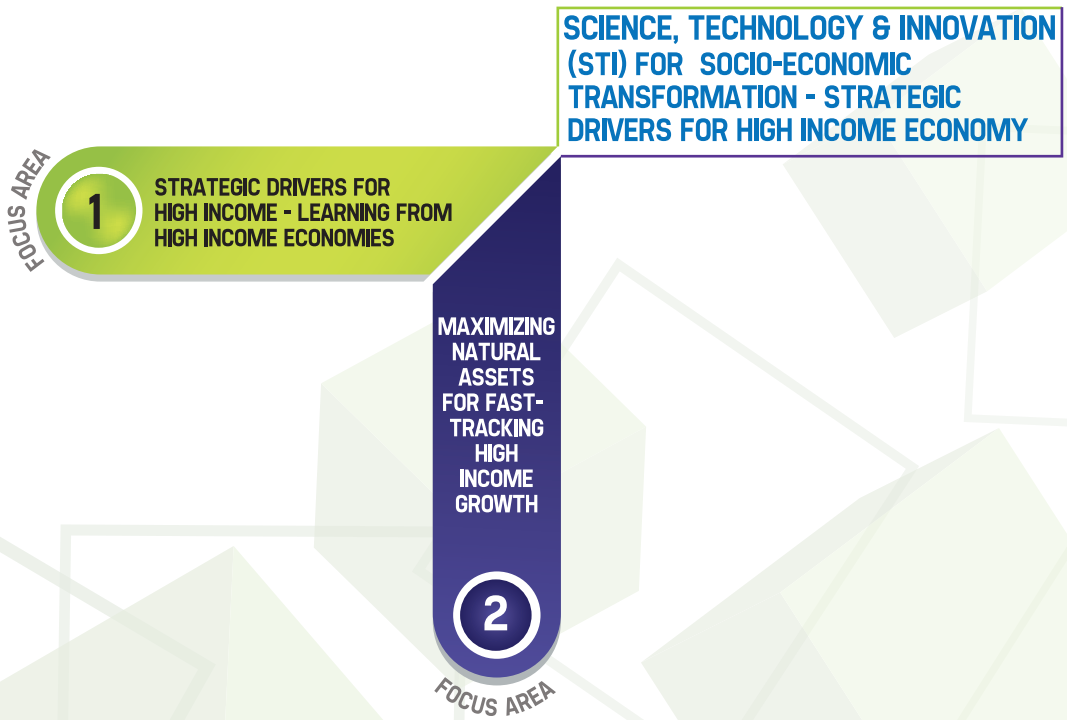
ASM INTERNATIONAL CONFERENCE 2012
ADVISORY REPORT



ASM International Conference 2012 Advisory Report

Science, Technology and Innovation for Socio Economic Transformation - Strategic Drivers for High Income Economy

2014

Foreword

I would like to congratulate the Academy of Sciences Malaysia International Conference (ASMIC) 2012 Organizing Committee chaired by Dato' Dr Samsudin Tugiman, FASc and the ASMIC 2012 Technical Committee chaired by Academician Prof Emeritus Tan Sri Dr Omar Abdul Rahman, FASc on this Advisory Report on *Science, Technology and Innovation for Socio Economic Transformation – Strategic Drivers for High Income Economy*. This Report would not have been possible without the strong support, co-operation as well as relevant and constructive ideas from various parties including Government ministries and agencies, scientific community, industry partners and corporate sector.

We believe that this Advisory Report is most timely in view of the need to realign our strategies and draw commitment at the highest levels to place science, technology and innovation (STI) at the heart of development policies towards realising the nation's aspiration to become a high-income economy by 2020. We hope that this report would make a strong case for STI to be declared and positioned as a strategic enabler to sustain the success of the NKEAs identified under the ETP.

The recommendations of this Report reflect the emphasis on a strong national STI Governance system for effective consolidation, co-ordination and implementation across all sectors. Given the challenges and demands of a very diverse society and region, globalization and international competitiveness, there is a need like never before for all sectors to come to a common consultative platform and find practical solutions in the spirit of responsible and ethical co-operation. STI should not only be viewed as important but there must be a sense of urgency to ensure that the STI strategies and initiatives are effective and pervasive to ensure that the goals of the new economic model are achieved.

ASM looks forward to further engagement with relevant stakeholders on the uptake of the recommendations in this Report.

Tan Sri Dr Ahmad Tajuddin Ali, FASc
President
Academy of Sciences Malaysia

Preface

Socio-economic transformation has now become a world agenda and its two major drivers are STI and human capital. In the context of Malaysia, this is of particular significance in our quest to become a high income, inclusive, sustainable and advanced nation as envisaged by the New Economic Model.

The Academy of Sciences Malaysia (ASM) organized this three-day international conference to provide a platform for constructive discussion on the theme, 'Science, Technology and Innovation (STI) for Socio-economic Transformation — Strategic Drivers for High Income Economy' among policy makers, academics, researchers, captains of industry, drivers of trade and finance, representatives of STI professional bodies as well as other relevant stakeholders and the general public.

Ideas generated were incorporated as input into the ASMIC Advisory Report on *Science, Technology and Innovation for Socio Economic Transformation — Strategic Drivers for High Income Economy* to be forwarded to the Government for consideration.

I would like to extend my sincere appreciation to all invited speakers, moderators, rapporteurs and participants for their undivided support and constructive input to this Advisory Report.

Dato' Dr Samsudin Tugiman, FASc
Chairman
ASMIC 2012 Organizing Committee

Content

Science, Technology and Innovation for Socio Economic Transformation — Strategic Drivers for High Income Economy

Executive Summary

This report is written with the objective of recommending strategic actions that should be taken by the country based on the findings from the recent *ASM International Conference (ASMIC)* held in Kuala Lumpur, 10 – 12 July 2012. The primary intention of the Conference is to identify potential strategic STI drivers to accelerate the socio-economic transformation of Malaysia and lead the nation towards becoming a high-income developed economy by 2020.

