



REPUBLIC OF ZAMBIA

NATIONAL POLICY ON SCIENCE AND TECHNOLOGY

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FOREWORD

The ability of any society to acquire knowledge, skills and technology that would make it build the capacity to meet its social and economic needs is vital for its development. Economic needs are realized through internal and external trade. Trade now is dominated by knowledge intensive technologies, which come from the translation of results from the scientific research and development work. Hence, science and technology are fundamental to sustainable socio-economic development of any nation.

In Zambia, insufficient attention has been paid to Science and Technology and its role in the national development process. The consequence of this neglect, over the years, has been the deterioration of the socio-economic development of the country. There has been a perpetuation of heavy dependency on external technological support and importation of finished goods and services while exporting raw materials with little value added, thereby weakening Zambia's commercial and industrial base.

The creation of a Ministry responsible for Science and Technology is a clear indication of the Zambian Government's recognition of the importance of science and technology for our socio-economic development. However, a major constraint to the effective development and application of science and technology in Zambia has been the lack of a clear Science and Technology Policy to provide guidelines for the development and application of science and technology. It is for this reason that the Ministry of Science, Technology and Vocational Training has developed this Policy on Science and Technology.

In conclusion, I wish to express sincere gratitude to all those individuals and institutions who worked tirelessly and organizations which assisted financially in the development of this policy document.



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EXECUTIVE SUMMARY

Background

Despite the implementation of various macro-economic and development strategies, from 1964 to 1991, there was deterioration in the economic and industrial performance in Zambia. The transformation of Zambia's economic policy framework, in 1992 from a Central State controlled to a free market and liberalized economy, with greater emphasis on private sector participation in the economy, brought some beneficial results in some sectors of economy and some negative results in other sectors, such as manufacturing industry, which faced stiff competition from imported goods and services.

A major contributing factor to the poor performance of the industry has been the lack of application of science and technology, which has resulted in industries becoming uncompetitive with declining productivity under global trade environment.

In view of the above, the Government has realized that a sustainable socio-economic development can only be achieved through a strong well co-ordinated and monitored Science and Technology System. Hence, the government decided to formulate a National Science and Technology Policy.

Mission Statement and Goals for the Policy on Science and Technology

The mission of the policy on Science and Technology *is to promote and exploit science and technology as an instrument for developing an environmentally friendly indigenous technological capacity in sustainable socio-economic development* in order to improve the quality of life for Zambia. The goals include:-

- (i) enhancing linkages between technology research institutes, the private as well as the public sector in order to encourage demand-driven research and development;
- (ii) developing and sustaining a national scientific and technological capacity and providing highly skilled human resource for increased productivity in the economy;
- (iii) fostering national and international linkages for enhanced technology transfer; and
- (iv) facilitating the acquisition, adaptation and utilization of foreign technology.

General Policy Objective and Strategies

The broad policy objective for science and technology is to embed science and technology as part of the culture of the key sectors for promoting competitiveness in the production of a wider range of quality goods and services.

The strategies for achieving this broad policy objective include: recognizing gender concern; changing institutional structure; ensuring that research is guided by national developmental goals; establishing a mechanism for increased innovation, transfer, diffusion and commercialization of technology, especially for small and medium scale industries, with emphasis on indigenous technology.

Putting in place efficient facilities to formulate and enforce standards and undertake quality control testing and assessment of industrial products; developing appropriate training which imparts practical skills and application of knowledge to develop prototype, products and processes in changing environment of market technology; establishing a comprehensive data bank which is easily accessible at strategic locations by scientific, management and industrial users; and providing incentives and high targeted promotions on the importance of science and technology to economic development in the key sectors.

Institutional and Legal Framework

The National Council for Scientific Research had been mandated to carry out both advisory function and research activities in science and technology. It has, however, failed in the advisory function because of weakness in its statutory linkages with other research institutions in the country. For this reason, a new legislation will be enacted to separate advice, formulation, co-ordination and direction roles from physical laboratories by creating the National Science and Technology Council and autonomous research institutes.

To provide a link between Research System and Productive Sector, a Technology Business Centre will be created under the auspices of the National Science and Technology Council.

