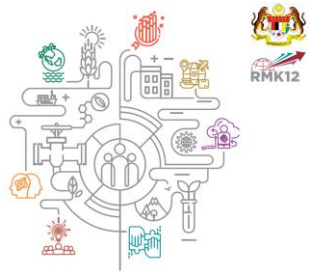
UNIVERSITI MALAYA

PUSAT KECEMERLANGAN UM (UM CENTRES OF EXCELLENCE)

UM PRIORITY AREAS

INTERNATIONAL

NATIONAL



UNIVERSITI MALAYA

Prior study has been done by studying the **International and National documents** to identify UM Priority Areas.

The documents consist of **Initiatives, Strategies and Action Plan** by the Global and Current Government.

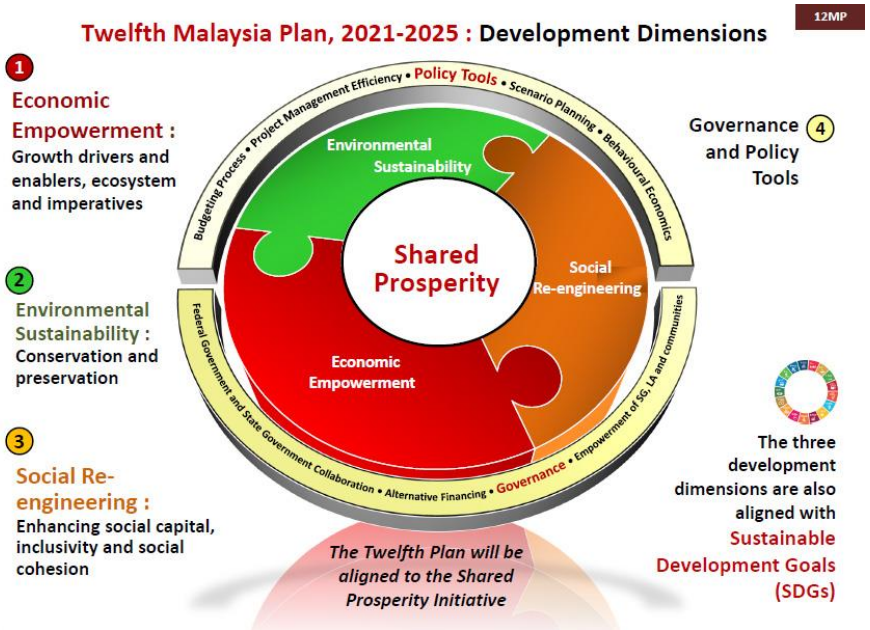
Among items that were considered as the priority is based on the **Economy, Environment and Social Well-being**.

TWELFTH MALAYSIA PLAN

AIMS: SHARED PROSPERITY, ENHANCE INCLUSIVITY AND SUSTAINABLE MALAYSIA

Three main **development dimensions** under the 12th Malaysian plan:

1. Economic Empowerment
2. Environmental Sustainability
3. Social Re-engineering



Three **theme** in the 12th Malaysian plan:

GAME CHANGER I: Imperative for Reform and Transformation

THEME 1 Resetting the Economy

GAME CHANGER II: Catalysing Strategic and High Impact Industries to Boost Economic Growth

GAME CHANGER III: Transforming Micro, Small and Medium Enterprise as the New Driver of Growth

THEME 2 Strengthening Security, Wellbeing and Inclusivity

GAME CHANGER IV: Enhancing National Security and Unity for Nation-Building

GAME CHANGER V: Revitalising the Healthcare System in Ensuring a Healthy and Productive Nation

GAME CHANGER VI: Transforming the Approach in Eradicating Hardcore Poverty

GAME CHANGER VII: Multiplying Growth of Less Developed States especially Sabah and Sarawak to Reduce Development Gap

THEME 3 Advancing Sustainability

GAME CHANGER VIII: Embracing the Circular Economy

GAME CHANGER IX: Accelerating Adoption of Integrated Water Resources Management

Source: RMK-12, EPU, 2021

TWELFTH MALAYSIA PLAN

Four **policy enabler** in the 12th Malaysian plan:

POLICY ENABLER 1 Developing Future Talent

GAME CHANGER X: Improving TVET Ecosystem to Produce Future-Ready Talent

POLICY ENABLER 2 Accelerating Technology Adoption and Innovation

GAME CHANGER XI: Enhancing Digital Connectivity for Inclusive Development

GAME CHANGER XII: Aligning Research and Development towards Commercialisation, Wealth Generation and Economic Growth

POLICY ENABLER 3 Enhancing Connectivity and Transport Infrastructure

GAME CHANGER XIII: Transforming the Logistics Ecosystem for Greater Efficiency

POLICY ENABLER 4 Strengthening the Public Service

GAME CHANGER XIV: Transforming the Public Service through the Whole-of-Government Approach

Economic sectors to improve:

- SERVICES
- MINING
- MANUFACTURING
- QUARRYING
- AGRICULTURE
- CONSTRUCTION

Source: RMK-12, EPU, 2021

TWELFTH MALAYSIA PLAN

Strategic and **high impact industries** and **activities**:

- **ELECTRICAL AND ELECTRONICS (E&E)**
- **GLOBAL SERVICES[1] (GS)**
- **AEROSPACE**
- **CREATIVE**
- **TOURISM**
- **HALAL**
- **SMART FARMING**
- **BIOMASS**

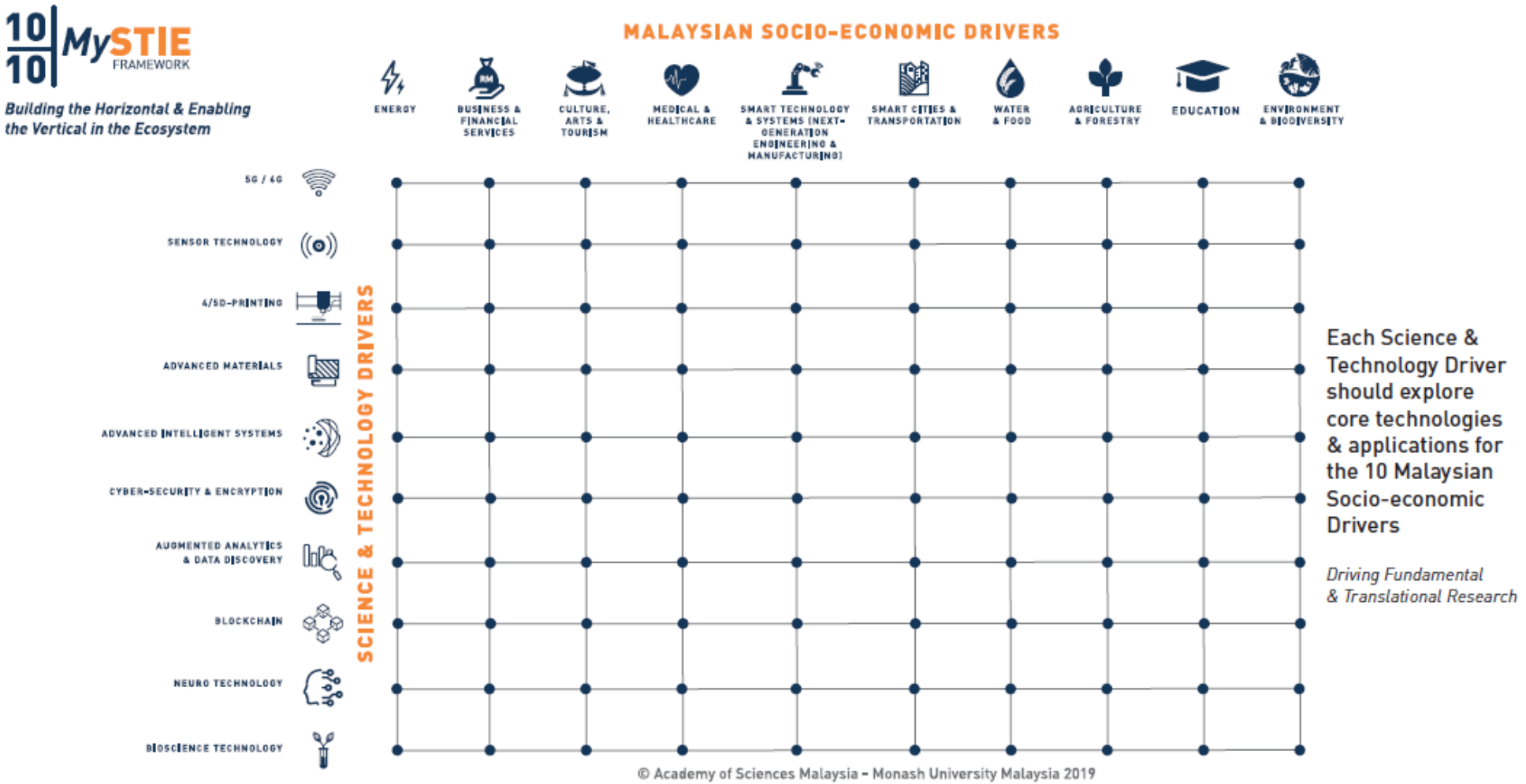
[1]High-value services that incorporate multiple functions and business services operating across the country with full control in the decision-making process, budget and reporting lines. These services include ICT, R&D, finance and accounting, human resources, procurement, legal, marketing, business analytics and shared support services across multiple locations within an organisation. Examples of global services are Principal Hubs, Global Business Services and headquarters operations.

Source: RMK-12, EPU, 2021

SUSTAINABLE DEVELOPMENT GOALS

Source: United Nation, 2015

10-10 MYSTIE



To achieve High-Tech Country and Gross Domestic Product (GDP) of RM3.4 trillion by 2030.

Source: 10-10 MySTIE, 2021

30 NATIONAL STIE NICHE AREAS FOR 10 SOCIO-ECONOMIC DRIVERS

Energy

Diversified Renewable Energy

Energy Storage System

Microgrid

Business & Financial Services

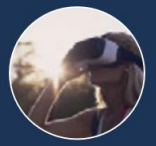
Subscription Business Models & Sharing Platforms

Digitalised & Autonomous Services

Fintech in Islamic Finance

Culture, Arts & Tourism

Creative Content & Heritage



Digitalised Tourism

High-Value Tourism

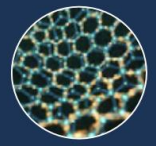
Medical & Healthcare

Digital Health

Precision Medicine

Clinical Trials Hub for Developing Countries

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



Advanced Materials for Circular Economy & Sustainable Society

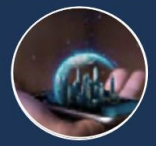
Next-Gen Smart Factories

Manufacturing of Smart Devices & Technology Development

Smart Cities & Transportation

Integrated Urban Infrastructure & Infostructure Management

Smart Systems for Connected Rural-Urban Communities



Human-Centred Design & Analytics

Water & Food

Premium Halal Food

Local Superfood

Integrated Water Resources Management

Agriculture & Forestry

High-Value Seafood

Premium Tropical Fruits

Local Agricultural Input

Smart Supply Chain Management for Sustainable Forest Products

Education

Personalised & Experiential Learning

Micro-credentials

Global Online Learning: Promoting Local Content

Environment & Biodiversity

Precision Biodiversity

Innovative Eco-Products from Waste

Source: 10-10 MySTIE, 2021

IMPACT OF THE NATIONAL STIE NICHE AREAS

12 niche areas are identified as
ECONOMIC BOOSTERS


Digitalised & Autonomous Services


High-Value Tourism


High-Value Seafood

Subscription Business Models & Sharing Platforms


Premium Halal Food


Premium Tropical Fruits


Fintech in Islamic Finance


Clinical Trials Hub for Developing Countries

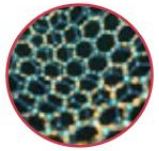

Next-Gen Smart Factories


Digitalised Tourism


Manufacturing of Smart Devices & Technology Development


Global Online Learning: Promoting Local Content

11 niche areas are classified as (combination of economic and social impact)
DUAL-IMPACT ENABLERS


Advanced Materials for Circular Economy & Sustainable Society


Creative Content & Heritage


Integrated Water Resources Management


Local Superfood


Energy Storage System


Integrated Urban Infrastructure & Infostructure Management


Smart Supply Chain Management for Sustainable Forest Products


Diversified Renewable Energy


Micro-credentials


Innovative Eco-Products from Waste


Local Agricultural Input

07 niche areas are identified as
SOCIETAL WELL-BEING CATALYST


Digital Health


Precision Medicine


Precision Biodiversity


Microgrid


Personalised & Experiential Learning


Smart Systems for Connected Rural-Urban Communities


Human-Centred Design & Analytics

Source: 10-10 MySTIE, 2021

PRIORITIES OF CURRENT GOVERNMENT

1. Reducing **Living Costs**

2. **Fighting Corruption** and **Promoting Democracy**

3. Strengthening **Youth Economic Prospects** And Engaging Into The **Humanity Sector** (eg. Green, Agro, Creative, Tvet - Skill-based Jobs)

4. **Rescuing** The **Lost Generation** In Education

5. Building **Disaster Mitigation** Strategies And Improved **Rakyat's Protection**

6. Working To Solve The **Contract Doctors Issue** And Giving **Robust Welfare** For Healthcare Employees

7. Eliminating **Gender Inequality** And Promoting **Women's Participation** In **Society And The Economy**

8. Strengthening The **Sabah** And **Sarawak** Regions

9. Improve All **Malaysians' Competitiveness**, Specifically Among Vulnerable Groups

10. **Environmental Preservation** For Our Future Generations

Source: Harapan Action Plan, 2022

MALAYSIA MADANI

6 BASIC PILLAR

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kesej **A** hteraan

D aya Cipta

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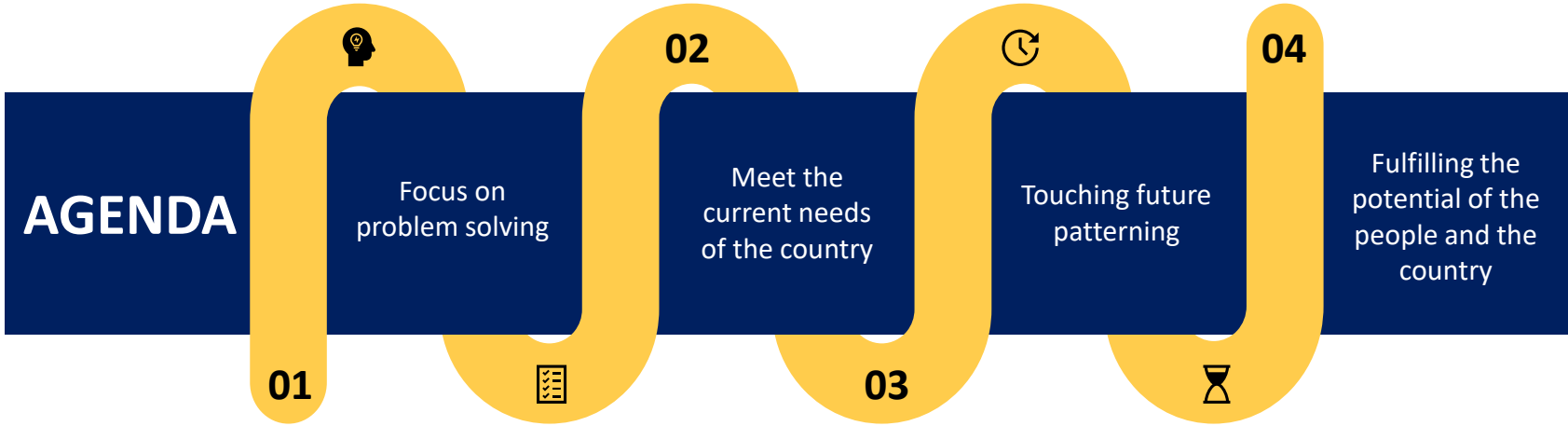
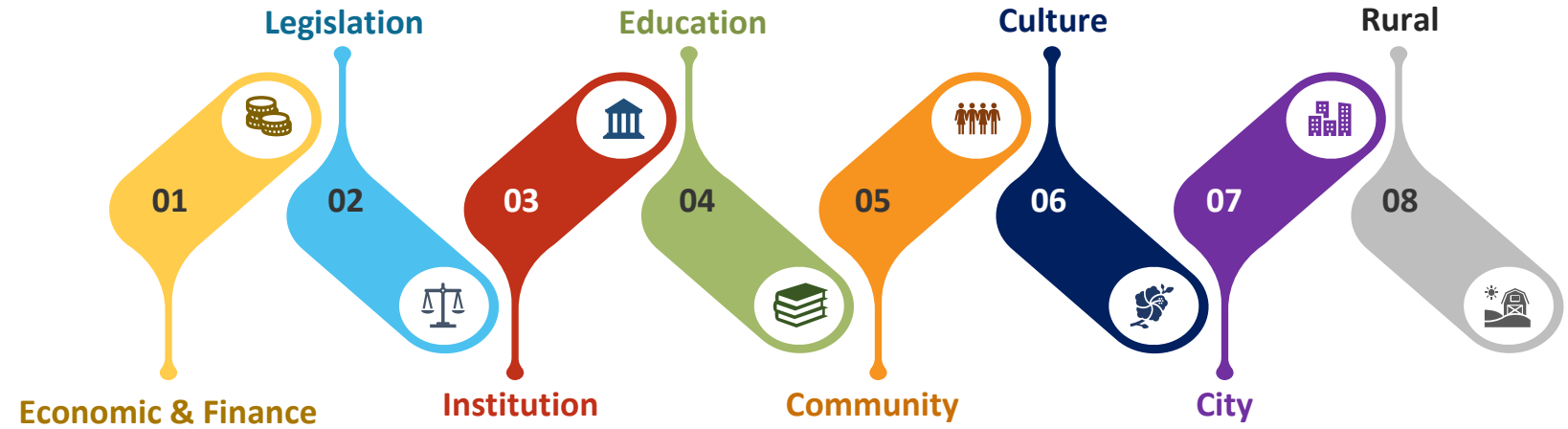
keyaki **N** an

I hsan



Target

Be the basis of every core that will be explored to strengthen:



Source: Prime Minister Office, 2023

MALAYSIA MADANI STRATEGIC THRUST

1 **Rebuilding the economy** through a human economy approach by economic restructuring based on ethics and sustainability

2 **Ensuring human well-being** is supported by the principle of fairness and courtesy. Community institutions are empowered to protect the dignity of human beings, social norms, respect and solidarity

3 **Reform of the legal and democratic institute** towards optimizing its functions and responsibilities to implement related policies

4 **Creating a trustworthy administration** through reforms to create a just and humane country

According to gradmalaysia MALAYSIA'S 100 Leading Graduate Employers 2021/2022, they have listed **20 career sectors** and **identify key differences** between the aspirations and behaviours of students interested in these sectors

The Career Sectors

1. Accounting & Professional Services
2. Automotive
3. Banking & Financial Services
4. BPO & Shared Services
5. Consulting
6. E-Commerce
7. Education
8. Electronics
9. Energy/Oil & Gas/Utilities
10. Engineering & Heavy Industries
11. Fast-moving Consumer Goods (FMCG)
12. Government Regulatory Bodies
13. Insurance
14. Information Technology (IT)
15. Leisure, Travel & Hospitality
16. Media & Entertainment
17. Pharmaceuticals
18. Property & Development
19. Retail
20. Telecommunications

These are the sectors that covers the **Research and Development (R&D) activities**

However, other sectors also have the potential for UM researchers to explore

Source: gradmalaysia MALAYSIA'S 100 Leading Graduate Employers 2021/2022

EXISTING ACTIVE HICOEs, UMCOEs, ENDOWMENT-BASED CENTRES, RESEARCH CLUSTERS IN UM

HICOE

1. UM Power Energy Dedicated Advanced Centre (UMPEDAC)
2. Photonics Research Centre (PRC)
3. Institute of Ocean and Earth Sciences (IOES)
4. Tropical Infectious Diseases Research & Education Centre (TIDREC)

UMCOE

1. Centre for Research in Biotechnology for Agriculture (CEBAR)
2. Nanotechnology and Catalysis Research Center (NANOCAT)

ENDOWMENT-BASED CENTRES

1. Ungku Aziz Centre (UAC)
2. Social Well-Being Research Centre (SWRC)

UM RESEARCH CLUSTERS

1. Industry, Innovation & Sustainability Science (IISS)
2. Frontiers of the Natural World (FNW)
3. Health & Well-Being (HWB)
4. Social Advancement & Happiness (SAH)

OTHER CENTRES OF RESEARCH IN UM

1. Centre for ASEAN Regionalism University of Malaya (CARUM)
2. Centre for Latin American Studies (CLAS)
3. Malaysian Population & Migration Research Centre (MPMRC)
4. UM Halal Research Centre (UMHRC)
5. UM STEM Centre (UM STEM)
6. Centre for Quranic Research (CQR)
7. Centre for Malaysia Indigenous Studies (CMIS)
8. Malaysian Chinese Research Centre (MCRC)
9. Centre of Civilisational Dialogue (UMCCD)
10. UM Cultural & Heritage Research Centre (UMCHRC)
11. UM North-South Research Centre (NSR)
12. Malaysia Japan Research Centre (MJRC)
13. Malaysia Korea Research Centre (MKRC)
14. UM Centre for Addiction Sciences (UMCAS)
15. Centre for Natural Products Research and Drug Discovery (CENAR)
16. Oral Cancer Research & Coordination Centre (OCRCC-UM)
17. UM Cancer Research Institute (UMCRI)
18. National Centre for Particle Physics (NCPP)
19. Low Dimensional Materials Research Centre (LDMRC)
20. Centre of Research in Systems Biology, Structural Bioinformatics and Human Digital Imaging (CRYSTAL)
21. Centre for Ionics University of Malaya (CIUM)
22. Mushroom Research Centre (MRCUM)
23. UM Plasma Technology Research Centre (UMPTRC)
24. Centre of Fundamental and Frontier Sciences in Self-Assembly (FSSA)
25. Centre for Mathematical Modelling & Optimization (CMMO)
26. UM Centre for Data Analytics (UMCDA)
27. UM Centre for Proteomics Research (UMCPR)
28. Centre for Advanced Manufacturing and Material Processing (AMMP)
29. Centre for Innovation in Medical Engineering (CIME)
30. Centre for Energy Sciences (CES)
31. Centre for Transportation Research (CTRUM)
32. UM Centre for Ionic Liquids (UMCIL)
33. Centre for Research in Industry 4.0 (CRI4.0)
34. Centre for Printable Electronics (CPE)
35. Water Engineering and Spatial-Environmental Governance (WESERGE)
36. National Antarctic Research Centre (NARC)
37. Centre for Building, Construction & Tropical Architecture (BuCTA)
38. Centre for Sustainable Urban Planning & Real Estate (SUPRE)
39. Centre for Research in International and Comparative Education (CRICE)
40. Centre of Applied Biomechanics (CAB)
41. Centre for Image & Signal Processing (CISIP)
42. Centre for Innovative Construction Technology (CICT)
43. Centre for Product Design & Manufacturing (CPDM)
44. Centre for Research in Applied Electronics (CRAE)
45. Centre for Separation Science & Technology (CSST)
46. Centre for Advanced Material (CAM)
47. Centre for Law and Ethics in Science and Technology (CELEST)
48. Centre for Legal Pluralism and Indigenous Law (CLPIL)
49. Centre for Epidemiology and Evidence-Based Practice (CEBP)
50. Clinical Investigation Centre (CIC)
51. National Orthopedic Centre of Excellence for Research and Learning (NOCERAL)
52. Centre for Population Health (CePH)
53. Biodiversity and Ecological Research Network (BEN)
54. Centre for Research in Waste Management (CRWM)
55. Centre for Theoretical and Computational Physics (CTCP)
56. Centre of Research for Statistical Modelling and Methodology (CoRSMM)
57. Geosciences Research Centre (GRC)
58. Centre for Mobile Cloud Computing Research (C4MCCR)
59. Institute of China Studies (ICS)
60. Centre for Excellence for Research in AIDS (CERIA)
61. Hong Lou Meng Research Centre (HLM)
62. Shimadzu-UMMC Centre for Xenobiotic Studies (SUCXES)
63. Quantum Science Centre (QSC)
64. UM Bioequivalence and Testing Centre (UBAT)
65. UM Centre for Data Analytics Consultancy and Services (UM-CDACS)
66. UM Centre for Democracy and Elections (UMCEDEL)
67. UM Eye Research Centre (UMERC)
68. UM Centre of Regulatory Studies (UMCoRS)
69. UM Family Research and Development Centre (UMFRDC)
70. UM Research Imaging Centre (UMRIC)
71. Virtual Reality Centre (VRC)

HIGHER INSTITUTION CENTRE OF EXCELLENCE (HICOE)

1. UM POWER ENERGY DEDICATED CENTRE (UMPEDAC)

Vision

Empowering Malaysia with the capability to become a regional leader in power energy.

