ZIMBABWE

SECOND SCIENCE, TECHNOLOGY AND INNOVATION POLICY OF ZIMBABWE

MARCH 2012

ACKNOWLEDGEMENTS

Several scientists and other stakeholders made contributions to this policy. The initial draft was discussed at five gatherings convened in different parts of the country. Government is indebted to them all and in particular wishes to thank UNESCO and the African Technology Policy Studies (ATPS) Institute for financing activities of a core team of scientists that helped in all the consultations held.

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ACRONYMS

ICT	Information and Communication Technology
IKS	Indigenous Knowledge Systems
IT	Information Technologies
MDG	Millennium Development Goals
MSTD	Ministry of Science and Technology Development
MTP	Medium Term Plan
OPC	Office of the President and Cabinet
R&D	Research and Development
RCZ	Research Council of Zimbabwe
S&T	Science and Technology
SCZ	Scientific Council of Zimbabwe
STI	Science, Technology and Innovations
UNESCO	United Nations Educational, Scientific, and Cultural Organization
ZAS	Zimbabwe Academy of Sciences

PREFACE

His Excellency, R. G. Mugabe, President of the Republic of Zimbabwe

For a nation to be able to develop sustainable solutions to pressing developmental challenges and to grow in a competitive global marketplace, there is need to be innovative and make use of the dynamic new technologies that create the ability to generate its own solutions while it adapts outside technical knowledge to suit the local environment.

Government came up with a Science and Technology Policy that led to the creation of the Ministry of Science and Technology Development in 2005. Later, however, that policy needed to be updated to take into account new technological developments and address new national challenges that had emerged. Since the Government realises the need to optimally tap into new innovations in Science and Technology it, accordingly, will always seek to harness recent developments in Science and Technology so as to achieve growth and development across all sectors of the Zimbabwean economy in a manner that benefits all citizens.

The Second Science and Technology Policy underscores the importance of mainstreaming Science in all sectors of the economy and ensures that Zimbabweans benefit from acquisition and utilization of available technology in improving the quality of their lives. The endeavours to meet basic human needs of food, energy, water, and shelter without degrading the planet's vital systems require ambitious, inter-disciplinary and solution-oriented research programmes. The focus should ensure that as many of our people as possible master modern technologies and integrate them in their socio-economic activities, including education.

For a developing country to achieve rapid and sustainable socio-economic development, policy formulation is imperative. If there are no effective policies on Science and Technology which can be translated

into concrete plans for the efficient exploitation of our natural resources, the danger is that the resources will be under-utilized, dissipated or even lost.

The publication of this Science and Technology Policy represents a milestone of innovation in Zimbabwe. This policy also aims at developing a more effective innovative system of partnering all institutions involved in creating new knowledge, producing new innovations and diffusing them to the benefit of the people of Zimbabwe and our region at large. I wish to encourage all those in the various processes of research and technology to remain innovative, adaptive and perpetually inquisitive.

I thus have great pleasure in presenting this Second Science and Technology Policy to the nation.

His Excellency, R. G. Mugabe
President of the Republic of Zimbabwe

FOREWORD

Rt. Hon. M. R. Tsvangirai
Prime Minister of the
Republic of Zimbabwe

In order to benefit from the advances in science and technology, Zimbabwe must give high priority to the implementation of its Science, Technology and Innovation (STI) Policy with importation and adaptation of advanced technologies where necessary. The implementation of this Second Policy on Science, Technology and Innovation that is being launched requires the full commitment and a comprehensive buy-in by all the stakeholders in government, industry & commerce, academia and indeed the whole of the civic society. Commitment, efficient collaboration and funding, constitute the core elements needed for the success of the implementation of the Second Policy on Science, Technology and Innovation.

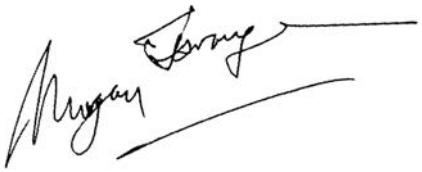
In an increasingly competitive global economy marked by the technology divide between the developed and the developing worlds it is even more urgent for Science and Technology to be imbedded in our programmes if the country is to avoid lagging behind in industrialization. This is a process which presupposes the development of the capacity to use the tools of Science and Technology. Hence capacity building is a vital component of the implementation strategy of the Policy. As part of the implementation process we hope that our educational institutions will re-align their training programmes in order to produce cadres, in sufficient quantities and high quality, to effectively translate the Policy into practical actions for concrete outputs and outcomes.