Mechanism for Funding Research and Development

Successful implementation of the Science and Technology Policy depends on the availability of adequate financial resources. Hence, the following sources of funds have been proposed: Government allocation of 3% of GDP to scientific and technological activities; public, private and donor contribution to the Science and Technology Fund, which will be created; research institutions' internal generation of funds through commercialisation of technologies, contract research and collaborative research; and Creation of Technology Venture Capital by the private sector.

SCIENCE AND TECHNOLOGY POLICY

1 BACKGROUND

1.1. Introduction

Since independence in 1964, Zambia followed and implemented various macro-economic and development strategies. Between 1960 and 1970 Zambia adopted an import substitution strategy for the development of its manufacturing sector in an effort to achieve a rapid industrialization process. The strategy enabled the country to produce a wide variety of consumer goods (ranging from food, textiles, furniture, alcoholic and non-alcoholic drink, etc) and assembled goods including motor vehicles, radios, etc. The policy of import substitution entailed transfer of technology and expertise from outside Zambia.

Despite massive investment in this sector, between 1970 and 1980, Zambia experienced stagnation in economic and industrial performance. Between 1980 and 1991 economic and industrial performance further deteriorated, followed by a devastating decline in social infrastructure, dwindling financial reserves, uncontrolled inflation, rising debt obligation and declining productivity and export capacity.

Since 1991 Government of the Republic of Zambia has transformed Zambia's economic policy framework from a Central State controlled to a free market and liberalized economy, with greater emphasis on private sector participation in the economy. Some of the policies included the privatisation, liberalization of the financial sector, freeing of interest rates and removal of price controls and subsidies.

Although the implementation of these policies has produced some beneficial results, some negative effects have manifested in some sectors of the economy. The manufacturing industry in particular has faced stiff competition from imported goods and services. Various reasons have been advanced for this status quo such as high import duty and sales tax. The Government is seriously addressing the issues of import duty and sales tax.

A major contributing cause of the poor performance of the manufacturing industry has been largely due to lack of application of science and technology, which has resulted in industries becoming uncompetitive with declining productivity, especially in a global trade environment dominated

by rapidly evolving new technologies and processes and governed by free market forces. On a macro-economic level, there has been lack of policies to respond to the new free market economic environment. Over the last twenty years, no significant investments in research and development have taken place in the development of new products and processes aimed at promoting competitiveness of both the public and private enterprises, despite 80% of the economy having been in the hands of the former Zambia Industrial and Mining Corporation (ZIMCO).

1.2 The role of Science and Technology in National Development

In Zambia Science and Technology work is carried out largely by the National Council for Scientific Research (NCSR), University of Zambia (UNZA), line Ministries principally, Agriculture Food and Fisheries, Environment and Natural Resources, Mines and Minerals Development and Health and with funding predominantly from Government. Despite this set up funding for research and development by both Government and private sector has, however, been limited and has greatly contributed to the poor performance of the application of Science and Technology in national development. Weak linkages between the Research System, Government and Industry is another contributing factor.

Apart from undertaking physical research NCSR has the mandate by an Act of Parliament (Chapter 236 of the Laws of Zambia) to advise Government on research policy, co-ordinate, promote and direct scientific research activities in the country.

Since the inception of such institutions, significant work has been undertaken and good results obtained such as the production of Tip Top drink from locally grown guava fruit, ceramics products, clay stoves, and various products of appropriate technology such as dehullers, pumps, oil presses, shellers, wind pumps etc.

These new products and processes demonstrate the power of Science and Technology and significant technological capabilities of scientists and engineers and the potential of such groups to contribute to economic and industrial development particularly in creating jobs for small scale farmers, transporters and manufacturers.

Unfortunately, very few of these products and processes have been successfully transferred for commercial exploitation. The lesson to learn is that Science and Technology is not just to support research and development but more about fostering linkages between research, manufacturing and marketing strategies through well co-ordinated

institutional arrangements and promoting culture for realization of the benefits of Science and Technology.

For Science and Technology to be relevant and appreciated in Zambia, policies should focus on the development of the *key sectors* that contribute to national development and creation of wealth.

In view of the above, the Government of the Republic of Zambia has realized that a sustainable social-economic development can only be achieved through a strong, well co-ordinated and monitored Science and Technology System. Consequently, the Ministry of Science, Technology and Vocational Training (M.S.T.V.T.), has decided to formulate a National Policy on Science and Technology. The Department of Science and Technology (DST) has therefore been created within the M.S.T.V.T to carry out the functions of Developing, Promoting and Monitoring Science and Technology policies in Zambia.