Mission

Researching innovations that not only benefit the nation and improve quality of life, but also raise Malaysia's standard of research in power energy and its related fields

Professor Dr. Nasrudin Abd Rahim
Founder and Director
UM Power Energy Dedicated Advanced Centre (UMPEDAC)

Objectives

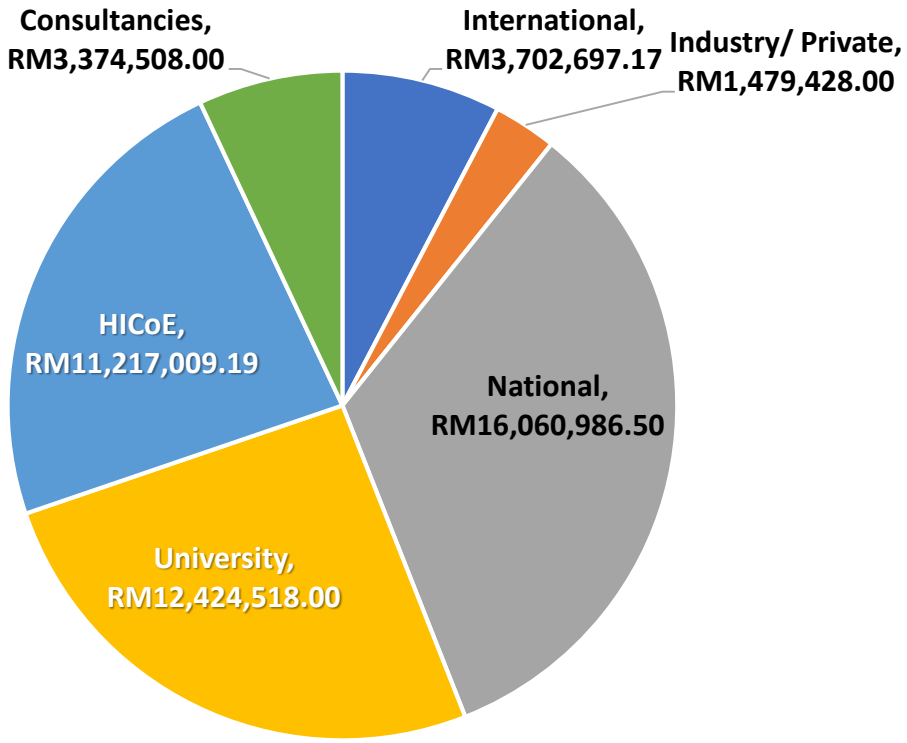
- Pioneering local research in power energy and spurring its growth towards world-class standards;
- Imparting the knowledge and the expertise gained from R&D;
- Centralizing knowledge, to become a knowledge hub to both academic institutions and related industries, for applications in power energy;
- Production of knowledgeable, skilled, capable, and competent graduates;
- The encouragement of development of new technology through research, among both students and engineers;

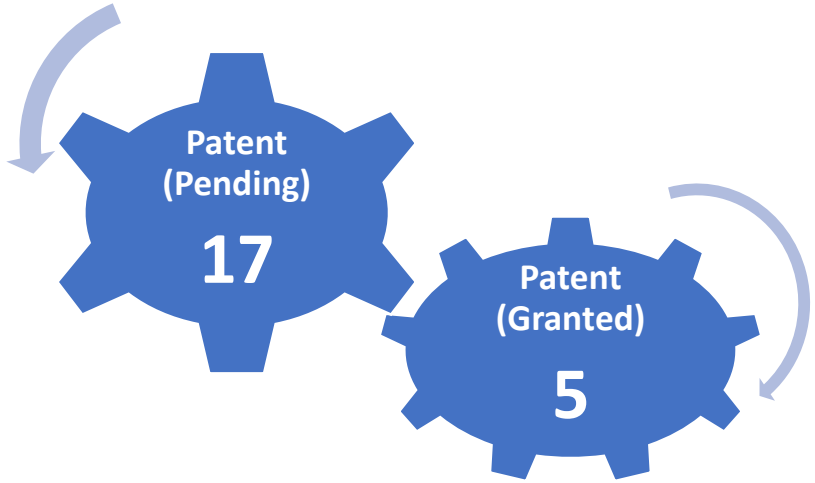
Sustainable Development Goals

- **Goal 4: Quality Education**
  Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- **Goal 7: Affordable and Clean Energy**
  Ensure access to affordable, reliable, sustainable and modern energy for all
- **Goal 9: Industry, Innovation and Infrastructure**
  Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- **Goal 11: Sustainable Cities and Communities**
  Make cities and human settlements inclusive, safe, resilient and sustainable.

RESEARCH & CONSULTANCY GRANT: 2010-2022

(as of 31st December 2022)





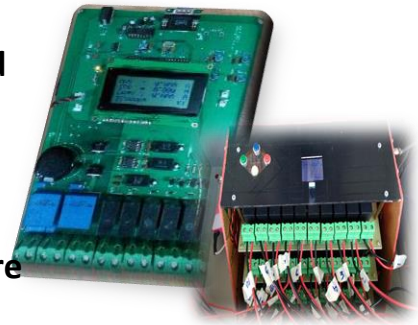
Patents: 22

Copyrights: 2

Technology Licensing: 1

RESEARCH PRODUCTS

Solar Fountain and Garden Lighting System



Multiplexer PV-IV Tracer System

PV Micro-inverter

Green Home PV/T Concept

PV Solar Street Light System

Contactless Temperature Thermometer

Grid-connected PV Micro Grid Inverter

PV Solar Tracker

PV Solar Tracking System

Technology Licensing: Single-Phase Grid-connected PV Inverter

Solar i-Kiosk

Green Oxyhydrogen Incinerator

Solar PV Online Monitoring System

Self-Cleaning Coating PV Module

ENGAGEMENT WITH SOCIETY

Clean Energy and Technology Conference (CEAT), 2011, 2013, 2014, 2016, 2018 and 2023 (coming soon).

International Scientific Forum (ISF 2019).

Solar i- kiosk and food truck, 2016: A collaborative project between UMPEDAC and local industry, Genius Wisdom Sdn. Bhd. To introduce modern business concept (using solar energy – emit noise and air pollution).

The first successful discussion between Universiti Malaya and Kyoto University to initiate Double Master's Degree Program in Renewable Energy.

Demonstrating renewable energy (RE) technology application to rural communities in Cambodia.

Visit from YBhg. Tan Sri Zarinah Anwar, UM Board of Director.

Workshop on "*Mendekati Keluarga Orang Asli - Sumber Tenaga Boleh Diperbaharui Sebagai Pemangkin Perubahan*" at Cameron Highland, 2021 (under JACEP-JICA Jepun).

Obtained MS ISO/IEC 17025 certification by the Department of Standard Malaysia.

* Solar Farm Testing

Solar PV training with indigenous community at Long Pasia, Sabah & Kampung Sg. Merah, Sarawak.

Program to Foster Renewable Energy Knowledge among Malaysian Youth.

Kyoto University – Universiti Malaya Rural Electrification Workshop.

Professional services for Grid-Connected PV Inverter Site Testing and Power Quality.

Visit from KPRIET (India), MIMOS Berhad, UNiKL, UiTM, Xiamen U, and many more.

2. PHOTONIC RESEARCH CENTRE (PRC)

MISSION

To form a research network with world-class facilities for encouraging innovation in the field of optical communications and transfer of knowledge to public and private sectors as well as becoming the reference center.

Distinguished Professor Datuk Dr. Harith Ahmad
Director
Photonic Research Centre (PRC)

OBJECTIVE

- To develop a world class photonics research center.
- To provide expertise in the field of photonics and to train human capital.
- To produce new photonics products and be the catalyst in the formation of SMEs.
- To be the national reference center for optical communication testing and calibration.

Impactful Programs in Photonics Research Centre

Photonics in AR 4.0 for Malaysia Oil Palm Plantation Industry	•Contract research sponsored fully by Sime Darby Plantation Research Sdn. Bhd. (SDPR) amounting to RM1.0M •Solution for a full automation system for FFB harvesting (part of the Infinity program spearheaded by SDPR) •To overcome the shortage of labor that cost the industry RM10 billion loss in 2021 •The program has been shown to progress very well and is expected to receive another RM700k of funds in 2023 for an extension of scope.
Human Resource Upskilling Program for Engineers in Malaysia	•The upskilling program is fully sponsored by II-VI AMC Sdn. Bhd. (Coherent Inc), a multinational company residing in Ipoh (the largest employer in Perak), in collaboration with MIDA •Coherent Inc is one of the largest producers of photonic devices used in various industries such as telecommunication, EV and manufacturing. •M.Phil. (Master by research) for 35 engineers with projects based on industrial problems. •This program is to enhance the competency and qualification of engineers in Malaysia to be on par with other countries in order to attract or sustain the foreign direct investment
Innovative Slope Monitoring Using Advanced Distributed Optical Sensors for Slope Monitoring in Malaysia	•The program was started in 2019 with funding from MIGHT and British Council under the Newton Ungku Omar Fund • By collaborating with experts from the UK, the center has developed various sensors for slope monitoring and ground movement detection. •As landslides and slope failures are considered serious problems that have caused the loss of lives in Malaysia, monitoring systems are needed to monitor the conditions of critical slopes that had been identified throughout the country •PRC is working closely with a main G7 contractor for JKR, Pintas Utama Sdn. Bhd. to test the sensors in the field (Blue Valley, Cameron Highland). An MOA for this collaboration will be signed on 17 January 2023. •It is a step before the commercialization and deployment of the sensors in Malaysia.

3. INSTITUTE OF OCEAN AND EARTH SCIENCES (IOES)

Vision

To be at the forefront in generating and disseminating scientific ideas and knowledge in marine and maritime research for sustainable utilization and management of the marine environment

Mission

To seek scientific understanding and to promote best management practices in the utilization of the marine environment, ocean law and maritime affairs, through multidisciplinary research, education and training

Professor Dr. Lim Phaik Eem
Acting Director
Institute of Ocean and Earth Sciences (IOES)

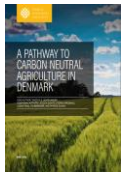
Objectives

- Initiate and undertake various aspects of ocean and earth science related research including science and technology, public policy and law, socio-economic development, environment, geography, history, political science and international relations.
- Facilitate collaboration within the University of Malaya and with local and international institutions in multidisciplinary research, training and education, and technology development.
- Provide advice and consultancy for management and policy decisions on sustainable development of coastal and marine resources, and the environment.
- Facilitate in the development of new products and patents arising from ocean and earth science research, in collaboration with the government and industries.

IOES ANALYSIS FOR QS WORLD UNIVERSITY RANKINGS 2022 BY SUBJECT 2022
(Earth & Marine Science) - No 33

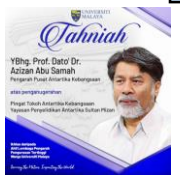
INSTITUTE OF OCEAN AND EARTH SCIENCES (IOES)
INSTITUT SAINS SAMUDERA DAN BUMI
Pusat Kecemerlangan Pendidikan Tinggi (HICoE)
&
Pusat Kecemerlangan Universiti Malaya (UMCoE)

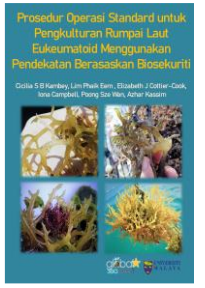
Government and international consultancies on severe weather/climate issues/harmful algal blooms e.g., National Water Transformation Plan 2040 (EPU), National Report for United Nations Framework Convention on Climate Change (KASA)/Contribution to UNESCO-Intergovernmental Oceanographic Commission (IOC) effort in developing a data portal of HAB species occurrence and event data globally



Solving the most pressing climate and environmental challenges, conserving and promoting sustainable use of natural heritage and resources through new technological applications and multidisciplinary approaches for the betterment of society

National and international recognition
- Fellow-Marine Biological Association UK; Fellow Royal Society of Biology (UK); Academy of Sciences Malaysia, National Antarctic Medal, Scientific Committee on Oceanic Research (International Science Council)





IOES In The Community – Help to identify and tackle issues related to Society/Environment e.g., on the impact of anthropogenic activities under changing climate/severe weather and climate, impact of air pollution on public health in Malaysia (NIHR, UK), conserve wild stock of tiger prawn in Sarawak for sustainable fishing (DOF); development of climate resilience seaweed strains for sustainable aquaculture (UM; NHM,UK; DOF Sabah)

International and national capacity building
- Training course to Malaysian students on ocean observation technology, seminars, workshops

4. TROPICAL INFECTIOUS DISEASES RESEARCH & EDUCATION CENTRE (TIDREC)

Vision

A leading, world-renowned research centre for the advancement of knowledge in tropical infectious diseases.

Mission

To advance knowledge by focusing on research in neglected tropical infectious diseases that have potential impact on the global community.

Professor Dr. Sazaly Bin Abu Bakar
Director
Tropical Infectious Diseases Research & Education Centre (TIDREC)

TIDREC houses the World Health Organization (WHO) Collaborating Centre for Arbovirus Reference & Research, and recently has been designated as one of the only three global outposts of **Tick Cell Biobank**.

TIDREC also oversees the operation of a fully certified modular **biosafety level 2 (BSL-2) & 3 (BSL-3) laboratories** for research involving highly virulent pathogens, as well as the country's first mobile BSL-3 laboratory. TIDREC also is currently the **only center** that operates a **mock BSL-3 training facility**.

During COVID-19 pandemic, TIDREC was designated as **one of the 10 diagnostics laboratories under a Special COVID-19 Screening Team formed by the Ministry of Higher Education (MOHE) and Ministry of Science, Technology & Innovation (MOSTI)** to assist the Ministry of Health (MOH) to conduct 42,420 tests within 30 days.

TIDREC also actively collaborate with local and international partner institutions, communities and industries to accelerate research on different aspects of COVID-19.

TIDREC has a proven and successful track record of **providing world class research and education in tropical infectious diseases**, especially diseases that have potential impact on the global community.

UNIVERSITI MALAYA

TIDREC@UM
TROPICAL INFECTIOUS DISEASES RESEARCH & EDUCATION CENTRE

Impact of Research in Niche Area of TIDREC

TIDREC Niche Area: Vector and Vector-borne Infectious Diseases	
Director	Professor Dr. Sazaly Abu Bakar
Status HICoE	Phase I June 2019 – June 2022 (Funded RM 3,000,000.00)
Income Generation (3 years)	RM 8, 161, 358.46

Selected as one of the laboratories to assist the Malaysian government in national SARS-CoV-2 genome sequencing and the evaluation of COVID-19 diagnostic kits (MDA)

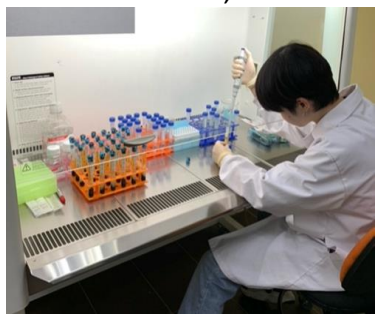
Produces trained skill force in the field of biosafety and biosecurity

Strengthening research capabilities at the local and international levels

One health surveillance of zoonotic infectious pathogens for pandemic preparedness

Expertise and human capacity building in vaccine development and manufacturing

Provides cutting-edge expertise and consulting services to local and international industry partners for clinical trials, antivirus and anti-microbial testing



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biotropics MALAYSIA
DAIKIN
HYPERWAVE Systems Engineering Sdn Bhd
GenBody Inc. CHANGE AND INNOVATION
AMC ENVIRONTECH
omniyo™ Advanced Nanotechnology Products
mundipharma
FUSION RESONANCE TECHNOLOGY®
AAF INTERNATIONAL
ecoat™
CIPRESS Bio-Tech

UNIVERSITI MALAYA CENTRE OF EXCELLENCE (HICOE)

1. CENTRE FOR RESEARCH IN BIOTECHNOLOGY FOR AGRICULTURE (CEBAR)

Vision

A world class research centre for agbiotech, advancing a sustainable bioeconomy.

Mission

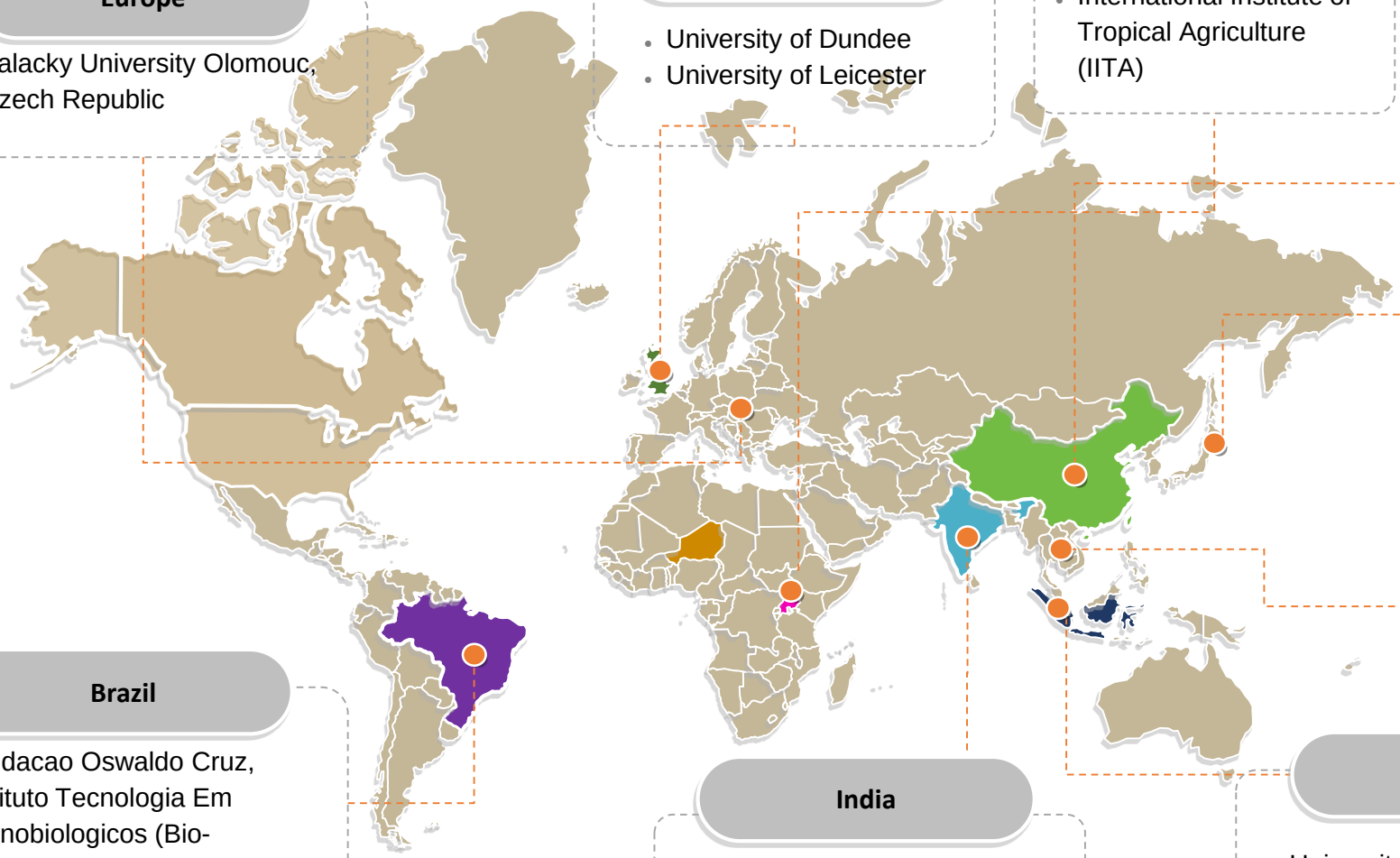
Advancing agbiotech through impactful research, quality education and effective engagement.