ASMIC 2012 had the benefit of three keynote addresses by speakers from USA, South Korea and Malaysia and thirteen plenary papers by both foreign and local speakers on two focus areas:

1. **Strategic Drivers for High Income — Learning from High Income Economies**
2. **Maximising Natural Assets for Fast Tracking High Income Growth**

An Open Forum of eminent panellists from six sectoral groups consisting of manufacturing, plantation agriculture, IT, services, mineral resources and biowealth was also held.

The presentations and discussions at *ASMIC 2012* confirm and strengthen the understanding of the ingredients necessary for a high income economy and that Malaysia has the resources and capacity to deliver what is needed. However, it is a matter of addressing the STI governance systems to ensure consolidation, co-ordination and implementation from the top to the operational levels across all ministries and sectors.

A high-income economy is built upon innovation and driven by entrepreneualism. Innovation is based on S&T which in turn is generated by research, development and commercialization (R,D&C). Therefore the foundation for a high-income economy is strength in R,D&C. The most urgent need is for Malaysia to strategically strengthen its STI infrastructure and the R,D&C system. Fragmentation of policy and oversight mechanism of R,D&C targeted funding, the lack of implementation monitoring is seen as major weaknesses in the current STI system.

The overarching recommendation to the government with three key strategic policy initiatives that relate to strengthening the STI Governance systems are:

STI to be declared and explicitly positioned as a strategic enabler to sustain the success of the NKEAs identified under the ETP. It must be supported by the following key strategic policy initiatives:

i. **Implementation and Monitoring** — To consolidate and harmonize all fragmented STI policy and oversight entities into a single National Science, Research and Innovation Council (NSRIC) chaired by the Prime Minister.

ii. **Consolidation of Funds** — to consolidate all contestable funds for research in priority and targeted areas under a single central entity — The National STI Foundation in the Prime Minister's Department.

iii. **Policy Integration** — To establish a central agency to monitor and co-ordinate the implementation of STI projects and activities. This agency can also serve as a secretariat to the NSRIC.

In about seven years, we will be reaching 2020 and for any programme to have real impact on the nation's economic growth, it must reveal some shades of visibility in the next year or so at least.

This report also highlights five sectoral-based recommendations as follows:

1. **Positioning Green Economy as a Strategic High Income Sector**

To declare green economy as the new growth mechanism for all key sectors such as: energy and the environment, transportation, housing, manufacturing, and health and wellness. This should be propelled from the top i.e. The Prime Minister's Department.

2. Leveraging the Manufacturing Base

In order to retain manufacturing as a strategic sector and to ensure Malaysia remains the preferred manufacturing base for key industrial sectors, a dedicated programme focussing on *Innovation in manufacturing*, which will enhance global competitiveness of Malaysian-based manufacturing enterprises, must be created.

3. Enhancing the ICT and E&E Industry

Malaysia must align the ICT/E&E sector to be a strategic part of national economic growth. Although much of the activities are carried out by MNCs, support infrastructure and value-added support system must be established to encourage MNCs to remain in Malaysia and to retain Malaysia as the base for the development of solutions for the green economy.

4. Technology for High Income Agriculture and Mining

One of the sub-sectors in agriculture which has high potential is perishables. Agricultural perishables can be positioned as a high income driver for the country. The supply chain process and traceability mechanism can be further enhanced and strengthened through a *National Integrated Food Chain Policy*.

Mining must be revived as a strategic new high income driver for the country and should now be part of the NKEA. It is recommended that a comprehensive review of this sector be carried out.

Malaysia must ensure that the GLCs and PLCs involved in the plantation and mineral/mining sectors increase revenue through investments in technology — increase the use of robotics and automation to reduce dependence on foreign labour. GLCs and PLCs need to invest in new downstream products and solutions, especially in high volume high value and premium products and services. This may include a *niche innovation* approach — innovation through identification of niche value addition to existing products and services.

5. GLCs leading the Innovation Uptake

Currently the GLCs have an important role to play in the nation's economic growth. However, to further strengthen their competitiveness, there is a need to increase the uptake of STI at all levels of the organization. Therefore it is recommended that the innovation generation and uptake to be part of its KPIs, with priority given to indigenously developed technologies, solutions and products.

Salient points gleaned from international speakers who shared country experiences is encapsulated as follows:

1. USA — Commitment towards Funding Innovation
   - Formulate a disciplined process to assess and evaluate various innovation and commercialization opportunities
   - To move from an efficiency driven to an innovation driven economy, the Government has to embed innovation into the national education system
   - The Government has to play the role of establishing effective collaboration between academia and industry to ensure innovations in S&T.

2. Korea — Commitment and Focus towards The Green Economy
   - To implement the policy on green growth for the entire nation, the Government has to identify strategies based on a well-thought vision to be translated into specific objectives, core technology areas and jobs related to research in green education and engineering departments in universities. The policy has to be embraced by all sectors and monitored by a central body.

3. Germany — Maintaining Manufacturing as a Foundation of Sustained Growth
   - Germany emphasizes maintaining manufacturing as a foundation of sustained growth and Malaysia needs to undertake applied production research that anticipates, adapts and shapes future requirements.

4. Taiwan — SMEs especially in the E&E sector will be the Focal Point for the Future
    - Map out emerging industries in the manufacturing sector for the country to undertake. A need to anticipate, adapt and shape future requirements in the country through ongoing research

5. Netherlands — Agriculture and Biowealth as Host to Technology and Growth
    - The role of the government is to create an institutional framework for innovation where farmers will be more integrated in the markets and the society than in the past
    - View innovation through an integrated and holistic approach and recognize that innovation is a social process.