1.3 Constraints on Science and Technology in Zambia

Science and Technology in Zambia has been constrained by lack of national Science and Technology Policy since independence in 1964. This lack of national policy has resulted in the following:-

- (i) Poorly co-ordinated Science and Technology System
- (ii) Under popularisation of Science and Technology in the community.
- (iii) Rigidity in the Education System.
- (iv) Restricted Cultural System.
- (v) Poor Information and database in the Science and Technology System.

2 MISSION STATEMENT

The Mission of the Science and Technology Policy is to promote and exploit science and technology as an instrument for developing an environmentally friendly indigenous technological capacity for sustainable socio-economic development in order to improve the quality of life in Zambia.

2.1 Principles for the Development of Science and Technology

The Science and Technology System in Zambia is intended to serve individuals', social and economic well-being and to enhance the utilization of abundant natural resources to enhance and improve the quality of the Zambian Community.

This will be achieved through liberalization and autonomisation of research institutions, promotion of individual initiative, partnership and to encourage market-demand driven research and development.

2.2 The Goals of the Science and Technology Policy

The goals of the Science and Technology Policy are:-

- (i) To enhance linkages between technology research institutes, the private as well as the public sector in order to encourage demand-driven research and development.
- (ii) To develop and sustain a national scientific and technological capacity and provide highly skilled human resource for increased productivity in the economy.
- (iii) To foster national and international linkages for enhanced technology transfer.
- (iv) To facilitate the acquisition, adaptation and utilization of foreign technology.

3 GENERAL POLICY OBJECTIVE AND STRATEGIES

3.1 Policy Objective

The broad Government policy objective for Science and Technology is to embed Science and Technology as part of the culture of the key sectors to promote competitiveness in the production of a wider range of quality goods and services.

3.2 Strategies

Strategies for the policy shall involve both Government and the private sector, working to complement each other, to ensure that Zambia provides and sharpens technical skills required in the promotion of competitiveness of the *key sectors*, and takes advantages of the vast natural resources potential for harnessing further the industrialization process, through, among others:-

- (i) Gender concerns in Science and Technology.
- (ii) Research and Development.
- (iii) Promotion, diffusion, transfer, and commercialisation.
- (iv) Standardization, quality assurance and environmental protection.
- (v) Development of appropriate skills.
- (vi) Gathering and dissemination of information.
- (vii) Cultural and public awareness.
- (viii) Institutional and Legal Framework.
- (ix) Mechanism for funding.

4 GENDER CONCERNS IN SCIENCE AND TECHNOLOGY

4.1 Rationale

Gender issues in science and technology are increasingly a focus of concern in Zambia. The participation of women in the area of science and technology has lagged behind that of men. Thus a gender sensitive Science and Technology Policy is important if both men and women are to participate effectively in the development and implementation of the Science and Technology programmes.

4.2 Objectives

- (i) Ensure that gender concerns are integrated at all levels of the Science and Technology development process.
- (ii) Increase the numbers of girls who take up science and technological subjects at all levels of learning.
- (iii) Identify and eliminate factors that prevent females from progressing and excelling in science subjects.

4.3 Measures

- (i) Review the school and college curricula on science and technology to make it gender sensitive.
- (ii) Establish special funds and scholarships to be used for awarding females for their education in the science and technical fields.
- (iii) Promote science and technology subjects in girls schools by making the subjects compulsory.
- (iv) Establish and/or strengthen career counseling programmes to address problems which hinder girls progression in Science and Technology.
- (v) Provide incentives to female teachers in science and technology.

5 RESEARCH AND DEVELOPMENT (R&D)

5.1 Rationale

There is insufficient orientation among R and D to serving the needs of the clients. As a result industrial stake holders are rarely told about the developed technologies. Research and development should be geared towards generation, acquisition, application and dissemination of knowledge and results for enhancement of national development. Science and Technology can open new horizons, however, research and development is effective when it is driven by market forces.

5.2 Objectives

- (i) Ensure that research is guided by national development goals and is predominantly in direct support of investment by and in the key sectors.
- (ii) Ensure utilization of applied research in the fields of industry, agriculture, engineering and manufacturing design, medicine and mining.
- (iii) As need arises in specific areas, conduct basic research to generate knowledge to harness unique resources and opportunities.
- (iv) Choose broad and directors for investment for public Research and Development to focus on key areas and create critical mass.