Professor Dr. Jennifer Ann Harikrishna
Director
Centre for Research in Biotechnology for Agriculture (CEBAR)

About the CoE

The Centre for Research in Biotechnology for Agriculture (CEBAR) is a Centre of Research Excellence at the University of Malaya (UM). CEBAR pursues multidisciplinary research leveraging Malaysia's mega biodiversity to support a sustainable agricultural bioeconomy. CEBAR was established in 2005 in recognition of the need to strengthen the agricultural biosecurity scientific capacity of Malaysia.

CEBAR: International Collaboration



Europe

- Palacky University Olomouc, Czech Republic

UK

- University of Dundee
- University of Leicester

Uganda

- International Institute of Tropical Agriculture (IITA)

China

- Nanjing Agriculture University

Japan

- Nara Institute of Science and Technology
- Kobe University
- Kyushu Institute of Technology

Thailand

- Suranaree University of Technology*
- Asian Institute of Technology*

Brazil

- Fundacao Oswaldo Cruz, Instituto Tecnologia Em Imunobiologicos (Bio-Manguinhos)

India

- Assam University
- Nirmala College for Women

Indonesia

- Universitas Airlangga*
- Universitas Gadjah Mada

**In the midst of developing MoU*

CEBAR: Industrial Linkages

Prof Dr Jennifer Ann Harikrishna
MRUN (rock melon) & Innovate Programme (biostimulants)

Dr Rosazlin Abdullah
Metabolite profiling of Ganoderma-infected oil palm

Prof Dr Subha Bhassu
Molecular Diagnostic Detection kit for Shrimp Virus

Prof Dr Jennifer Ann Harikrishna
Postgraduate student's project

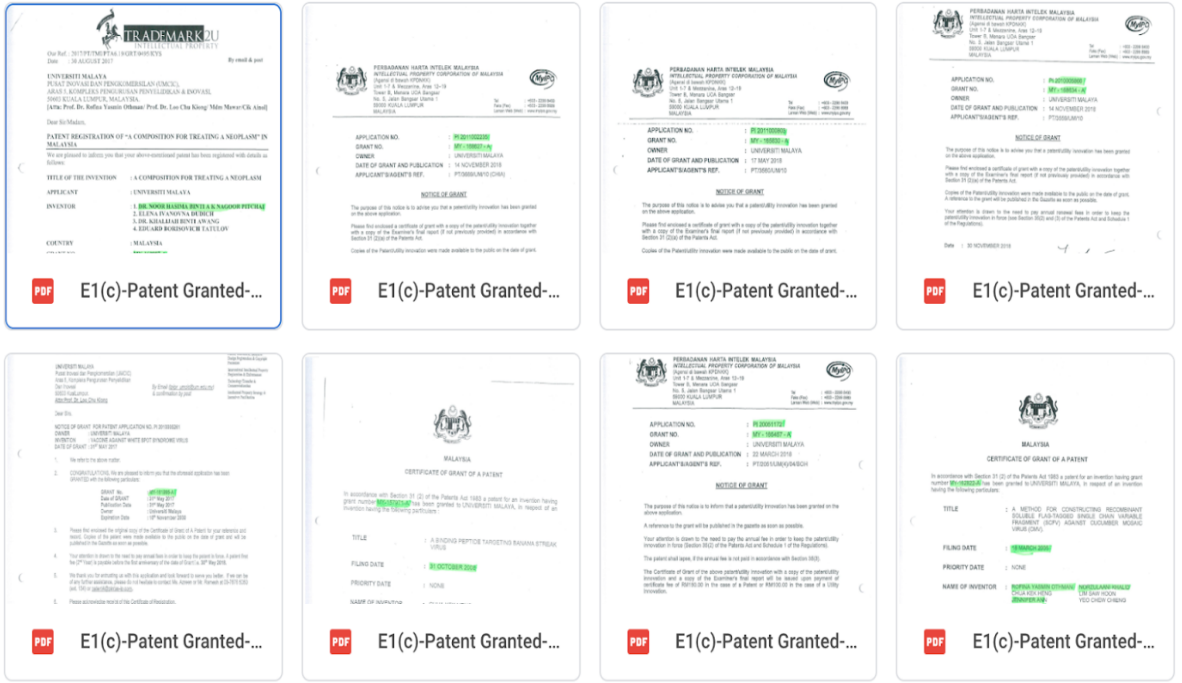
Dr Hasmahzaiti Omar
Species diversity of rat in oil palm plantations and its control

Dr Tan Boon Chin
Micro-credentials and Urban Farming

Innovation - IPR/patents

Granted (selected)

- *Vaccine Against White Spot Syndrome Virus*
- *A Modular Airlift Tubular Photobioreactor (A Bioreactor For Algae Cultivation)*
- *A Plant Virus Expression Vector*
- *A Novel Peptide Targeting Banana Streak Virus (BSV) - (A Binding Peptide Targeting Banana Streak Virus)*



Filed (selected)

- *Rapid Detection of Prawn Viruses, using the Multiplex Real Time PCR Method and Kit thereof*
- *Rapid Detection of Prawn Viruses, Method and Kit thereof*
- *A Method of Altering Metabolite Levels In Boesenbergia rotunda by RNA Interference-Mediated Silencing of the Cinnamate-4-Hydroxylase Gene*

Research Highlights – Media coverage: online & print

4/12/2021 'High-protein fly larvae an alternative to chicken and fish feed' | The Star

'High-protein fly larvae an alternative to chicken and fish feed'

NATION

Sunday, 11 Apr 2021

BACHOK: Breeding flies may sound peculiar, but in aquaculture, black soldier fly (BSF) larvae are an alternative source of chicken and fish feed.

Universiti Malaya (UM) social engineering research group senior lecturer Dr Norhidayah Mohd Taufek said based on her four-year research, BSF or its scientific name Hermetia Illucens, is a cheaper alternative to buying livestock feed from the market.

The researcher from the UM Biological Science Institute said the larvae collected to feed chicken and fish were also high in protein, which is beneficial to the animals.

She said one gram of the flies' eggs costs only RM10 and the eggs could be recycled to generate up to 3kg of larvae.

Norhidayah said BSF's lifecycle was around 45 days and the larvae could be harvested after 15 to 18 days.

"The breeding process depends on the area where there are suitable organic wastes and the process is very easy.

"For example, put about one gram of BSF larvae inside a basin with food waste and let them grow into one-inch sized pupae.

"At this time, they can already be harvested to be made into feed. The larvae are easy to breed and clean as they are not a disease-vector and are not dangerous to humans," she said.

Norhidayah said BSF also decomposed organic waste that could be turned into fertiliser, while for fish food, BSF could be made into flour and then pellets using a formula.

She added that BSF could be found almost all over the world and were easy to breed, especially in the tropical weather of Malaysia.

"BSF have been widely used for several years in Selangor, however in Kelantan it is just starting," she said, adding that she was cooperating with Ain Aquaculture Sdn Bhd, a marine fish hatchling and breeding centre to conduct workshops for locals who were interested in breeding the larvae. — Bernama

TAGS / KEYWORDS:

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https://www.thestar.com.my/news/nation/2021/04/11/high-protein-fly-larvae-an-alternative-to-chicken-and-fish-feed#.YHLaPv5juJQ.linkedin 1/5

Scientist's mission to promote seaweed

By AIDA AHMAD

METRO NEWS

Thursday, 23 Sep 2021

Pilot project gives new lease on life to ex-drug users

KUALA LUMPUR: When Mohd Nasir Mohamad Hatta and Nor Asmah Abdullah tied the knot a year ago, they were unsure of what the future had in store for them.

Being reformed drug addicts, they were determined to make a good living. Sadly, the social stigma attached to drug use denied them the opportunities to be financially independent.

Fortunately, things started looking up for the couple in January this year when they were chosen to participate in a pilot agricultural community project devised by Universiti Malaya's (UM) Community and Sustainability Centre or UMCares.

The project is being implemented by UM Centre for Addiction Science Studies (UMCAS) and its beneficiary is Sinar Kasih, a non-governmental organisation set up two years ago to help ex-drug addicts, particularly those undergoing methadone treatment, to learn new skills and assimilate into society.

Mohd Nasir, 36, and Nor Asmah, 35, are among eight former substance abusers who are engaged in the pilot project involving the commercial cultivation of some 200 'berangan' banana plants on a 0.2-hectare plot in Kampung Padang Balang in Gombak, Selangor.

The plants still have several months to go before bearing fruit but watching what they have planted thriving before their very own eyes is a very satisfying experience for the participants.

"It gives us the feeling that all our hard work has already paid off," said Mohd Nasir, adding that although it had been hard for him to gain the trust of the public despite having been drug-free for five years now, not once did he lose hope of leading a useful life.

Pointing to their banana plantation, he said the whole area was overrun by shoulder-high weeds before he and his fellow participants cleared the land—which UMCares has leased for five years from the landowner—to cultivate banana.

TURN OVER A NEW LEAF

Mohd Nasir, who is from Kelantan, and Nor Asmah, from Selangor, were addicted to heroin for about 20 years before seeking treatment at Universiti Malaya Medical Centre (UMMC). In fact, the couple first met whilst undergoing methadone replacement therapy at UMMC six years ago.

(The methadone replacement therapy, introduced in Malaysia 13 years ago, helps drug abusers to overcome their addiction to opioids or hard drugs.)

"Thanks to the methadone programme, my wife and I are able to live like normal human beings. During my drug addict days, I used to be very thin and my life was so disorganised.

"Then I started to wonder how long more I was going to be dependent on drugs, especially when I saw my friends in my kampung, who were also addicts, dying," Mohd Nasir related when met recently at a workshop on banana cultivation and biochar production at the community project site, organised by UM.

The workshop was an excellent opportunity for Mohd Nasir and his wife to pick up some pointers on the correct techniques of cultivating banana.

He said both of them share an interest in agriculture and wish to eventually start their own venture on a piece of land owned by his family in Kuala Krai, Kelantan.

"I hope that the experience we gain from participating in this project will help us to improve our economic well-being," he added.

UM COMMUNITY PROJECT

UMCAS chief coordinator Dr Rusdi Abd Rashid, who also spearheads Sinar Kasih, said the banana cultivation scheme was a pilot community project that was devised by UMCares out of concern about the fate of the former drug users.

He said the project would enable the participants to build a new life by exploring the field of agriculture and starting their own economically-viable ventures.

He said they are guided by UM lecturers and researchers in various fields, including plant science and biotechnology.

The participants, most of whom are undergoing methadone therapy, also receive medical supervision and even spiritual guidance to boost their morale.

"Most addicts who are on methadone treatment are marginalised by society due to the assumption that they are still addicts. It's a misconception actually," he said.

TISSUE CULTURE TECHNIQUE

Meanwhile, UM Centre for Foundation Studies in Science senior lecturer Dr Mahanom Jalil, who heads the pilot community project, said the participants are tutored in all aspects, starting from the initial stages of cultivation right up to marketing.

Mahanom, who is a specialist in the production of tissue culture, said during the first phase of cultivation, they are exposed to the techniques of producing banana tissue culture at the Plant Biotechnology Incubator Unit at UM.

She explained that tissue culture banana shoots are preferred for commercial cultivation purposes as they are not only disease-resistant but also produce higher quality fruits. Tissue culture banana plants also have uniform growth rates and fruit production timings.

"This will make it easier for the farmers to harvest the bananas and market them," she added.

During the second phase, the participants learn banana cultivation techniques and how to produce biochar from agricultural waste.

Biochar is a carbon-rich material produced through a process called pyrolysis, which involves heating of biomass (such as wood or leaves), in the complete absence of oxygen. Studies have shown that biochar, when added to the soil, can increase crop growth and yield.

"After the second phase, we teach them how to identify diseases that commonly affect banana plants. The final phase involves marketing and producing banana-based downstream products," she said.

UMCares has received funding from the Education Ministry for the community project for ex-drug addicts which would be carried out over two years. Capital is also extended to former drug addicts who want to start their own nurseries to produce and sell tissue culture banana shoots, as well as produce biochar for marketing purposes.

"If our pilot project is a success, we will expand our banana cultivation community project to other locations, also involving former substance users," she added. —Bernama

PBIU, UM lahir usahawan kultur tisu.. Kosmo! 29-April-2019

Image size: 48KB |

1.6k Shares

PBIU,UM lahir usahawan kultur tisu

ESOK Unit Inkubator Bioteknologi Tumbuhan (PBIU), Universiti Malaya (UM) akan menganjurkan bengkel Benih Pisang Kultur Tisu dan Aklimatisasi bagi mewujudkan kesedaran dan minat orang ramai terhadap tumbuhan.

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Research Highlights – Media coverage: magazine & radio

ATLAS of Science
another view on science

RESEARCH | CONFERENCES & SYMPOSIUMS | TOOLS & METHODS | ACADEMIA | ARCHIVE | B

January 2, 2021 | Research | No comments

Sheath blight of rice: challenges and management

Rice (*Oryza sativa* L) is one of the most widely consumed cereal crops, countries. Around 40,000 different varieties of rice exist in the world, wit amount of rice (142.3 million tonnes) followed by India (110.4 million tor 2018). Sheath blight (ShB) of rice, caused by *Rhizoctonia solani* Kunh A *cucumeris* (Frank) Donk (teleomorph), a soil-dwelling fungus, has becor disease causes significant grain yield losses of up to 50%. First reporte subsequently spread across regions where rice is grown under intense *solani* has a broad host range infecting over 27 families of plants, causi blight, root, crown, hypocotyl, pod and belly rot, banded leaf, brown pat

R. solani survives in the soil as a hard, weather-resistant structure known as a sclerotium. The sclerotium contains food reserves, helping the fungus to survive in soil 3 years or more. After coming into contact with the rice plant, the sclerotium undergoes myceliogenic germination. The fungus secretes cell wall degrading enzymes to break down complex cellulose, hemicellulose and pectin of the rice plant into simple sugars, which are used by the fungus to obtain nutrition and establish infection. Warm temperatures (..28-32°C), high humidity (..95%) and a high level of nitrogen fertilizer favour the infection establishment process. Thereafter, infection spreads from leaf sheath to leaf blades, panicles and tillers creating a 2-3 cm long and 1 cm wide necrotic lesior resulting in stem lodging which disturbs canopy architecture, affects pho

Fig. 1. Rhizoctonia sol

BBernama.com

TERKINI Lima deret kedai musnah dalam kebakaran [15m ago]

Tanaman Pisang Bantu Ekonomi Bekas Penagih

Tarikh kemaskini: 19/09/2019

Peserta daripada Sinar Kasih diberi tunjuk ajar cara penanaman pokok pisang oleh kakitangan Pusat Asasi Sains Universiti Malaya yang terlibat dalam projek komuniti membantu bekas penagih dadah. –fotoBERNAMA(2019) HAK CIPTA TERPELIHARA

Oleh Kurniawati Kamarudin

KUALA LUMPUR (Bernama) – Jika ada yang menganggap golongan bekas penagih dadah tidak mampu membanting tulang empat kerat, maka tanggapan itu tidak semestinya benar.

Hakikatnya, mereka yang bebas daripada ketagihan bahan terlarang itu mampu melakukan pelbagai kerja, seperti juga orang lain asalkan diberi peluang dan ilmu dalam bidang berkaitan.

2. NANOTECHNOLOGY AND CATALYSIS RESEARCH CENTER (NANOCAT)

Vision

To be an internationally renowned and recognized CoE in Catalysis and Nanomaterials

Mission

To advance technological excellence in multidisciplinary research to address the key challenges of 21st century

Professor Dr. Mohd Rafie Bin Johan
Director
Nanotechnology and Catalysis Research Center (NANOCAT)

About the CoE

NANOCAT
NANOTECHNOLOGY AND CATALYSIS RESEARCH CENTRE

Nanotechnology and Catalysis Research Center (NANOCAT) is a PTJ incorporated by the Universiti Malaya (UM) in 2012, a Universiti Malaya Centre of Excellence (UMCOE). Its mission is to be a world leader in catalysis and nanotechnology coining sustainability and green technology. NANOCAT research thirst is deploying catalysis to support energy, chemical synthesis, environment pollution, and global warming mitigation as well as designing smart materials as a catalyst, sensor, nanocoating, and nanocomposites.

Research Highlights – Industries and international Projects

No	Nama Projek	Dana/ Geran penyelidikan	Penaja/ Pemberi Dana	Jumlah dana yang diterima	Tempoh Projek	Sasaran impak	Pemegang Taruh terlibat	Naratif impak
1	Development Of Low Cost And Efficient Recycling Processes Through Metal Reduction Of The By Product Of Sodium Borohydride (NaBH4)	Private	Nanomalaysia Berhad	500,000.00	1 year 6 months	Energy Industry	1) Nano Commerce Sdn. Bhd ; 2) Ministry of Science, Technology Malaysia	Complete Recyclability of raw materials for hyrogen production
2	Removal Of Ammoniacal Nitrogen, Bod, Cod And Odors From Industrial Wastewater Using Fabrication Of Granular Activated Carbon, Zeolite And Limestone	UM Innovate	Minister of Finance (MOF)	125,000.00	2 year 6 months	Industry like Rubber and palm oil	1) Vinca Solutions Sdn Bhd; 2) Department of Environment	Efficient Waste water treatment process flow system
3	Modification Of Existing Nitrile Latex With Magnetite Nano Particle-extension (Phase 2)	Private	Hartalega Sdn Bhd	780,000.00	2 years + 3 years (extended)	Rubber glove Industry	1) Hartalega Sdn Bhd; 2) Rubber Glove industry; 3) Food Manufacture	Detectable magnetic rubber glove for food processing industry
4	Development of Pilot Plant for Nanomagnetite Iron Oxide Slurry Project	Private	Hartalega Sdn Bhd	500,000.00	2 years + 3 years (extended)	Rubber glove Industry	1) Hartalega Sdn Bhd; 2) Rubber Glove Indusrty; 3) Food manufacture	Detectable magnetic rubber glove for food processing industry
5	Modification Of Existing Nitrile Latex With Magnetite Nano Particle-extension (Phase 1)	Private	Hartalega Sdn Bhd	656,900.00	2 years	Rubber glove Industry	1) Hartalega Sdn Bhd; 2) Rubber Glove Indusrty; 3) Food manufacture	Detectable magnetic rubber glove for food processing industry
6	Mass Production of Graphene Oxide	Private	Karex Industries Sdn Bhd	1,932,000.00	2 years	Rubber product stake holder	1) Karex Industries Sdn Bhd; 2) Rubber Industry	High strength and sustainable rubber product
7	Extreme Pressure Additives	Private	Oleon Sdn Bhd	1,000,000.00	2 years	Oil lubricant Industry	1) Oleon Sdn Bhd; 2) Lubricant Industry	New additive for enhencement of the oil lubricant properties
8	A Baseline Study : Co2 Methanation Catalyst And Performance Evaluation	Private	Petronas Research Sdn Bhd	980,763.62	7 months +2 months (extended)	Oil Petroleum Industry	1) Petronas Research Sdn Bhd: 2) Ministry of Energy and Environment Malaysia	Effective catalyst for CO2 conversion to Methane
9	Ester-based Bio Lubricant for Refrigerant System [Bio-Ester Refrigerant]	Private	Oleon Sdn Bhd	619,940.00	2 years+6 months (extended)	Oil lubricant Industry	1) Oleon Sdn Bhd; 2) Lubricant Industry	New additive for enhencement of the oil lubricant properties
10	Novel Nitrogen Heterocycle Compounds: Design, Synthesis and Evaluation of the Antiviral Activities Against Covid 19	International	JICA ASEAN University Network	207,348.00	2 years	COVID 19 patient	1) Ministry of Health Malaysia ; 2) COVID 19 patients	New drug to combat COVID 19

ENDOWNMENT-BASED CENTRE

1. UNGKU AZIZ CENTRE (UAC)

The Royal Professor Ungku Aziz Chair (RPUAC) was established at the Faculty of Economics and Administration, University of Malaya to honor the contributions of Professor Ungku Aziz in the field of education and economic development especially rural development and poverty.

The Ungku Aziz Centre for Development Studies, previously known as the Centre for Poverty and Development Studies (CPDS), is created to facilitate the activities of the chair. Since 2016, the Centre has undertaken steps to develop and further expand the field of development studies to reflect its interdisciplinary nature, to attract a wider participation, to engage young minds and to go beyond a mono-disciplinary approach to development. The defining pillars of the Ungku Aziz Centre for Development Studies represents the Centre's evolution and the dynamism of the field of study.

Professor Datin Sri Dr. Suhaiza Hanim Dato Mohamad Zailani
Director
Ungku Aziz Centre (UAC)

Objectives

1. To organize joint research projects and undertake comparative studies on poverty and rural development including amongst rural communities in remote and marginalized areas.
2. To develop new approaches and methodologies that are suitable for poverty and development studies, as well as to provide consultancy services and technical assistance.
3. To improve accessibility to information pertaining to poverty groups through the creation of databases, publications, seminars and conferences as well as through the internet and the media.
4. To contribute towards capacity building in the rural areas especially amongst the poor and encouraging the incorporation of local and indigenous knowledge in the development process.
5. To encourage co-operation between the Government, Private and Educational sectors through the sharing of best practices in integrated development activities.

