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**SCIENCE, TECHNOLOGY AND INNOVATION (STI)
POLICIES AND STRATEGY SURVEY**

**Introduction**

The Global Innovation Index (GII) published by World Intellectual Property Organization (WIPO) has been used as a unique tool to guide policy-makers and businesses in measuring a country’s innovative capacity by relying on 81 indicators comprised of innovation inputs and outputs based on criteria that include institutions, human capital and research, infrastructure, credit, investment, linkages; the creation, absorption and diffusion of knowledge; and creative outputs. In the recent GII 2021 Brunei is ranked 82nd among the 132 economies, which is a major drop from GII 2020’s position at 71st. Analysis of the GII 2021 has indicated that Brunei’s innovation investments do not translate to innovation outputs.

*Survey Purpose*

The purpose of this survey is to study the state of the Science, Technology and Innovation ecosystem in relationship to the development of economic and social development in Brunei, which includes the Research and Development (R&D) infrastructure, funding mechanisms and technology adoption. The survey is designed around understanding the impact, challenges, and policies of STI in the priority economic sectors under the Ministry of Finance and Economy Economic Blueprint, as well as the 5 social development sectors in the Ministry of Culture, Youth and Sports Strategic Plan 2020-2024.As such, recognizing that innovation is the key driver of economic and social development, this survey aims to identify the challenges in the key economic sectors and key social development areas that can be supported through Science, Technology and Innovation (STI).

*Outcome: Science, Technology and Innovation (STI) National Innovation Survey*

The findings from this survey will design the structure and content of the STI workshop that is planned after the conclusion of this pilot study. The STI workshop will involve stakeholders from various Government Agencies, Private Sector and Institutes of Higher Learning. The findings and input from the workshop will feed into the drafting of the Science, Technology and Innovation Framework that will outline the STI policies and strategy, including the action plans and action item owners.

***Instruction***
Please submit completed survey to sti@mtic.gov.bn by 15th January 2022

**SECTION A: KEY ECONOMIC SECTORS**

The Ministry of Finance and Economy’s Economic Blueprint outlines five (5) priority sectors have been to spearhead the development of the country’s economic diversification efforts. These five priority sectors are; Downstream Oil and Gas, Food, Tourism, Info-communications and Technology (ICT) and Services.

1. Please indicate rank of the impact Science, Technology and Innovation (STI) in each of the sectors, please indicate (1) to (5) in the table below. Five (5) indicating having the most impact and one (1) being the least.

|  |  |  |
| --- | --- | --- |
| **MOFE Economic Sectors** | **STI impact** | **Reasoning/Remarks** |
| Downstream Oil and Gas |  |  |
| Food |  |  |
| Tourism |  |  |
| Info-communications and Technology (ICT) |  |  |
| Services |  |  |

1. In terms of STI Research and Development (R&D) direction, what are the challenges in the MOFE economic sectors that need STI support?

|  |  |  |  |
| --- | --- | --- | --- |
| **MOFE Economic Sectors** | **What are some of the sectoral gaps, challenges, trends, or disruptions that STI can help address?** | **What kind of technologies should be focused on to promote innovation and support the short-term growth of the sector?** | **What areas/topics of research and development should be focused on to maintain long‑term growth and sustainability?** |
| Downstream Oil and Gas |  |  |  |
| Food |  |  |  |
| Tourism |  |  |  |
| Info-communications and Technology (ICT) |  |  |  |
| Services |  |  |  |

1. What *other* economic sectors can benefit from STI?

|  |  |  |  |
| --- | --- | --- | --- |
| **Economic Sectors** | **What are some of the sectoral gaps, challenges, trends, or disruptions that STI can help address?** | **What kind of technologies should be focused on to promote innovation and support the short-term growth of the sector?** | **What areas/topics of research and development should be focused on to maintain long‑term growth and sustainability?**  |
|  |  |  |  |
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1. In relation to MOFE’s priority Economic Sectors, what are the existing policies, strategies, roadmaps or plans that can help to provide strategic direction to national research policy?

|  |  |
| --- | --- |
| **MOFE Economic Sectors** | **Strategic Plan/ Roadmaps/Policies** |
| Downstream Oil and Gas |  |
| Food |  |
| Tourism |  |
| Info-communications and Technology (ICT) |  |
| Services |  |

**SECTION B: KEY SOCIAL DEVELOPMENT AREAS**

The Ministry of Culture, Youth and Sports (MCYS) Strategic Plan 2020-2024 identifies five vision outcomes (key social development sectors) namely (i) Community Sector (Progressive Community); (ii) Youth Sector (Future-Ready Youth) (iii) Sports Sector (Proud Sporting Nation) (iv) Culture Sector (Dynamic, Culture and Safeguard Heritage) and (v) Administrative Governance. These MCYS Vision Outcomes are outlined to support the Wawasan Brunei 2035 vision.

