



# The Brunei Darussalam STI Profile of the OIC Member State

## Science, Technology and Innovation Indicators



**COMSTECH**

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# FOREWORD

It gives me great pleasure to share the *Science, Technology and Innovation Profiles of OIC Member States*, as prepared by COMSTECH. These profiles of member states are being printed, as well as shared on the COMSTECH website. A few words are therefore presented to explain the wider aims and purposes of this exercise.

The member countries of the OIC are vigorously engaged with science, technology and innovation, both as a pursuit of knowledge and in harnessing the forces of nature for human betterment. Depending on their circumstances they have advanced to different levels, but much needs to be done, in general, to catch up with the attainments of the more advanced countries. However, there exists a well-defined need to catalogue national efforts in this direction. In particular, to identify respective strengths, achievements and shortcomings, as well as the institutions and policies that are shaping the scientific research and development profiles of OIC member states.

It is with the above goals and purposes that COMSTECH has ventured on this ambitious task viz. preparing a summarized version of the science, technology and innovation landscape of each member state. We have initiated this effort starting with the profiles of countries leading in this area, and will be continuing and sharing as we proceed onwards.

Undoubtedly much more could be said about each country than the summary that we have presented, but our emphasis is on the essentials and on maintaining brevity. COMSTECH welcomes feedback from member states on this effort and will be happy to update the website profiles on the basis of information received officially.

I hope that the scientific community as well as the planners and administrators of member states will find these profiles both useful and inspiring.

Prof. Dr. M. Iqbal Choudhary  
*Coordinator General COMSTECH*  
*UNESCO Chair*

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# CONTENTS

Following is the list of topics covered in the STI profiles of OIC Member States. All sub-sections/topics may not appear for every country due to unavailability of some data.

## **1. Country Overview**

- a. Brief history
- b. Geography
- c. Population
- d. Main occupations

## **2. Economic Overview**

- a. GDP (US\$ billions)
- b. GDP performance by sector
- c. High tech exports
- d. Key economic initiatives

## **3. Social and Human Development**

- a. Skilled labour force
- b. Employment percentage
- c. Access to electricity, and internet
- d. Life expectancy and literacy
- e. Human Development Index (HDI)

## **4. Key Government Organizations and Policy frameworks for S&T and Higher Education**

- a. Key policy frameworks for STI policy
- b. Key ministries and organizations responsible for science, technology and higher education
- c. Major research centers and institutes

# CONTENTS

## **5. Research and Development**

- a. GERD as percentage of GDP
- b. GERD: by sources of finance
- c. Researchers by sector of employment
- d. Researchers intensity (Researchers per million inhabitants)
- e. Researchers distribution in major fields
- f. Key areas of focus (Interest of policy makers, governing bodies and businesses)

## **6. Higher Education**

- a. Top ranked universities
- b. Tertiary graduates by field of study
- c. Key public institutions and key private institutions

## **7. Research Publications**

- a. Number of research publications (Articles); recent trend
- b. Number of research documents; historical trend
- c. Impact of research documents; scholarly output, citations, Citations per Publication (CPP), Field Weighted Citation Impact (FWCI)
- d. Distribution of publications over different fields or subject areas.
- e. Publications quality or ratings as per quartile sets.
- f. Most productive universities/institutions based on the number of scholarly output.
- g. Trend of international collaborations (%)
- h. Top collaborators in scientific research publications

# CONTENTS

## **8. International Cooperation and Support Initiatives**

- a. Key agreements and cooperation mechanisms with other countries
- b. Bilateral, regional, and international agreements and partnerships.

## **9. Innovation, Entrepreneurship and Technology Parks**

- a. Number of patents granted
- b. Global Innovation Index (GII)
- c. Major policies/initiatives for innovation
- d. Technology parks, incubation centers & startups promotion

## **10. Combating the COVID-19 pandemic**

- a. Vaccine development and/or administration efforts
- b. Indigenous production to meet pandemic requirements
- c. Mobile applications to support country's effort

# Brunei Darussalam

Brunei, formally Brunei Darussalam, is a country located on the north coast of the island of Borneo in Southeast Asia. Apart from its South China Sea coast, it is completely surrounded by the Malaysian state of Sarawak. It is separated into two parts by the Sarawak district of Limbang. Brunei is the only sovereign state entirely on Borneo; the remainder of the island is divided between Malaysia and Indonesia.



Brunei has total area of 5,765 square kilometres (2,226 sq mi). It has 161 kilometres (100 mi) of coastline next to the South China Sea, and it shares a 381 km (237 mi) border with Malaysia. The climate of Brunei is tropical equatorial that is a Tropical rainforest

As of 2020, its population was 460,345, of whom about 100,000 live in the capital and largest city, Bandar Seri Begawan. About 97% of the population lives in the larger western part (Belait, Tutong, and Brunei-Muara), while only about 10,000 people live in the mountainous eastern part (Temburong District).

