



**Asia-Pacific
Economic Cooperation**

2021/CTI/WKSP4/010

Session: 2

Malaysia's Approach Towards Digital Innovation

Submitted by: Academy of Sciences Malaysia



**Workshop on Building Capacity in
Promoting Inclusive and Responsible
Business for Sustainable Growth in Digital
Society
19-20 May 2021**



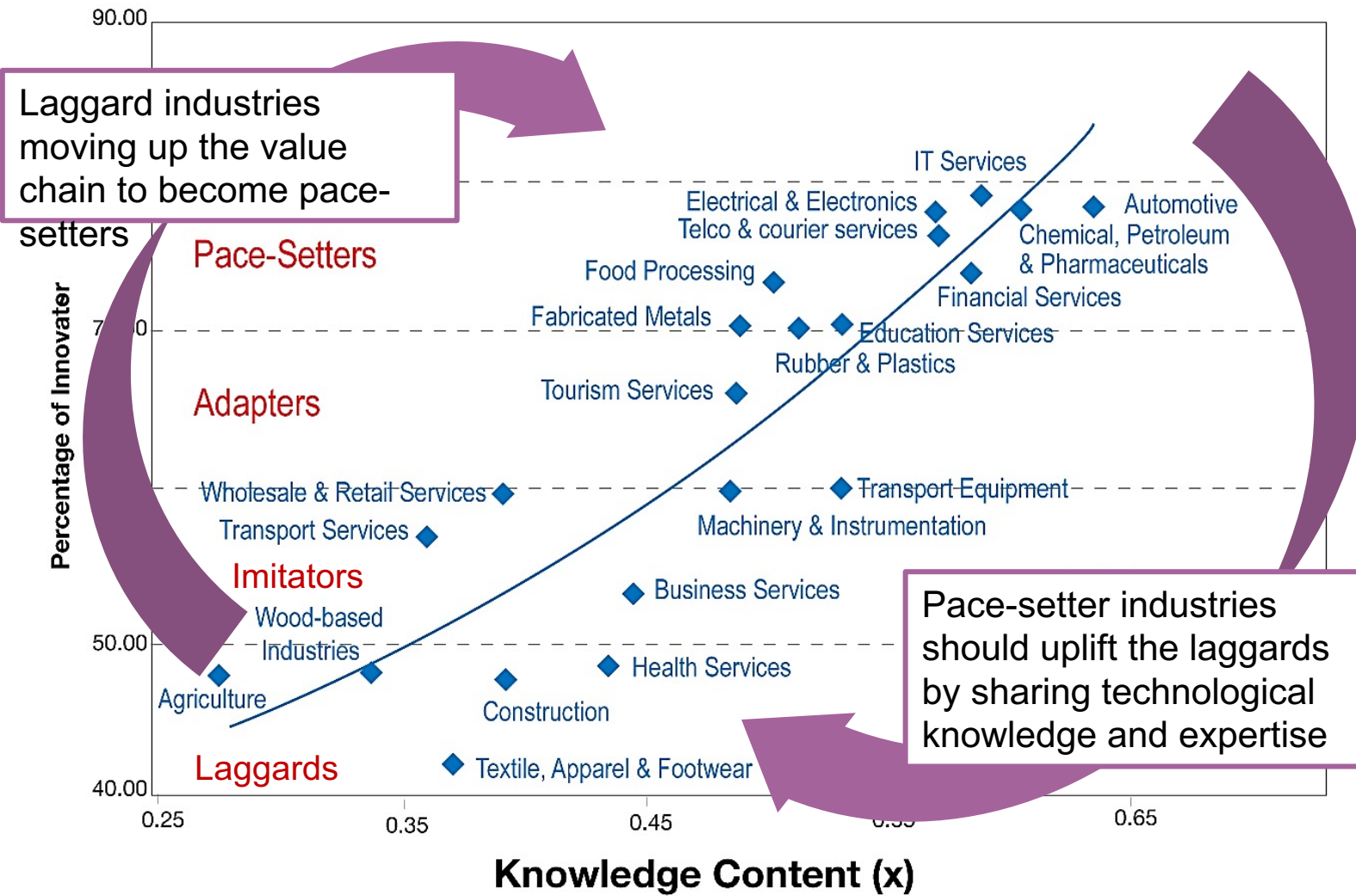
Malaysia's Approach towards Digital Innovation

APEC Workshop on Inclusive and Responsible
Business (IRB) for Sustainable Development

19-20 May 2021



Malaysia's Key Economic Sectors and Innovation Capacity (Pockets of Excellence)



Source: A Study on Knowledge Content in Key Economic Sectors in Malaysia Phase III (MyKEIII), EPU 2016