Funding for the implementation of the Policy is absolutely necessary. Government has already made a commitment to invest at least 1% of gross domestic product on research and development. We invite private sector participation in funding research activities. Various

incentives have been agreed upon as detailed in the Policy document. We want the private sector to avail themselves of these incentives and contribute to research funding.

I encourage the scientific community to create strategic partnerships and collaborations to support research. We hope to see institutional and multi-sectoral collaborations that pool resources and expertise in Science and Technology. Zimbabwe has to take advantage of the good relations we have with other countries so that we can promote and renew strategic bilateral, regional, international and multilateral cooperation in Science and Technology.

The Second Policy on Science, Technology and Innovation has been fully considered by the Government of Zimbabwe. Its full implementation is awaited by the rest of the nation.



Right Hon. M. R. Tsvangirai (MP)
Prime Minister of the Republic of Zimbabwe

INTRODUCTORY STATEMENT

Hon. Heneri A. M. Dzinotyiweyi (MP), Minister of Science and Technology Development

This is Zimbabwe's second policy on Science and Technology but now incorporating Innovation to underscore the general expectation that activities and products of an innovative nature have strong likelihood of success where they are backed by appropriate Research and Development (R&D) support. Every socio-economic sector of the economy has aspects that can be enhanced through Science, Technology and Innovation (STI). To manage all that, this Policy presents six primal goals through which all efforts should be channelled. These are:

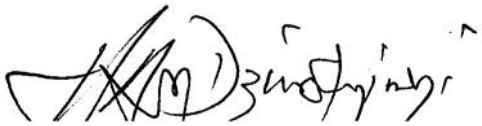
- Strengthen capacity development in STI.
- Learn and utilise emergent technologies to accelerate development.
- Accelerate Commercialisation of Research Results.
- Search for scientific solutions to global environmental challenges.
- Mobilise resources and Popularise science and technology.
- Foster international collaboration in STI.

These have been arrived at, after a careful analysis of Zimbabwe's current challenges and also noting the availability of a wide range of natural resources the country should exploit. The Policy calls for STI to be an active component of all national developmental efforts in order to speed up the process.

The Policy implementation will naturally remain a critical part of the extent to which success can be realised. The document on policy implementation is presented separately but should be viewed as an

annex to this document. It is pertinent to underline that, with respect to the role of STI, both the Medium Term Plan (MTP) and the Millennium Development Goals (MDGs) are achievable as part of the exercise of implementing this Policy.

I trust that institutions and scientists will find meaningful guidance in their contributions to national development through this Policy.



Hon. Heneri A. M. Dzinotyiweyi (MP)
Minister of Science and Technology Development

BACKGROUND

Zimbabwe's overall Science, Technology and Innovation (STI) regulatory framework is outlined in a number of key policy documents that include the Research Act of 1986 and its subsequent amendments, the Science and Technology (S&T) Policy of 2002, the Biotechnology Policy of 2005, the Biotechnology Act of 2006 and the ICT Policy Framework of 2006.

From national independence in 1980 up to 2002 the S&T sector was overseen by the Research Council of Zimbabwe, previously called Scientific Council of Zimbabwe, reporting to the Office of the President and Cabinet. In 2002 the Department of Science and Technology Development was established within the President's Office. This was elevated to a fully fledged Ministry of Science and Technology (MSTD) in 2005 in recognition of the large and diverse role of S&T in national development.

The Ministry of Science and Technology Development has reviewed the S&T Policy of 2002 with a view to developing a more up-to-date one that takes into account new national and global S&T challenges, embraces national STI needs in order to address specific economic growth and wealth creation issues.

The Ministry commissioned the Zimbabwe Academy of Sciences (ZAS) to undertake a national Science, Technology and Innovation (STI) status review in 2009 and 2010. That review has informed the current policy formulation process by furnishing statistics on the current environment in STI in Zimbabwe, identifying gaps and assessing the financial support and fiscal incentives for the STI in the country. It noted disjointed efforts in need of coordination in research particularly lack of coordination in the funding of research.

Since the adoption of the first National Science and Technology Policy in 2002 there have been significant advances in science and

technology globally especially in ICT, biotechnology, space sciences and indigenous knowledge systems (IKS) and new technologies like nanotechnologies have emerged.

