NATIONAL POLICY ON SCIENCE, TECHNOLOGY & INNOVATION (NPSTI)

2013 - 2020

Harnessing STI for Socio-Economic Transformation and Inclusive Growth

July 2013

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List of Abbreviations

EPPs	Entry Point Projects
ETP	Economic Transformation Programme
GDP	Gross Domestic Product
GERD	Gross Expenditure on R,D&C
ICT	Information and Communication Technology
IHLs	Institutions of Higher Learning
IMD	International Institute for Management Development
MASTIC	Malaysian Science and Technology Information Centre
MOSTI	Ministry of Science, Technology and Innovation
NEM	New Economic Model
NKEAs	National Key Economic Areas
NPSTI	National Policy on Science, Technology and Innovation
PRIs	Public Research Institutes
R,D&C	Research, Development and Commercialisation
RIs	Research Institutes
SMEs	Small and Medium-sized Enterprises
SOPs	Standard Operating Procedures
SRIs	Strategic Reform Initiatives
STI	Science, Technology and Innovation

CHAPTER 1: INTRODUCTION

1.1 Background

Malaysia has an overarching goal of becoming a developed nation that is inclusive and sustainable by the year 2020 with a society that is stable, peaceful, cohesive and resilient. A central challenge towards the attainment of the nation's Vision 2020 goal is that of establishing a scientifically advanced and progressive society, one that is innovative and forward-looking, which is not only a consumer of technology but also a contributor to the scientific and technological civilisation of the future. This challenge underscores the important role of science, technology and innovation (STI), particularly in facing the rapid changes of a globalised and competitive world. Realising that STI are central to propel the socio-economic landscape of the nation, it is imperative that STI be strengthened and mainstreamed into all sectors and at all levels of national development agenda. STI should be pervasive and touch the lives of every Malaysian.

The commitment of Malaysia in harnessing, utilising and advancing Science and Technology is reflected with the formulation and implementation of the First National Science and Technology Policy (1986-1989), The Industrial Technology Development : A National Action Plan (1990-2001), and The Second National Science and Technology Policy and Plan of Action (2002 – 2010). The various initiatives and programmes that were implemented under these policies, including the enhancement of national capabilities and capacities of Research and Development (R&D), the forging of partnerships between public funded research organisations and industries, enhancement of commercialisation through National Innovation Model, and development of new knowledge-based industries, have accelerated the advancement of country's STI.

Moving ahead in an era fraught with uncertainties and intense global competition, business as usual approach will not work. Therefore, in 2009, the Government, through The New Economic Model (NEM), adopted new and bold initiatives to ensure the achievement of Vision 2020. NEM laid out a new course for Malaysia to realise our aspiration of becoming a high-income nation with an economy that is inclusive and sustainable. The broad directions of the NEM have been incorporated into the Tenth Malaysia Plan (2011-2015) and implemented through the Economic Transformation Programme (ETP) incorporating, among others, the 12 National Key Economic Areas and 6 Strategic Reform Initiatives (SRIs).

1.2 The need for STI Policy

Much has been achieved since the introduction of the NSTP 2 in 2003. In today's competitive and rapidly changing world, innovation has become a multi-institutional, multidisciplinary and a global endeavour. In 2012, Malaysia has become one of the top 15 most competitive economies in the world after ascended to 14th position (ranked 16th in 2011) in the World Competitiveness Yearbook (WCY) 2012 survey conducted by Institute for Management Development's (IMD). The country is now aiming to be among the top 10 most competitive economies globally by 2020.

In order to succeed, Malaysia has no choice but to innovate based on strong scientific fundamentals. In this regard, fostering strong and resilient partnerships, connectivity and inter-dependence amongst all sectors of the society is essential.

For Malaysia, the changing landscape has become a challenge, not only to government but also to industries, universities, research institutes, and the whole STI ecosystem. Therefore, the formulation of National Policy on Science, Technology and Innovation (NPSTI) that adopts an integrated and holistic approach is timely to respond to these challenges. Our past approaches, though have yielded some results, have not had the desired effect on the development of our home grown capabilities in STI.