- 1 Malaysia current GDP: RM1.42 trillion
- 2 Technology is the fuel of the future economy. These technologies are STI-driven. After 62 years, we do have the building blocks of success.
- 3 Malaysia has transitioned from capacity building to being innovation-driven as evidenced by our pace-setters
- 4 But we also have laggards which alarmingly are industries providing basic needs (clothing, shelter, food)
- 5 How to move all our economic sectors up the value chain?
- 6 To move forward, we need to address pressing challenges with whole-of-government strategic approach

DSTIN for the first time officially link Science & Technology Drivers to Socioeconomic Drivers for Value Creation

**Socio-economic
Development**

To address economic
disparities and show
RESULTS we need to create
seamlessness between R&D
priorities and economic
development

**STI
Priorities**

Collaborative Network

Domestic STIE Framework as a Technology View of the world towards the development of niche areas for Malaysia's competitive advantage



1. Domestic **Priority Areas**

- 9 NSRC Priority Areas
- 12 NKEA
- MITI (3+2)
- 7 MOE Research Grant Cluster

2. **Research Capability**

- Publication and Patent Analysis
- MRU Research Capability Index (Quantum and Quality of Publication, (Research Building Block)

3. **Analysis of Emerging and Declining Technologies**

- Global Patent Analysis
- Technology Investment Analysis

4. **Industry Analysis**

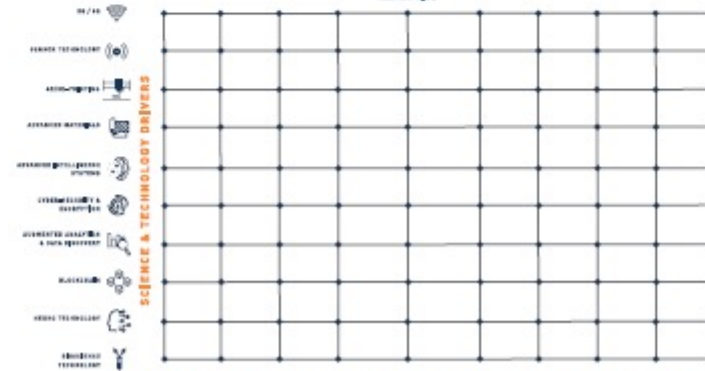
- MyKE Study III (Phase 1 and Phase 2)
- Surveys and Interviews with Business Leaders

5. **Global trends**

- Top 10 technology drivers
- Global technology drivers

10|MySTIE
FRAMWORK
Building the Horizontal & Scaling
the Vertical in the Ecosystem

MALAYSIAN SOCIO-ECONOMIC DRIVERS





Guiding tool to deep dive and serve as the base matrix for engagements with all relevant ministries, agencies, industries and researchers towards implementing high impact projects

Each Science & Technology Driver should explore core technologies & applications for the 10 Malaysian Socio-economic Drivers

Driving Fundamental & Translational Research

Each Malaysian Socio-economic Driver should explore how the 10 Science & Technology Drivers will value-add and enhance their global competitiveness

**5G/6G**

Next-generation mobile networks that enable higher frequencies, capacity and lower latency.

**SENSOR TECHNOLOGY**

High-performance sensors, including microelectromechanical systems (MEMS), magnetic materials and piezoceramics, wearable biosensors and printable wearable electrochemical sensors.

**4D/5D-PRINTING**

Printing using smart materials that change forms according to the environmental changes or responding to stimulus, and print parts as simultaneous multilayer curved layers, making the objects stronger and more cost competitive than 3D printing.

**ADVANCED MATERIALS**

New, stronger, durable and efficient heat and energy conducting materials that have wide industrial, biological, medical and other applications.

**ADVANCED INTELLIGENT SYSTEMS**

Encompasses big data processing, advanced robotics, artificial intelligence, machine learning, directed self-assembly, neuromorphic engineering and quantum computing to enable flexibility, adaptability, precision and efficiency in analyses, information processing and response.

**CYBER-SECURITY
& ENCRYPTION**

Technologies, processes, practices and methods that protect information and communication systems (networks, devices and data), mitigating risks associated with malicious attack, digital hijacking, unauthorised access and damage to systems and

**AUGMENTED ANALYTICS
& DATA DISCOVERY**

Advanced data discovery methods that enable users to gain insights into patterns of the data generated using various statistical methods, pattern recognition, machine learning, natural learning and other advanced data analysis tools.

**BLOCKCHAIN**

Digital ledger system that is democratic, incorruptible, efficient, verifiable and holds permanent record of every transaction of value among multiple economic agents.