1. Please rank the impact that Science, Technology and Innovation (STI) can have in these social development sectors. Please indicate (1) to (5) in the table below. Five (5) indicating having the most impact and one (1) being the least.

|  |  |  |
| --- | --- | --- |
| **MCYS’s Vision** | **STI Impact** | **Reasoning/Remarks** |
| **Community Sector:***Progressive Community*Sustainable community capacity development ecosystem that is resilient, competitive, dynamic and progressively inclusive. |  |  |
| **Youth Sector:** *Future-Ready Youth*Values-driven world class youths, who are future-ready agents of change for national development, rooted in inclusivity |  |  |
| **Sports Sector:** Proud Sporting NationAchieve excellence in competitive sports, advancements in sports development and wellness of the community. |  |  |
| **Culture Sector:** *Dynamic Culture and Safeguard Heritage*Nation’s culture and heritage as cornerstones of unity that is continuously relevant in contributing towards national development. |  |  |
| **Administrative Governance:** *Productive and Inclusive Workplace*Actively engaged, agile, capable and confident personnel in delivering services that meet diverse needs and to further our strategic objectives. |  |  |

1. In terms of STI Research and Development (R&D) direction, what are the challenges in MCYS’ vision that need STI support?

|  |  |  |  |
| --- | --- | --- | --- |
| **MCYS’s Vision** | **What are some of the sectoral gaps, challenges, trends, or disruptions that STI can help address?** | **What kind of technologies should be focused on to support the short-term issues of the sector?** | **What areas/topics of research and development should be focused on to address the policies and understanding in the sector?** |
| **Community Sector:***Progressive Community*Sustainable community capacity development ecosystem that is resilient, competitive, dynamic and progressively inclusive. |  |  |  |
| **Youth Sector:** *Future-Ready Youth*Values-driven world class youths, who are future-ready agents of change for national development, rooted in inclusivity |  |  |  |
| **Sports Sector:** Proud Sporting NationAchieve excellence in competitive sports, advancements in sports development and wellness of the community. |   |  |  |
| **Culture Sector:** *Dynamic Culture and Safeguard Heritage*Nation’s culture and heritage as cornerstones of unity that is continuously relevant in contributing towards national development. |  |  |  |
| **Administrative Governance:** *Productive and Inclusive Workplace*Actively engaged, agile, capable and confident personnel in delivering services that meet diverse needs and to further our strategic objectives. |  |  |  |

1. What *other* social development areas can benefit from STI?

|  |  |  |  |
| --- | --- | --- | --- |
| **Social Development Areas** | **What are some of the sectoral gaps, challenges, trends, or disruptions that STI can help address?** | **What kind of technologies should be focused on to support the short-term issues of the sector?** | **What areas/topics of research and development should be focused on to address the policies and understanding in the sector?** |
|  |  |  |  |
|  |  |  |  |
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1. In relation to MCYS’s Vision in their strategic plan, what are the existing policies, strategies, roadmaps or plans that can help to provide strategic direction to national research policy?

|  |  |
| --- | --- |
| **MCYS’s Vision** | **Strategic Plan/ Roadmaps/Policies** |
| **Community Sector:***Progressive Community*Sustainable community capacity development ecosystem that is resilient, competitive, dynamic and progressively inclusive. |  |
| **Youth Sector:** *Future-Ready Youth*Values-driven world class youths, who are future-ready agents of change for national development, rooted in inclusivity |  |
| **Sports Sector:** Proud Sporting NationAchieve excellence in competitive sports, advancements in sports development and wellness of the community. |  |
| **Culture Sector:** *Dynamic Culture and Safeguard Heritage*Nation’s culture and heritage as cornerstones of unity that is continuously relevant in contributing towards national development. |  |
| **Administrative Governance:** *Productive and Inclusive Workplace*Actively engaged, agile, capable and confident personnel in delivering services that meet diverse needs and to further our strategic objectives. |  |

**Survey Definitions**

**Science** is a system of knowledge that is concerned with the physical and natural world and its phenomena and works to unveil general truths and the operations of fundamental natural laws. Producing scientific knowledge requires unbiased observations and systematic experimentation using the scientific method

**Technology** is the systematic theoretical and practical knowledge and skill used in the process of production or service delivery. Technology is not a finished product or service. Technology includes the entrepreneurial expertise and professional know-how needed to deliver products and services

**Innovation** is the process of using knowledge and technology to develop, improve, or improve the production or performance of products, services and processes that have value in terms of commercial impact or social benefit.