This overarching STI policy is also crucial to harmonise and consolidate all of our STI activities and programmes. It is indeed an essential component that should be placed at the centre stage of all national development plans and strategies.

1.3 The National Policy on Science, Technology and Innovation

The new NPSTI describes an agenda to advance Malaysia towards a more competitive and competent nation built upon strong STI foundations. The policy is formulated based on the nation's achievements, challenges and lessons learnt. It charts new directions to guide the implementation of STI in creating a scientifically advanced nation for socio-economic transformation and inclusive growth.

The NPSTI is grounded on the following five fundamental foundations namely:

(i) STI for Policy;
(ii) Policy for STI;
(iii) Industry Commitment to STI;
(iv) STI Governance; and
(v) STI for a stable, peaceful, prosperous, cohesive and resilient society.

To ensure success and achievement, the above five foundations should embody the following six strategic thrusts:

(i) Advancing scientific and social research, development and commercialisation;
(ii) Developing, harnessing and intensifying talent;
(iii) Energising industries;
(iv) Transforming STI governance;
(v) Promoting and sensitising STI; and
(vi) Enhancing strategic international alliances.

CHAPTER 2: THE FRAMEWORK FOR THE NATIONAL POLICY ON SCIENCE, TECHNOLOGY AND INNOVATION (NPSTI)

The NPSTI framework focuses on the pivotal role of STI in the context of Government Transformation framework, knowledge-based economy, and other changing "rules of the game" to steer Malaysia towards a high income nation that is sustainable and inclusive. The thrusts and its strategies described in this policy are the driving forces of STI that will guide Malaysia's initiatives in achieving its vision.

2.1 Vision

A scientifically advanced nation for socio-economic transformation and inclusive growth

2.2 Mission

Advancing and mainstreaming STI at all levels and in all sectors

2.3 Strategic Thrusts

(i) Advancing scientific and social research, development and commercialisation;
(ii) Developing, harnessing and intensifying talent;
(iii) Energising industries;
(iv) Transforming STI governance;
(v) Promoting and sensitising STI; and
(vi) Enhancing strategic international alliances.

The above strategic thrusts are not mutually exclusive. They are, instead, inextricably linked. The success of one strategic thrust has ramifications on the others. Similarly, the failure of any of these strategic thrusts will have debilitating effects on the rest. The solid development of these strategic thrusts Malaysia will emerge as a healthier, prosperous, and greener country based on STI foundations imbued with strong ethical and humanistic values embedded within a resilient society.

2.4 Key Policy Foundations

The NPSTI endorses that STI is a powerful socio-economic instrument that will enhance the generation of knowledge, creation of wealth and societal well-being. This will be achieved through adoption of a holistic approach incorporating the following policy foundations:

(a) ***STI for Policy***

STI for policy is the most important foundation. It ensures that STI are mainstreamed into, embraced and implemented by, all ministries, agencies, private sectors and all relevant stakeholders. NPSTI embodies the needs of harnessing STI in the context of socio-economic transformation programme. It is based on the New Economic Model (NEM) and the ETP with the 6 strategic reform initiatives (SRIs), 12 national key economics areas (NKEAs) and 131 entry points projects (EPPs).

(b) ***Policy for STI***

In order to provide the supporting role as indicated above, the nation's STI capacity and capabilities should be enhanced in terms of institutions, mandates, management, personnel, funding and deliverables. The integral part of NPSTI deals with policies and strategies to enhance education and research for capacity building in the STI related areas through funding and grants, the transmission and diffusion of STI knowledge to the public sector, industry, and communities, the promotion of basic and market-driven research, as well as policies and strategies to promote inclusive STI towards inclusive growth.

(c) ***Industry commitment to STI***

Private sectors, including SMEs, are at the forefront of translating ideas into new or improved products, processes, services or solutions. They should be dynamic and robust to act as the driver of economic growth. However, the limitations of some of Malaysia's larger private sectors and SMEs in terms of technology and innovation are well known. To address this issue, we have to do things differently. NPSTI will help to strengthen STI capabilities for industry to play a more active role as envisioned in the government's Economic Transformation Programme (ETP). The industry will be re-energised and reinvigorated through various incentives and measures. Linkages and collaborations among the public and private sector, research organisations, and industry-specific research institutes must be further forged.