5.3 Measures

5.3.1 General

- (v) Ensure the public sector research institutes conduct predominantly demand-driven, and client-oriented research and development work. This should be driven by the needs of the key sectors and geared towards ensuring competitiveness, efficiency and innovation of commercial products.
- (vi) Ensure interaction with existing industries, especially small and medium scale ones to assist with process technology selection and product design.

- (iii) Strive to promote industrial private sector research and development especially in larger companies where it is cost effective.
- (iv) Create incentives in the form of tax allowances and rebates that will promote active participation in research and development by the public sector.
- (v) Restructure and rationalize existing laboratories in the public sectors into autonomous research institutes under the auspices of the Science and Technology Council.
- (vi) Establish a mechanism for access to technology in the public domain to take advantage of utilizing technologies which have not been patented and whose industrial property rights have expired.
- (vii) Establish a national Petty Patent System for locally developed intermediate technologies.
- (viii) Provide up-to-date and efficient scientific information system involving libraries, documentation centre, computer systems etc as vital tools and components in strengthening the country's capability to transfer technology and commercialise technological innovations.
- (ix) Develop research and training and capacity building in new and emerging technologies.

5.3.2 Specific

5.3.2.1 Industrial Research

- (i) Creation of technologies, products and processes for the key sectors.
- (ii) Strengthening the laboratories with additional equipment.
- (iii) Focusing on identification and characterization of locally available raw materials for industrial purpose.
- (iv) Reviewing existing standards to promote the use of industrial local raw materials.
- (v) And Others

5.3.2.2 Engineering and Manufacturing Design

- (i) Create and/or strengthen several new centres including the Technical and Development Advisory Unit (TDAU) to act as a national centre for design/manufacturing of prototypes, products and processes especially for small and medium scale industries in the formal and informal sector.
- (ii) Offer advice in quality control and efficient production techniques to small and medium scale industries in key sectors.
- (iii) Provide testing and monitoring facilities for various equipment aimed at evaluating their performance.
- (iv) Facilitate and encourage private sector product and process development where it is cost effective.

5.3.2.3 Agriculture Research

- (i) Provide a high quality appropriate and cost effect services to farmers, generating and adapting crop and livestock technologies, which increase agricultural productivity and diversity production. This includes the development of low cost sustainable farming systems for all major agro-ecological zones and farm sizes in Zambia through participation of both public and private sector in research activities.
- (ii) Strengthening demand driven adaptive research; multiplication and distribution of planting materials of major food security crops.
- (iii) Strengthening research/extension/farmer linkages.
- (iv) Strengthening research capabilities and capacity for livestock research in diseases, husbandry practices, breeding and nutrition in order to address the livestock constraint of small-scale farmers.

5.3.2.4 Health and Medical Research

- (i) Ensure that research priorities are geared to generating information intended to solve health and nutritional problems.

- (ii) Ensure research capabilities and capacities of institutions carrying out health research are strengthened.
- (iii) Relate the research programmes to the priority problems in the health sector.
- (iv) Establish effective linkages between research institutions on one hand, and users on the other.
- (v) Establish an effective health data bank for research results and mechanisms for their utilization.

5.3.2.5 Social Cultural Research

- (i) To carry out a cultural analysis in order to estimate the value of cultural heritage. This will involve an understanding of historic, scientific, social and economic values of different groups of the Zambian people.
- (ii) To determine actions to be taken in order to protect such cultural values identified in (i) when any scientific or technological activity is initiated in the community.
- (iii) To carry out a social analysis in order to determine priorities of the economically disadvantaged Zambian people, so that such priorities are considered when initiating scientific and technological research.

5.3.2.6 Information Technology Research

- (i) Carry out studies on information needs of industry including those of small-scale industrial enterprises; microelectronic hardware and software; and innovative microelectronic applications in priority areas.
- (ii) Develop a strategy for the development of information systems and databases in government departments and public institutions.
- (iii) Carry out national surveys on resources such as equipment labour, administrative, managerial and entrepreneurial skills with respect to Information Technology.