**NEURO TECHNOLOGY**

Technology that enables the study of brain processes, brain-computer interface, decision-making, behaviour and neurological disorders.

**BIOSCIENCE TECHNOLOGY**

Technology that uses biological processes, systems or living organisms to manufacture products or produce technology based on molecular biology, bionics, bioengineering, genetic engineering and nanotechnology.

10

SOCIO-ECONOMIC DRIVERS



ENERGY

This sector is constituted by a complex and inter-related network of entities involved in the production, management and distribution of energy to fuel the economy and improve the quality of life of the *rakyat*. This includes both renewable and non-renewable energy sources.



BUSINESS & FINANCIAL SERVICES

This sector encompasses services that support business functions broader economy, such as Information Communication Technologies (ICT), logistics, financial services and other professional services.



CULTURE, ARTS & TOURISM

Malaysia is a confluence of diverse range of people and cultures. This sector covers a wide array of activities including expression and application of creative content and artworks. Tourism sector leverages on the diverse cultural heritage and natural resources of Malaysia.



MEDICAL & HEALTHCARE

Medical and healthcare encompass all goods, services and payment mechanisms for prevention, restoration, cure, maintenance of one's physical, mental or emotional well-being.



SMART TECHNOLOGY AND SYSTEMS (NEXT-GENERATION ENGINEERING & MANUFACTURING)

Smart technology and systems that create resilient utilisation of resources through self-monitoring, troubleshooting, optimising and integrating manufacturing processes and supply chains. This allows for adaptive data-driven decisions and intelligent cyber-physical systems.



SMART CITIES & TRANSPORTATION

Smart cities and transportation involve integration of physical and natural infrastructure with advanced technologies to deliver sustainable, resilient, and prosperous living conditions.



WATER & FOOD

Water and food are core to the sustainable development of communities across the globe. This demands a well-integrated ecosystem to ensure water and food security to address the challenges of rising population, urbanisation, climate change and economic disparities.



AGRICULTURE & FORESTRY

Agriculture and forestry is an important socio-economic driver for Malaysia. Agriculture encompasses crops, livestock, and fisheries. Agriculture and forestry are key sectors for food security, employment and revenue generation for the country.



EDUCATION

Education spans from pre-school to post-doctoral and continuing education. The purpose of education is to nurture a creative society and a skilled workforce. The education sector is also an important revenue earner for the country.



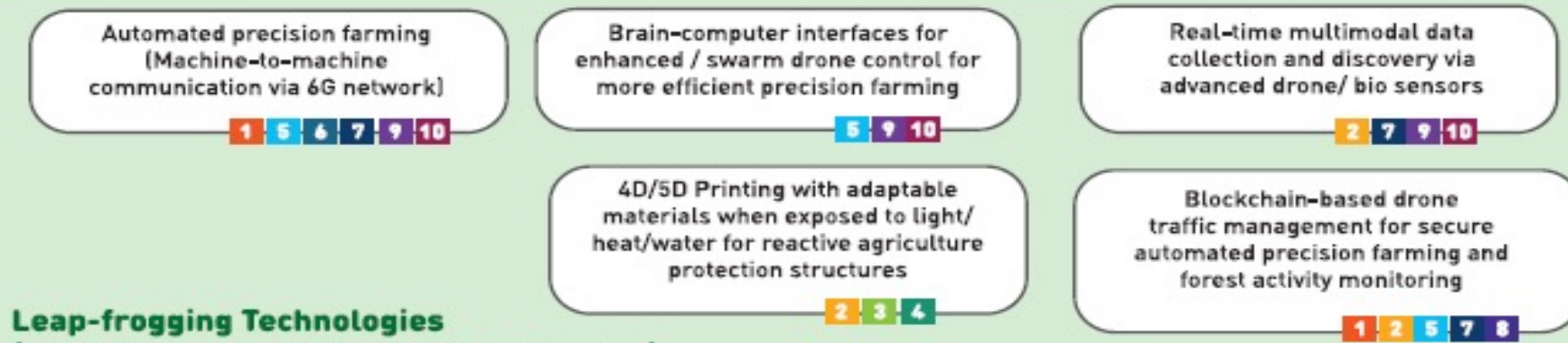
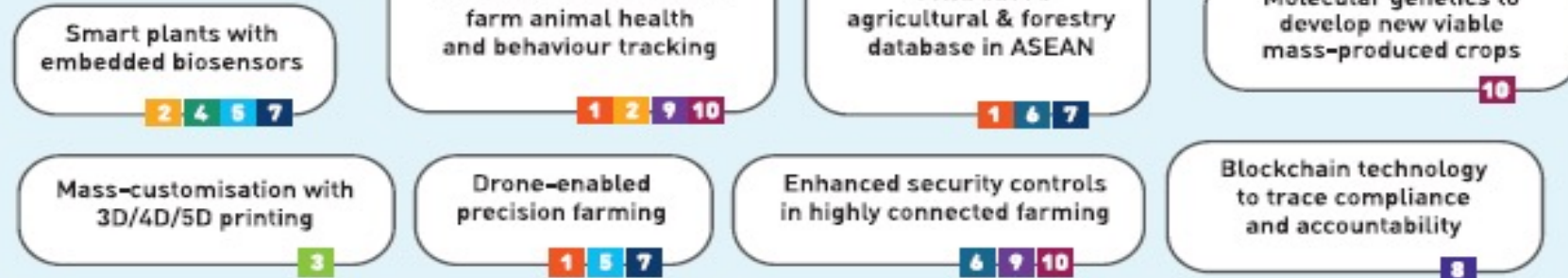
ENVIRONMENT & BIODIVERSITY