(d) ***STI governance***

A sound institutional and regulatory framework is central to an effective and well-functioning STI system. Since matters pertaining to STI transcend all ministries and involve the participation of various stakeholders such as civil servant, industry, academia and the community, issues pertaining to coordination, collaboration and harmonisation assume importance. NPSTI reinvigorates the nation's existing STI framework in order to enhance the execution of policies besides providing mechanisms to ensure commitment by all parties towards the development of STI in the country. It will help to overhaul our STI tracking system to ensure that it informs policy makers on the performance of the STI programmes.

In addition, the innovative potential of the public service, including the policy makers and implementers should be harnessed to ensure a more efficient and effective delivery system. In line with the demands required to become a high-income economy, the public delivery system should be further improved. The principles of sound public sector governance should be adopted. In this context, STI governance will be embedded in the system and norm of public sector taking into consideration an internationally accepted principles of public sector governance as stipulated in the NEM.

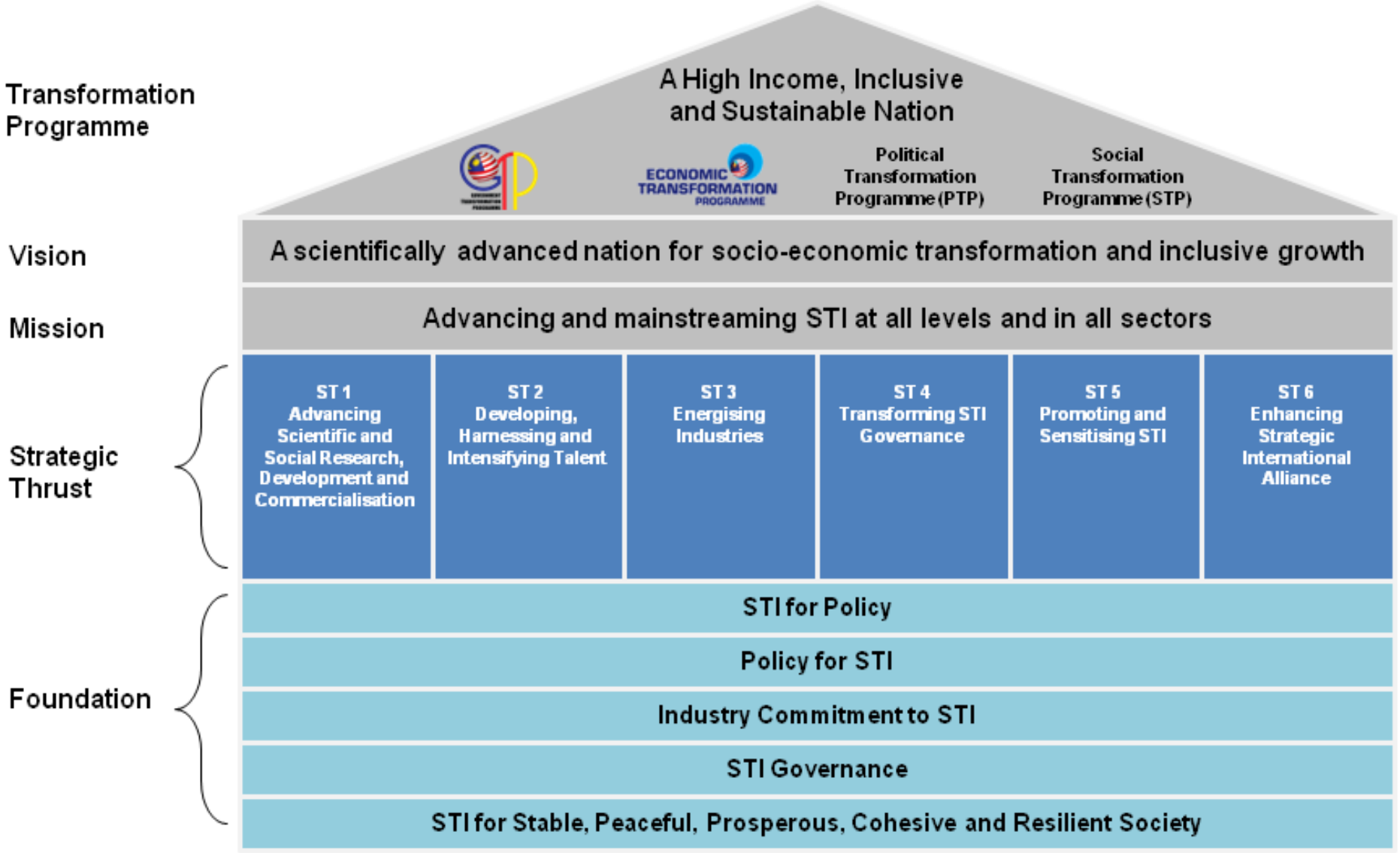
(e) ***STI for a stable, peaceful , prosperous, cohesive and resilient society***