Pertinent issues to be addressed from a national perspective were discussed at length as follows:

1. Consolidating and harmonising all fragmented STI policy and oversight entities: In order to ensure Science and Technology (S&T) are put in the forefront of the country's transformation agenda, the right incentives must be offered to lure high calibre students to take up science as well as attract the best brains to teach science.

2. Consolidating all contestable funds for research

3. Integration of the Food Chain System: Incorporate an integrated agricultural supply chain structure at all the food basket clusters with the view to reduce risks in cross contamination, to have a shorter carbon footprint and ensure that the products can be dispatched to the market as soon as possible

4. Establishment of a National Technology Exchange Centre

5. Position ICT strategically as a pervasive and cross-cutting technology: It will create an ecosystem that promotes the pervasive use of digital technology across all aspects of the economy to connect communities globally and interact in real time resulting in increased GNI, enhanced productivity and improved standards of living.

6. Enhance industry-academia research collaboration and obtain commitment from the GLCs to lead this initiative; and

7. Ensure the positioning of STI based on a holistic and not sectoral perspective.

RECOMMENDATIONS

Key Sectoral Recommendations

STI to be declared and explicitly positioned as strategic enabler to sustain the success of the NKEAs identified under the ETP. It must be supported by the following key strategic policy initiatives:

- Implementation and Monitoring — To consolidate and harmonise all fragmented STI policy and oversight entities into single National Science, Research & Innovation Council (NSRIC) chaired by the Prime Minister.
- Consolidation of Funds — To consolidate all contestable funds for research in priority and targeted areas under a single central entity — the National STI Foundation in the Prime Minister's Department.
- Policy Integration — To establish a central agency to monitor and co-ordinate the implementation of STI projects and activities. This agency can also serve as a secretariat to the NSRIC.

Overreaching Recommendations

- To declare green economy as the new growth concept for all key sectors such as: energy and the environment, transportation, housing, manufacturing and health and wellness. This will be propelled from the centre — The PM's Department.
- In order to retain manufacturing as a strategic sector and to ensure Malaysia remains the preferred manufacturing base for key industrial sectors, a dedicated programme focussing on innovation in manufacturing, which will enhance global competitiveness of Malaysian-based firms, must be created.
- Malaysia must align the ICT/E&E sectors to be a strategic part of national economic growth, although much of the activities are carried out by MNCs. Support for infrastructure and value-added support systems must be establish to encourage MNCs to remain in Malaysia and to retain Malaysia as the base for the development of solutions for the green economy.
- Malaysian sub-sectors in agriculture has potential perishables. Agricultural perishables can be positioned as a high income driver for the country. The supply chain process and traceability mechanism can be further enhanced and strengthened through a National Integrated Food Chain Policy. Mining must be revived as a strategic new high income driver for the country and should now be part of NKEA. It is recommended that a comprehensive review of this sector be carried out. Malaysia must ensure the GLCs and PLCs involved in the plantation and mineral/mining sectors to increase revenue through the investment in technology — increase the use of robotics and automation to reduce dependence of foreign labour. GLCs and PLCs need to invest in new downstream products and solutions, especially in high-volume, high-value and premium products. This may include *niche innovation* approach — innovation through identifying niche value addition to existing products and services.
- Currently the GLCs have an important role to play in the nation's economic growth. However, to further strengthen its competitiveness, there is a need to increase the uptake of STI at all levels of the organization. Therefore it is recommend that the innovation generation and uptake to be part of its KPIs with priority given to indigenously developed technologies, solutions and products.

Science, Technology and Innovation for Socio Economic Transformation — Strategic Drivers for High Income Economy

Purpose of the Report

This report is written with the primary objective of recommending strategic actions that should be taken by the country, based on the findings from the recent *ASM International Conference* held in Kuala Lumpur, 10 – 12 July 2012.

The conference themed, "Science, Technology and Innovation for Socio-economic Transformation — Strategic Drivers for High Income Economy" was organised with the objective to determine potential key science, technology and innovation (STI) drivers that will enable the socio-economic transformation within the framework of the New Economic Model to be realised.

Through clarity of understanding and appreciating the strategic intervention of STI drivers within the national socio-economic framework, we would not only accelerate our growth, but more importantly sustain it beyond 2020, and thus make Malaysia a respected and leading developed nation in the next decades.

This report is structured into six main parts.

1.0 Background

1.1 The Conceptual Framework

1.1.1 The Objectives

The *ASMIC 2012* was organised with the primary intention to identify potential strategic STI drivers to accelerate the socio-economic transformation of Malaysia and leading the nation in becoming a high-income developed economy by 2020.

In less than eight years, we will be reaching 2020, and for any programme to have real impact on the nation's economic growth, it must reveal some shades of visibility in the next year or so at least.

1.2 The Proposed Framework

Figure 1 provides an overview of the framework introduced to design *ASMIC 2012*.

Figure 1.Overview: Framework design of ASMIC 2012.

1.3 The Components

1.3.1 The STI Strategic Drivers

These are key STI areas that will play the strategic role in driving the high growth of the economy.

1.3.2 Policies

In order to maximise the impact of the STI drivers, policies will be required to be put in place to support the successful implementation of the initiatives.

1.3.3 Institutions

For effective implementation of initiatives, institutions must be present to ensure resources are organised, managed and monitored to sustain delivery.

1.3.4 Processes

Institutions would need specific processes to deliver results. These processes must be relevant and be at the right places.

1.3.5 Human Resources

To carry out the processes, there must be competent human resources. Trained human resources in specific areas are essential in delivering results.

1.3.6 Financial Resources

To support and sustain the implementation of initiatives and delivery of results, financial resources will be required. The availability of financial resources is crucial to the success of the initiatives.

1.4 The Conference

1.4.1 *ASMIC 2012* was organised by the Academy of Sciences (ASM) at Hotel Royale Chulan, Kuala Lumpur on 10 – 12 July 2012.