Circumstances in the country have also changed in the last decade since the adoption of the first S&T Policy. The country experienced unprecedented economic meltdown leading to the closure of various manufacturing companies; there has been a large flight of skills to the Diaspora. On the positive side, there has been a phenomenal expansion of Higher Education with establishment of new universities. Further, there remain undisputable advantages that the country is rich in natural resources and has a hard working population — core factors for economic advancement.

Hence this Second Science, Technology and Innovation Policy was formulated with that background in mind and to address present and future challenges. With the observation that STI is cross-cutting among all socio-economic sectors, there is need for a policy that clearly spells out explicit trends to be followed, trends that will make a difference to each of those sectors.

STRUCTURE OF SECOND STI POLICY

Vision:

To make Science and Technology an integral part of both individual and national development.

This vision has been adopted in order to address the national challenge—namely to accelerate development to a level closely comparable to that of the developed world in as short a time as possible. Such development has happened elsewhere through contributions from Science and Technology. With that in mind the challenge is therefore to develop innovative ways of bringing scientific and technological contributions to all developmental efforts done at both individual and national levels.

Primary Goals

This STI Policy has six Primary Goals which will provide guidance for core activities that can be measured and programmed to take place over specified periods of time. Accordingly, under each of these Primary Goals specific policies will be cited later. The Primary Goals are:

1. Strengthen capacity development in STI
2. Learn and utilise emergent technologies to accelerate development
3. Accelerate Commercialisation of Research Results.
4. Search for scientific solutions to global environmental challenges
5. Mobilise resources and popularise science and technology
6. Foster international collaboration in STI

Policy Implementation

Each of the policies cited under the above goals is unpacked to show how it will be implemented, citing key players and monitoring mechanisms. That detail constitutes the content of the Policy Implementation Strategy produced as a separate document that should guide the overall implementation of this Policy.

1. STRENGTHEN CAPACITY DEVELOPMENT IN STI

The capacity of a country to be innovative using S&T will depend on the availability of appropriately educated and skilled human resources as well as infrastructure. Development of skilled human resources has its foundation in education which begins at primary school level and is then strengthened at the secondary and tertiary levels. In addition, there needs to be a continuous investment in infrastructure to pursue research and training in various aspects of S&T. Specific policies are cited below for each of the themes:

Education

The goal is to compliment efforts of the education sector ministries as follows:

1.1 Pupils at primary and secondary school should spend at least 30% of their overall time studying science subjects. This translates to a requirement for every O' Level secondary student to study mathematics and at least two other science subjects, as mathematics is already a compulsory subject of study.

1.2 Practical experiments should exploit the background experiences of students and encourage interest across gender.

1.3 Science subjects must be taught in a manner that allows each pupil to undertake direct practical experimentation regularly.

1.4 Teachers and students should regularly use the internet to learn and evaluate scientific topics taught and successful approaches used in other countries.

1.5 At least 60% of university education should be in S&T skills development.

Skills Development

1.6 All employers in the socio-economic production and services sectors to expose their employees to the technical basis of their activities. (For instance a manufacturing company could find ways of ensuring that every employee is given an opportunity to understand the range of the company's scientific and/or technology based processes).

1.7 Develop and monitor the level of research and S&T skills available in the country. (This includes identification of areas in need of S&T skills to be developed, technology transfer and encouragement of innovative endeavours to address local challenges).

1.8 Encourage inter-disciplinary research and technological engagements to address national challenges through S&T.

1.9 Every science teacher should hold a minimum qualification of a relevant degree in the subject taught.

1.10 Science teachers, technicians and professionals to continuously advance themselves. (This includes the establishment of national professional and scholarly associations and societies and maintaining these at a level that is internationally respected—both for organizations and the individual members).

Institutions and Infrastructure Development

Institutions and infrastructure development need to be developed as the backbone to the programmes they can run to acceptable standards. To this end:

1.11 Functional science laboratories must be in place and be maintained in all schools, universities and related research and training institutions.

1.12 Modern technological developments such as ICT should readily be availed to institutions to ensure competitiveness.

1.13 Promote the development of centres of excellence in various disciplines of S&T at tertiary and research institutional levels.

1.14 Promote institutional linkages and regularly review their collaborative networks in order to avoid duplication of efforts and achieve optimal usage of resources.

2. LEARN AND UTILISE EMERGENT TECHNOLOGIES TO ACCELERATE DEVELOPMENT

New advances in S&T have brought about technologies that are exploited substantially in virtually all developed countries. Some of the technologies may be too costly to develop in the developing world. Accordingly, there is need to adopt an innovative approach focusing at understanding those aspects that are likely to have immediate relevance in addressing challenges in our national development.