An environment which encourages creativity, risk taking, rewards market-driven ideas will inspire interest in S&T careers and is vital for STI to flourish. The community must be engaged so that they will continue to be supportive, values and places a high premium on STI. Many players including government, universities, science-oriented communities, professionals and journalists need to support and promote the enculturation of STI.

While STI plays an important role in humankind, the risk and ethical questions as well as issues of public interest (safety, health, security and the environment) will always be of concern. Therefore, the NPSTI also ensure that the ethical and humanity issues are taken into consideration and be understood through the promotion of integration of knowledge across disciplines and sectors so as to foster a balanced approach in economic and social development as well as in environmental protection.

Based on the above six strategic thrusts and foundations, the NPSTI overall framework is as shown **in Figure 2.1.**

Figure 2.1: Framework for the National Policy on Science, Technology and Innovation (NPSTI)



CHAPTER 3: STRATEGIC THRUSTS

3.1 STRATEGIC THRUST 1 (ST1)

ADVANCING SCIENTIFIC AND SOCIAL RESEARCH, DEVELOPMENT & COMMERCIALISATION

Reshaping public R,D&C to address national priorities, challenges and new opportunities

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Malaysia must continue to enhance its capacity to generate, deploy and utilise knowledge in order to move into higher value added activities. A solid knowledge base and an effective diffusion system are vital in ensuring that the country forges a dynamic national innovation system. To achieve a more innovative economy, the National Science Research Council (NSRC) has established nine priority areas in R&D efforts apart from enhancing innovation infrastructure and strengthening partnerships and collaboration among all the key players of the economy for mutual benefit, as follows:

(i) Biodiversity;
(ii) Cyber Security;
(iii) Energy Security,
(iv) Environment and Climate Change;
(v) Food Security;
(vi) Medical & Healthcare;
(vii) Plantation Crops & Commodities;
(viii) Transportation & Urbanisation; and
(ix) Water Security.

To advance scientific and social R,D&C the Government will adopt the following policy measures:

1. Increase Gross Expenditure on R&D (GERD) to at least 2.0% of GDP by 2020

2. Enhance the performance of public and private R,D&C funding

3. Improve the delivery of STI services

4. Enhance commercialisation and increase uptake of home grown R&D innovative products through clear guidelines and standards compliance

5. Intensify the integration of social sciences and humanities with pure and applied sciences

3.2 STRATEGIC THRUST 2 (ST2)

DEVELOPING, HARNESSING AND INTENSIFYING TALENT

Malaysia needs to nurture, develop and retain a strong and committed talent pool to drive the STI agenda

A dynamic innovation economy is founded on the readily available talent pool in STI. Without sufficient talent pool there will be no STI base to create and transform ideas into products, processes and solutions that improve the quality of our lives. Global competition for talent is on the rise, and building and sustaining domestic talent must be accorded priority if Malaysia wants to build a vibrant innovation ecosystem and economy. Currently, the talent pool is diminishing due to the outflow of talent to other countries.