2. SOCIAL WELLBEING RESEARCH CENTRE (SWRC)

Emeritus Professor Datuk Dr Norma Mansor
Director
Social Wellbeing Research Centre (SWRC)

Vision

The leading think-and-do tank and referral point in Malaysia and to the region on matters concerning social wellbeing.

Mission

To contribute and strengthen body of knowledge and applied research in social wellbeing for the benefit of all.

Objectives

The following are the main objectives of setting up the Old Age Financial Protection Chair (OAFPC) and the Centre:-

- To enhance awareness on ageing and retirement issues amongst the Malaysian public, academia, policy makers, governmental and non-governmental agencies and the international community.
- To build strong fundamentals and knowledge in the field of public policy, especially regarding retirement and old age protection amongst faculty members of local universities and new graduates in related field of studies; and
- To promote public awareness on the potential of the elderly participating in economic and social activities in an ageing society besides formulating policies which enable the society to age in a healthy and a financially-secured environment.

UM RESEARCH CLUSTERS

Industry, Innovation & Sustainability Science

Niche Areas:
1. Energy
2. Materials

Thrust Areas
1. Industry 4.0
2. Water & Environment
3. Sustainable Living

Frontiers of the Natural World

Niche Area:
1. Nature Inspired Research: Driving Drug Discovery

Thrust Area:
1. Curiosity Driven Fundamental Research

Health & Well-Being

Niche Areas:
1. Cancer
2. Active Ageing

Thrust Areas:
1. Innovative Health
2. Mental Well-Being
3. Lifestyle Diseases

Social Advancement & Happiness

Niche Areas:
1. Cultural, Heritage and Civilisation
2. Behavioral Studies

Thrust Areas:
1. Education for the Future
2. Smart Society

PROPOSED CENTRES OF EXCELLENCE (CoEs)

1. Artificial Intelligence and Emerging Technologies
2. Innovative Medical Devices
3. Value Creation
4. Micro, Small and Medium Enterprise
5. Climate Preparedness and Community Resilience
6. Environment, Social and Governance
7. Food Security and Intelligent Farming
8. Urban Ecosystem, Culture and Heritage
9. Futures Studies
10. Halal Research, Training and Education *
11. Smart Mobility
12. Aerospace Innovation
13. Rare Earth Elements
14. Natural Products, Biopharmaceuticals and Precision Medicine
15. Future Sustainable Energy
16. Biodiversity for Sustainable Economy
17. Quantum Information Science and Technology *
18. Digital Transformation of Health

*Research and Profit Making
*Research
*Other Potential Shell Centre

CoE's CHARACTERISTICS

01 **PROBLEM-BASED APPROACH**
Creating innovative solutions through problem-based viewpoint

02 **BASIC AND RESPONSIVE**
Both fundamental and applied research are important in solving problems and meeting the needs of the stakeholders

03 **HIGHLY INTEGRATIVE**
Open to everyone from any Faculty, HICoE, UMCoE, CoR to be involved in research projects that lead towards solving national and global issues/challenges

04 **PROJECT BASED ALLIANCE OF RESEARCHERS**
Core group of researchers from diverse disciplines addressing a common (research/consultancies) problem relating to society/environment/economy

05 **INDUSTRY LEAD**
Will have industrial advisors to identify issues/challenges in the real world and connect industries with researchers

06 **PROJECT MANAGER**
Professional project managers to ensure interdisciplinary approach in carrying out the projects

RESEARCH MATRIX

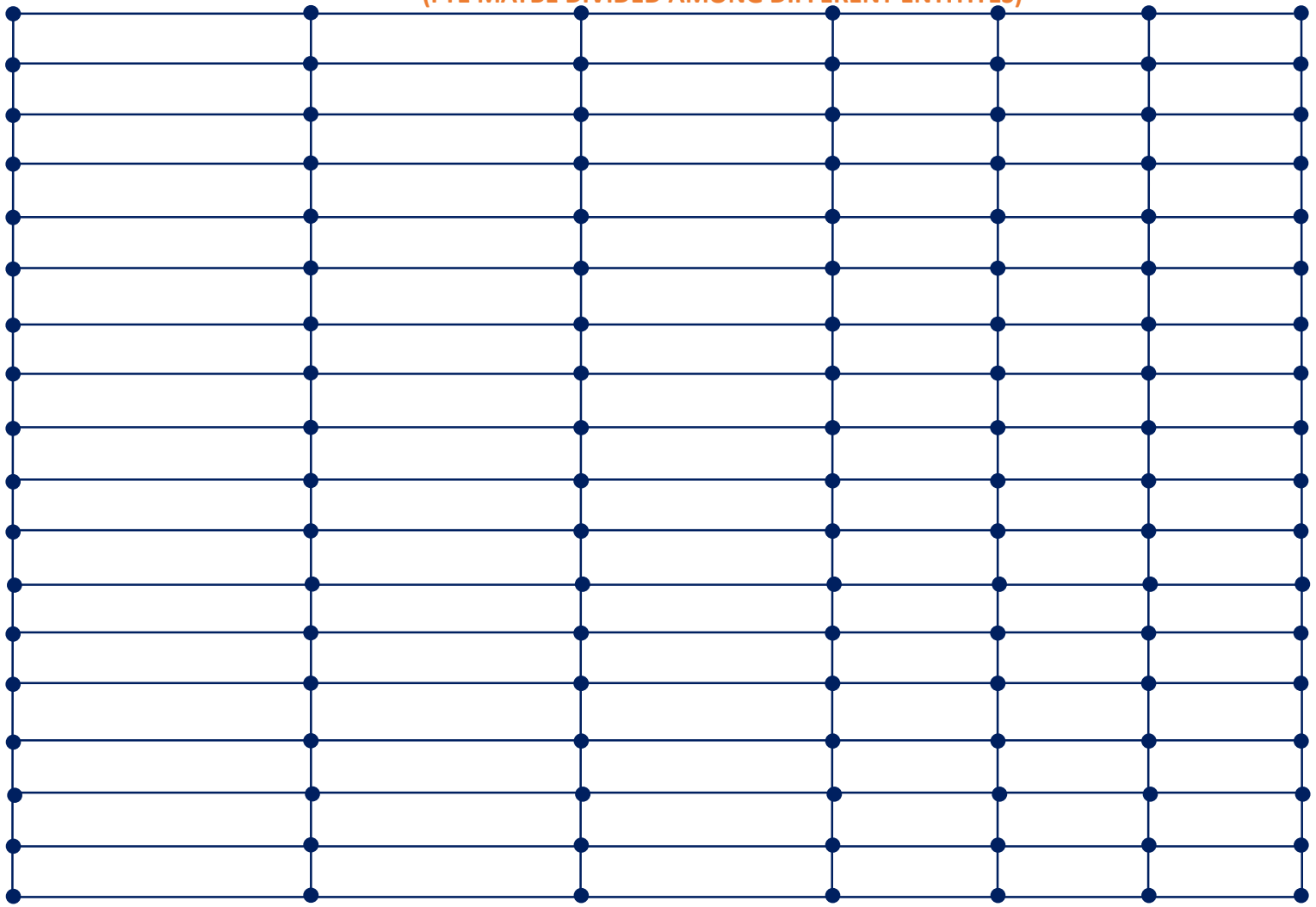
CENTRES OF EXCELLENCE ("SHELL CENTRES")

- Artificial Intelligence and Emerging Technologies
- Innovative Medical Devices
- Value Creation (Entrepreneurship)
- Micro, Small and Medium Enterprise
- Climate Preparedness and Community Resilience
- Environment, Social and Governance
- Food Security and Intelligent Farming
- Urban Ecosystem, Culture and Heritage
- Futures Studies
- Halal Research, Training and Education *
- Smart Mobility
- Aerospace Innovation
- Rare Earth Elements
- Natural Products, Biopharmaceuticals and Precision Medicine
- Future Sustainable Energy
- Biodiversity for Sustainable Economy
- Quantum Information Science and Technology *
- Digital Transformation of Health

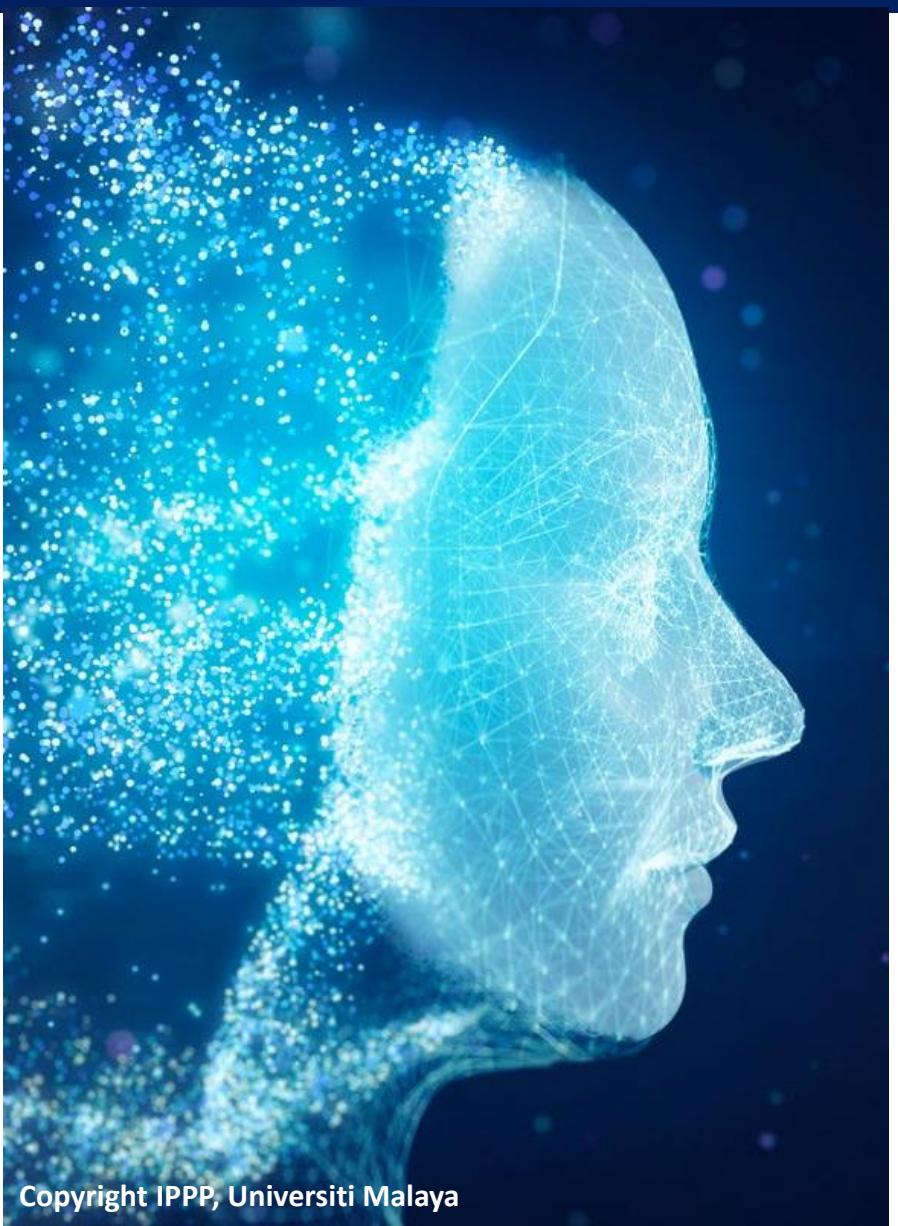
Higher Education Centres of Excellence (HICoE)	Universiti Malaya Centres of Excellence (UMCoE)	Centres of Research (CoR - PTj/Cluster-based) & Top-Down/ Endowment-based Research Centres	Academies	Faculties	Institutes	Centres

RESEARCHERS

(FTE MAYBE DIVIDED AMONG DIFFERENT ENTITITES)



1. ARTIFICIAL INTELLIGENCE AND EMERGING TECHNOLOGIES



Policy Enabler 2

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ENERGY

CULTURE, ARTS & TOURISM

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

WATER & FOOD

EDUCATION

BUSINESS & FINANCIAL SERVICES

MEDICAL & HEALTHCARE

SMART CITIES & TRANSPORTATION

AGRICULTURE & FORESTRY

ENVIRONMENT & BIODIVERSITY

Areas of Research:

Virtual reality, augmented reality, artificial intelligence (AI), digital innovation, connectivity, transport and logistics infrastructure, oil & gas, modern farming, manufacturing, medical, automotive, biotechnology, image processing, cyber security

List is non-exhaustive

Concept

Leading center for impactful AI solutions

- To showcase available expertise for cross-disciplinary adoption.

Addressing national and society problem using AI and emerging technology solutions:

- Impact to nation and society
- Practical and feasible
- Beneficial to stakeholder
- Policy maker

Mission

Convergent point for experts in AI and emerging technologies from multiple domains, locally and internationally

ARTIFICIAL INTELLIGENCE AND EMERGING TECHNOLOGIES

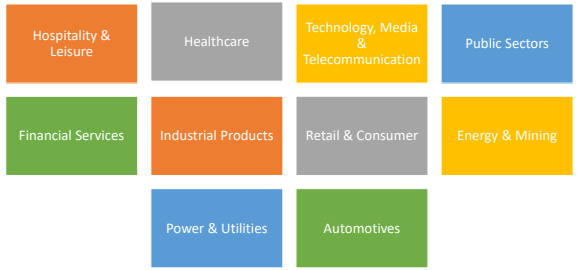
List of Stakeholders

Government

- Economic Planning Unit, Ministry of Economic
- Ministry of Rural and Regional Development
- Ministry of Plantation Industries and Commodities
- Agriculture and Food Security
- International Trade and Industry
- Local Government Development
- Health
- Defence
- Higher Education
- Education
- Communications and Digital
- Law and Institutional Reform
- Science and Technology
- Home
- Women, Family and Community Development
- Domestic Trade and Cost of Living
- Works
- Environment and Climate Change
- Entrepreneur Development and Cooperatives Foreign
- Tourism
- National Unity
- Youth and Sports
- Human Resources

Government Agencies

Industries



Academia

List of Potential Projects

1. Overcrowding solutions at hospital
2. Cost of living solutions
3. Communication coverage solutions
4. Job mismatch and job forecast solutions
5. Early cancer/disease detection
6. Renewable energy solutions
7. Climate change forecast and mitigation
8. VR for education (agricultural education, special needs, creative education)
9. Digital literacy framework for inclusive education
10. Biodiversity surveillance solutions

List is non-exhaustive

Theme 2

2. INNOVATIVE MEDICAL DEVICES

Areas of Research:

Biotechnology, vaccine development and production, medical services, healthcare system and management, health economics, hospital networks, health policies and securities

List is non-exhaustive

Concept

- Developing emerging medical devices for healthcare services to serve the nation
- Commercializing the developed medical device
- Providing consultation on medical device innovation, commercialization and cyber security

INNOVATIVE MEDICAL DEVICES

List of Stakeholders

1. **Kementerian:**
   - i. Ministry of Health (MOH)
   - ii. Ministry of International Trade & Industry (MITI)
   - iii. Ministry of Multimedia & Communication (MMMC)
   - iv. Ministry of Higher Education (MOHE)
   - v. Ministry of Science, Technology & Innovation (MOSTI)

2. **Agensi Kerajaan:**
   - i. Medical Device Authority (MDA)
   - ii. National Cyber Security Agency (NACSA)
   - iii. Malaysian Industry-Government Group for High Technology (MIGHT)
   - iv. Malaysian Research Accelerator for Technology & Innovation (MRANTI)
   - v. Malaysian Industry Development Authority (MIDA)
   - vi. Attorney General Office

3. **Industri:**
   - i. SIRIM's Medical Device Innovation Centre (MDIC)
   - ii. Malaysia Medical Device Association (MMDA)
   - iii. Association of Malaysian Medical Industries (AMMI)
   - iv. Private hospitals

4. **Akademik (Universiti):**
   - i. UTM's Medical Devices & Technology Centre (MEDiTEC)

5. **Badan Bukan Kerajaan/ Masyarakat Sivil**
   - i. MERCY Malaysia
   - ii. Majlis Kanser Negara (MAKNA)
   - iii. Cleft Lip & Palate Association Malaysia (CLAPAM)
   - iv. Malaysian Association for Blind (MAB)

6. **Lain-lain:**
   - i. International Federation of Medical & Biological Engineering & Computing (IFMBE)
   - ii. Biomedical Engineering Association Malaysia (BEAM)
   - iii. Malaysia Society of Medical & Biomedical Engineering (MSMBE)
   - iv. IEEE Engineering in Medicine & Biology Society (EMBS)
   - v. Bar Council Malaysia
   - vi. Malaysia Medical Association (MMA)
   - vii. Malaysian Medical Council (MMC)
   - viii. Malaysia Dental Association (MDA)
   - ix. Academy of Sciences Malaysia (ASM)
   - x. Institute of Engineers Malaysia (IEM)

List is non-exhaustive

List of Potential projects:

- Short term (6-12 months):
  - Non-invasive device to monitor cholesterol
  - Automated recognition of pathological features for early detection of oral diseases

- Long term:
  - Advancing stem cell carbo-based bio-scaffold for cardiac tissue engineering
  - IOT medical device cyber security framework in Malaysia
  - Biosensors from sustainable sources extracted from biomass (eg pathogen sensing for food or sepsis)
  - Smart textile: Wearable electrochemical sensors using carbon and silver threads for continuous metabolite monitoring (lactate, glucose, uric acid and cortisol)
  - Flexible electronics skin patches (EMG and BIA) for monitoring recovering stroke patients, low back pain and cancer surgery patients
  - Molecular finger printing using Raman spectroscopy for early detection of oral cancer
  - Usage of biowaste for tissue engineering application
  - Wearable medical device IOT and product safety and security framework in Malaysia
  - Eatable sensor for oral and gut microbiome monitoring
  - Mandibular advancement device for OSA
  - Peripheral arterial tonometry for Sleep study
  - Mini CPAP for treatment of OSA

3. VALUE CREATION (ENTREPRENEURSHIP)

Theme 1 | Theme 3 | Policy Enabler 1 | 4 QUALITY EDUCATION | 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE | EDUCATION

Theme 2 | Policy Enabler 2 | 8 DECENT WORK AND ECONOMIC GROWTH | BUSINESS & FINANCIAL SERVICES

Areas of Research:

Income, education support, employment, community safety, social intervention, talent growth, entrepreneurship development, gig economy, digital economy, national security, socioeconomic advancement

List is non-exhaustive

Concept

- Future market needs development study
- Developing future ready talent
- Accelerating technology adoption and innovation
- Developing talent driven ecosystem
- One-stop centre for information and guidance for budding entrepreneurs
- Socio-economic development

VALUE CREATION (ENTREPRENEURSHIP)

List of Stakeholders

Ministry

1. MOHE
2. MOSTI
3. MOH

Government Bodies

1. MIMOS
2. MIDA
3. DBP

Industry

1. SHELL
2. Petronas

Academic (Universiti)

1.IPTA

2.IPTS

NGO/ Civil Society

Entrepreneurs

Others

1.Angel Investors (Cradle, MRANTI

List of Potential Projects

- Cultivating the entrepreneurial mindset.
- Bridging the gap between industry & academia with social skills.
- Talent driven ecosystem for society.
- One-stop center for information and guidance for budding entrepreneurs.
- Socio-economic growth.
- Talent development & training for graduates.
- Proper infrastructure for talents development

**List is non-exhaustive*

Theme 1 Theme 3 Policy Enabler 1 EDUCATION

Theme 2 Policy Enabler 2 BUSINESS & FINANCIAL SERVICES

4. MICRO, SMALL AND MEDIUM ENTERPRISE (MSME)

Areas of Research:

In 2021, the total of MSMEs are 1,226,494 which accounts for 97.4% of overall establishments in Malaysia. MSMEs are vital in promoting entrepreneurship and economic growth of the country. Transformation of MSMEs will:

- increase the contribution of MSMEs to GDP and exports
- enhance the competitiveness of MSMEs
- enhance the capabilities of Bumiputera entrepreneurs
- address the low level of technology and digital adoption

Source: SME Corp Malaysia & RMK-12 Plan

****List is non-exhaustive***

Concept

This centre **aligns with the government directions**, i.e RMK12, TPB 2030, CP TPPA, and recent technology developments to c**reate and strengthen community of MSME** to be able to compete globally.

It also serve as **driving aspects for effective policies implementation** and sustainability of MSME development program

MICRO, SMALL AND MEDIUM ENTERPRISE (MSME)

List of Stakeholders

1. **Kementerian:**
   - Kementerian Ekonomi
   - Kementerian Perdagangan Antarabangsa dan Industri
   - Kementerian Pembangunan Usahawan Dan Koperasi Malaysia
   - Kementerian Sains, Teknologi dan Inovasi
   - Kementerian Kewangan

2. **Agensi Kerajaan**
   - SME Corp
   - Khazanah Nasional Berhad
   - Teraju
   - SIRIM
   - FELDA
   - MPC

3. **Industri - business community**
   - Manufacturing & services
   - Medical device
   - Processed food & beverages
   - Automotive Parts & Component

4. **Akademik (Universiti)**

5. **Badan Bukan Kerajaan/ Masyarakat Sivil**
   - NGO, Yayasan Kebajikan, Persatuan

List is non-exhaustive

List of Potential Projects

- Cultivating the entrepreneurial mindset.
- Bridging the gap between industry & academia with social skills.
- Talent driven ecosystem for society.
- One-stop center for information and guidance for budding entrepreneurs.
- Socio-economic growth.
- Talent development & training for graduates.
- Proper infrastructure for talents development

5. CLIMATE PREPAREDNESS AND COMMUNITY RESILIENCE

Theme 3

Areas of Research:

Planetary Health, climate action, nature-based solutions, environmental and ecological care, climate action, how to go to low carbon economy - transition phase from high carbon to low carbon - cannot just shut down power plants – "just-transition" - health - needs reskilling

List is non-exhaustive

Concept:

1. **Application** of technological innovation in understanding the anthropogenic and non-anthropogenic causes of climate change and its impact on biota and non-biota.
2. **Providing** technical and nature-based solutions for mitigation and adaptation of extreme weather events (e.g., monsoon, floods, haze, pollution).
3. **Providing** technological solutions for industries towards zero net carbon processes and sustainability of various economic resources e.g., aquaculture, agriculture, healthcare, tourism etc.
4. **Evaluating** the techno-economic, socio-technical, socio-economic, and socio-legal feasibility of technological solutions in mitigating the effects of climate change.
5. **Providing** expert legal, policy and technical advice on mitigation, solution strategies for enhancing risk reduction in disaster management to strengthen community resilience.