6 TECHNOLOGY DIFFUSION, TRANSFER, INNOVATION AND COMMERCIALIZATION

6.1 Rationale

Zambia has lagged behind in technological advancement, which is generally enhanced by improved diffusion, transfer, innovation and commercialisation processes. It is essential to stimulate commercial innovation of technology in Zambia. In addition a whole range of incentives and support are required to ensure the transfer, diffusion, commercialisation and innovation of new technologies in the key sectors.

6.2 Objective

Establish a mechanism for promotion, diffusion and commercialization of indigenously developed and other technologies especially for the small and medium scale industries through the provision of fiscal and other regulatory measures.

6.3 Measures

6.3.1 General

- (i) Promote through the provision of favourable legal instruments and incentives such as tax rebates, regulations, etc., to enterprises using local technological know-how, licensing arrangements and mastering and reproduction.
- (ii) Facilitate investment in pilot plants, processes demonstration and proto-type development to enable rapid commercial exploitation of technologies, which are developed in the country.
- (iii) Provide incentives to promote innovation / invention.
- (iv) Ensure that intellectual property rights and legal frameworks are adequate to promote research and development and commercialisation in new technologies.

6.3.2 Specific

6.3.2.1 Junior Engineering, Technicians and Scientists (JETS)

To support and facilitate the efforts of JETS in order to:-

- (i) Popularise science and technology among all school pupils.
- (ii) Help pupils get a better foundation to meet the demands of higher-level education and training in science and technology.
- (iii) Give pupils an opportunity to learn and apply scientific principles in the design and construction of technical projects.
- (iv) Help pupils to learn how to do research work leading to the preparation and presentation of technical reports.
- (v) Assist pupils to discover and appraise their own abilities, aptitudes and interests.
- (vi) Provide to the pupils a preview of engineering, technology and other sciences and an acquaintance with those in the field.
- (vii) Assist pupils to be aware of opportunities for careers in engineering, the sciences and related technical fields in the public and private sectors of the economy.

5.3.2.2 Petty patents and trademarks

Create a National Petty Patent Mechanism through which utility certification will be granted in order to:

- (i) Help protect traditional innovations not covered by the Patent System and usually displaced by new technologies.
- (ii) Enable local innovations to improve their technologies so as to be protected and enable them play a more significant role in the key sectors.

7 STANDARDIZATION, QUALITY ASSURANCE AND ENVIRONMENTAL PROTECTION

7.1 Rationale

Development of a technology or a product does not always ensure that it is a *good* quality, meets required specification and is environmentally friendly. Hence as more technologies, products and processes become available from local foreign sources, there is need for standards and quality control of such products. Equally there is need for technologies and processes in use to be free from pollutants and other harmful substances, which damage the environment.

7.2 Objective

Ensure facilities are made available to formulate and enforce standards and understand quality assurance testing and assessment of industrial products emanating from technologies and processes in use in the country, as well as, industrial pollution at source and in operation.

7.3 Measures

- (i) Strengthen institutions responsible for standardization, quality assurance, environmental protection such as the Zambia Bureau of Standards (ZABS), Food and Drug Board (FDB) and the Environmental Council of Zambia (ECZ) with human and financial resources to enable them to formulate and enforce standards and to set up infrastructure needed for quality control testing of industrial products from technologies and processes from local source and abroad.
- (ii) Review and ensure that the Standards Act is effectively implemented.
- (iii) Ensure that industries operate in accordance with the legal provision of the Environmental Protection and Pollution Control Act.

8 DEVELOPMENT OF APPROPRIATE SKILLS

8.1 Rationale

The skills that people acquire through training equip them to make a positive impact on the development of non-human resource, thereby leading to increase in the country's wealth. Basic orientation in Science and Technology require training, which imparts practical skills and application of knowledge to develop prototypes, products and processes in a changing environment of labour market technology.

8.2 Objectives

- (i) Provide students at primary, secondary and technical colleges with broad based curricula with adequate scientific knowledge and skills so as to diversify and lead into practical and applied work in the future.
- (ii) Produce at the tertiary level very high quality scientists and engineers who are not only well grounded in theory and practice but learn about entrepreneurship and the nature and power of science and technology to competitiveness of business.
- (iii) Strengthen community-based research to generate appropriate technology that will improve the quality of life of Zambians.
- (iv) Provide survival skills to school dropouts, and those who have never been to school.