It is now known that man made activities may interfere with nature in a manner that may become detrimental to the ecosystem. Accordingly, in adopting emerging technologies this should be done with adequate risk assessment.

Specific policies are cited below focusing at the disciplines of biotechnology, ICTs and space sciences, nanotechnology, indigenous knowledge systems and high level technologies yet to emerge.

Biotechnology

Biotechnology has relevance in fields such as agriculture, medicine and manufacturing which can impact on the environment. Research and development needs to be pursued in all these areas with the ultimate goal of enhancing positive outcomes in each of them while at the same time addressing safety concerns. Specific actions to be taken include:

2.1 Promote and coordinate biotechnology research on plants and animals aimed at increasing food productivity.

2.2 Promote the use of beneficial derivatives of biotechnology by farmers.

2.3 Strengthen biotechnology research for disease prevention and control.

2.4 Strengthen research aimed at optimising manufacturing processes through the use of biotechnology.

2.5 Exploit the biodiversity in the environment through biotechnology such as herbal products, fermentation processes and bio-leaching.

ICTs

Rapid advances have taken place through the use of ICTs and space sciences. Appropriate research is required to keep abreast with the rapid developments and make effective use of the knowledge available. This can be achieved through the following specific policies:

2.6 Research into the creation of IT platforms for innovative deployment of data and knowledge for use in various sectors of the economy.

2.7 Enhance national competence for computer hardware, software engineering and cyber security

Space Sciences

Regionally and internationally much attention is being paid to in space sciences. This requires Zimbabwe to play its role in this area as well. This can be achieved through the following specific policies:

2.8 Carry out local R&D in Space Sciences in order to enhance its wide diversity of applications e.g. meteorology, land-use, aeromagnetic surveillance.

2.9 Seek active participation in regional Space Science initiatives.

Nanotechnology

Nanotechnology is the application of processes and products at nanometre (10-9m) scale. Products from nanotechnology have been developed with significantly improved properties such as durability, efficiency and precision. It is an emergent technology that holds the power to revolutionise the way we approach fields such as agriculture, energy production and utilisation, environmental protection, healthcare, information technology, national defence, among other fields. Nanotechnology can thus be exploited as an enabling engine for new economic growth, sustainable development and societal well-being. It has applications in all spheres of life. The following specific policies will help Zimbabwe to benefit from the advances in nanotechnology:

2.10 Establish a national nanotechnology programme aimed at identifying and undertaking studies and research in aspects of nanotechnology for the benefit of the country.

2.11 Develop a coordination framework for all activities on nanotechnology undertaken by local institutions.

2.12 Develop regulations and standards in keeping with international developments on nanotechnology that are beneficial for the country to uphold.

Indigenous Knowledge Systems (IKS)

Traditionally, IKS has played an important role in daily life and development in Zimbabwe. Aspects such as the value of indigenous fruits, animal breeding, soil cultivation, herbal medicines, etc have been well known and applied and are gradually phasing out of living memory in various localities. Many of these traditions and products can still play an important role in the future development of Zimbabwe particularly in the rural areas. Researching on relevant IKS for current and future needs would help compliment other existing and emerging

technologies. The following specific policies will help Zimbabwe to benefit from the Indigenous Knowledge Systems:

2.13 Develop a database on IKS with a view to identifying aspects that can be exploited using modern S&T (e.g. synthetic biology) for national benefit.

2.14 Promote research on potential applications of IKS to future national developmental challenges.

2.15 Develop courses on IKS that are suitable for inclusion in the school curricula.

Technologies yet to emerge

Technologies are fast changing and new ones emerging. It is therefore necessary to provide for adoption and adaptation of the new technologies as and when they are appropriate

2.16 High level technologies that are yet to emerge and are deemed relevant to the needs of Zimbabwe will need to be adopted in a related manner with the appropriate risk assessment.

3. COMMERCIALISATION OF RESEARCH RESULTS

The advances in S&T together with the high level of technological development have created a setting whereby most research findings can be harnessed into relevant and appropriate applications in order to accelerate national development. It is vital to develop innovative ways aimed at utilizing most of the research findings for commercial gain. The following policies are intended to facilitate such realization:

3.1 Identify and document national and global research results/outputs and technologies that can enhance value addition to national resources.