CLIMATE PREPAREDNESS AND COMMUNITY RESILIENCE

List of Stakeholders

Government Ministries	Government Agencies	Industry players	Community
1. Ministry of Natural Resources, Environment, and Climate Change 2. Ministry of Agriculture & Food Security 3. Ministry of Science, Technology & Innovation 4. Ministry of Entrepreneur Development and Cooperatives (SME) 5. Ministry of Tourism, Arts and Culture 6. Ministry of Housing and Local Government 7. Ministry of Law & Institutional Reform 8. Ministry of Home Affairs 9. Ministry of Transport 10. Ministry of Works 11. Ministry of Health 12. State governments	1. Meteorological Department 2. Department of Environment 3. Department of Fisheries 4. NAHRIM 5. JPS 6. APMM (Agensi Penguatkuasaan Marin Malaysia) / Polis Marin 7. MARDI 8. Civil Defence Department 9. Welfare Department	1. Energy 2. Aquaculture 3. Agriculture 4. Manufacturing 5. Waste management 6. Fishing 7. Tourism	1. Local community 2. Coastal area residences 3. Orang Asli 4. Urban flooding areas

**List is non-exhaustive*

List of Potential Projects

1. **Seeking workable solutions** to manage carbon capture and utilization (CCU): conventional CCU, emerging technologies of CCU, e.g., algae farming.
2. **Exploring the potential to harness renewable energy** from the ocean in the form wind, solar, wave, and tidal energy sources to reduce dependence on fossil fuel and carbon emission.
3. **Exploring practicable innovative aquaculture** in restoring biodiversity and alleviating poverty in facing climate change.
4. **Blue carbon capture** for mitigating climate change and potential for carbon tax release.
5. **Legal impediments** to be examined, **pursuing resources and buy-ins** relating to development, conservation, disaster management planning from relevant industries, state governments, local agencies, and communities.

Theme 3

6. ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG)

Areas of Research:

Environmental, social and governance (ESG) is a term used to represent an organization's corporate financial interests that focus mainly on sustainable and ethical impacts. Capital markets use ESG to evaluate organizations and determine future financial performance. While ethical, sustainable and corporate governance are considered non-financial performance indicators, their role is to ensure accountability and systems to manage a corporation's impact, such as its carbon. GHG emission factor, framework for sustainability for decision making on data integrity, sustainability analytics (sustainalytics)

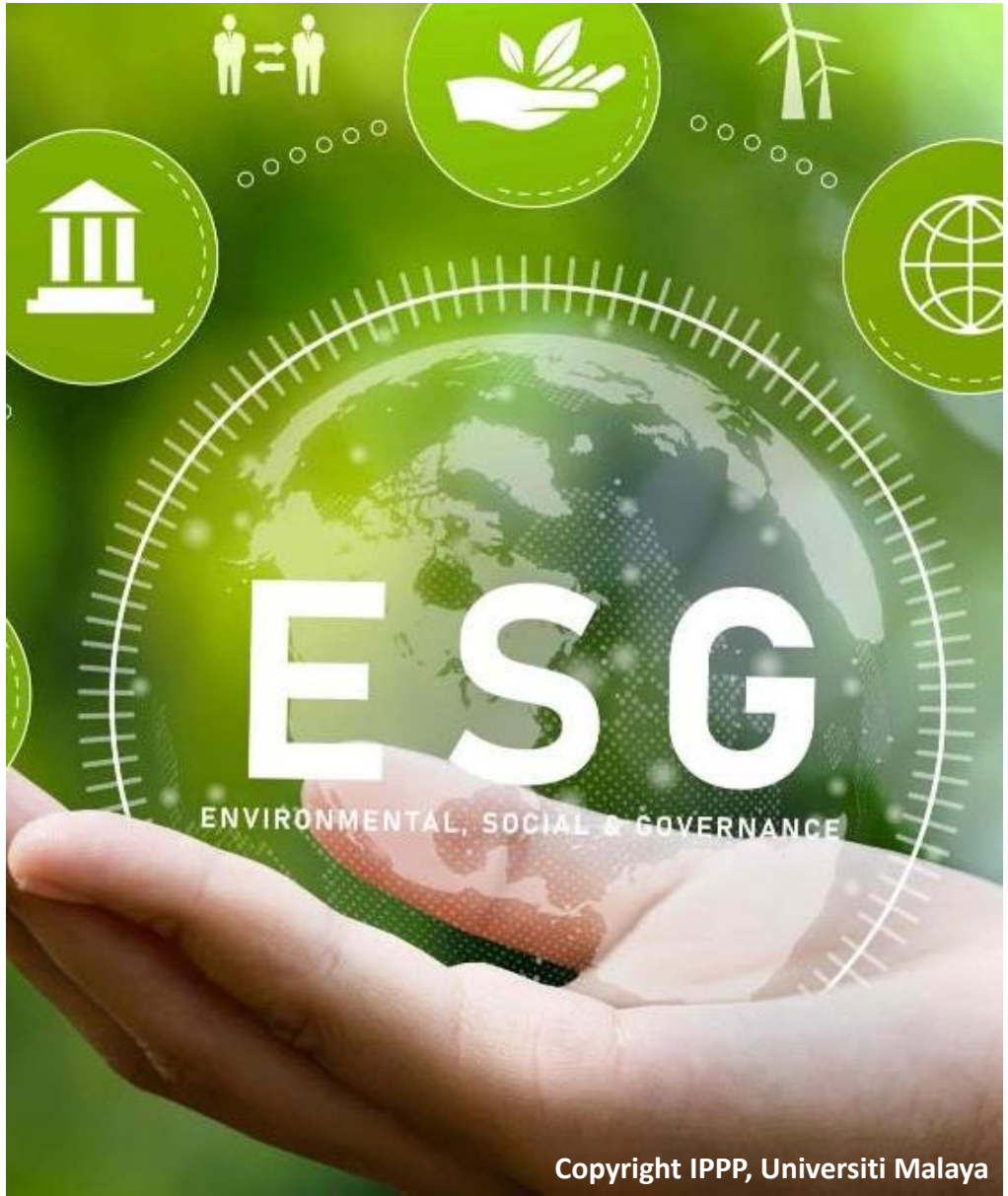
List is non-exhaustive

Concept

- Renewable fuels
- Greenhouse Gases Emissions (GHG)
- Energy efficiency
- Climate Risk
- Water management
- Recycling processes
- Emergency preparedness

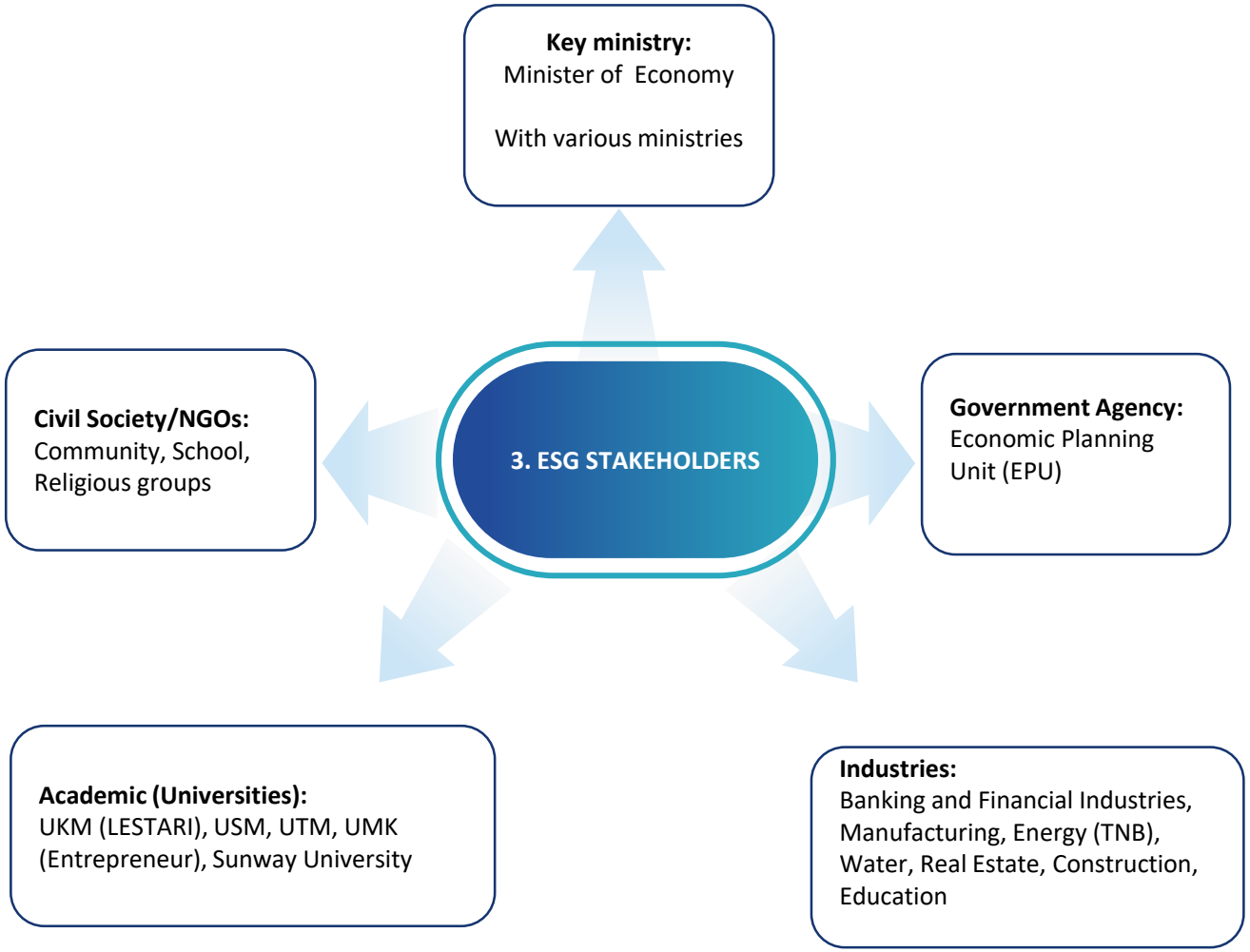
- Health and safety
- Working conditions
- Employee benefits
- Diversity and inclusion
- Human rights
- Impact on local communities

- Ethical standards
- Board diversity and governance
- Stakeholder engagement
- Shareholder rights
- Pay for performance
- **Malaysia MADANI**



ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG)

List of Stakeholders



List is non-exhaustive

List of Potential Projects

NET ZERO 2050

0-5 years SHORT TERM	5-10 years MID-TERM	10 years and above LONG TERM
• UM to champion for higher education esg	• Establishment on Southeast Asia ESG framework	• Leader and focal point for beyond esg for south east asia
• Networking with banking	• Data centre for banking	• Reference point / contact point for beyond ESG for global
• Networking with SMEs	• Data centre for SMEs	
• Establishment on malaysia ESG framework	• Leader for education and research for ESG	

7. FOOD SECURITY AND INTELLIGENT FARMING

Theme 1 Theme 3 Theme 2

Areas of Research:

Sustainable/smart/precision agriculture, sufficient food production, physical and economic access to sufficient food, modern farming technology

nutrition - superfood - one of the problems of SDG is stunted growth - food that we take in - mushroom - cultured meat

List is non-exhaustive

Concept

Using knowledge and technology to improve food security in Malaysia

- Improve efficiency of food production through best practices and appropriate use of new technology
- Improve resilience of supply chain
- Reduce food and feed imports
- Improve access to good quality food for all communities in Malaysia
- Reduce use of foreign labour and improve career structure and rewards in agriculture and food production sectors
- Improve practices to be environmentally sustainable
- Reduce waste in food production and consumption
- Improve decision making by use of intelligence based on monitoring (from farm through processing and to market)
- Explore use of alternative proteins and high quality affordable food and feed
- Address challenges of access to finance and support for MSME farmers
- Address demotivation and socio-cultural issues in the farming sector
- Address the land issues – ownership, availability, accessibility and suitability
- Address the high cost of inputs – pesticides, fertilizers, seeds, vaccines, feed etc
- Explore establishment of “one-stop” centre for farming related issues and challenges
- Climate change responsiveness (improve processes for uptake of modified crops and systems)

FOOD SECURITY AND INTELLIGENT FARMING

List of Stakeholders

1. **Ministries** – MAFS, MOSTI, NRECC, MOHR, KPDNHEP, MiTI
2. **Government Agencies** – MARDI, FAMA, MIGHT, LKIM, DVS
3. **Industries** – BERNAS, (& numerous MSME)
4. **Academics (University)** – UM, UPM, UKM, UMK, UUM, UMS, UNIMAS, UMP, UITM, UNiM, UCSI, UTAR, Monash, Sunway
5. **Civil Society** – Farmers organisations, NGO (environmental, consumer)
6. **Others**

List of Potential Projects

- Multicomponents and complex problem
- Expertise are fragmented
- Sensitivity of the issue related to current practices (eg seed quality)
- Reluctant to change practices
- Limited resources (human, financial, time, expertise, accessibility to technology)

List is non-exhaustive

Theme 3

8. URBAN ECOSYSTEM, CULTURE AND HERITAGE

Areas of Research:

Tropical urban studies, urban resilience –urban heat island - thermal comfort
Tropical Urban Studies - Resilience - weather and climate are different from temperate - thermal comfort is different -
Future proofing urban related to climate change – urban poverty

List is non-exhaustive

Concept

Built environment
(Infrastructure, design & planning, project management, real estate, industries & supply chains, logistics, maintenance, transportation etc)
Education
(Perceptions, awareness, behavioural studies etc)
Socio-Economics
(Economics, income, lifestyle, affordability etc)
Culture & Heritage
(Preservation, conservation, tourism etc)
Health & Well-Being
(Social health & well-being, aging, mindfulness, mobility etc)
Energy & Resources
(Energy, food, water, renewable resources etc)

URBAN ECOSYSTEM, CULTURE AND HERITAGE

List of Stakeholders

1. **Ministries**
   - Ministry of Housing and Local Authority
   - Ministry of Finance
   - MOSTI
   - MOH
   - MOHE
   - MOE
   - Ministry of Works
   - Ministry of Domestic, Trade and Living Cost
   - Ministry of Energy and Natural Resources
2. **Developers**
3. **Local authorities**
4. **Communities and societies**
5. **Education institutions**
6. **NGOs**
7. **Industries (JKR, CIBD, REHDA etc)**
8. **Banking & Financial institutions**
9. **Medical institutions**

**List is non-exhaustive*

List of Potential Projects

1. **Built Environment**
   - Housing Affordability
   - Technology innovation & advancement
   - Facility management
   - Project management
2. **Education**
   - Awareness
   - Behavioural, attitude and perception studies
   - Mindset
3. **Socio-economics**
   - Low household income & high household debts
   - Cost of living
   - Incentives
   - Employability
   - Entrepreneurship
4. **Culture & Heritage**
   - Conservation and preservation
   - Tourism
5. **Health & Well-Being**
   - Social health & well-being
   - Aging population
   - Mindfulness
   - Mobility
6. **Energy & Resources**
   - Energy
   - Food security
   - Water security
   - Renewable resources
   - Waste management

9. FUTURES STUDIES

Policy Enabler 1

Policy Enabler 2

Areas of Research:

An interdisciplinary field that aggregates and analyzes trends, with both lay and professional methods, to compose possible futures. It includes analyzing the sources, patterns, and causes of change and stability to develop foresight.

List is non-exhaustive

Concept

- Shaping
- Predicting/ forecasting
- Impacting
- Imagining the new way of life
- Cause and effect
- Needs to understand the present (best practice to move forward)

FUTURES STUDIES

List of Stakeholders

1. **Minsitry**
   - Kementerian Komunikasi Multimedia (KKMM)
   - Kementerian Belia Sukan (KBS)
   - Kementerian Kesihatan Malaysia (KKM)
2. **Government Agencies**
3. **Industries**
4. **Academic (University)**
   - Multimedia University
   - University Putra Malaysia
5. **NGO/ Civil Society**
6. **Others**

**List is non-exhaustive*

List of Potential Projects

Food security	Precision medicine & biodiversity	Green technology	Circular economy
Quantum science	Rare earth elements	Medical lingo	Regionalism

Safe and comfortable lifestyle for senior citizen

- Affordable inclusive and safe homes
- Lifestyle – transportation
- Easy assess to everything (banking etc)

Future generation

- Education – value, intrinsic (innate), skills of the future
- Culture/ heritage/ values – preservation
- Lifestyle

Theme 1

10. HALAL RESEARCH, TRAINING AND EDUCATION

Areas of Research:

Overall halal ecosystem (food and food-related products, pharmaceuticals, cosmetics, health products, toiletries, medical devices, service sector components such as logistics, marketing, print and electronic media, packaging, branding, and financing)

List is non-exhaustive

Concept

Penyelidikan
Penyelidikan secara holistik

i. Agama & Kefatwaan – Shariah, Fiqh, Undang-undang, *Islamic Consumerism*
ii. Sains & Teknologi – *Halal Authentication Analysis*
iii. Perniagaan dan Ekonomi - *Consumer Behaviour, Marketing*
iv. Sains Komputer – *Islamic Related ICT*
v. Bidang Sosio - Budaya - Pusat Dialog, Fakulti Sains Sosial
vi. Komunikasi - Jabatan Komunikasi & Media

Training

i. Melatih Bakat Halal
   a. Eksekutif Halal
   b. Auditor Halal
   c. QA/QC Halal
   d. Penyelia Halal
ii. HRTE akan turut membangunkan modul untuk latihan berkenaan Halal dan pada masa yang sama mendapatkan pengiktirafan daripada pihak berwajib untuk memastikan modul yang dibangunkan adalah menepati kehendak dan keperluan semasa.