8.3 Measures

- (i) Support education and training systems that produce skills useful to the labour market and those required to enter the productive sector on a self-employment basis.
- (ii) Impart supportive production oriented, basic business and entrepreneurship skills through development and strengthening of existing programmes.
- (iii) Develop courses in technical entrepreneurship and management of technology for science and engineering students, and dynamics and power of science and technology for business

profitability and national development for business management and political science administration students, respectively.

- (iv) Train university and college lecturers in the subject matter mentioned in (iii) above to enable delivery of such courses.
- (v) Strengthen the teaching and application of design and manufacturing capacity.
- (vi) To review the school, college and university curricula on science and technology to make it gender sensitive.
- (vii) Strengthen existing and increase the number of special secondary schools and tertiary institutions for science, mathematics and technical education.

9 GATHERING AND DISSEMINATION OF INFORMATION

9.1 Rationale

Easy access and availability of information on technologies, financing, markets, suppliers, regulators, designs and processes, which is crucial to the persons involved in production of goods and services, is very poor in Zambia. Such information must be gathered in a comprehensive manner and must be disseminated effectively. Availability and convenient access to scientific and technological information require the establishment of a comprehensive data bank, which is easily accessible at strategic locations by scientific, managerial and industrial users.

9.2 Objectives

To ensure that accurate and up to date information from local and international sources on manpower, research and development activities, markets and publications which are essential for progressive and competitive industrial production are readily accessible to various users.

9.3 Measures

- (i) Establish a comprehensive data bank with essential elements for data collection, storage, retrieval and dissemination.

- (ii) Establish computer and telecommunication facilities to facilitate data retrieval at various strategic locations in the country.
- (iii) Establish the Science and Technology Information Service Centre.

10 CULTURAL AND PUBLIC AWARENESS

10.1 Rationale

There is a general lack of appreciation of the importance of Science and Technology in the development of a country. Therefore, there is need to shape the culture of the Zambian society into realizing and appreciating the importance of Science and Technology in enhancing economic development in the key sectors.

10.2 Objective

Provide attractive incentives and high targeted promotions on the importance of Science and Technology to economic development in the key sectors.

10.3 Measures

- (i) Provide motivation and incentives to scientists and engineers through improved conditions of service and working environment, and provide for satisfaction of the scientific community.
- (ii) Utilize as far as possible available local scientific and technological personnel for consultancy where such expertise is available.
- (iii) Award design, manufacturing, building and construction tender to local firms where expertise is available to encourage and promote the development of local technological capability.
- (iv) Establish a special fund to be used for awarding individual scientists/engineers or institutions in recognition of their achievements in the application of Science and Technology to economic development.

- (v) Utilize the tremendous potential of women in development activities in general and in particular the importance of involving women in the promotion and utilization of Science and Technology.
- (vi) Popularise Science and Technology through science fairs, exhibitions, and JETS activities to inculcate scientific and technological culture, and through the mass media particularly films, newspapers, radios and televisions in the dissemination and promotion of scientific and technological knowledge, as well as enhancing general education of both youth and adults.
- (vii) Encourage and support professional associations aimed at achieving interactions in the exchange of scientific information and enhance excellence in scientific and technological fields.
- (viii) Contract out services requirements to the private sector as much as possible.

11 INSTITUTIONAL AND LEGAL FRAMEWORK

11.1 Rationale

The NCSR which was created through an Act of Parliament (Chapter 236 of the Laws of Zambia) has been carrying out both the advisory functions and research activities in Zambia. However, one of the critiques of the NCSR is that it has failed because of weakness in its statutory linkages with other research institutions in the Country.

In this regard, the National Council for Scientific Research Act will be repealed and a new one enacted to separate advice, formulation, coordination and direction roles from physical laboratories into the proposed Science and Technology Council and creation of autonomous research institutes for industrial, agriculture, technology development and medical research. To provide the link between Research System and the productive sector, a Technology Business Centre will be created under the auspices of the Science and Technology Council. On the Government side, Department of Science and Technology in the Ministry of Science, Technology and Vocational Training will be strengthened and Cabinet and Parliament committees created.

