the region.
- More micro-bibliometric studies of research laboratories, institutes and groups that will reveal patterns of publication, scientific collaboration and scientific capacity.
- Studies on the dissemination of scientific information in the region and specifically the role of local and indigenous journals in this regard.

It would be prudent for SARUA to consider partnering with some of the current research programmes and projects that are addressing similar goals. In fact, SARUA could well play a major facilitating role in this area as well.
INTRODUCTION

THE BRIEF

The aim of the report is to produce data on selected S&T topics and indicators for the 14 member countries of SADC. Five main areas were stipulated by the brief:

1. Areas of specialization in R&D
   a. List of International and local research institutes and centres
   b. Production of scientific articles in peer-reviewed journals.
2. The size of the R&D workforce
   a. Number of academic staff in public universities
   b. Number of researchers in key research institutes
   c. Number of doctoral graduates produced
3. Key R&D initiatives and networks
   a. Key initiatives
   b. Priority areas according to S&T policy and strategic documents
   c. Main international and regional networks
4. Facts and Figures on brain drain
   a. Data on scientific mobility
   b. Summary of main initiatives around brain drain and “bring home campaigns”
5. International and foreign funding of S&T
   a. Role of international funding and donor agencies (e.g. Sida/SAREC, NORAD, Rockefeller, Carnegie, Mellon, Gates Foundation, Kellogg, MacArthur, Cida, Danida, DfiD, GTZ and IDRC) in SADC countries

It is important to emphasize the methodological constraints that one faces in a study of this nature:

- Some data categories remain unreliable, dated and highly anecdotal. This applies to many of the S&T indicators that we report on. It also includes statistical data on brain drain and funding information for international support of science in the region.
- The country profiles that have been compiled here essentially represent the view from the outside. With the exception of the South African profile, none of the reviews were produced by scholars or scientists from the countries concerned. Although some of the profiles benefited from field visits and primary data collection the fact remains that this is a poor substitute for a study generated by local scholars.
- The country profiles also – because of the previous point – are essentially descriptive and statistical in nature with very little interpretation and explanation. We have ventured some high-level interpretative propositions and conclusions in Section 1 of the report, but they require further investigation and validation.

OUTLINE OF REPORT

The report consists of two sections. Section 1 is a more analytical and thematic summary of the main findings and emerging themes of the study. It presents some preliminary conclusions around these themes based both on the material presented in the country profiles and other sources. Section 2 presents (alphabetically) the profiles for the 14 countries in the SADC region.

The table below provides a summary of the content of the report. The structure of the table is based on the schedule above where the above five main areas and sub-points are used as a checklist. The highlighted blocks indicate those sections where information was obtained and consequently discussed in the report below.
Table 1: Summary table of information available for each SADC country

<table>
<thead>
<tr>
<th>Country</th>
<th>Areas of R&amp;D specialization</th>
<th>Size of R&amp;D Workforce</th>
<th>Current R&amp;D Initiatives &amp; Networks</th>
<th>Brain Drain</th>
<th>Donor Agencies</th>
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<tbody>
<tr>
<td></td>
<td>Research Institutes</td>
<td>Peer-reviewed article production</td>
<td>Academic staff</td>
<td>Researchers in key institutes</td>
<td>Masters &amp; Doctoral students</td>
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