1.4.2 Together with the first conference in 2010 based on the theme "Wealth Creation through Science, Technology and Innovation — Creating the Environment for Technology Based Innovation", this second initiative by ASM addressed pertinent issues in realising the transformation agenda of the nation.

1.4.3 The objectives of *ASMIC 2012* are to:

1.4.3.1 Provide a platform for constructive discussion on the theme "Science, Technology and Innovation for Socio economic Transformation — Strategic Drivers for High Income Economy".

1.4.3.2 Provide relevant input on how Science & Technology and Human Capital can drive innovation and transformation for competitiveness and sustainability in the new economy through appropriate enabling mechanisms.

1.4.3.3 Identify the missing link in realising the transformation agenda of the nation and make specific recommendations to the Government.

1.4.4 *ASMIC 2012* was attended by 150 participants comprising policy makers, academics, researchers, captains of industry, drivers of trade and finance, representatives of STI professional bodies as well as other relevant stakeholders and the general public.

1.4.5 The opening address was delivered by the Minister of Science, Technology and Innovation YB Datuk Seri Panglima Dr Maximus Johnity Ongkili, JP followed by three keynote addresses and 13 plenary papers during the three-day Conference. The presentations by the plenary speakers and open forum led by eminent panellists formed the basis of deliberations by the Conference participants. Ideas and perspectives were freely and openly discussed as guided by the two focus areas namely:

1.4.5.1 Strategic Drivers for High Income — Learning from High Income Economies which included Netherlands, South Korea, Europe, Germany and Taiwan.

1.4.5.2 Maximizing Natural Assets for Fast-Tracking High Income Growth from seven sectors consisting of manufacturing, agriculture, palm oil and rubber, biomass, carbon sink, services and mineral resources.

1.4.6 An Open Forum was also held where eminent panellists representing six sectors comprising manufacturing, plantation agriculture, IT, services, mineral resources and biowealth gave their perspectives. This was followed by an hour of sectoral-based discussions to identify recommendations in six categories covering policy, process, human capital, IT, finance and institutions.

Theme: Science, Technology & Innovation (STI) for Socio-economic Transformation – Strategic Drivers for High Income Economy

Key Address

Critical factors for Global Competitiveness
Green Economy: Opportunities for Growth
Delivering the Economic Transformation Programme ETP through STI

Focus Area I	Focus Area II
Strategic drivers for High Income: Learning from High Income Economies	Maximizing Natural Assets for Fast Tracking High Income Growth

- Netherlands
- Germany
- Europe
- South Korea
- Taiwan

- Manufacturing
- Agriculture
- Plantation
- Biomass
- Mineral Resources
- Services
- Digital
- 7 step system

Open Forum

Manufacturing | Plantation | Service | Mineral res. | Biowealth | Information Technology

Group Discussions

Recommendations

Policy	Process	Finance	Human Capital	Science & Technology	Institutions

Overview of ASMIC 2012

2.0 Learning from High Income Economies

2.1 Keynote I: Critical factors for Global Competitiveness

Dennis Tsu, Senior Director, Innovative Programmes, Stanford Research Institute (SRI) International, USA.

Key Points

- Identify the appropriate and supportive eco-systems to nurture innovation and new endeavours for Malaysia. A true innovation economy requires the support of 10 areas: Participation of existing large industries with research institutions, funding for R&D, education for talent pool creation, workforce with appropriate skills and training, entrepreneurship capabilities, create demand conditions, risk capital in various forms, infrastructure to support new ventures, networks and linkages and Government Policy.
- Formulate a disciplined process to assess and evaluate various innovation and commercialization of opportunities to be applied at multiple levels by different institutions for different purposes.
- To move from an efficiency-driven to innovation-driven economy; the Government has to embed innovation into the national education system. A policy has to be put in place for all universities to provide courses on entrepreneurship and innovation to produce graduates with the right knowledge, skills and attitudes who can generate new job opportunities. In addition, a disciplined process to assess and evaluate various innovation and commercialization opportunities has to be developed.
- To create the right climate for innovation, the Government has to review laws relating to bankruptcies where entrepreneurs are required to share their lessons and reasons for their failures. There has to be a tolerance for failures as shown in the statement “I have not failed, but I found reasons why it won’t work”.
- To promote innovation, the Government has to play a role to establish collaboration between academia and industry to ensure that innovations in S&T from conception of the idea to implementation and commercialization.
- Ensure research institutions develop a systematic process to identify customers and markets before embarking on their research. This is to overcome the natural tendency to undertake research for research sake and raise the commercial potential of all the research conducted.

- Foster collaboration between universities and research institutions and local industry partners to develop "network clusters" and focus on applied research.

2.2 Keynote II: Green Economy: Opportunities for Growth

Dr Jooho Whang, President, Korea Institute of Energy Research.

Key Points

- Korea's Green Growth Strategy seeks to transform its economy's entire system of resources and energy uses across the whole range of sectors for sustained green growth.
- Creates a new green export dynamism.
- Ensures a continuing process of innovation at the technological and institutional levels.
- The ultimate driver of innovation is the need to reduce GHG emissions to meet the declared target.
- A new national development paradigm to drive economic growth.
- To implement the policy on Green Growth for the entire nation, the Government has to identify strategies based on a well-thought vision to be translated into specific objectives, core technology areas and jobs in research in green education and engineering departments in universities. The policy has to be embraced by all sectors and monitored by a central body.
- Formulate a National Green Growth Policy for Malaysia as a new paradigm for national development. Each government ministry has to develop a framework for Green Growth and encourage involvement and investment of private sector.

2.3 Plenary 1: Technology Intensive Agriculture: The Netherlands Experience

Dr Krijn J. Poppe, Business Economy, Agricultural Economics Research Institute (LEI), Wageningen University.