Preserving and conserving the natural environment and biodiversity of Malaysia are important in harnessing its value for sustainable development. This requires a sustainable approach to unlocking the value of terrestrial and marine ecosystems.

Application of the 10-10 MySTIE Framework to the Agriculture & Forestry Socio-economic Driver

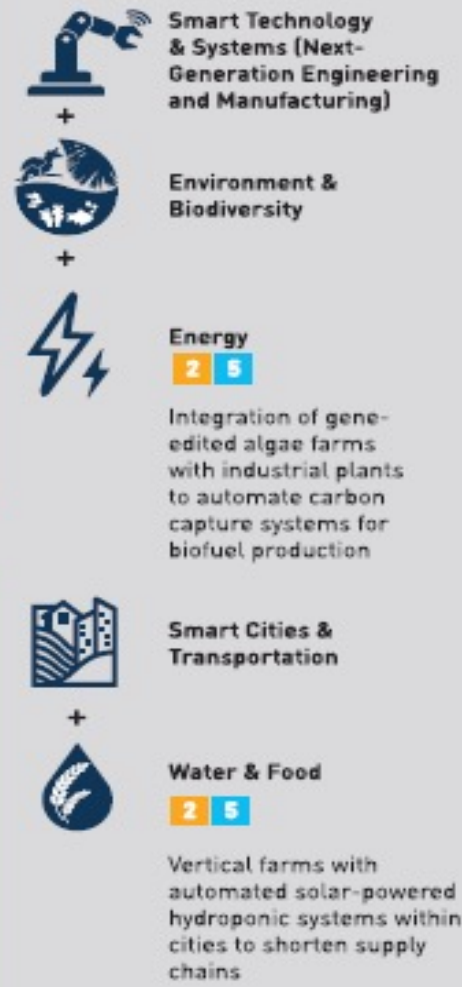
Case study of how the 10-10 MySTIE can be utilised to develop the next generation technologies for raising the return of value and competitiveness of the agriculture and forestry sector.

Catch-up (Current) Technologies



Leap-frogging Technologies (Next-Generation Research & Application)

How can agriculture and forestry innovations be integrated with other sectors?



Multiplier Effect of Modernising Agriculture and Forestry to other Socio-Economic Drivers



AGRICULTURE & FORESTRY

SMART AGRICULTURE

Modernising the Agriculture Sector

The 10-10 MySTIE Framework encourages the convergence of technologies that facilitates the transformation of each sector. This, in turn, creates a multiplier effect on other socio-economic drivers. For instance, modernising the agriculture sector can give rise to a vibrant agrotourism industry, and thereby providing a lucrative revenue stream.

Leveraging value creation opportunities requires careful curation of an ecosystem and its constituent systems and processes. This will continuously drive the multiplier effect and positive market externalities to create greater socio-economic impact for all stakeholders.



ENERGY

- Generation of feedstock and renewable energy from biofuels



BUSINESS & FINANCIAL SERVICES

- Smart Integrated Supply Chain
- Global Halal Services



CULTURE, ARTS & TOURISM

- Development of agrotourism



MEDICAL & HEALTHCARE

- Exploration of alternative ingredients, bioactive compounds and biomaterials
- Development of functional food and herbal product



SMART TECHNOLOGY & SYSTEMS (NEXT GENERATION ENGINEERING AND MANUFACTURING)

- Farm mechanisation and automation
- Development of smart farm monitoring



SMART CITIES & TRANSPORTATION

- Smart Integrated Transportation of agriculture products
- Normalised urban farming
- Connected rural and remote agriculture and fishing communities



WATER & FOOD

- Effective water irrigation and drainage systems



EDUCATION

- Personalised and experiential learning through a curriculum designed for tropical agriculture
- Development of a global centre with expertise in tropical agriculture