The World Bank (2011) reported a number of Malaysians with tertiary education migrated abroad has tripled in the last two decades and that for every ten tertiary educated Malaysians, two have moved to either OECD countries or Singapore. As of 2010, the World Bank also estimated a third of Malaysian diaspora of about a million have tertiary education. The World Bank also quoted the number of expatriates residing and working in Peninsular Malaysia has dropped drastically by about twenty five per cent between 2004 and 2010.

The alarming outflow of talents has eroded the country's skills base and threathened to derail the country's aspiration to be a developed high-income nation by 2020. More so if the loss of the nation's "best and brightest" is not being replaced with in flow of similar talents. Without a solid base of talented people, Malaysia will find it difficult to attract global R,D&C centres to its shores. Likewise, SMEs ability to innovate and compete is also likely to be undermined due to the lack of sufficient talent pool. Malaysia faces three major challenges in building its human capital for the innovation economy. Firstly, it needs to build its talent pool, secondly, in nurturing and retaining talent, and thirdly, in utilising and linking the talent.

Overcoming these challenges requires Malaysia to adopt a holistic approach that requires enhancing institutions, mechanisms and programmes to ensure continual development and engagement of our talent pool for achieving

national objectives. The government is committed to addressing these challenges as reflected in the 10th Malaysia Plan and NEM. The Economic Transformation and Government Transformation Programmes also incorporate the issue of talent building.

The policy measures to develop, harness and intensify STI talent are as follows:

1. Increase the ratio of researchers per 10,000 workforce to at least 70 by 2020

2. Develop higher order cognitive, analytical, creative and innovative skills among school children, tertiary level students and teachers

3. Introduce new innovative skills in the work force to advance the nation's STI capabilities

4. Intensify STI's Brain Gain and Brain Circulation

5. Enhance talent management system to track supply and demand of skilled human capital in STI

6. Develop a dynamic career path for researchers in public research institutes (PRIs) and institutions of higher learning (IHLs)

7. Promote and enhance meaningful, effective and equitable female participation in STI at all levels and in all sectors

8. Increase skilled and competent technical workforce to manage, operate and maintain highly specialised equipment and infrastructure

3.3 STRATEGIC THRUSTS 3 (ST3)

ENERGISING INDUSTRIES

Economic growth through increased private sector investment and commitment to STI

As clearly mentioned in the New Economic Model, a private sector is to be energised to rejuvenate investments, create high value jobs and position Malaysia in global market to propel sustained high income growth. To spur innovation and commercialisation, industry is the key player by which ideas are transformed into jobs and wealth for the nation. Despite the innovation imperative, many firms in Malaysia remain deficient in this essential ingredient for success due to a variety of reasons. Part of the reason is due to the heavy dependence of private sector on government to develop their innovative capacity. Since the outbreak of the global financial crisis, private sector's R & D spending began to fall sharply from a high of 84.9 per cent achieved in 2006 to a level of 70.5 per cent in 2008. The declining trend private R & D expenditures hit the bottom at 56.7 per cent in 2011, thus further impacted the private sector innovative capability and capacity.

We need to elevate their innovative capacity as a matter of urgency to ensure their competitiveness and the country's continued prosperity. To elevate innovative capacity among industries, the following policy measures will be undertaken:

1. Maintains a minimum R&D expenditure ratio between private and public sector

2. Develop enterprises with distinctive capabilities

3. Initiate extensive review of fiscal and financial incentives to promote industry innovation, particularly among Small and Medium Enterprises (SMEs)

4. Stimulate and facilitate the private sector to undertake R,D&C

5. Engage industry associations and strengthen networking to co-create STI programmes and activities

6. Develop new approaches to enhance knowledge transfer to industry from PRIs, IHLs, government organisations and regional corridor development agencies

7. Formulate and implement an Inclusive Innovation Roadmap (2013-2020) to address the concerns and needs of the excluded, including the disadvantaged and low-income group