Education/*Outreach*
Program kesedaran halal

i. Mengadakan program kesedaran halal kepada masyarakat setempat
   a. Pelajar sekolah
   b. Institiusi Pendidikan
   c. Industri halal
   d. Masyarakat setempat
ii. Untuk memberikan maklumat bahawa konsep halal tidak tertakluk kepada masyarakat Muslim sahaja dimana prinsip halal merangkumi prinsip toyyiban (konsep keselamatan dan kualiti)

HALAL RESEARCH, TRAINING AND EDUCATION

List of Stakeholders

1. **Ministry** – MITI, JPM (JAKIM), EPU, MOH, KPM
2. **Government Agency** – (KUSKOP, KPDN, Jabatan Kimia, BNM, Jabatan Standard Malaysia, SME Corp, NPRA)
3. **Industry** - HDC
4. **Academic (University)** – KPM, (KIHIM – UPM, UIA, USIM & UM) dan universiti-universiti lain.
5. **NGOs/ Civil Society** – Komuniti-komuniti tempatan
6. **Others** – SME, Penyedia-penyedia latihan Halal

List is non-exhaustive

List of Potential Projects

1. **SUDUT POLISI:** walaupun agensi pengeluar sijil adalah JAKIM, tetapi halal juga tertakluk kepada agensi2 lain, contoh nya NPRA, MDA, DVS, KPNDHEP.
2. **SUDUT *TALENT DEVELOPMENT :*** lebih daripada 60 IPTS yg menawarkan halal.program, tapi adakah silibus selari dengan keperluan pihak industri? Akan timbul isu overload?
3. **SUDUT SMEs**: *Strict adherence* kepada syarat-syarat pensijilan Halal menyebabkan SMEs sukar untuk mendapatkan sijil Halal.
4. **SUDUT *AWARENESS:*** dimana Halal hanya terpakai kepada Muslim. Ataupun di pihak masyarakat Muslim, sebagai masyarakat Muslim, tentulah akan menghasilkan produk halal sahaja sedangkan Halal turut menekankan konsep Toyyiban – *Safety & Quality*
5. **SUDUT STANDARD:** Kepelbagaian standard Halal bagi pelbagai negara yang terlibat dengan industri Halal dan tiada harmonisasi. Ini boleh menyebabkan masalah *barrier to trade* (TBT- *According to WTO principle*).
6. **SUDUT KOORDINASI**:
   - Masalah koordinasi di antara JAKIM (peringkat nasional) dan pihak Jabatan Agama Negeri.
   - Tiada koordinasi/penyelarasan polisi dan strategi yang menyeluruh bagi pemegang taruh.
7. **SUDUT ISLAMIC BANKING:**
   - Hubungkait diantara program dan produk halal yang lebih baik dengan pihak kewangan Islami
   - Menggalakan institiusi-institiusi kewangan Islam berkolaborasi di dalam proses inovasi dan *scaling up*
8. **SUDUT SUSTAINABILITY:** Untuk memberi penjelasan/penerangan dengan lebih lanjut mengenai konsep ESG yang selari dengan konsep Halal (yang menerapkan konsep seperty *Quality & Safety,* tiada elemen pembaziran dan sebagainya)

11. SMART MOBILITY

Policy Enabler 3

Areas of Research:

Electrical Vehicles (EV) Motorbikes, EV, Autonomous Vehicles, Charging, Dynamic Wireless EV Charging, Automotive technologies and developments

List is non-exhaustive

Concept

SOCIAL	TECHNOLOGY	INFRASTRUCTURE & ENVIRONMENT	VEHICLE
People	ICT ITS AI	- Seamless Connectivity - Wireless - Charging station	EV Autonomous Robotic

SMART MOBILITY

List of Stakeholders

1. Kementerian – MOT, MOSTI, KKR, KASA, KKD
2. Agensi Kerajaan – APAD, MDEC, MCMC, PBT, SIRIM, PRASARANA
3. Industri – Pengangkutan, IT, e-hailing
4. Akademik (Universiti) – MiTRANS (UiTM), (SUTRA) UKM, (KidSafe) UTHM, Transportation Systems, Infrastructure & Intelligent Transport (TransSIIT) (UiTM), Transportation and Mobility Group (USM), Pervasive Computing Research Group (UTM)
5. Badan Bukan Kerajaan/ Masyarakat Sivil – ITSM, TSSM, MYCAS,
6. Lain-lain - Smart Mobility Research Centre (Chulalongkorn University), EASTS, Smart Cities Mobility (Stuttgart)

List of Potential Projects

- Data (NDA, outdated & restricted source)
- “One Stop Centre” for Transportation related data/information
- Policy & Infrastructure for ITS
- Policy & Infrastructure Autonomous (preparedness) – Blue Print for Autonomous (refer to UTHM RC)
- First Mile & Last Mile (safety of user & accessibility)
- Micro Mobility Issues (Blue Print for Micro Mobility)

List is non-exhaustive

Theme 1

Policy Enabler 3

12. AEROSPACE INNOVATION

Areas of Research:

Aircraft, spacecraft technologies and developments

List is non-exhaustive

Concept

Shell center comprising of multi and inter-disciplinary expertise focusing on accelerating the competitiveness of Malaysia aerospace industry

Role:

i. Market Intelligence gathering
ii. Securing funds from private-public agency
iii. Marketing UM Solutions

AEROSPACE INNOVATION

List of Stakeholders

1. Kementerian: MITI, MINDEF
2. Agensi Kerajaan: *SELATI* (*Selangor* Aviation Technology and Innovation Sdn Bhd), STRIDE (Institut Penyelidikan Sains dan Teknologi Pertahanan) , National Aerospace Industry Corporation Malaysia (*NAICO* Malaysia)
3. Industri: Turkish Aerospace Malaysia (TUSAS), Aerodyne Msia, Strand Aerospace Malaysia)
4. Akademik: UnISEL, UTM, NOTTINGHAM,UTHM, UIA
5. Badan Bukan Kerajaan/ Masyarakat Sivil: Malaysia Aerospace Industry Association, Aerospace Society Malaysia
6. Lain-lain

List of Potential Projects

- Aerospace Supply Chain Financing Model
- Economics and Corporate Strategy
- Aero-Manufacturing Production efficiency
- Drone Technology and Services
- Sustainable Aerospace

List is non-exhaustive

13. RARE EARTH ELEMENTS

Areas of Research:

Non-radioactive rare earth elements (NREE), Ion adsorption clay
Upstream – exploration, geology
Midstream – sustainable mining, *insitu* leaching
Downstream - separation processes, explore to concentrate heavy rare earth to use as supermagnet - to drive any motor- wind turbine motor drive
UMP UTP JMGeosains

List is non-exhaustive

Concept

3 main Approaches and Focuses of this Centre:

Upstream

- Exploration
- Soil Stability
- Sustainability
- Minimize the impact of pollution to the environment
- Legal Issues

Midstream -

- Separation
- Purification
- Waste Management

Downstream –

- Application of REE
- Cost benefit

RARE EARTH ELEMENTS

List of Stakeholders

- UMP – Pusat Alam
- MINT – Agensi Nuklear Malaysia
- Lynas Malaysia Sdn Bhd
- Menteri Besar Selangor Incorporated
- GMT Group

List is non-exhaustive

List of Potential Projects

COMPONENTS	ISSUES	CHALLENGES (How to..)	SOLUTIONS
UPSTREAM	1. **Lack of technology know-how & high-skill manpower** in Rare Earth Exploration.	1. **No local company & experts in Malaysia** have facility and know-how skills to explore and mining the rare earth elements.	1. **Legal to advise the terms of condition in the agreement** between local-international corporations to use the local community as workers.
MIDSTREAM	1. **Separation & Purification** - the existing highly corrosive medium of separation 2. **Waste Management** - Radioactive byproduct from the Rare Earth Elements Separation cause soil & water pollution	1. Replace the existing medium 2. **Dispose and reuse** the byproduct	1. **Green solvents** 2. **Green technology** for waste management include carbon recycling

Theme 2

14. NATURAL PRODUCTS, BIOPHARMACEUTICALS AND PRECISION MEDICINE

Areas of Research:

Natural products extraction – synthesis - pharmaceutical drugs – data respository for indigenous products - regulations and policies

List is non-exhaustive

Concept

- We have mega biodiversity resources and diverse population and diseases. Our state of art biopharmaceuticals knowledge/skills/technology can be used to develop value-added, high quality and targeted/precision medicine/products that bring economics impact and health security to the nation
- Work together across consortiums (ie Biodiversity & conservation, Artificial intelligence, Halal hub, medical device and others) when required
- Exploring our own flora and fauna, development of vaccine and biologics, and targeted therapy e.g gene and stem cells.

Natural products

- Isolated from any organism i.e bacteria, yeast, plant (honey) and any organism
- Not supposed to be naturally active, not only confined to drug
- Isolate, characterize but perhaps extend to biopharmaceuticals
- Adjuvant derived from natural products extended for biopharmaceutical usage

Biopharmaceuticals

- Involve drug design, discovery and delivery
- very precise medicine, very targeted delivery
- What kind of adjuvants used
- Always come with biological materials
- Biologics - Including all biological small molecules and macromolecules

Precision Medicine

- Use of genetics and molecular information to provide a targeted and personalized medicine

NATURAL PRODUCTS, BIOPHARMACEUTICALS AND PRECISION MEDICINE

List of Stakeholders

1. Kementerian (Ministry) : MOSTI, MOH, NRECC, MAFI (Kementerian Agrikultur dan Keterjaminan Makanan), EPU, MATRADE, MOTAC,
2. Agensi Kerajaan and GLRI: NIBM, FRIM, MPOB, MINT, NPRA, MARDI, IMR
3. Industri: Pharmaceutical Industries, Neutraceuticals Industries, Food Industries, Agriculture Industries, Bio-based product industries, Nano technology Industries
4. Akademik (Universiti): All the public and private universities
5. Badan Bukan Kerajaan (NGO)/ Masyarakat Sivil (Society): National Kidney Foundation, MAKNA, Diabetes Malaysia Society, Rare Disease Society (ie motor neuron disease society), MNPS (Malysia Natural Products Society), MPS (Malaysia Pharmacists Society), MMC, Traditional Practitioners Society (GAPERA), controlled release society (CRS).
6. Lain-lain

List is non-exhaustive

List of Potential Projects

- Plenty of unknown and inconsistency of quality (limited database)
- Resources sustainability-commercialization funding
- Funding for clinical trials
- Technology of the equipment become obsolete (spare part discontinued), instruments readiness, facilities
- Stringent regulations for approvals
- Insufficient manpower
- Poor industrial take up

15. FUTURE SUSTAINABLE ENERGY

Theme 1 Policy Enabler 1 7 AFFORDABLE AND CLEAN ENERGY ENERGY

Theme 3

Areas of Research:

The looming oil shortage, which provides most of our transportation fuel, and the alarming increase in atmospheric carbon dioxide over the past 50 years, caused by the burning of oil, gas, and coal and the clearing of forests that threatens to alter the climate of the planet through global warming will allow us to create reasonable, logical, and accurate decisions about our future energy. Future Energy examines all the energy sources at our disposal, considering a scenario in which oil and gas production declines and atmospheric carbon dioxide levels rise dramatically.

List is non-exhaustive

Concept

The centre will focus on education, research & development, integration and provision of alternative, sustainable, affordable energy that will enhance economic and social growth as well as create social impact

Scopes:

- Development of new and pre existing sustainable energy
- Future energy affordability
- Management of future energy
- Environmental friendly
- Sustainable energy governance & policy development
- Education and awareness of sustainable energy
- Human capacity development on sustainable future energy
- Energy security

FUTURE SUSTAINABLE ENERGY

List of Stakeholders

Kementerian

1. Ministry of Natural Resources, Environment & Climate Change
2. Ministry of Education
3. Ministry of Higher Education
4. Ministry of Science, Technology & Innovation
5. Ministry of Human Resources

Agensi Kerajaan

1. Suruhanjaya Tenaga
2. Sustainable Energy Development Authority (SEDA)
3. Malaysian Green Technology & Climate Change Corp (MGTC)
4. Malaysian Investment Development Authority (MIDA)
5. Grid System Operator (GSO)
6. Malaysian Automotive, Robotics and IoT Institute (MARII)
7. MIMOS
8. Nano Malaysia
9. Malaysian Industry Government Group for High Technology (MIGHT)
10. Malaysian Talent Development Corp (MTDC)
11. Nuclear Energy Insttute

Industri

1. Tenaga Nasional Berhad
2. Oil & Gas eg Petronas
3. Automotive Industry
4. Sarawak Energy Berhad
5. ANDRITZ Hydro
6. Malaysian Palm Oil Board (MPOB)

Akademik

1. IPTA
2. IPTS
3. Skim Latihan 1Malaysia (SL1M)

Badan Bukan Kerajaan/ Masyarakat Sivil

1. Malaysian Nature Society
2. Water & Energy Consumers Association
3. Institute of Electrical and Electronics Engineers (IEEE)

Lain-lain

List of Potential Projects

- Lack of awareness on sustainable energy
  - Provision of training and education
- In need of clearer policy and guidelines for stakeholders
  - Inclusion of stakeholders as subject matter expert
- Energy storage technology
  - Development of more suitable, sustainable materials for storage
  - Cost-effective & high efficiency method of energy storage
- Lack of nationally driven initiative for materials and product development in sustainable energy
- Management of energy material waste
  - Re-purposing of energy material waste

List is non-exhaustive

Theme 3

16. BIODIVERSITY FOR SUSTAINABLE ECONOMY

Areas of Research:

Biodiversity data mobilization, Soil microbial ecology, animal and plant taxonomy, ecological and bio-informatics and modelling, Genetic diversity, Terrestrial biodiversity

List is non-exhaustive

Concept

To provide integrated multidisciplinary solutions aimed at sustainable utilization of biological and environmental resources for socio-economic benefits.

BIODIVERSITY FOR SUSTAINABLE ECONOMY

List of Stakeholders

1. **Kementerian**
   - Kementerian Pendidikan Tinggi
   - Kementerian Sumber Asli, Alam sekitar dan Perubahan Iklim
   - Kementerian Pertanian dan Keterjaminan Makanan
   - Kementerian Pelancongan, Seni dan Budaya
2. **Jabatan / Agensi Kerajaan**
   - FRIM, Jab. Perhutanan
   - Jabatan Perikanan
   - PERHILITAN
   - Jab. Kemajuan Orang Asli
   - Jab. Pengairan dan Saliran
3. **Industri**
   - Sime Darby Research
   - BGI Genomics
   - Spartan Maritime
   - Hotel, resort
4. **Akademik (Universiti)**
   - Awam
   - Swasta
5. **Badan Bukan Kerajaan/ Masyarakat Sivil**
   - Sahabat Alam Malaysia (SAM)
   - Malaysian Nature Society (MNS)
   - Sabah Wetlands Conservation Society
   - Pers. Nelayan Kebangsaan,
   - Komuniti
6. **Kerajaan Negeri**
7. **Lain-lain**
   - International Strategic Partners (e.g., Cambridge University, Harvard University)
   - Startups (e.g., EnviroDNA)
   - Media (e.g., ASTRO, The Star, etc.)

List is non-exhaustive

List of Potential Projects

This COE will champion this issues/research projects:

- Integrating urban diversity into urban planning
- Developing application of IoT, robotics, AI for monitoring and surveillance for biodiversity in challenging environments
- Involvement in policy implementation and governance towards biodiversity and ecosystem accounting (System of Environmental Economic Accounting).

17. QUANTUM INFORMATION SCIENCE AND TECHNOLOGY

Theme 1

Policy Enabler 2

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ENERGY

CULTURE, ARTS & TOURISM

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

WATER & FOOD

EDUCATION

BUSINESS & FINANCIAL SERVICES

MEDICAL & HEALTHCARE

SMART CITIES & TRANSPORTATION

AGRICULTURE & FORESTRY

ENVIRONMENT & BIODIVERSITY

Areas of Research:

Quantum communication for secured banking transactions

List is non-exhaustive

Concept

To include strategic activities covering:

- quantum information **hardware**. (qubit systems, detectors, communication channels, and cloud quantum computers) ,
- quantum information **software**. (quantum/hybrid algorithms, classical quantum software interfaces, quantum-based apps),
- **Education, training** and **consultancy** in emerging areas of quantum information science and technology

To enhance Malaysia's readiness, participation and competitiveness in the fast growing global quantum technology market (USD 3.2B)

Global Trend/ Thrust Area:

Quantum Computing (Q-algorithm for search engine, optimization, machine learning, and Q-computer)

Quantum Security and Cryptography (Q-key distribution (QKD), post-quantum algorithm,)

Quantum Sensing and Metrology (Healthcare, Oil & Gas exploration, etc.)

Quantum Communication (network design, energy distributions, etc.)

QUANTUM INFORMATION SCIENCE AND TECHNOLOGY

List of Stakeholders

Area	Stakeholders
Quantum Computing	Telcos service provider, CyberSecurity Malaysia, Bank Negara, Financial companies, Banks, Brusa, Dept. of Statistic, Department of Metrology, Ministry of Finance, Ministry of Defence, e-commers, MIMOS Berhad
Quantum Security and Cryptography	Telcos service provider, CyberSecurity Malaysia, Bank Negara, Financial companies, Banks, Brusa, Dept. of Statistic, Department of Metrology, Ministry of Finance, Ministry of Defence, Ministry of Multimedia, Jabatan Pendaftaran Negara/e-governance, MIMOS Berhad
Quantum Sensing and Metrology	Department of Metrology, Ministry of Transportation, Ministry of Health, MIMOS Berhad
Quantum Communication	Telcos service providers (TM, Maxis, Digi, etcs), CyberSecurity Malaysia, Ministry of Defence, MIMOS Berhad

List of Potential Projects

- Advanced materials for **qubits** (Q-photonics, spintronics, topological materials, single photon sources and detections, and non-classical light)
- **Quantum sensing** and spectroscopy for ultra-weak signal and imaging e.g. brain signal, brain machine interface application.
- Advanced materials **modelling** and simulations using quantum optimization for biochemical structure modelling, energy materials, drug design.
- Big data analysis using quantum algorithm for banking, finance, risk analysis, climate and weather prediction, routing mobility.
- Data security for cyber security, medical, social data, and defense.

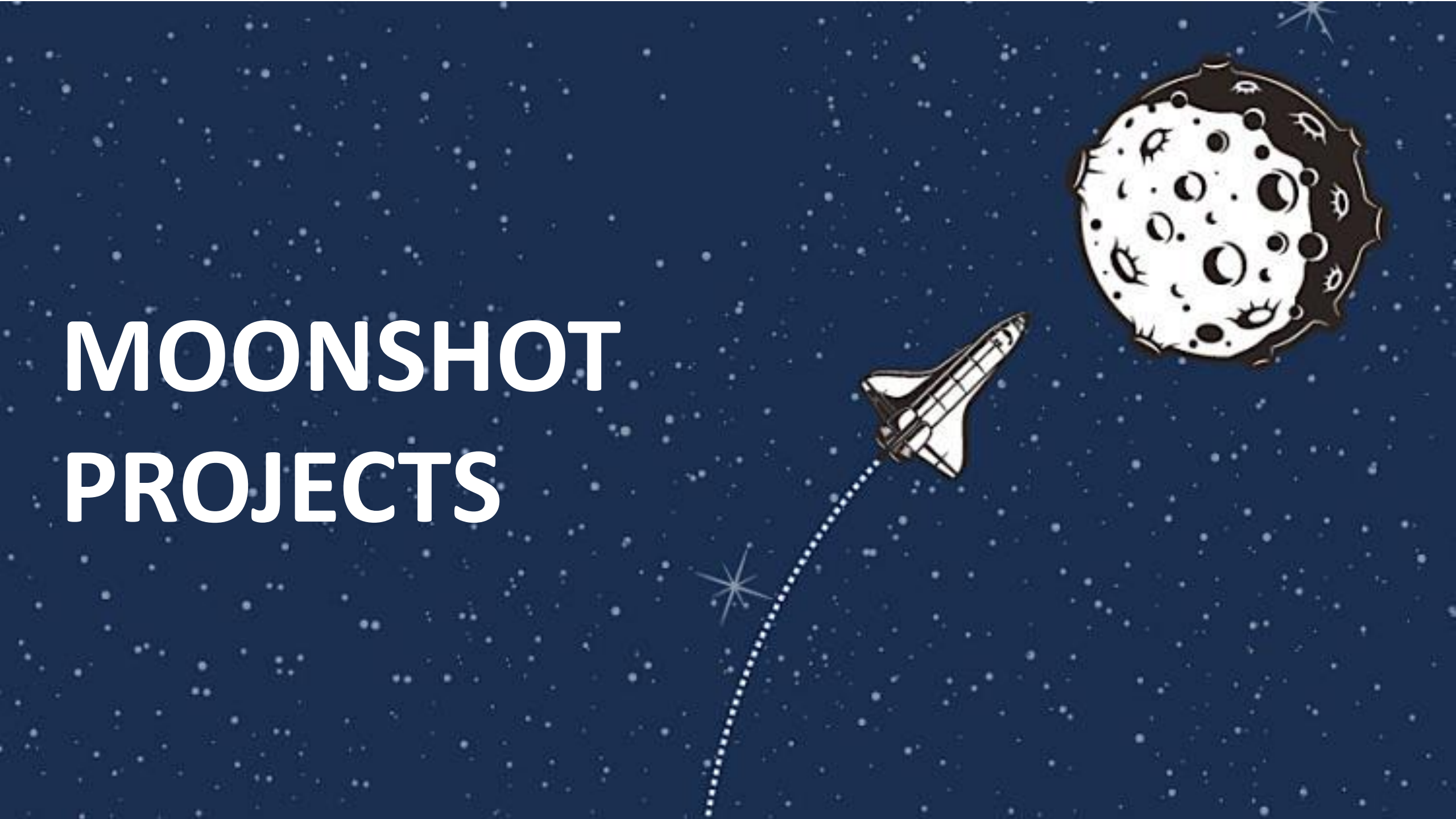
On-Going Projects

- **Quantum threat to data/cybersecurity**. (Preliminary discussion done with Cybersecurity Malaysia, Ministry of Defense, Ministry of Multimedia)
- **Quantum communication on using optical fiber network**. (on going FRGS)
- **Single photon source for quantum information application** (TRGS 2023 draft)
- On going participation with **Malaysian Consortium for Quantum Information Science** (UM, UTM, UPM, UniMAP, UIAM, Xiamen University)

OTHER POTENTIAL “SHELL CENTRES”

18. Centre for Digital Transformation of Health

MOONSHOT PROJECTS

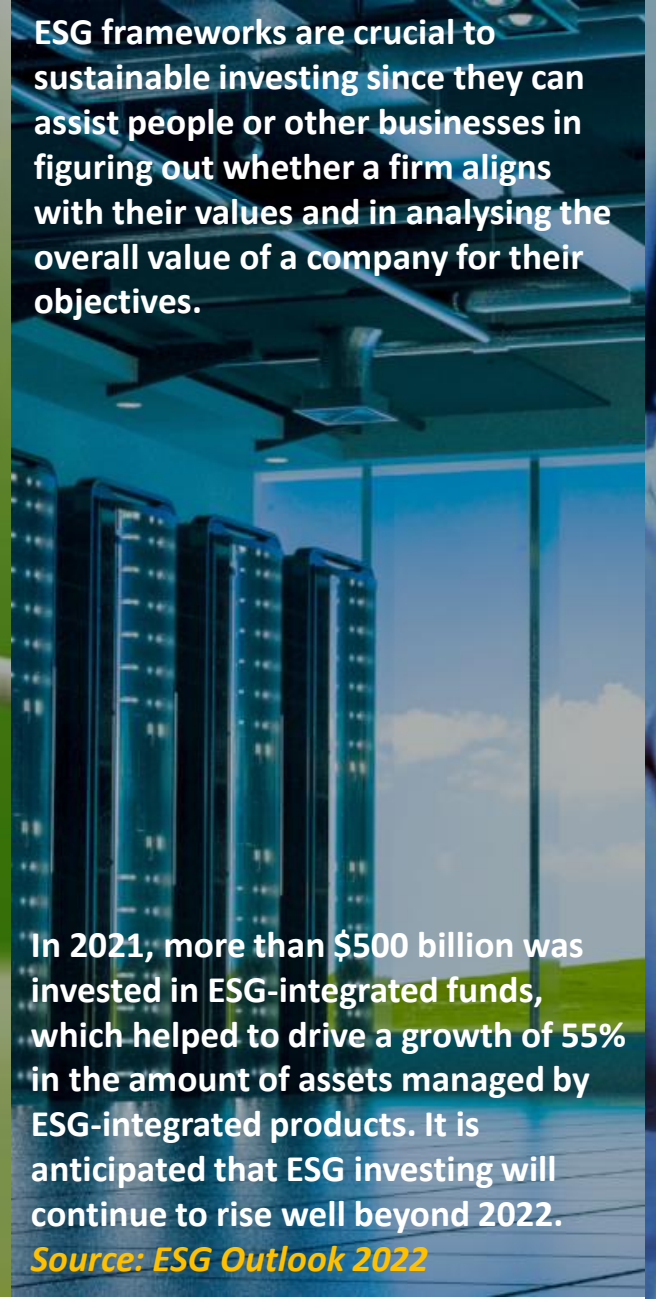


Green energy is crucial for the environment since it offers environmentally preferable substitutes for the harmful consequences of fossil fuels. Green energy is derived from natural resources and is frequently clean, renewable, and emits no or little greenhouse gases. It is also frequently accessible.