ENVIRONMENT & BIODIVERSITY

- Effective natural resources and environmental management (e.g. soil, flood, air quality)
- Modernised sustainable replanting programme
- Effective management of the marine and coastal communities
- Conservation of flora, fauna, indigenous animals, plants and insects

Basis for National STIE Niche Areas

The National STIE Niche Areas are identified based on 4 key criteria:



Domestic Niche Areas to Malaysia Grand Challenges



Energy



Business & Financial Services



Culture, Arts & Tourism



Medical & Healthcare



Smart Technology & Systems (Next-Generation Engineering & Manufacturing)



Smart Cities & Transportation



Water & Food



Agriculture & Forestry



Education



Environment & Biodiversity



Diversified Renewable Energy



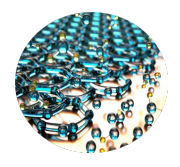
Subscription Business Models and Sharing Platforms



Creative Content and Heritage



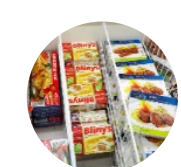
Digital Health



Advanced Materials for Circular Economy & Sustainable Society



Integrated Urban Infrastructure and Infostructure Management



Premium Halal Food



High-Value Seafood



Personalised and Experiential Learning



Precision Biodiversity



Energy Storage System



Digitalised & Autonomous Services



Digitalised Tourism



Precision Medicine



Next-Gen Smart Factories



Smart Systems for Connected Rural-Urban Communities



Local Superfood



Premium Tropical Fruits



Microcredentials



Innovative Eco-Products from Waste



Microgrid



Fintech in Islamic Finance



High-Value Tourism



Clinical Trials Hub for Developing Economies



Manufacturing of Smart Devices & Technology Development



Human-Centred Design & Analytics



Integrated Water Resources Management



Local Agricultural Input



Global Online Learning: Promoting Local Content



Smart Supply Chain Management for Sustainable Forest Products

30 Domestic STIE Niche Areas were endorsed by the National Science Council on 14 July 2020
These niche areas are to be reviewed every 2-3 years

Impact of Domestic Niche Areas (Inclusive and Responsible Business)

12 Economic Booster

11 Dual-Impact Enabler

7 Societal Well-being Catalyst



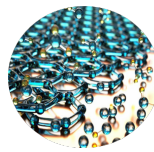
Digitalised & Autonomous Services



High-Value Tourism



High-Value Seafood



Advanced Materials for Circular Economy & Sustainable Society



Creative Content and Heritage



Integrated Water Resources Management



Digital Health



Precision Medicine



Precision Biodiversity



Subscription Business Models and Sharing Platforms



Premium Halal Food



Premium Tropical Fruits



Local Superfood



Energy Storage System



Integrated Urban Infrastructure and Infostructure Management



Microgrid



Personalised and Experiential Learning



Fintech in Islamic Finance



Clinical Trials Hub for Developing Economies



Smart Supply Chain Management for Sustainable Forest Products



Diversified Renewable Energy



Microcredentials



Smart Systems for Connected Rural-Urban Communities



Next-Gen Smart Factories



Digitalised Tourism



Innovative Eco-Products from Waste



Local Agricultural Input



Human-Centred Design & Analytics



Manufacturing of Smart Devices & Technology Development



Global Online Learning: Promoting Local Content

8i Innovation Helix Ecosystem Analysis



8i STI Ecosystem Enablers

01 / INFRASTRUCTURE

PHYSICAL & NATURAL

Quality and sophistication of the infrastructure that supports the growth and development of the industry and the broader economy.

02 / INFOSTRUCTURE

DIGITAL INFRASTRUCTURE

Digital infrastructure that provides seamless integration of multiple value chains within and across the industries and communities. These systems provide seamless flow of information for market intelligence and strategic decision making.

03 / INTELLECTUAL CAPITAL

TALENT STOCK

Skills (technical, entrepreneurial and leadership) and knowledge (general and specialised) of the talent stock.

04 / INTEGRITY

GOOD GOVERNANCE

Governance systems to manage processes and ensure commitment to continuous improvements and adherence to best practices.

05 / INCENTIVES

FISCAL AND NON-FISCAL

Incentives to encourage R&D, adoption of new technologies, innovation, commercialisation of local technology, and market expansion, including globalisation of local technology.

06 / INSTITUTIONS

GOVERNANCE BODIES

Quality of the institutions of governance (e.g. regulatory bodies, industry associations, institutions of learning / research institutes etc.) that support systematic development of markets, industries and communities.

07 / INTERACTION

STRATEGIC PARTNERSHIPS

Level and quality of collaboration, co-creation and knowledge sharing among stakeholders.