**Research & Development (R&D)** activity is creative and systematic work undertaken in order to increase the stock of knowledge — including

knowledge of humankind, culture, and society — and to devise new applications of available knowledge. R&D covers three activities defined below — basic research, applied research, and experimental development:

* **Basic research** is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any application or use in view.
* **Applied research** is original investigation undertaken in order to acquire new knowledge. It is directed primarily towards a specific, practical aim or objective
* **Experimental development** is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.

**Examples of Disciplines: Science and Engineering Fields of R&D**

|  |  |  |  |
| --- | --- | --- | --- |
| **A. Computer and Information Sciences*** Artificial intelligence Computer and information technology administration and management
* Computer science
 | * Computer software and media applications
* Computer systems analysis
* Computer systems networking and telecommunications
 | * Data processing
* Information sciences, studies Information technology
 |  |
| **B. Engineering****1. Aerospace, Aeronautical, and Astronautical Engineering** * Aerodynamics
* Aerospace engineering Space technology

**2. Bioengineering and Biomedical Engineering** * Biological and biosystems engineering
* Biomaterials engineering
* Biomedical technology
* Medical engineering

 **3. Chemical Engineering** * Biochemical engineering
* Chemical and biomolecular engineering
* Engineering chemistry
* Paper science
* Petroleum refining process
* Polymer, plastics engineering
 | **4. Civil Engineering*** Architectural engineering
* Construction engineering
* Engineering management, administration
* Environmental, environmental health engineering
* Geotechnical and geoenvironmental engineering
* Sanitary engineering
* Structural engineering
* Surveying engineering
* Transportation and highway engineering
* Water resources engineering

**5. Electrical, Electronic, and Communications Engineering*** Communications engineering
* Computer engineering
* Computer hardware engineering
* Computer software engineering
* Electrical and electronics engineering
* Laser and optical engineering
* Power
* Telecommunications engineering
 | **6. Industrial and Manufacturing Engineering Industrial engineering*** Manufacturing engineering
* Operations research
* Systems engineering

**7. Mechanical Engineering*** Electromechanical engineering
* Mechatronics, robotics, and automation engineering

**8. Metallurgical and Materials Engineering*** Ceramic sciences and engineering
* Geophysical, geological engineering
* Materials engineering
* Metallurgical engineering
* Mining and mineral engineering
* Textile sciences and engineering
* Welding
 | **9. Other Engineering*** Agricultural engineering
* Engineering design
* Engineering mechanics, physics, and science
* Engineering physics
* Engineering science
* Forest engineering
* Nanotechnology
* Naval architecture and marine engineering
* Nuclear engineering
* Ocean engineering
* Petroleum engineering
* Other engineering fields that cannot be classified using the fields listed above
 |
| **C. Geosciences, Atmospheric Sciences, and Ocean Sciences****1. Atmospheric Science and Meteorology*** Aeronomy
* Atmospheric chemistry and climatology
* Atmospheric physics and dynamics
* Extraterrestrial atmospheres
* Meteorology
* Solar
* Weather modification
 | **2. Geological and Earth Sciences*** Earth and planetary sciences
* Geochemistry
* Geodesy and gravity
* Geology
* Geomagnetism
* Geophysics and seismology
* Hydrology and water resources
* Minerology and petrology
* Paleomagnetism
* Paleontology
* Physical geography
* Stratigraphy and sedimentation
* Surveying
 | **3. Ocean Sciences and Marine Sciences*** Biological oceanography
* Geological oceanography
* Marine biology
* Marine oceanography
* Marine sciences
* Oceanography, chemical and physical
 | **4. Other Geosciences, Atmospheric Sciences, and Ocean Sciences**Other fields that cannot be classified using the fields listed above |
| **D. Life Sciences****1. Agricultural Sciences*** Agricultural business and management
* Agricultural chemistry
* Agricultural economics
* Agricultural engineering—report in Engineering
* Agricultural production operations
* Animal sciences
* Applied horticulture and horticultural business services
* Aquaculture
* Food science and technology
* International agriculture
* Plant sciences
* Soil sciences
* Wood science

**2. Biological and Biomedical Sciences*** Allergies and immunology
* Biochemistry, biophysics, and molecular biology
* Biogeography
* Biology and biomedical sciences, general
 | * Biomathematics, bioinformatics, and computational biology
* Biotechnology
* Botany and plant biology
* Cell, cellular biology, and anatomical sciences
* Epidemiology, ecology and population biology
* Genetics
* Microbiological sciences and immunology
* Molecular medicine
* Neurobiology and neuroscience
* Pharmacology and toxicology
* Physiology, pathology and related sciences
* Zoology, animal biology