By 2030, cheap electricity generated from renewable sources may account for 65 percent of the world's total electrical production. By 2050, it could decarbonize 90% of the electricity sector, drastically reducing carbon emissions and assisting in the fight against global warming.

Source: United Nation

GREEN ENERGY FROM HYDROGEN

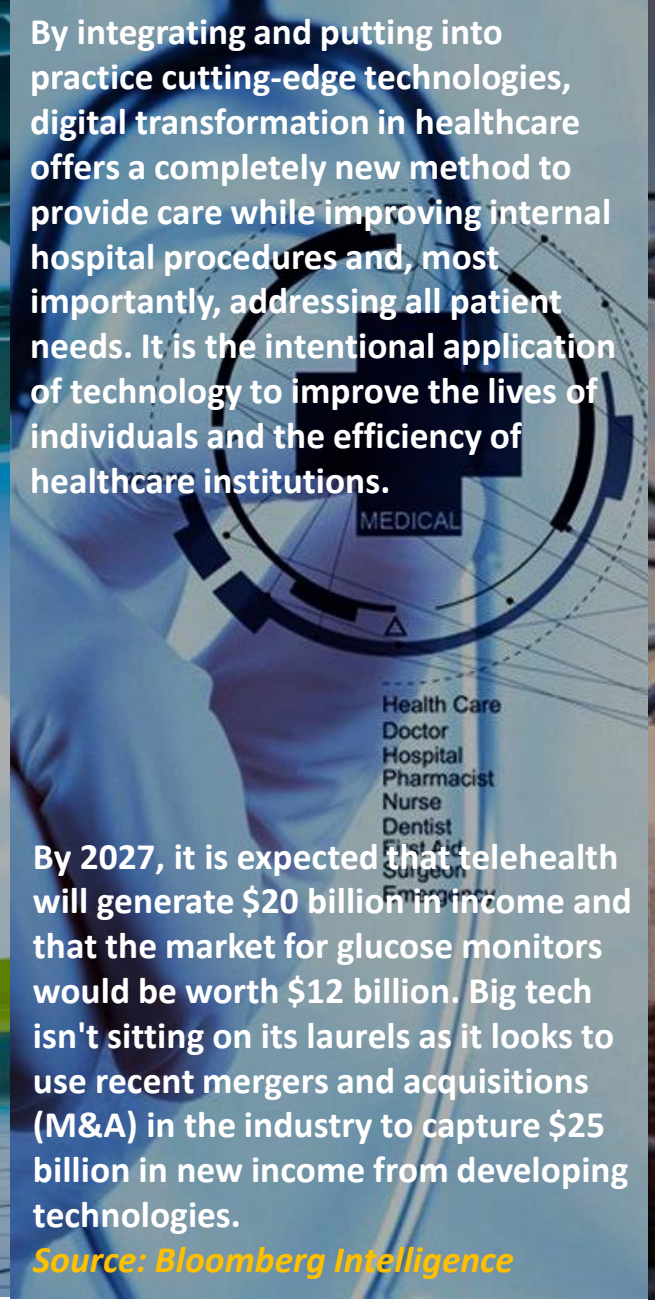


ESG frameworks are crucial to sustainable investing since they can assist people or other businesses in figuring out whether a firm aligns with their values and in analysing the overall value of a company for their objectives.

In 2021, more than $500 billion was invested in ESG-integrated funds, which helped to drive a growth of 55% in the amount of assets managed by ESG-integrated products. It is anticipated that ESG investing will continue to rise well beyond 2022.

Source: ESG Outlook 2022

NATIONAL ESG DATA CENTRE



By integrating and putting into practice cutting-edge technologies, digital transformation in healthcare offers a completely new method to provide care while improving internal hospital procedures and, most importantly, addressing all patient needs. It is the intentional application of technology to improve the lives of individuals and the efficiency of healthcare institutions.

By 2027, it is expected that telehealth will generate $20 billion in income and that the market for glucose monitors would be worth $12 billion. Big tech isn't sitting on its laurels as it looks to use recent mergers and acquisitions (M&A) in the industry to capture $25 billion in new income from developing technologies.

Source: Bloomberg Intelligence

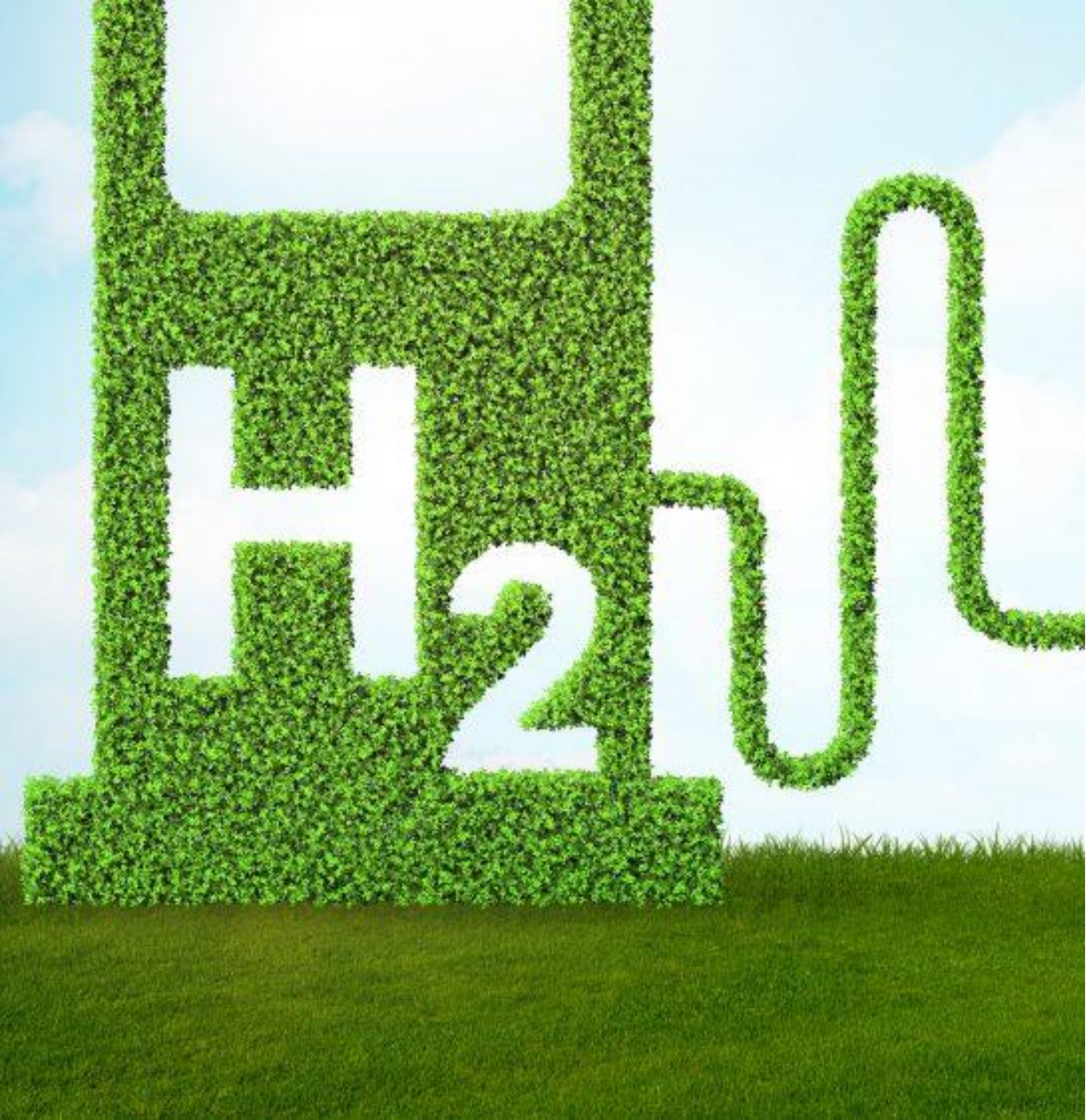
DIGITAL TRANSFORMATION OF HEALTH

Innovation promotes competitiveness, fosters employment growth, empowers customers, extends life expectancy, and advances knowledge. It also supports economic and organisational progress. Additionally, it may result in upsetting change, such as upsetting economic and social transitions, which may have both advantageous and disadvantageous effects.

In 2020, the world aerospace market had a value of $298 billion, with about half of that coming from North America. It is anticipated to increase by 7.7% to $430.7 billion in 2025 and then by another 5.9% per year until 2030, when it will reach a total of $573.6 billion.

Source: Embroker

AEROSPACE INNOVATION



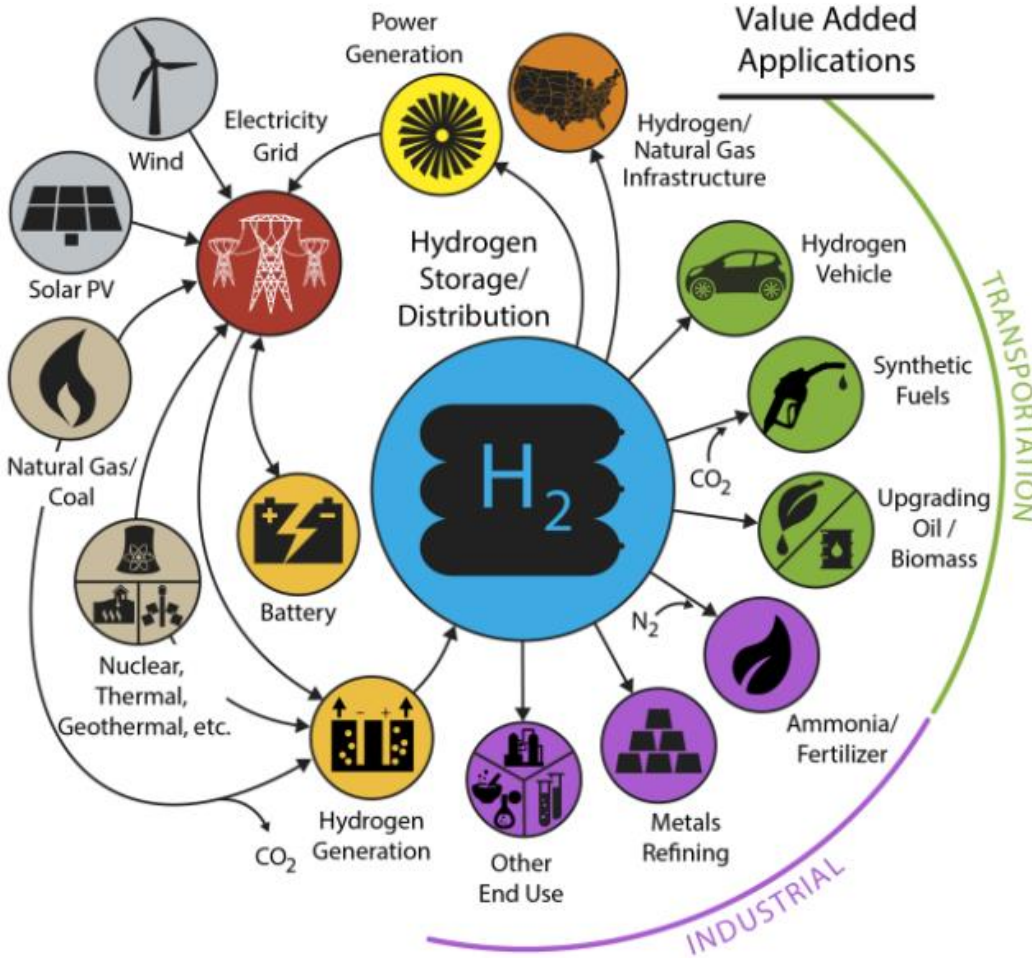
GREEN ENERGY FROM HYDROGEN

GREEN ENERGY FROM HYDROGEN

The energy problem is the biggest challenge facing mankind in the 21st century, entangling strongly with the issues of global warming and climate change. Sustainable green hydrogen production has been earmarked as one of the most important solution pillars and where strategic policies have been put in place in many countries, including Malaysia to safeguard future energy security.

Hydrogen Economy 2.0 is a crucial part of the ultimate energy decarbonisation plan, and in fact identified as the next pillar of growth post-fossil fuel which aligned with sustainable development goals (SDGs) 2030 under 7: Affordable and Clean Energy and 13: Climate Action. Malaysia implemented its hydrogen energy roadmap (2005–2030) especially in support of its application in H2 fuel cell vehicles, aiming to develop a global export market for green hydrogen.

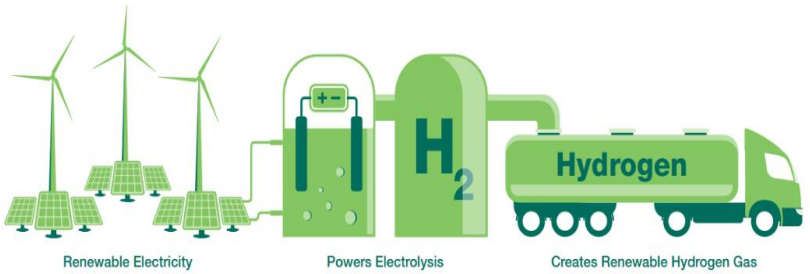
However, the technological options for green hydrogen security in the immediate to mid-term is at current limited both in Malaysia and globally. The advances of energy technologies are crucial to sustain the effort.



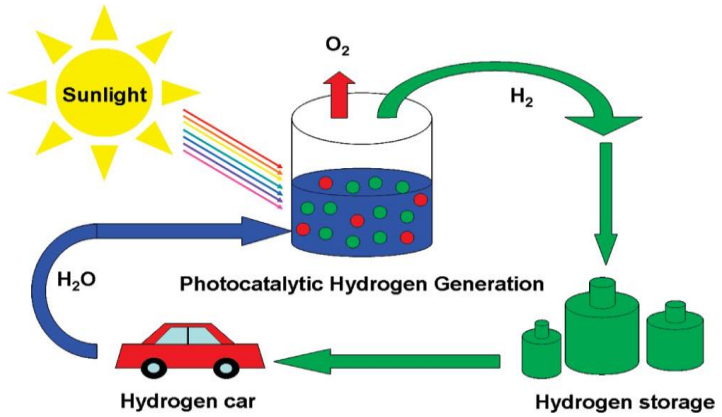
Simplified Framework

POTENTIAL PROJECT/SOLUTION

Electrolysis to spilt water to hydrogen and oxygen from renewable electricity (i.e. solar, wind, ocean thermal energy conversion, hydro, etc) is expected to be a mainstream technique of green hydrogen production. The development of effective and economical electrolyzer and the infrastructures for renewable electricity production will be the game changer.



Solar hydrogen is deemed the ultimate frontier in green hydrogen production due to the freely available solar energy of 14-17 MJm-2 per day. the development of The direct solar-to-hydrogen (STH) conversion via photocatalytic water splitting is one the solution. The development of highly active and economical photocatalytic system to split water is crucial for production of green hydrogen.

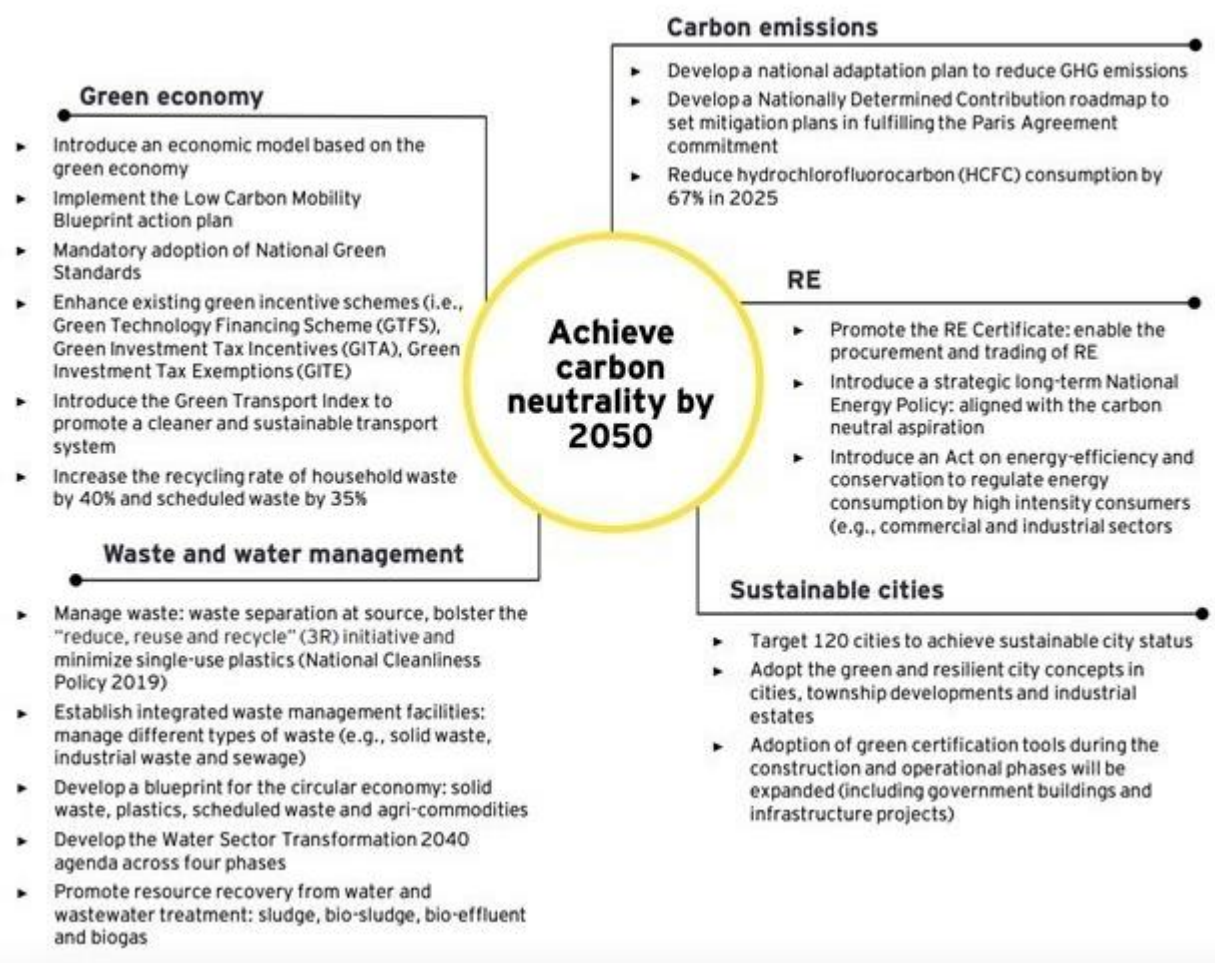


Government and Economy benefit: The success of this project is aligned with national policy of hydrogen energy roadmap (2005–2030) (MIDA, 2021), which will a great milestone for government and ministers. Our government has introduced the Net Energy Metering Scheme in November 2016 with quota allocation of 500 MW up to year 2020 to encourage Malaysia's Renewable Energy. This will serve as new economy for Malaysia from generating renewable hydrogen as energy carrier.

NATIONAL ESG DATA CENTRE

BACKGROUND

Malaysia's five-year sustainability plans under the 12th Malaysia Plan



Source: Malaysia's five-year sustainability plans under the 12th Malaysia Plan, Source: Trending- Sustainable responsible investment in Malaysia and the region, EY, 2022

Eng, S. (2022, June 15). Here's how Malaysia is stepping up our ESG efforts. TM One. Retrieved February 15, 2023, from https://www.tmone.com.my/resources/think-tank/article/how-malaysia-is-stepping-up-our-esg-efforts/

A key theme of the 12th Malaysia Plan is 'advancing sustainability' which outlines our aspiration to become a carbon neutral country by 2050.

Source: Kuen, Y. L. (2022, December 16). How Malaysia scores on ESG. The Star. Retrieved February 15, 2023, from https://www.thestar.com.my/business/business-news/2022/08/02/how-malaysia-scores-on-esg

RMK 12 GAME CHANGER II: Catalysing Strategic and High Impact Industries to Boost Economic Growth

GAME CHANGER VIII: Embracing the Circular Economy

- RMK 12 – focus on implementing the green economy agenda by prioritising environmental, social and governance (ESG) elements in investment.

BACKGROUND

In 2004, the United Nations Global Compact and the Swiss Federal Department of Foreign Affairs published a report **Who Cares Wins**, in which the term 'ESG' was coined. ESG became the first sustainability scoring concept which is promulgated by the United Nations (UN) Principles for Responsible Investing (PRI).