Key Points

- A high income economy is built on a history and culture of good organizational strength and specialized research and innovation.
- The world has to produce more food with fewer inputs and this calls for a technology intensive agriculture, as well as changes in consumer behaviour.
- A new approach in agriculture has to be initiated to enable the world to raise the productivity of agriculture in a sustainable manner.

- GRIN (Genetics, Robotics, ICT and Nano technology) technologies form the basis on which research and innovation are developed.
- The role of the government is to create an institutional framework for innovation where farmers will be more integrated in the markets and the society than in the past.
- The experience of The Netherlands in transforming agriculture towards a source of high income economic activity shows the importance of close cooperation between Science, Business and Government.
- View innovation as an integrated and holistic manner and recognize that innovation is a social process.

2.4 Plenary 2: Green Growth and Innovation Strategy for Sustainability Development: The South Korean experience

Professor Dr Lee June Seung, President, Korea Institute of S&T Evaluation and Planning (KISTEP), South Korea.

Key Points

- Korea's green growth (GT) has brought them increased tangible results through GT transfer and commercialization.
- Identify strategic areas to focus, develop policies and acts and build infrastructure to support the implementation of the Green Growth Policy.

2.5 Plenary 3: Opportunities in the Services Sector from the Digital Revolution: The European Experience (video – conferencing)

Mr Bror Salmelin, Advisor to the DG, Innovation Systems, European Commission Information Society and Media Directorate-General (INFSO).

Key Points

- That all organizations can innovate and in developing policies, innovation has to be the focus and central to every activity.
- The importance of creating the best possible eco system for putting innovation as the central focus and developing a set of multiple measures to assess its sustainability.
- Create awareness of the various forms of measuring Innovation i.e. indexes such as Global Innovation Index (GII), Innovation Union Scoreboard (IUS) Innovation Capacity Index (ICI).

2.6 Plenary 4: The Innovation Strategy for the Manufacturing Sector: The German Experience.

Dr Ing Kai Mertins, Deputy Director, Fraunhofer Institute for Production Systems and Design Technology (IPK), Germany .

Key Points

- National wealth is created based on innovation that has to be benchmarked against world standard products and competitive production processes as well as the development of intellectual capital to use technology (human), manage technology (structural) and communicate technology (relational).
- The manufacturing sector is the essential driver of economic potential and performance in Germany employing 8.1 million and is responsible for an export ratio of 37%.
- The innovation strategy for the manufacturing sector in Germany has been able to undertake applied production research that anticipates, adapts and shapes future requirements.

2.7 Plenary 5: The Role of STI in Enhancing Competitiveness in SME Manufacturing: The Taiwan Experience

Dr Chintay Shih, Chairman, Institute for Information Industry, Taiwan.

Key Points

- The small - and medium-enterprises (SMEs) have contributed to Taiwan's achievement in upgrading and transformation from labour intensive to technology intensive. Taiwan's SMEs have achieved competitive positions on several industries, e.g. machine tool, bicycle, and ICT products.
- By 2010, there were 1.2 million SMEs in Taiwan representing 97.68% of all business enterprises .
- Taiwan's road to becoming a high-income economy has been largely due to the development of its SMEs that have managed to upgrade and transform themselves from being labour intensive to technology intensive.
- Map out emerging industries in the manufacturi ng sector for the country to undertake. A need to anticipate, adapt and shape future requirements in the country through ongoin g research.

3.0 Assessing Malaysia's High Income Potential

3.1 Plenary 6: Moving Up the Value Chain in Manufacturing

YM Raja Dato Abd Aziz bin Raja Muda Musa, Vice President, Federation of Malaysian Manufacturers.

Key Points

- In 2011, manufactured goods comprised 76.4% of total exports. It accounted for nearly 27% of the nation's GDP in 2010 and almost a third of total employment.
- There is a need for the manufacturing sector to go through a continuous process of change, innovation and productivity growth.
- All activities from start to finish have to move up the value chain by enhancing human resource capability and producing work that is of high value and of world class quality.
- All these would require investments in technology, talents, education system, skills and capital.
- In ensuring that (S&T) is projected in the forefront of the country's transformation agenda, there is a need to offer the right incentives to lure high–calibre students to take up science as well as attract the best brains to teach science.

3.2 Plenary 7: Building Bridges in the Time-sensitive Perishable Trade – A Business Solution in Horticultural Trade in Malaysia.

Mr Azizi Meor Ngah, Director, *Halal* Industry Development Corporation.

Key Points

- Set up the Consolidation Processing and Packaging Centre (CPPC) that offers sorting, grading and packaging services besides cold room and vacuum chilling services. It can be the centre of excellence in post-harvest management, cool chain logistics and product management, and serve as a meeting pot where the initial transaction between the farmers and the buyers and settlement of accounts could take place. With the presence of cheap satellite connections and cloud computing, the consolidation/collection, processing and packaging centres (CPPC) can serve as a tool for innovations in crop performance and cost management and reduce the post-harvest losses currently experienced.
- Step up the role of FAMA and other established marketing institutions to search for new markets to funnel the finished perishables from the various CPPCs locally and abroad.
- Implement a policy on law of traceability from farm to table in horticultural products and provide incentives to suppliers to promote packaging and branding and other value-added activities.
- For GOM to look into a national integrated food chain policy. A need to look at strengthening the whole value chain of existing economic activities.

- Incorporate an integrated agricultural supply chain structure at all the food basket clusters to reduce risks in cross contamination, and to have a shorter carbon footprint and for the products to be dispatched to the markets as soon as possible.
- Provide more financing sources for infrastructure CPPC and transportation facilities.
- Provide incentives to improve the physical marketing infrastructure like the building of hard infrastructure to connect the farms with mainstream supply chains and the market end.

3.3 Plenary 8: Realising High Value Addition from the Plantation Sector: The Case of Palm Oil and Rubber.

Tan Sri Datuk Dr Yusof Basiron, Chief Executive Officer, Malaysian Palm Oil Council (MPOC).

