

Message from the Hon. Minister of Science, Technology and Research

National Research and Development Framework is a comprehensive document that provides helpful guidance to scientists and technologists to align their research and development activities towards the national development agenda of the country. This is a result of hard work carried out by the National Science and Technology Commission (NASTEC), the policy formulation arm of the Ministry of Science, Technology and Research.

Working in collaboration with a large group of leading experts in the field of S&T and other stakeholders, NASTEC has identified ten focus areas that require immediate attention of the S and T community along with ten forms of interventions to address issues and problems associated with those. It is expected that the Framework will pave the way for the enhancement of quality of life of the people and enhancement of economic development of the country.

I wish to take this opportunity to congratulate and thank NASTEC for successfully completing this important endeavor which involved comprehensive consultative process of stake holders coming from a multitude of disciplines. I am also grateful to all experts who provided their intellectual inputs in formulation of the Framework and staff of the Ministry of Science, Technology and Research for their continuous support towards its successful completion.

Susil Premjayanth (M.P.)

Minister of Science, Technology and Research

1st March 2016

Foreword

National Science and Technology Commission (NASTEC) acting on the directions of the Ministry of Science, Technology and Research has formulated a Research and Development Framework for the purpose of aligning Science and Technology (S & T) activities of the country towards its national development agenda. It is envisaged that the Framework will pave the way for development of a knowledge economy in Sri Lanka, which will be driven by science, technology and innovations.

The framework has been formulated through a wide consultative process for which a large section of the S & T community of the country gave their valuable inputs. It has also been presented to social scientists, professionals and to the business circles and their suggestions have been incorporated in an appropriate manner. The framework received the blessings of over 400 leading scientists, technologists and administrators who participated at the Seventh Sri Lanka Biennial Conference on Science and Technology (BICOST-VII) held on 7th July 2014. It was further refined by NASTEC since then and is now ready to be adopted at national level.

The formulation of the framework commenced with the identification of focus areas that need immediate R & D interventions and identification of such interventions that may be made on the identified focus areas. Altogether ten focus areas and ten interventions have been identified forming a 10 x 10 matrix of hundred possible combinations. A detailed study of the focus areas have been carried out by ten expert groups appointed for this purpose. They have identified sub-areas of each focus area, problems and issues associated with each sub area along with R & D interventions that should be made in order to address those problems.

I would like to thank the present Minister of Science, Technology and Research Hon. Susil Premjayanth for the support and encouragement given for the successful completion of the Framework. The importance of having a Science and Technology Framework was first mooted by the then Minister of Technology and Research, Hon. Patalie Champika Ranawaka. The Framework was initiated and the bulk of its work was completed during his tenure. I am grateful to him for the initial conceptualization of the idea, important suggestions made and continuous encouragement given to improve the quality of the Framework. Valuable support given by the Secretary of the Ministry Mrs. R. Wijjaludchumi, former Secretary to the Ministry, Mrs. Dhara Wijayatilake, all the officials of the Ministry and Mr. Asoka Abeygunawardana, Advisor to the former Minister in successful completion of the framework is greatly appreciated.

Bulk of the formulation of the Framework was carried out by the members of the ten expert groups appointed to carry out detailed studies on each focus area. I would like to gratefully acknowledge the hard work carried out by them and other stake holders who took part in brain storming sessions.

Finally I would like to thank the members of the National Science and Technology Commission for the unstinted support given and the dedicated staff of the NASTEC secretariat lead by its able Director, Dr. Muditha Liyanagedera, without their commitment the completion of the formulation of the Framework would not have been a reality.

Prof. Dhammika A. Tantrigoda

Chairman, National Science and Technology Commission

1st March 2016

Executive Summary

Many countries in the world including those in the Asian region such as India and China have made enormous strides in national development through timely and appropriate interventions of Research and Development (R & D). Sri Lanka having realized the important role that R & D activities can play in the development of its economy, formulated a medium term Research and Development Framework. National Science and Technology Commission (NASTEC) working under the instructions of the Ministry of Science, Technology and Research has given the leadership in this endeavor.

Main objectives of the framework are;

- (1) Enhancing the quality of life of the people of the country,
- (2) Enhancing the economic development of the country,
- (3) Laying the foundation for Sri Lanka to become scientifically and technologically advanced nation while preserving its Environment.

The framework has been formulated through a wide consultative process for which a large section of the S & T community of the country gave their valuable inputs. It has been also presented to social scientists, professionals and to the business circles and their suggestions have been incorporated in an appropriate manner. The formulation process commenced with the identification of areas, focus areas, that need immediate R & D interventions and identification of appropriate interventions that may be made on the identified focus areas.