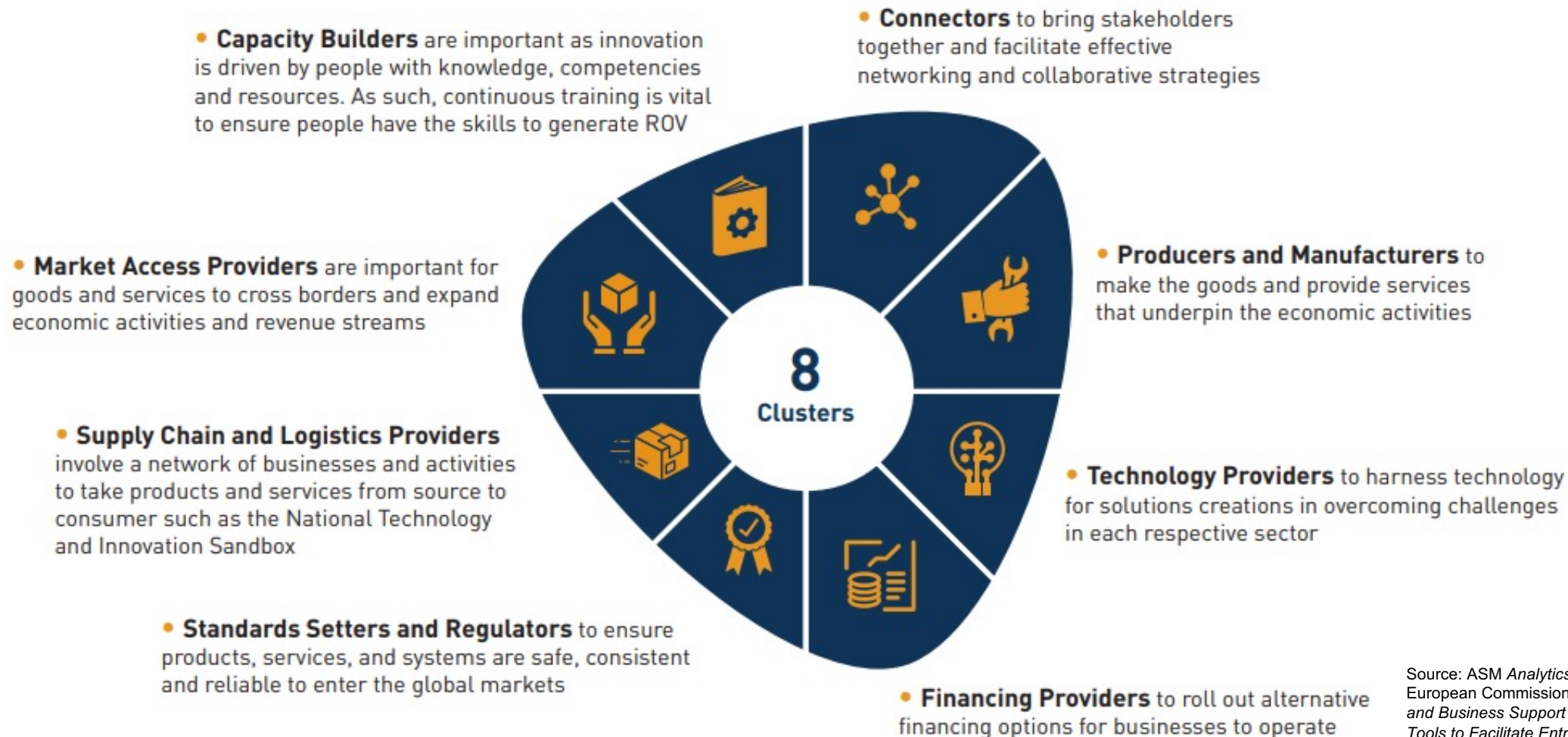
08 / INTERNATIONALISATION

GLOBAL BEST PRACTICES & STANDARDS

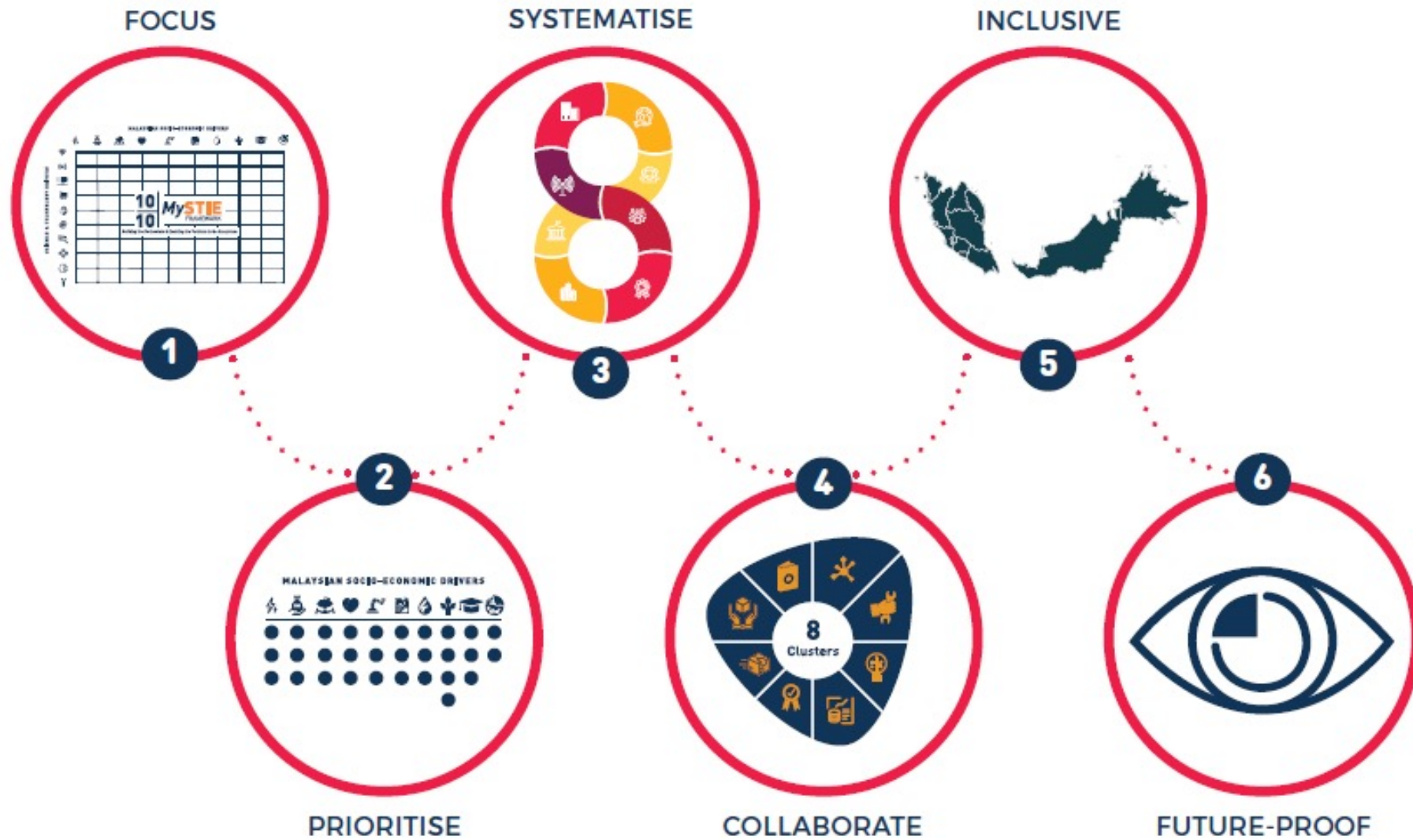
Depth and breadth of engagement with global knowledge and innovation networks, institutions of governance and global supply chains.

Collaborative Platform

While the National STIE Niche Areas provide strategic focus, the translation on the ground cannot happen effectively unless there is a collaborative platform that brings together key players to spearhead concerted action. The collaborative platform provides a more holistic solution and effective implementation of strategies, policies and programmes. In order to develop a conducive ecosystem to support and sustain key economic growth activities and societal well-being at localities across Malaysia, we need 8 clusters:



10-10 MySTIE: A mechanism for sustainable development for shared prosperity



Source: Analytics by ASM and Nair, Ahmed, Vaithilingam and Monash University Malaysia Research Team, 2020