Key Points

- Adopt the 3Ps; people, planet and profit approach as practiced by the Malaysian plantation industry. Be aware that the next wave of doing business will be the Revolutionary Renewal Approach where strategic activities must contribute to repairing and building society and the environment.
- That the Government of Malaysia meet and collaborate with other Governments, namely Thailand and Indonesia, on areas related to taxation over rubber and oil palm.
- Conduct research to improve agronomic practices and seed quality to reduce post-harvest losses similar to the GRIN group of technologies used in the Netherlands.
- Re-invent agricultural education and develop experts and resources in seed technology, planting/agronomy, plant breeding and scientists, as well as emphasising in agronomic sciences and supply chain management.

3.4 Plenary 9: Adding Value to Biomass Utilization.

Datuk Dr Choo Yuen May, Director General, Malaysian Palm Oil Board and Dr Astimar Abdul Aziz.

Key Points

- For biomass to realize its full potential, the maturation of technologies, assured supply and consistent availability of such biomass, logistics issues, improved production cost *vis a vis* competing products have to be addressed.

- Policies, laws and regulations for products derived from green and renewable sources over depleting non-renewable and high-carbon footprint competing products need to also be looked into.
- Allocate funds to tap the potential of the non-oil biomass resource as a high-income driver in higher value applications such as energy, second generation biofuels, biocomposite products and biochemicals.

3.5 Plenary 10: Realising High Value Addition from Mineral Resources.
Dato' Seri Dr Mohd Ajib Anuar, President, Malaysian Chamber of Mines.
Key Points

- Evaluate Malaysia's competitive advantage in the mineral resource sector through value chain analysis.
- Recognise the mineral sector as an important component in the National Key Economic Areas.
- Undertake a comprehensive study of the nation's mineral resources and related mineral assets and review their potential towards promoting investment upstream to support downstream activities.
- Establish a Mineral Development Board to replace the existing Tin Board. The setting up of a legal administrative unit through the National Mineral agenda and a more comprehensive study of the nation's mineral resources and their value adding potentials.

3.6 Plenary 11: Harnessing Opportunities in Niche Services Industry
N. Danaraj, Corporate Advisor and Director Hartalega Berhad.
Key Points

- Develop policies on how to:
  - Support differentiation strategies of companies through R &D
  - Produce and process innovation
  - Design and brand jobs
  - Create novel business models
- Induce automation in order to reduce the number of foreign workers.
- Provide incentives to improve labour productivity of foreign workers.
- Create advanced specialised institutions to support niche services.
- Promote cultural diversity in the arts, fashion and music.
- Undertake an in depth study to evaluate the effectiveness, growth and competitiveness in several sub-sectors in view of the liberalization policy adopted in 2009.

- Develop a policy to groom a workforce that is knowledgeable, creative, entrepreneurial and with soft skills to compete in the international arena. HR assistance is required.
- Conduct an in-depth study to evaluate the effectiveness of government liberalization measures in improving the competitiveness and growth of related sub-sectors.

3.7 Plenary 12: Digital Malaysia: Galvanizing Digital Technology to Drive Innovation and Productivity

Datuk Badlisham Ghazali, CEO, Multimedia Development Corporation.

Key Points

- According to Datuk Badlisham, Digital Malaysia is a national programme to advance the country towards a developed digital economy by 2020. It will create an ecosystem that promotes the pervasive use of digital technology in all aspects of the economy to connect communities globally and interact in real time resulting in increased GNI, enhanced productivity and improved standards of living.
- The implications are summarised in its three key thrusts of reallocating resources to more demand focused programmes and activities, change the way people behave to produce as they consume and enhance competitiveness by focusing on knowledge-added activities.

4.0 Key Lessons Learnt

4.1 International Speakers — Selected Countries

4.1.1 SRI — About Commitment towards Funding Innovation

4.1.2 Korea — Commitment and Focus towards The Green Economy

4.1.3 Germany — Maintaining Manufacturing as Foundation of Sustained Growth

4.1.4 Taiwan — SMEs especially in the E&E sector will be the Focal Point for the Future

4.1.5 Netherlands — Agriculture and Biowealth as Host to Technology and Growth

4.2 Domestic Speakers — Selected Sectors

4.2.1 Consolidating and harmonising all fragmented STI policy and oversight entities

4.2.2 Consolidating all contestable funds for research

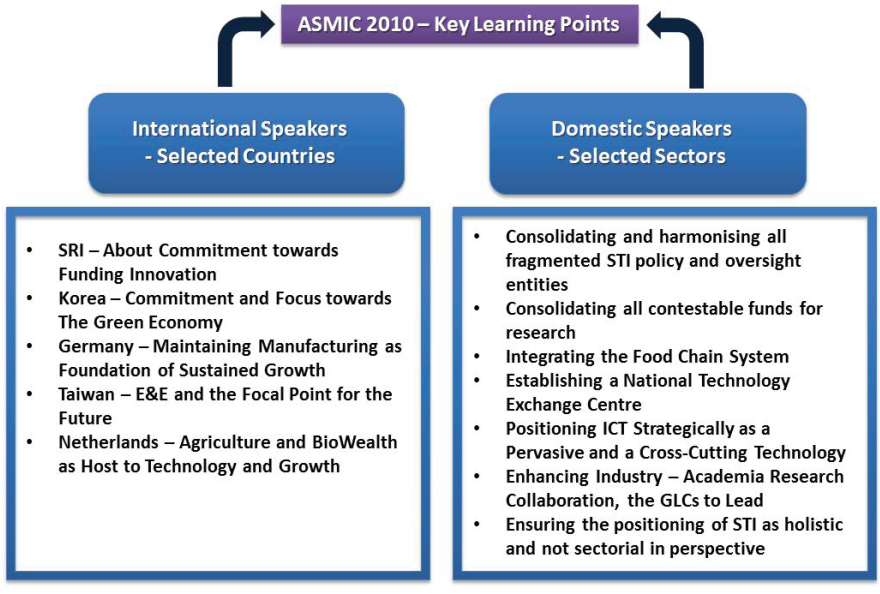
4.2.3 Integrating the Food Chain Systems