The ten focus areas identified are;

- (1) Water
- (2) Food, Agriculture and Nutrition
- (3) Health
- (4) Shelter
- (5) Environment
- (6) Energy
- (7) Mineral Resources
- (8) Apparel Industry
- (9) ICT and Knowledge Services
- (10) Basic Sciences, Emerging Technologies and Indigenous Knowledge.

As can be seen, the first five focus areas are aimed at social well-being of the people while the remaining five areas are aimed at the economic development of the country.

Water has been selected as the first focus area in view of several water related problems confronted by the country such as adverse effects due to water pollution, water borne diseases including chronic kidney disease of unknown etiology and lack of sufficient water for agricultural purposes in spite of the availability of extensive cascade tank systems. Agriculture sector has been considered as of utmost importance as it contributes approximately 11% to the Gross Domestic Product (GDP) and more than 70% of the population in rural areas in Sri Lanka depends on agriculture. However, this sector is not without issues. Fragmented agricultural lands, high cost of inputs, labour shortages are discussed among other issues and suitable interventions to overcome those issues are proposed here. Aspects relevant to Food security, food safety and nutrition are also discussed under the Focus Area 2 on Food, Nutrition and Agriculture.

Although Sri Lanka has taken a place well above the other countries in South Asia in important health indicators, Non Communicable Diseases (NCDs) such as diabetes, cancer, ischemic heart disease and chronic kidney disease are on the rising tide. Need to address the high burden of NCDs as well as control and management of vector-borne diseases and re-emerging tropical diseases such as Denghu are discussed at length. Special attention has been paid to exploit the potential of readily available indigenous knowledge and herbal resources to develop drugs.

Access to shelter is considered as a basic human right by the United Nations Organization. Furthermore, it is an essential requirement to enhance the health, wellbeing and productivity of human beings. However, Sri Lanka faces many issues in providing shelter to all its citizens. Shelter should be considered as a process where it is an integral part of human settlement and also as a product where it serves to satisfy a need. Participation of target communities in housing projects for low income groups and popularization of low cost building materials and cost effective technologies need proper attention in planning human settlements and providing housing facilities.

Environmental issues are ever increasing due to human activities that are far from being environmentally friendly. Climate changes that invoke natural disasters required to be predicted in order to mitigate their impacts. Waste management including its new forms such as e-waste and nuclear waste needed to be planned properly before their effects become irreversible. Immediate necessity of going into environmental friendly renewable energy sources and implementation of demand side management programs have been emphasized under the focus area of Energy.

Textile and Apparel industry has been considered as one of the focus areas as it is the largest employment provider in industrial sector while being the country's main export earner (38% of the total export earnings). The sector provides over 300,000 direct employment and 600,000 indirect employment opportunities. At present this industry faces many challenges such as increasing labour cost and trade barriers. The changes in competitive advantage has compelled to seek new strategies to be adopted into this sector.

Development of ICT and Knowledge services have been encouraged as a strategy of earning valuable foreign exchange and opening doors of the information society to the masses. Investment on emerging technologies such as; nanotechnology, biotechnology, sensor technology, robotics and microelectronics have also been encouraged with the intension making Sri Lanka a technologically advanced country in the future. Under the focus area of Minerals, reconnaissance airborne geophysical surveys over the land as well as contiguous sea areas to assess the mineral availability, value addition to available minerals and development of products using them have been recommended. In the tenth focus area, basic Sciences have been emphasized as basic sciences and

technology are interwoven in an inseparable manner. Basic sciences of today will give birth to tomorrows' technology and also provide nourishment for its later development.

The ten interventions that have been proposed are;

- (1) Policy Formulation
- (2) Pure and Applied Research
- (3) Promotion of Innovation
- (4) Application of Nanotechnology
- (5) Application of Biotechnology
- (6) Application of Indigenous Knowledge
- (7) Testing, Standardization & Accreditation and Assurance of Intellectual Property Rights (IPR)
- (8) Capacity Building
- (9) Application of Information Communication Technologies (ICT)
- (10) Popularization

Ten focus areas and ten interventions form a 10 x 10 matrix of hundred possible combinations. A detailed study of the focus areas have been carried out by ten expert groups appointed for this purpose and have identified sub-areas of each focus area, problems and issues associated with each sub-area and R & D interventions that should be made in order to address those problems.

It is expected that this framework will provide useful guidance for the S&T community, policy makers and administrators of the country in planning their R&D activities, policy formulation and decision making.