A Collaborative Network – Sustainable Innovation Ecosystem

Developing Home-Grown, High-Value Innovations

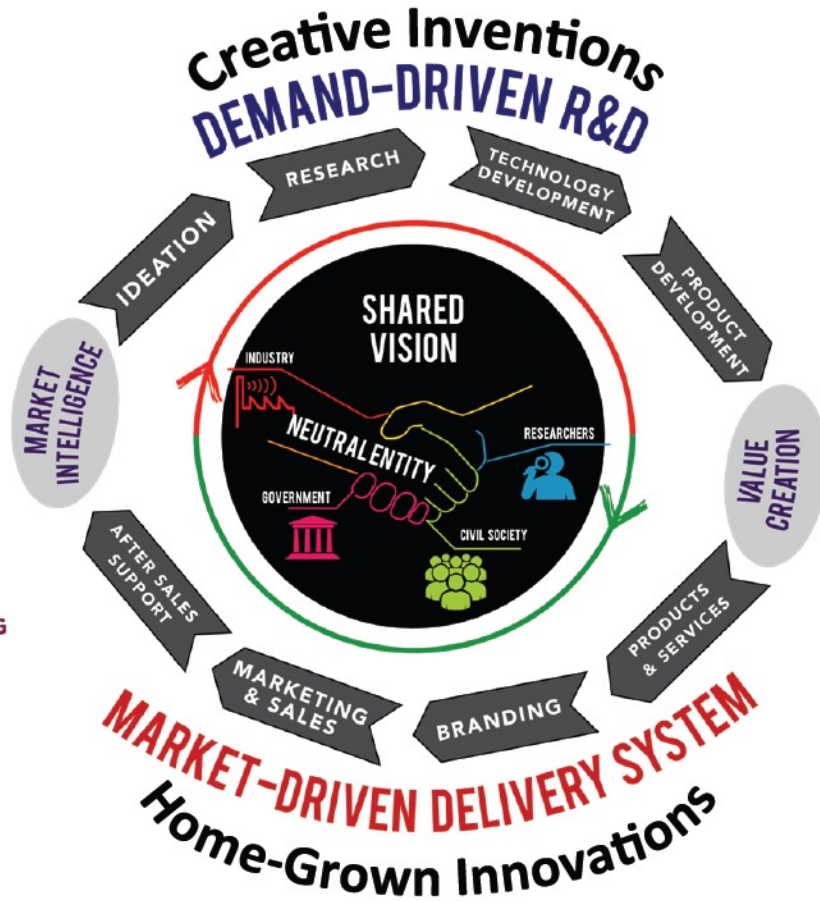
REALITY CHECK



INDUSTRY GROWTH CHALLENGES



INDUSTRY-DRIVEN STRATEGIC PLANNING



OUTCOMES



KNOWLEDGE CLUSTERS



TALENT HUB



DISRUPTIVE INNOVATION

Past impact of E&E Industry

Research & Development		Commercialisation	
145		RM 5 Billion	
Collaborative R&D projects approved		FDI realised in high value-added activities	
87	24	11x	
Companies	Universities	Return for every RM1 of R&D spent	
65%	35%	25%	
Industry Funding	Government Grant	Commercialisation rate from Completed R&D projects	

Potential Impact to



NEUTRAL ENTITY



SIRIM Tech Venture Sdn. Bhd (179894-W)
Accelerating Business Commercialisation



SIRIM Tech Venture Sdn. Bhd (179894-W)
Accelerating Business Commercialisation



TECHNOLOGY PARK MALAYSIA

MOSP Initiative (2020-2021)

Malaysia Open Science Alliance

Academy of Sciences Malaysia (ASM)

Ministry of Science, Technology & Innovation –
Malaysia Science and Technology Information
Center (MASTIC)

Malaysian Administrative Modernisation and
Management Planning Unit (MAMPU)

Ministry of Higher Education (MOHE)

Ministry of Health (MOH)

Malaysia Research University Network (MRUN)

- University of Malaya
- Universiti Sains Malaysia
- Universiti Teknologi Malaysia
- Universiti Kebangsaan Malaysia
- Universiti Putra Malaysia

International Science Council Regional Office
for Asia and the Pacific (ISC ROAP)

1. Malaysian Space Agency
2. Nuclear Agency Malaysia
3. Chemistry Department Malaysia
4. Atomic Energy Licensing Board
5. Malaysia Technology Development Corporation
6. Malaysia Venture Capital Management Berhad
7. Malaysian Global Innovation & Creativity Centre
8. Malaysian Industry – Government Group
for High Technology (MIGHT)
9. MIMOS Berhad
10. National Institute of Biotechnology Malaysia
11. Planetarium Negara



Open Government Data
by Malaysian Administrative
Modernisation and
Management Planning Unit
(MAMPU)



CATALOG

open
SCIENCE



DATA COLLECTION



MAIN LOG



Researchers / Society / Industry / Government



International Open Science
Data Platforms



Research Institutes
15 from 73 Public Sector



Agencies Repositories
under MOSTI

Research Universities
5 from 64 universities



Research Universities
Repositories

UM, USM, UTM, UKM, UPM

MOSP Pilot Initiative



**OPEN INNOVATION
FEATURE**



**Open Science
Knowledge Platform**

Research

Discovery

Platform

Research

Collaboration

Platform

10|MySTIE 10| FRAMEWORK

Trailblazing the Way for Prosperity,
Societal Well-Being & Global Competitiveness



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