8. Encourage social, grassroots and prosumer driven innovation

9. Enhance industry driven collaboration and partnerships

10. Enhance innovation and inculcate risk taking culture among entrepreneurs to accelerate R&D commercialisation

3.4 STRATEGIC THRUST 4 (ST4)

TRANSFORMING STI GOVERNANCE

The STI governance must be enhanced to ensure effective implementation of policies and strategies with improved transparency and accountability in R,D&C

A sound institutional and regulatory framework is central to an effective and well-functioning innovation system including the development of STI. The Government plays an important role in influencing and steering the environment under which STI flourishes through incentives and regulatory measures. Despite sound structures to steer the nation's STI agenda, Malaysia's STI framework needs to be reinvigorated in order to enhance the execution of policies and empower research institutes and universities to act autonomously to confront the growing complexity of the innovation process.

The government has to facilitate and foster the adoption of these formidable constructs so that innovation can flourish in Malaysia. Initiatives to bring all four players (*Quadruple Helix* - Government, Academia Industry and People) closer together have to be started by the government as a close working relationship is generally lacking between these four stakeholders of innovation. The Quadruple Helix represents a shift towards systemic, open and user-centric innovation policy. Therefore, a linear and top-down approach is no longer relevant since it does not have the participation of consumers, customers and citizens which is a new component of the Quadruple Helix approach.

To transform STI governance, the following policy measures will be undertaken:

1. Formulate a Science, Technology and Innovation (STI) Act for orderly implementation of the national STI agenda in 2013

2. Strengthen and streamline STI related councils

3. Transform and enhance PRIs' governance to ensure efficient management and effective implementation of their core functions

4. Provide greater autonomy to public and private IHLs and PRIs to spur industry collaboration and entrepreneurship

5. Incorporate social norms, ethical and moral values in the advancement of science

6. Encourage IHLs and PRIs to comply with the Intellectual Property Commercialisation Policy for Research & Development (R&D) Projects Funded by the Government of Malaysia (2009)

7. Transform existing science and technology information centres to become more effective

8. Innovate and improve public sector delivery system

3.5 STRATEGIC THRUST 5 (ST5)

PROMOTING AND SENSITISING STI

Public awareness of STI is critical for the overall development of society and nation. Enculturation of STI to create a scientifically advanced, innovative and progressive society is the main challenge

Inculcating a culture of STI at all levels is critical to enhance the scientific, creative and innovative thinking among Malaysians. STI should be imbued naturally and practiced. A strong commitment by the stakeholders is vital to promote, support and popularise STI programmes.

The Ministry of Science, Technology and Innovation (MOSTI), in collaboration with its strategic partners, has been and will continue to lead and implement various programmes to stimulate and cultivate creativity and innovation. This effort is in line with the declaration of the "Decade of Innovation", announced by the Deputy Prime Minister on 5 November 2012 in conjunction with the "World Innovation Kuala Lumpur Forum" in 2012. The Decade begun in 2010 with the launching of several programmes such as the Year of Creativity and Innovation, Malaysia 2010 or "Innovative Malaysia 2010", followed by the Promotion of Science and Mathematics 2011. In 2012, the "Year of Science and the National Innovation Movement 2012" (SGI2012) was launched with an allocation of RM100 million.

To ensure inclusive development, various programmes and knowledge-intensive activities, creativity and innovation continued to be encouraged and mainstreamed in all sectors and all walks of life. Through Budget 2013, this inclusive initiative is taken up by the Ministry of Science, Technology and Innovation in close collaboration with Malaysia Innovation Agency (AIM) and the NGOs.

In the effort to promote and sensitise STI in society, the following policy measures will be undertaken:

1. Establish an advisory body to guide STI public awareness and promotions

2. Expand and empower science centres to popularise and sensitise STI in society

3. Promote STI among school children, professional bodies and science-oriented societies

4. Conduct outreach programme to raise awareness on ethics and humanities in society

3.6 STRATEGIC THRUST 6 (ST6)

ENHANCING STRATEGIC INTERNATIONAL ALLIANCES

Global collaborations and partnerships are essential in advancing R,D&C

The world economy is undergoing rapid globalisation. This has, among other things, led to faster information flow, global alliances, global manufacturing, and talent mobility. Countries have no option anymore but to strenghten existing linkages and build new alliances. Malaysia should not be a bystander in this world wide interconnectedness but to collaborate, co-create and foster strategic partnerships for socio economic growth.