Source: https://www.ifc.org/wps/wcm/connect/bee837d0-34b5-4703-95bb-ebb8c474f729/IFC-ESG-Guidebook.pdf?MOD=AJPERES&CVID=nXrNOGJ

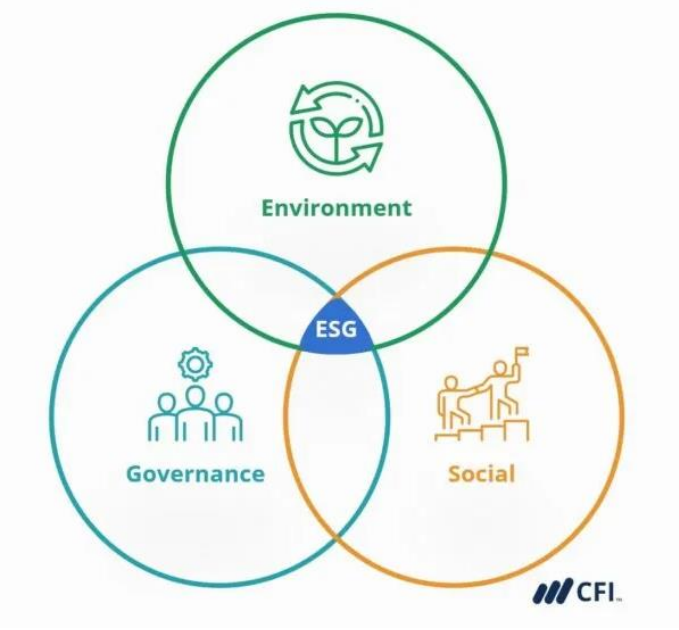
ESG stands for **Environment, Social, and Governance**, and is a set of criteria that investors are considering in searching and filtering companies that are "socially responsible". These standards create a holistic approach for business strategies and investor screening by accounting for all the stakeholders — investors, company staff, environment, and society.

(Source: Joy Peligrino 2022. What is ESG: Issues, Importance, and Initiatives https://www.azeusconvene.com/esg/articles/what-is-esg-issues-importance-and-initiatives)

- ESG is a framework that helps stakeholders understand how an organization manages risks and opportunities around sustainability issues.
- ESG has evolved from other historical movements that focused on health and safety issues, pollution reduction, and corporate philanthropy.
- ESG has changed how capital allocation decisions are made by many of the largest financial services firms and asset managers in the world.

Source: Alana, B. (n.d.). Environmental, social and governance (ESG) investing and how to get started. NerdWallet. Retrieved February 15, 2023, from https://www.nerdwallet.com/article/investing/esg-investing#:~:text=Carbon%20emissions.,Green%20energy%20initiatives

BACKGROUND



Environmental standards include the **company's usage of energy resources, policies on waste management, and its impact and efforts towards net-zero emission and climate change**.

Social criteria cover social relationships focusing on management and employee relationships. This includes **human rights, worker's rights, workplace policies, employee wellness and training, DEI (diversity, equity, and inclusivity), and wages**.

Governance criteria encapsulate issues and efforts involving decision-making, and corporate cultures of transparency, accountability, inclusivity, and compliance. This also includes the relationship with stakeholders, such as shareholders, investors, and customers.

Under this set of criteria, companies must evaluate concerns such as **board composition, board-shareholder relationships, financial report transparency, suppliers and regulators policies, partner compensation, customer relations, and political stances**.

(Source: Joy Peligrino 2022. What is ESG: Issues, Importance, and Initiatives https://www.azeusconvene.com/esg/articles/what-is-esg-issues-importance-and-initiatives)

Environmental	Social	Governance
• Carbon emissions. • Air and water pollution. • Deforestation. • Green energy initiatives. • Waste management. • Water usage.	• Employee gender and diversity. • Data security. • Customer satisfaction. • Company sexual harassment policies. • Human rights at home and abroad.	• Diversity of board members. • Political contributions. • Executive pay. • Large-scale lawsuits. • Internal corruption. • Lobbying.

Source: Alana, B. (n.d.). Environmental, social and governance (ESG) investing and how to get started. NerdWallet. Retrieved February 15, 2023, from https://www.nerdwallet.com/article/investing/esg-investing#:~:text=Carbon%20emissions.,Green%20energy%20initiatives

Is ESG the same as corporate social responsibility?

ESG	CSR
ESG is the criteria for assessing the corporations' impact and initiatives towards being socially responsible.	CSR is a business model that drives companies to develop and implement socially responsible programs to bring a positive impact on the community while maximizing profit.
ESG offers the standards to which social actions and measures are made	CSR provides the vision and mission for businesses to be accountable in their sustainability and responsibility agenda
ESG is the quantitative side of social commitments	**CSR is the qualitative side of social commitments**

True ESG is consistent with a company's well-considered strategy and advances its business model

Environmental

Addresses impact on the physical environment and the risk of a company and its suppliers/partners from climate events

- Climate change and greenhouse-gas emissions (GHG)
- Air pollution (non-GHG)
- Water and wastewater management
- Waste and hazardous-materials management; circularity
- Biodiversity and ecosystems; rehabilitation

Social

Addresses social impact and associated risk from societal actions, employees, customers, and the communities where it operates

- Labor practices
- Health and safety
- Community engagement; diversity and inclusion
- Community relations, local economic contribution
- Product and service attributes

Governance

Assesses timing and quality of decision making, governance structure, and the distribution of rights and responsibilities across different stakeholder groups, in service of positive societal impact and risk mitigation

- Business ethics, data security
- Capital allocations, supply chain management
- Governance structure and engagement; incentives
- Policies; external disclosures; position and advocacy

Source: https://www.mckinsey.com/capabilities/sustainability/our-insights/does-esg-really-matter-and-why

ISSUES & CHALLENGES

Most important elements of ESG reporting

Elements	2021 (%)	2022 (%)
Clear explanation of the roles ESG plays in the investment process	50	56
Reporting on specific E, S and G factors	43	55
Third party validation/reviewing	30	44
Carbon footprints	25	38
Reporting on spcific UN Sustainable Devlopment Goals	18	31
Stewardship reports	16	30
Proxy voting outcomes	12	23
Case studies	9	23

Source: ESG Global Study 2022

Challenges with incorporating ESG data

Challenges	2021 (%)	2022 (%)
Overcoming lack of consistency in ESG scores	53	50
The need to interpret and analyse third-party ESG data	45	48
Difference in what information is disclosed by asset class, region or provider	*	40
Constantly changing methodologies	*	39
Addressing the limitations of ratings which focus on outdated/ historic data	36	38
Reconciliation with my organisation's definitions, standards and principles	28	31

Source: ESG Global Study 2022
Note: * 2021 Data not available

GLOBALLY, A report by The Alliance for Corporate Transparency in 2020 concluded that apart from only a minority of companies provided comprehensive and reliable sustainability-related information, most disclosures are **not specific enough** to enable understanding of a company's position and future developments. There **have not been concrete targets, outcomes of policies with respect to these targets, and specific information on risks and impacts**.

Source: https://www.iasplus.com/en/news/2020/02/allianceforcorporatetransparency

LOCALLY, The Twelfth Plan will advance green growth by implementing the **clean, green and resilient development agenda** through the whole-of-nation approach. The key strategies will include **increasing resilience against climate change and disasters, embracing the circular economy, mainstreaming SDGs and ESG principles in investment decision, sharing responsibilities in moving towards a low-carbon nation, implementing evidence-based and risk-informed strategies, ensuring equitable benefit sharing and steering behavioural changes**. Effective execution of policies and strategies under the clean, green and resilient development agenda, supported by mindset and behavioural changes, will contribute to **sustainable growth and better planetary health** as well as the achievement of the 2030 Agenda.

- Industry players will be required to adopt the ESG elements in their business practices (RMK 12) – promotes the low-carbon and climate-resilient economy
- Integrate ESG consideration into business practices and investment consideration of companies and financial service providers.
- Integrates the SDGs and ESG principals into decision making

- **Absence of data base for businesses to prepare for ESG reporting**
- **Lack of guidelines and talent in ESG reporting**

Source: June, M. (2022). The importance of ESG for companies, investors. Retrieved February 15, 2023, from https://themalaysianreserve.com/2022/12/05/the-importance-of-esg-for-companies-investors/

FRAMEWORK

WEF2023: Lima langkah untuk pastikan usaha ESG berjaya, menurut Pengerusi UN-Habitat

Israr Khalid
Januari 19, 2023 11:40 MYT

MAIMUNAH: Bukan hanya melihat kepada Ringgit dan sen tetapi kena fikir apa kesannya, kosnya kepada sosial dan alam sekitar. - Astro AWANI

KUALA LUMPUR: Pengarah Eksekutif UN-Habitat, Datuk Seri Maimunah Mohd Sharif memberikan lima faktor yang perlu diberi tumpuan untuk memastikan dasar Ekonomi, Sosial dan Urus Tadbir (ESG) dapat dilaksanakan dengan jayanya.

- Integration
- Collaboration
- Technology
- Continuity and sustainability
- Finance

Setting up National ESG Data Centre

1. Serves as the ESG analytics think tank to the government;
2. Offers scientific data for ESG disclosure to corporate businesses;
3. Provides ESG talent training;
4. Connects and bridges institutional communication between the global ESG initiatives with the national practices.

Source: https://www.astroawani.com/berita-malaysia/wef2023-lima-langkah-untuk-pastikan-usaha-esg-berjaya-menurut-pengerusi-unhabitat-402625

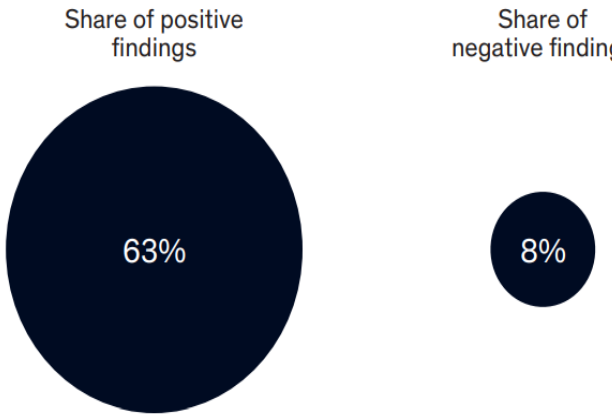
ECONOMIC BENEFIT

- Investment and asset optimization
  - Research by Accenture (2020) found that companies with high ratings for environmental, social and governance (ESG) performance enjoyed average operating margins **3.7 times higher** than those of lower ESG performers, as well as offering higher returns to shareholders
  - ESG investing has now become vital for investors as they have seen how the stock price of ESG-focused companies has become more stable, outperforming those with low ESG rankings. Such a statement confirms that companies that are highly oriented in ESG can expect high returns. (source: https://www.fool.com/investing/stock-market/types-of-stocks/esg-investing/)
- Environmental, Social and Governance (ESG) investing is estimated at over $20 trillion in assets under management and is growing. It has seen billions of dollars channeled into climate action in the last decade as countries set net zero carbon targets and has brought about innovation in rethinking the way we live, move, build and power our cities (UN Habitat 2022).
- Employee productivity uplift
- Net Zero Target 2050
- Directly support government SDGs commitment
- Reduce economic externalities of development

ECONOMIC BENEFIT

Paying attention to environmental, social, and governance (ESG) concerns does not compromise returns—rather, the opposite.

Results of >2,000 studies on the impact of ESG propositions on equity returns



Source: Gunnar Friede et al., "ESG and financial performance: Aggregated evidence from more than 2000 empirical studies," *Journal of Sustainable Finance & Investment*, October 2015, Volume 5, Number 4, pp. 210–33; Deutsche Asset & Wealth Management Investment; McKinsey analysis

A strong environmental, social, and governance (ESG) proposition links to value creation in five essential ways.

	Strong ESG proposition (examples)	**Weak ESG proposition** (examples)
Top-line growth	Attract B2B and B2C customers with more sustainable products Achieve better access to resources through stronger community and government relations	Lose customers through poor sustainability practices (eg, human rights, supply chain) or a perception of unsustainable/unsafe products Lose access to resources (including from operational shutdowns) as a result of poor community and labor relations
Cost reductions	Lower energy consumption Reduce water intake	Generate unnecessary waste and pay correspondingly higher waste-disposal costs Expend more in packaging costs
Regulatory and legal interventions	Achieve greater strategic freedom through deregulation Earn subsidies and government support	Suffer restrictions on advertising and point of sale Incur fines, penalties, and enforcement actions
Productivity uplift	Boost employee motivation Attract talent through greater social credibility	Deal with "social stigma," which restricts talent pool Lose talent as a result of weak purpose
Investment and asset optimization	Enhance investment returns by better allocating capital for the long term (eg, more sustainable plant and equipment) Avoid investments that may not pay off because of longer-term environmental issues	Suffer stranded assets as a result of premature write-downs Fall behind competitors that have invested to be less "energy hungry"

Source: Five ways that ESG creates value - mckinsey &; company. Witold Henisz, Tim Koller, and Robin Nuttall (2019). Retrieved February 15, 2023, from https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Strategy%20and%20Corporate%20Finance/Our%20Insights/Five%20ways%20that%20ESG%20creates%20value/Five-ways-that-ESG-creates-value.ashx

DIGITAL TANSFORMATION OF HEALTH

BACKGROUND & ISSUES

- Digital transformation is the use of digital technologies to improve the health and well-being of individuals and populations.
- In today's world, digital health transformation is becoming increasingly important, and these changes are motivated using digital technology as well as data-driven solutions.

Issues

- High burden of non-communicable diseases, ageing population, implications of COVID 19 (including mental health issues) and Long COVID, health financing issues, utilization of care – e.g. over-crowding of clinics and hospital, catastrophic expenditure, rising cost of co-payments, human resource management.
- MoH aims to table the Health White Paper in Parliament by 2023

POTENTIAL PROJECTS

- Telehealth and virtual care in improving care
- Data driven solution for clinical decision support
- Digital health technologies in disease prevention
- Digital interventions (including digital communication channels) that promote patient adherence to treatment
- Ethical and legal issues
- Patient adoption and engagement
    - Digital health solutions must be designed with patient needs and preferences in mind, and patients must be empowered to use these technologies effectively.

BENEFIT & CHALLENGES

Benefits of digital transformation in health include :

- improved patient outcomes
- Increase patient safety
- increased efficiency
- improve access to care
- enhanced patient engagement
- teaching, training and supervision opportunities

Challenges in implementation:

- Inequalities in digital access
- Regulatory issues
- Data issues – privacy, security, quality accuracy

FRAMEWORK

- Identify priorities
- Stakeholders - researchers, clinicians, other experts, and stakeholders to drive digital transformation in areas such as digital health and social care, artificial intelligence, machine learning, patient-centred design, e-health, digital health records and telehealth
- Develop, implement and evaluate
- Teaching, clinical trial and other research opportunities through remote monitoring and supervision
- Advocate for policy change

AEROSPACE INNOVATION

INTRODUCTION

BACKGROUND

Aerospace is a catalytic high-value industry that has the potential to drive economic growth, promote innovation, create high-skilled jobs and has a strong industry multiplier effect.

The aerospace industry in Malaysia has been growing steadily in recent years and has a positive outlook for the future. The country's strategic location in Southeast Asia, coupled with a well-developed infrastructure and a supportive government, has made it an attractive destination for aerospace investments.

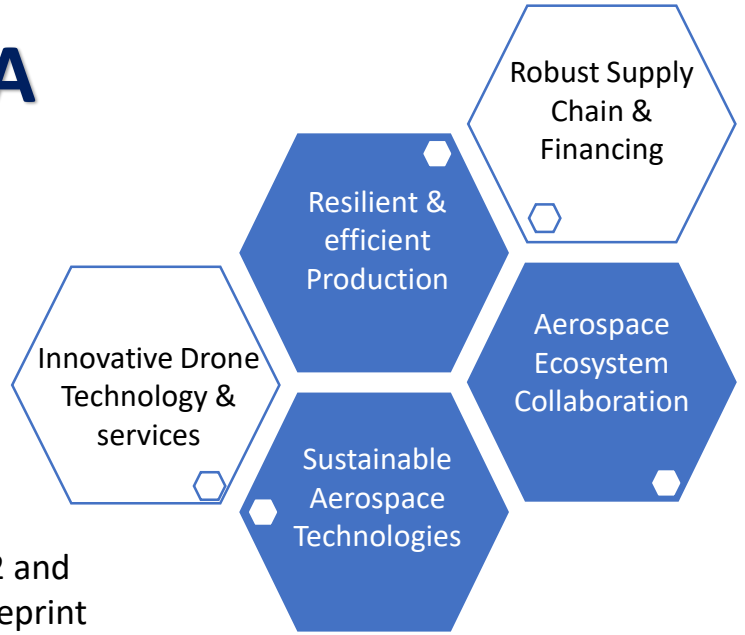
According to a report by the Malaysian Investment Development Authority (MIDA), the aerospace industry in Malaysia is expected to grow at a compound annual growth rate (CAGR) of 7.1% from 2020 to 2025. The report also indicates that Malaysia is well-positioned to capture a significant share of the global aerospace market, particularly in the areas of aircraft maintenance, repair and overhaul (MRO), manufacturing and engineering services.

The government has implemented a number of initiatives to support the growth of the aerospace industry, including the establishment of the Aerospace Industry Blueprint 2030, which aims to position Malaysia as a leading aerospace nation in the Asia-Pacific region. The blueprint includes plans to develop aerospace parks, increase research and development capabilities, and attract more foreign investments.

ISSUES

The aerospace industry is highly competitive, with many other countries also vying for a share of the global market. In the Aerospace blueprint and the RMK 12 it highlighted that technology adoption, in particular digitalization and green supply chain, have not been taken up well which could threaten the potential growth that the industry is seeing now. Industry experts have also observed the lack of capability of the Aerospace SME to move up the value chain which is necessary for Malaysia to be recognized as key global players. As new Moving forward Malaysia Aerospace must continually invest in R&D and innovation to stay competitive, in which UM can play a big role as a triple helix hub in steering, engaging and knowledge repository for the various stakeholders.

FOCUS AREA



Aligned directly the requirements of the RMK12 and the National Aerospace Blueprint

MOVING FORWARD

POTENTIAL PROJECTS

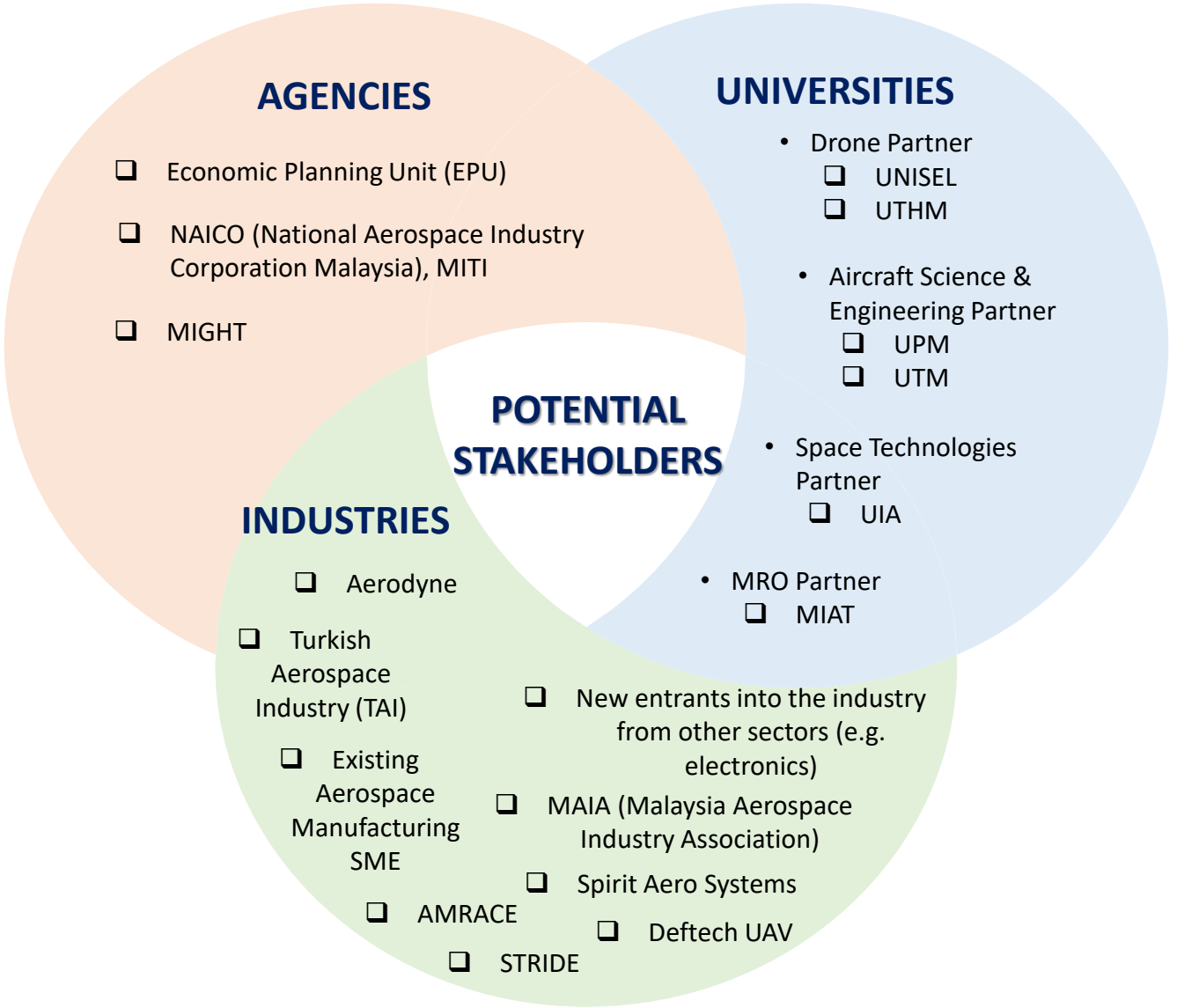
1. Key Cost Management Model for Multi-Stage Machining For Quality - Cost Equilibrium
2. Readiness Index for Resources Efficiency towards Green Aero Manufacturing
3. Autonomous Manufacturing Readiness Based On Multidimensional Factors
4. Development of Supply Chain Financing Model for Aero Manufacturing
5. Geospatial Data Driven Drone Application

FRAMEWORK/ ROADMAP

The centre will align its research direction & strategies to RMK12 and the Aerospace Industry Blueprint 2030. AIC is the process of preparing research and technology roadmap.

ECONOMIC BENEFIT

Malaysia aims to become the No 1 aerospace nation in SE Asia & Integral part of the global market. The industry is targeting a RM55.2 billion revenue with 32,000 jobs in the aerospace sector.



THANK YOU