4.2.4 Establishing a National Technology Exchange Centre

4.2.5 Positioning ICT Strategically as a Pervasive and a Cross - cutting Technology

4.2.6 Enhancing Industry — Academia research collaboration, the GLCs to lead

4.2.7 Ensuring the positioning of STI as holistic and not sectorial in perspective.



5.0 General Recommendations

5.1 Positioning green economy as a strategic high income sector.

5.1.1 Korea has selected this as the strategic theme that will determine the future opportunities and economic growth of the country. However, Korea is not alone, many other countries could see that the green agenda is an opportunity that should be harnessed to create new growth in years to come. The green economy, a cross-cutting initiatives involving nearly all sectors of the economy, among them:

5.1.1.1 Energy and the Environment
5.1.1.2 Transportation
5.1.1.3 Manufacturing
5.1.1.4 Health and Wellness
5.1.1.5 Housing
5.1.1.6 Lifestyle

5.1.2 What is important — the Green Economy Agenda is a top-down strategic initiative and not just a sectorial effort.

5.1.3 Key Points

5.1.3.1 It will be the new growth area for the future driven by environmental sustainability
5.1.3.2 It is strategic and cuts across all sectors
5.1.3.3 It is pervasive
5.1.3.4 It must be a TOP-DOWN initiative
5.1.3.5 Malaysia has the right ingredients to support this industry
5.1.3.6 Large energy-based sector
5.1.3.7 Large bio-based sector
5.1.3.8 Large electronics-based sector
5.1.3.9 Large biodiversity
5.1.3.10 Manpower and research based to support the sector.

5.1.4 Strategic Action

To declare green economy as the new growth mechanism for all key sectors such as: energy and environment, transportation, housing, manufacturing and, health and wellness. The green economy should be a strategic and transformative initiative cutting across various sectors and will be led from the centre — The PM's Department.

5.2 Leveraging the Manufacturing base

5.2.1 While there has been a euphoria towards services as the source of growth, this approach may have resulted in neglect to the foundation of services — manufacturing. The relative weaknesses of the manufacturing base in USA and in certain European nations has contributed to the ineffectiveness in achieving sustained economic growth. Germany, Korea and Taiwan remain committed to strengthening these sectors to ensure future growth and also continuing employment opportunities for the people.

5.2.2 Key Points

5.2.2.1 Relatively large as a sector within the economy.

5.2.2.2 Still able to withstand competition from China and other developing economies.

5.2.2.3 A large employment-base for the country.

5.2.2.4 A major source of revenue for the services industry.

5.2.2.5 Strategic in housing technologies, competencies and capabilities that are crucial for sustaining growth for the country.

5.2.3 Strategic Action

In order to retain manufacturing as a strategic sector and to ensure Malaysia remains the preferred manufacturing base for key industrial sectors, a dedicated programme focussing on *Innovation in Manufacturing*, which will enhance global competitiveness of Malaysian-based manufacturing enterprises, must be created. MITI could lead this programme in collaboration with ASM, AIM, MIGHT and MOSTI.

5.3 Enhancing the ICT and E&E Industry

5.3.1 Taiwan remains committed to strengthening its ICT and E&E sectors. Whatever the arguments about growth, it cannot be denied that productivity, the value preposition and the solutions that are seen today in the various areas such as: the automotive sector, the telecommunication sector, the food and agricultural sector, the defence sector, the healthcare and wellness sector, are all dependent on electronics technology; that distinguish the growth of today and the growth prior to the semiconductor era. The chip enables miniaturisation of devices, enabling speed in doing things and access to luxury at a fraction of what it may cost many years ago.

5.3.2 Key Points

5.3.2.1 Malaysia has a globally competitive E&E and ICT industry.

5.3.2.2 It has the technological and human capital base to support the industry.

5.3.2.3 It provides employment to thousands of Malaysian.

5.3.2.4 It has developed many leaders for the industry and also serves other sectors.

5.3.2.5 It has a large R&D capability.

5.3.2.6 It hosts nearly all key global E&E and ICT players.

5.3.3 Strategic Action

Malaysia must align the ICT/E&E sector to be a strategic part of national economic growth, although much of the activities are carried out by MNCs. Infrastructure support and value added support system must be established to encourage MNCs to remain in Malaysia and to retain Malaysia as the base for the development of solutions for the green economy . MITI could be the lead agency for this initiative.

5.4 Technology for High Income Agriculture and Mining

5.4.1 Netherlands in particular is committed to building STI capability via agriculture, thus creating a two-pronged growth strategy. On the supply side — increasing productivity of the agricultural and food sector, and on the demand side — technologies to increase productivity and quality of agriculture and food products.

5.4.2 Key Points

5.4.2.1 Malaysia has a large plantation and a long established mining industry.

5.4.2.2 Malaysia has relatively a good food and agricultural system.

5.4.2.3 The mining industry's value chain could be enhanced in line with changing demands for mineral resources.

5.4.2.4 Malaysia still needs many more players to upgrade the systems and capabilities to achieve world-class status for the plantation and mining sectors.

5.4.2.5 Malaysia with the right climate can provide food supply to many parts of the world.

5.4.2.6 The use of technology can increase productivity in both sectors.

5.4.2.7 Extensive use of technology can provide employment to graduates in science, technology and engineering.

5.4.3 Strategic Action

One of the sub-sectors in agriculture which has high potential is perishables. Agricultural perishables can be positioned as a high income driver for the country. The supply chain process and traceability mechanism can be further enhanced and strengthened through a *National Integrated Food Chain Policy*. This initiative to be led by the Ministry of Agriculture and Agro-Based Industry and the Ministry of Domestic Trade and Consumer Affairs.