11.2 Legislation Reform

There is need to repeal the National Council for Scientific Research Act (Chapter 236 of the Laws of Zambia) and create a new Act for the implementation of the establishment of Science and Technology Council and provision of incentives for promotion of research and development for industrial development. The Legislation reform shall consider, among other things, the following:-

- (i) Repeal the NCSR Act and create a new Act to establish the Science and Technology Council, Research Institutes and the Technology Business Centre.
- (ii) Enact new laws to establish the Science and Technology Development Fund and Venture Capital Fund for supporting technology-oriented business.
- (iii) Introduce tax breaks and incentives for spending money on research and development and commercialisation. Also consider the same for the following and taking into account ranking of incentives as follows:-
 - (a) Locally designed, innovation and manufactured technologies, processes and products (high rating).
 - (b) Licensing with local inputs (medium high).
 - (c) Licensing with important inputs (medium low).
 - (d) Direct input of technologies and processes and turn-key projects (low rating).

11.3 Institutional Arrangements

11.3.1 Rationale

The Research System, Government and key sectors are so isolated from each other, that there is need to bring them into closer contact to discover, analyse and resolve national problems and opportunities relating to the development of the key sectors through Science and Technology.

11.3.2 Objective

To create strong science and technology institutions, polices and health links among research institutions, Government and the key sectors in order to achieve overall national development.

11.3.3 Measures

- (i) Establish an action oriented Science and Technology Council to link government and the key sectors, coordinate research and disburse funds.
- (ii) Restructure and rationalize existing research laboratories and technology service organizations into autonomous research institutes covering vital areas of national interests.
- (iii) Establish autonomous Technology Business Centre under the auspices of the Science and Technology Council for entrepreneurship development and offer opportunities for laboratories and universities to sell science and technology results that are not being realized because the researchers and designers are not aware of specific industrial needs. In addition, there are many technically skilled people who are leaving universities, technical colleges, and employment due to retrenchment, who would like to start businesses, but do not have access to necessary technical and production skills, which the Centre can provide.
- (iv) Establishment of the Department of Science and Technology in the Ministry responsible for Science and Technology.
- (v) Establish a Cabinet responsible for Science and Technology to raise the profile of Science and Technology in decision-making.
- (vi) Establish a position of Advisor to the President on Science and Technology.
- (vii) Establish a Parliamentary Committee to monitor the performance of Science and Technology Policies and programmes.

11.4 Functions and Composition of Governance Systems of proposed institutions

11.4.1 Science and Technology Council

11.4.1.1 Functions

- (i) Regulate research in the country.
- (ii) Advise Government on Science and Technology policies and activities in Zambia
- (iii) Set broad directions, stimulate coordination and initiate special projects which others will execute under contract.
- (iv) Provide an independent forum linking Government, industry and research system to investigate, promote and publicize national broad priorities in Science and Technology for national development.
- (v) Resource (financial, human etc) mobilization and utilization in key sectors.
- (vi) Recommend the establishment of any new research institutes which it may deem necessary.
- (vii) Collect and disseminate Science and Technology information including publication of scientific reports, journals and other such documents and literature.
- (viii) Sponsor such national and international scientific and technological conferences as it may deem necessary.
- (ix) Establish and maintain relationship with corresponding scientific organizations in other countries.

- (x) Receive annual reports from all public Science and Technology agencies.
- (xi) Mobilize and distribute Science and Technology funds.
- (xii) Identify and determine national Research and Development priorities.

11.4.1.2 Governance

- (i) The Council shall have a Chief Executive and permanent staff of core expertise in key sectors.
- (ii) The Council shall consist of members who shall be drawn from relevant fields and stakeholders.
- (iii) There shall also be advisory committees in relevant fields.

11.4.2 Department of Science and Technology (DST)

11.4.2.1 Functions

- (i) Develop. Monitor and promote Science and Technology policies within and outside Government.
- (ii) Carry out technology impact assessment.
- (iii) Receive annual Budget for the Science and Technology System.
- (iv) Ensure enforcement of Science and Technology regulations.
- (v) Assist Cabinet and Parliament Committee on all issues of Science and Technology.
- (vi) Stipulate activities for the promotion and popularisation and advancement of Science and Technology.
- (vii) Encourage training of research personnel through bursaries and sponsorship.

- (viii) Discover, analyse and provide policy advice to resolve national problems relating to production sector through science and technology in a timely manner.

11.4.3 Research Institutes

There shall be established a Research Board for each Research Institute whose membership shall consist of not more than eight members who shall be qualified persons in matters relating to research activities of the institute and Permanent Secretaries of responsible participating Ministries and their industrial clients. The Chairperson shall be elected from among the Board members for a prescribed period.