Malaysia is a member to various organizations and has participated in many forums at regional and international levels such as the Association of Southeast Asian Nations (ASEAN), the Asia-Pacific Economic Cooperation (APEC), Non-Aligned Movement (NAM), Organisation of Islamic Cooperation (OIC), the World Trade Organisation (WTO), the World Health Organisation (WHO) and United Nations Educational, Scientific and Cultural Organisation (UNESCO). In the past, Malaysia has also signed a number of Memorandum of Understanding (MoU) in the S & T cooperation with partner countries since 1968 and the Free Trade Agreement (FTA) in the bilateral and multilateral levels. Some of the past agreements and MoUs needed to be reviewed and revised to ensure optimal benefits to the country in terms of human capital development cooperation, technology transfer and trade opportunities.

It is therefore crucial for Malaysia to strengthen its existing relationships and develop new networks together with the partner countries at the regional and global levels. In 2011, the ASEAN market, for instance accounted for 26.2 per cent of the country's total trade for 2011. While emerging markets, like India, China and the countries of Eastern European Block, needed to be further explored and tapped.

Hence, to enhance global linkages and partnerships, the following policy measures will be undertaken:

1. Improve R,D&C ecosystem to attract global partners

2. Nurture domestic talents to enable organisations and industries to penetrate global markets

3. Develop partners, allies and channels in key destination countries

4. Establish "go-global" market strategies for home grown STI product (including market access, business intelligence, etc)

5. Strengthen marketing and development of global brands

6. Continuous improvement in monitoring and evaluation

7. Intensify domestic and international networks for research collaboration, strategic partnerships and business relationships

CHAPTER 4: CONCLUSION

Malaysia has in the past developed and harnessed its scientific and technological competency in various socio-economic sectors. The continual development of such competency assumes increasing importance in today's rapidly changing, globalising and unpredictable world where prosperity depends on the generation and more importantly, the application and dissemination of new ideas and skills. The government recognises the challenges faced in its endeavour to advance the national STI agenda. The NPSTI represents the Government's commitment towards revitalising the nation's STI ecosystem so that the nation can be more competitive, innovative and creative in advancing STI to achieve the nation's goal.

4.1 NPSTI – Strengthening the Strategic Thrusts in STI

The NPSTI sets out a new and focused approach to discover, utilise and optimise the full potential of STI to achieve our long-term economic, social and environmental goals. It has taken stock of the successes, challenges, lessons learnt and prospects of STI development and implementation plans both at national and international level. The NPSTI positions Malaysia to become a scientific, competitive and innovative nation by 2020.

The NPSTI approach is grounded on 5 strong foundations as follows:

(i) STI for Policy;
(ii) Policy for STI;
(iii) Industry Commitment to STI;
(iv) STI Governance; and
(v) STI for a stable, peaceful, prosperous, cohesive and resilient society.

The above foundations support the six strategic thrusts namely:

(i) Advancing scientific and social research, development and commercialisation;
(ii) Developing, harnessing and intensifying talent;
(iii) Energising industries;
(iv) Transforming STI governance;
(v) Promoting and sensitising STI; and
(vi) Enhancing strategic international alliances.

These strategic thrusts will provide the building blocks for a dynamic innovation-led economy in Malaysia. By strengthening these strategic thrusts we are confident the Malaysia can enhance its competency in STI so that it can generate knowledge, create wealth and raise the quality of life.

4.2 Supporting the Nation's STI Agenda

Under the NPSTI, the Government, through the multiple stakeholders as well as partnerships with the society at large, will drive and steer the nation's STI agenda. STI will be developed, applied, diffused and embodied into all sectors and levels.

The measures set out in the NPSTI, particularly the formulation of a legal framework, provide a solid basis for building a dynamic innovation-led economy in Malaysia. By effectively implementing the six strategic thrusts of the NPSTI supported by five firm foundations, the full potentials of science, technology and innovation can be enhanced to benefit the nation.