Mining must be revived as a strategic new high income driver for the country and should now be part of NKEA. It is recommended that a comprehensive review of this sector to be undertaken. This review can be led by EPU in collaboration with the Ministry of Natural Resources and the Environment.

Malaysia must ensure the GLCs and PLCs involved in the plantation and mineral/mining sectors increase revenue through investment in technology — increase the use of robotics and automation to reduce dependence on foreign labour. GLCs and PLCs need to invest in new downstream products and solutions, especially in high volume, high value and premium products and services. This may include *niche innovation* approach — innovation through identifying niche value addition to existing products and services. The government could take the lead through Khazanah, PNB and MKD to put this into action.

5.5 GLCs leading the Innovation Uptake

5.5.1 Key Points

5.5.1.1 Malaysia has done relatively well in creating and developing GLCs and GICs to build global firms.

5.5.1.4 The government to set the minimum R&D targets plus commercialisation impact of the R&D. This must be monitored as part of its reporting to the government.

5.5.1.5 The GLCs will be the driver in developing R&D capability to ensure we are able to remain a competitive global player.

5.5.1.2 These firms enjoys the support and protection of the government while are relatively free to determine its commercial direction.

5.5.1.3 For these firms to continue to be significant, we need to look at the long-term potential and impact. In order to remain relevant and competitive, it has to increase substantial investment in R&D.

5.5.2 Strategic Action

Currently the GLCs have an important role to play in the nation's economic growth. However, to further strengthen its competitiveness, there is a need to increase the uptake of STI at all levels of the organization. Therefore it is recommended that the innovation generation and uptake to be part of its KPIs with priority given to indigenously developed technologies, solutions and products. Khazanah, PNB and MKD could take the lead in collaboration with relevant government STI related organisations such as ASM, MIGHT and AIM.

6.0 Specific recommendations

6.1 STI Governance system

6.1.1 ASMIC 2012 highlighted key challenges confronting Malaysia in transforming its socio-economic framework and enhancing its global competitiveness in moving forward:

a. A high-income economy is built upon innovation and driven by entrepreneurship.
b. Innovation is based on science and technology which in turn is generated by research, development and commercialization (R, D & C).

c. Therefore, the foundation for a high-income economy is strength in R, D & C.
d. The most urgent need is to strategically strengthen science, technology and innovation infrastructure and the R, D &C system in the country.

6.1.2 However, the major weaknesses in the current STI system are fragmentation of policy and oversight mechanism and of R, D & C, targeted funding and the lack of monitoring at the implementation phase.

6.1.3 Therefore the following is recommended, for the key strategic policy initiatives:

STI to be declared and explicitly positioned as a strategic enabler to sustain the success of the NKEAs identified under the ETP. It must be supported by the following key strategic policy initiatives:

6.1.3.1 Implementation and Monitoring — To consolidate and harmonise all fragmented STI policies and oversight entities into the single National Science, Research and Innovation Council (NSRIC) chaired by the Prime Minister

6.1.3.2 Consolidation of funds — To consolidate all contestable funds for research in priority and targeted areas under a single central entity — the National STI Foundation in the Prime Minister's Department

6.1.3.3 Policy Integration — To establish a central agency to monitor and co-ordinate the implementation of STI projects and activities. This agency can also serve as a secretariat to the NSRI Council.

RECOMMENDATIONS

General Recommendations

- To declare green economy as the new growth concept for all key sectors such as energy and environment, transportation, housing, manufacturing, health and wellness. Will be led from centre — The PM's Department
- In order to retain manufacturing as a strategic sector and to ensure Malaysia remains the preferred manufacturing base for key industrial sectors, a dedicated programme focussing on innovation in manufacturing, which will enhance global competitiveness of Malaysian based firms, must be created.
- Malaysia must align the ICT/E&E sectors to be a strategic part of national economic growth, although much of the activities are carried out by MNC's. Infrastructure support and value added support system must be establish to encourage MNCs to remain in Malaysia and to retain Malaysia as the base for the development of solutions for the green economy.
- Malaysia as one of the sub-sectors in agriculture which has a high potential in perishables. Agricultured perishables can be positioned as the high income driver for the country. The supply chain process and traceability mechanism can be further enhanced and strengthened through a National Integrated Food Chain Policy.

  Mining must be revived as a strategic new high income driver for the country and should now be part of NKEA. It is recommended a comprehensive review of this sector to be carried out.

  Malaysia must ensure the GLCs and PLCs involved in the plantation and mineral/mining sectors to increase revenue through investments in technology — increase the use of robotics and automation to reduce dependence of foreign labour. GLCs and PLCs need to invest in new downstream products and solutions, especially in high volume, high value and premium products and services. This may include niche innovation approach — innovation through identifying niche value addition to existing products and services.
- Currently the GLCs have an important role to play for nation's economic growth. However, to strengthen its competitiveness, there is a need to increase the uptake of STI at all levels of the organization. Therefore it is recommended that the innovation generation and uptake to be part of its KPIs with priority given to indigenously developed technologies, solutions and products.

Specific Recommendations

STI to be declared and explicitly positioned as a strategic enabler to sustain the success of the NKEAs identified under ETP. It must be supported by the following key strategic policy initiatives

- Implementation and monitoring — to consolidate and harmonise all fragmented STI policy and over sight entities into a single National Science, Research and Innovation Council (NSRIC) chaired by the Prime Minister.
- Funds Consolidation — to consolidate all contestable funds for research in priority and targeted areas under single central entity — the National STI Foundation in the Prime Minister's Department.
- Policy Integration — to establish a central agency to monitor and coordinate the implementation of STI projects and activities. This agency can also serve as a secretariat to the NSRI council.

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