3.2 Strengthen national Intellectual Property Rights regime. In particular, promotion and facilitation of registration of patents from institutions, researchers and inventors are needed.

3.3 Promote the establishment of funds dedicated to commercialisation of research results and outputs by various relevant institutions, such as Innovation and Commercialisation Fund in the Ministry of Science and Technology Development.

3.4 Forge linkages between tertiary institutions and industry dedicated to harnessing research results for commercialization. (This could include exposure of patented research results to industry at special Expositions)

3.5 Establish science and technology parks at research institutions and universities. This may include parks that service multiple institutions and independent innovators.

3.6 Incentivise uptake of new operations based on new research findings. (This could include provision of space at techno parks, seed funding, tax exemption and other mechanisms.)

4. SEARCH FOR SCIENTIFIC SOLUTIONS TO EMERGENT ENVIRONMENTAL CHALLENGES

The world has experienced unprecedented natural disasters that include effects of climate change, earthquakes (tsunamis) and others. There continues to be debate on the extent to which some of the disasters emanate from anthropogenic (human) activities such as pollution, deforestation and global warming. Scientific solutions need to be pursued, towards this end. The following needs to be done:

4.1 Research aimed at finding appropriate flora and fauna able to thrive under changing climatic conditions, such as drought tolerant and disease resistant crops and animals, crops with short growing seasons etc; should be pursued.

4.2 Promote use of earth observation technologies to improve national capability on early warning and forecasting on changes and compliance with international requirements. (This should include development of national capability for measuring carbon emissions and other pollutants).

4.3 Continuously search for appropriate materials for effective management, mitigation and control of environmental challenges. This should give due consideration to matters relating to ecology, pollution, water and alternative sources of renewable energy e.g. bio-fuels, wind energy as well as solar.

4.4 Maintain the national gene bank so as to preserve the national gene stock.

5. MOBILISE RESOURCES AND POPULARISE SCIENCE, TECHNOLOGY AND INNOVATION

The benefits generated by S&T for development should be widely publicised to reach all nationals and the country at large. It is generally accepted that such benefits would increase proportionally with the increase in funding. The following specific goals are aiming at optimizing such realization and include:

5.1 Government is committed to make a budgetary allocation of at least 1% of GDP for expenditure on R&D.

5.2 Develop adequate mechanisms for channelling all Government or budgetary allocations for R&D through one dedicated institution.

5.3 Put in place tax concessions for companies that channel funds and donations towards R&D.

5.4 Give awards/incentives and recognition for achievements in S&T.

5.5 Mobilise funds for engaging in international collaboration researches

5.6 Popularise S&T in a manner aimed at reaching out to the majority of the population.

6. FOSTER INTERNATIONAL COLLABORATION IN SCIENCE, TECHNOLOGY AND INNOVATION

Active involvement in STI matters at international level is important to achieve international standards, contribute to the global effort to generate new ideas, acquire and establish high standard inputs to local effort and be a good global citizen in the S&T arena. To achieve these, the following specific policies will be pursued:

6.1 Call on tertiary institutions to engage in relations geared for collaborative research between research institutes nationally, regionally and internationally.

6.2 National R&D institutions and researchers should actively pursue membership of distinguished international bodies.

6.3 Zimbabwe shall join and maintain good standing membership of distinguished international bodies.

6.4 Government shall enter into mutually beneficial partnerships/agreements with other countries and multilateral organizations and accede to S&T protocols in order to benefit the nation.

6.5 Create linkage platforms that can facilitate scholars and researchers abroad (including those in the Diaspora) to engage with local STI activities.

6.6 Create and promote platforms for technology screening, transfer, acquisition, adoption and absorption.

7. WAY FORWARD

To address the six main goals of this Second STI Policy, a total of 53 specific policies have been cited above. Under each of those policies specific actions are developed including monitoring and evaluation mechanisms. These are contained in the document entitled "Implementation of Second STI Policy". Both Policy documents are in harmony with the aims and goals of the Medium Term Plan and the Millennium Development Goals.

It is intended that strategic plans and annual budgets will be guided by the two documents from now on until conditions change sufficiently to necessitate the formulation of a further new policy—namely the Third STI Policy. In view of the limited resources for funding S&T research, there shall be periodic prioritisation of research areas. For such prioritization to yield optimal impact on research undertaken, coordination of all research institutions is vital.

This policy will be implemented to produce intended results in proportion to the extent that it is funded.