11.4.3.1 Functions

- (i) Conduct research and development in identified key areas of national development
- (ii) Disseminate research findings.
- (iii) Liaise with other research bodies within and outside Zambia.
- (iv) Review research activities in areas of competence.
- (v) Receive and raise funds for research in identified key areas.
- (vi) Establish and maintain relationships with corresponding scientific institutions in other countries.

11.4.4 Technology Business Centre (TBC)

11.4.4.1 Functions

- (i) Facilitate acquisition of technology to entrepreneurs to help them set up their own business.
- (ii) Assist Research Institutes including universities and technical colleges and make links with

industry clients to sell the Research Institutes research expertise and prototypes on the shelf on their behalf.

- (iii) Provide advisory service in Engineering and process design that will accompany the marketing work and to assist prototype work to go into industrial production.
- (iv) Act as liaison institution by promoting linkages among researchers, bankers and businessmen on the issue of new technology-based development; and
- (v) Evaluate relevance of imported technology and asses its environmental impact.

11.4.5 Cabinet Committee on Science and Technology

There shall be a Science and Technology Committee of Cabinet which will carry out the following functions:-

- (i) Advise the Government on policies, programmes and activities in Science and Technology
- (ii) Harmonise Government policies that pertain to Science and Technology in industry, trade and commerce and environment.

11.4.6 Parliamentary Committee responsible for Science and Technology

There shall be a Parliamentary Committee responsible for Science and Technology. It's functions shall be:-

- (i) To monitor the performance of implementation of Science and Technology policies, programmes and activities.
- (ii) To sensitise members of parliament on the important of Science and Technology in national development.

12 REGIONAL AND INTERNATIONAL COOPERATION IN SCIENCE AND TECHNOLOGY

The development of Science and Technology in any country has both national and international perspective, which derive from universality and dynamism of scientific and technological knowledge, irrespective of national boundaries.

In this regard, Zambia shall support and seek co-operation with regional and international organizations in the promotion of Science and Technology; in particular, the country will utilize the United Nations system (e.g. UNCTAD, UNIDO, UNESCO, UNDP, ECA, WIPO, IAEA, etc) and other national or international and /or regional organizations to strengthen her scientific and technological capability.

Through sub-regional and regional co-operation, the Government shall encourage establishment of institutions or associations to handle multinational and complex national projects.

13 MECHANISM FOR FUNDING OR SCIENTIFIC AND TECHNOLOGICAL RESEARCH AND DEVELOPMENT

13.1 Rationale

Success for implementation of the Science and Technology Policy depends not only on the adequate allocation of financial resources for research and development and other activities but also for the development and expansion of small, new technology oriented business ventures. Hence the need to develop a funding mechanism for both scientific and technological research and development, which shall facilitate the development and promotion of appropriate technology.

13.2 Source of funding

The following sources of financing are recommended.

13.2.1 Allocation of Minimum percentage of GDP to Science and Technology activities

Allocate 3% of the GDP to scientific and Technological activities.

13.2.2 Operational Funding

Operational funding for routine function of the public Science and Technology System shall be disbursed by the Council through the Ministry responsible for Science and Technology

13.2.3 Science and Technology Development Fund

In order to encourage special initiatives in the Research and Development and commercialisation of technologies a Science and Technology Fund shall be created. The fund will get contributions not only from the Government but also, from other public and private institutions, including donor community and individuals, and especially the users of research findings such as public and private industrial firms. Contributions from major public and private enterprises engaged in production activities shall be in the form of pre-determined levy on gross income/turnover or profit. The Science and Technology Council will allocate this funding to National Science and Technology Systems under the direction of an industry led Board of Directors.

13.2.4 Internal Generation

Internal generation of funds by the public sector institutions through charging of commercial rates for offer of services rendered in a market driven research and development approach. For the private sector, input in research and development should receive duty and tax incentives.

13.2.5 Venture Capital

Creation of Technology Venture Capital Fund by the private sector shall be facilitated for the promotion of small and new technology oriented business ventures formed by technical entrepreneurs who have no collateral demanded by commercial banks. The fund shall be constituted from various different sources within and outside Zambia such as capital potential available in pension and insurance funds.