**3. Health Sciences*** Advanced, graduate dentistry and oral sciences
* Allied health and medical assisting services
* Bioethics, medical ethics
* Clinical medicine research
* Clinical/medical laboratory science/research and allied professions
 | * Communication disorders sciences and services
* Dentistry
* Dietetics and clinical nutrition services
* Health and medical administrative services
* Health, medical preparatory programs
* Gerontology, health sciences
* Kinesiology and exercise science
* Medical clinical science, graduate medical studies
* Medical illustration and informatics
* Medicine
* Mental health
* Nursing
* Optometry
* Osteopathic medicine, osteopathy
* Pharmacy, pharmaceutical sciences, and administration
* Podiatric medicine, podiatry
* Public health
* Radiological science
 | * Registered nursing, nursing administration, nursing research and clinical nursing
* Rehabilitation and therapeutic professions
* Veterinary biomedical and

clinical sciences* Veterinary medicine
* Zoology

**4. Natural Resources and Conservation*** Fishing and fisheries sciences and management
* Forestry
* Natural resources conservation and research
* Natural resources economics
* Natural resources management and policy
* Renewable natural resources
* Wildlife and wildlands science
* and management

**5. Other Life Sciences**Other life sciences that cannot be classified using the fields listed above |
| **E. Mathematics and Statistics*** Applied mathematics
* Mathematics
* Statistics
 |  |  |  |
| **F. Physical Sciences****1. Astronomy andAstrophysics*** Astronomy
* Astrophysics
* Planetary astronomy and science
 | **2. Chemistry**(except Biochemistry—report inBiological and Biomedical Sciences)* Analytical chemistry
* Chemical physics
* Environmental chemistry
* Forensic chemistry
* Inorganic chemistry
* Organic chemistry
* Organo-metallic chemistry
* Physical chemistry
* Polymer chemistry
* Theoretical chemistry
 | **3. Materials Science*** Materials chemistry
* Materials science

**4. Physics*** Acoustics
* Atomic, molecular physics
* Condensed matter and materials physics
* Elementary particle physics
* Mathematical physics
* Nuclear physics
* Optics, optical sciences
* Plasma, high-temperature physics
 | * Theoretical physics

**5. Other Physical Sciences**Other physical sciences that cannot be classified using the fields listed above |
| **G. Psychology*** Clinical psychology
* Counseling and applied psychology
* Human development
* Research and experimental psychology
 |  |  |  |

**Example of Disciplines: Social Sciences and Other Sciences Fields of R&D**

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| --- | --- | --- | --- |
| **H. Social Sciences****1. Anthropology*** Cultural anthropology
* Medical anthropology
* Physical and biological anthropology

**2. Economics*** Applied economics
* Business development
* Development economics and
* international development
* Econometrics and quantitative economics
* Industrial economics
* International economics
* Labor economics
* Managerial economics
* Public finance and fiscal policy
 | **3. Political Science and Government*** Comparative government
* Government
* Legal systems
* Political economy
* Political Science
* Political theory
 | **4. Sociology, Demography, and Population Studies*** Comparative and historical sociology
* Complex organizations
* Cultural and social structure
* Demography and population studies
* Group interactions
* Rural sociology
* Social problems and welfare theory
* Sociology
 | **5. Other Social Sciences*** Archeology
* Area, ethnic, cultural, gender, and group studies
* Cartography
* Criminal science and corrections
* Criminology
* Geography
* Gerontology, social sciences
* International relations and national security studies
* Linguistics
* Public policy analysis
* Regional studies
* Urban studies, affairs
 |

**Example of Disciplines: Non-Science & Engineering Fields of R&D**

|  |  |  |  |
| --- | --- | --- | --- |
| **I. Non-S&E Fields****1. Business Management and Business Administration*** Business administration
* Business management
* Business, managerial economics
* Management information systems and services
* Marketing management and research

**2. Communication and Communications Technologies*** Communication and media studies
* Communications technologies
* Journalism
* Radio, television, and digital communication
 | **3. Education*** Education administration and supervision
* Education research
* Teacher education, specific levels and methods
* Teaching fields

**4. Humanities*** English language and literature, letters
* Foreign languages and
* literatures
* History, including history and
* philosophy of science and
* technology
* Humanities, general
* Liberal arts and sciences
* Philosophy and religious
* studies
* Theology and religious vocations
 | **5. Law*** Law
* Legal studies

**6. Social Work*** (no specific examples)

**7. Visual and Performing Arts*** Drama, theatre arts and stagecraft
* Film, video, and photographic arts
* Fine and studio arts
* Music
 | **8. Other Non-S&E Fields*** Architecture
* City, urban, community and regional planning
* Family, consumer sciences and human sciences
* Foods, nutrition, and wellness studies
* Landscape architecture
* Library science
* Military technology and applied science
* Parks, sports, recreation,
* leisure and fitness
* Public administration and public affairs
* Other non-S&E fields that cannot be classified using the fields listed above
 |