The government is a monarchy ruled by its Sultan, entitled the Yang di-Pertuan, and implements a combination of English common law and sharia law, as well as general Islamic practices.

Brunei has been led by the Sultan of Brunei Hassanal Bolkiah since 1967, and had gained its independence as a British protectorate on 1 January 1984. Economic growth during the 1990s and 2000s, transformed Brunei into an industrialised country. It has developed wealth from extensive petroleum and natural gas fields. Brunei has the second-highest Human Development Index among the Southeast Asian nations, after Singapore. The IMF estimated in 2011 that Brunei was one of two countries (the other being Libya) with a public debt at 0% of the national GDP.

Ethnicities indigenous to Brunei include the Belait, Brunei Bisaya, indigenous Bruneian Malay, Dusun, Kedayan, Lun Bawang, Murut and Tutong. 76% of population live in urban areas. In 2014, 65.7% of the population were Malay, 10.3% are Chinese, 3.4% were indigenous, with 20.6% smaller groups making up the rest. There is a relatively large expatriate community. Most expats come from non-Muslim countries, Islam is the official religion of Brunei, More than 80% of the population, including the majority of Bruneian Malays and Kedayans identify as Muslim. Other faiths practised are Buddhism (7%, mainly by the Chinese) and Christianity (7.1%). Freethinkers, form about 7% of the population. While followers of indigenous religions are about 2% of the population.

Source: <https://en.wikipedia.org/wiki/Brunei>



## A. ECONOMIC OVERVIEW

### ❖ Brunei GDP

Brunei has the second-highest Human Development Index among the Southeast Asian nations, after Singapore. Crude oil and natural gas production account for about 90% of its GDP. About 167,000 barrels (26,600 m<sup>3</sup>) of oil are produced every day, making Brunei the fourth-largest producer of oil in Southeast Asia. It also produces approximately 25.3 million cubic metres (890×10<sup>6</sup> cu ft) of liquified natural gas per day, making Brunei the ninth-largest gas exporter in the world. Forbes also ranks Brunei as the fifth-richest nation out of 182.

According to the International Monetary Fund (IMF), Brunei is ranked fifth in the world by gross domestic product per capita at purchasing power parity. Substantial income from overseas investment supplements income from domestic production. Most of these investments are made by the Brunei Investment Agency, an arm of the Ministry of Finance. The government provides for all medical services, and subsidises rice and housing.

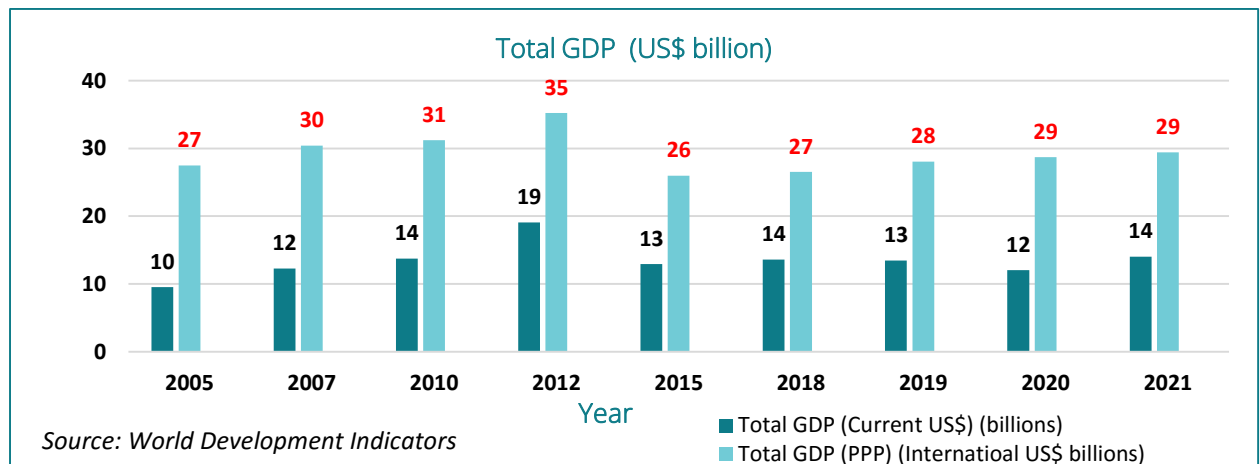
Brunei depends heavily on imports such as agricultural products (e.g. rice, food products, livestock, etc.), vehicles and electrical products from other countries. Brunei imports 60% of its food; of that amount, around 75% come from other ASEAN countries.

The government of Brunei has also promoted food self-sufficiency, especially in rice. Brunei renamed its Brunei Darussalam Rice 1 as Laila Rice during the launch of the "Padi Planting Towards Achieving Self-Sufficiency of Rice Production in Brunei Darussalam" ceremony at the Wasan padi fields in April 2009. In July 2009 Brunei launched its national

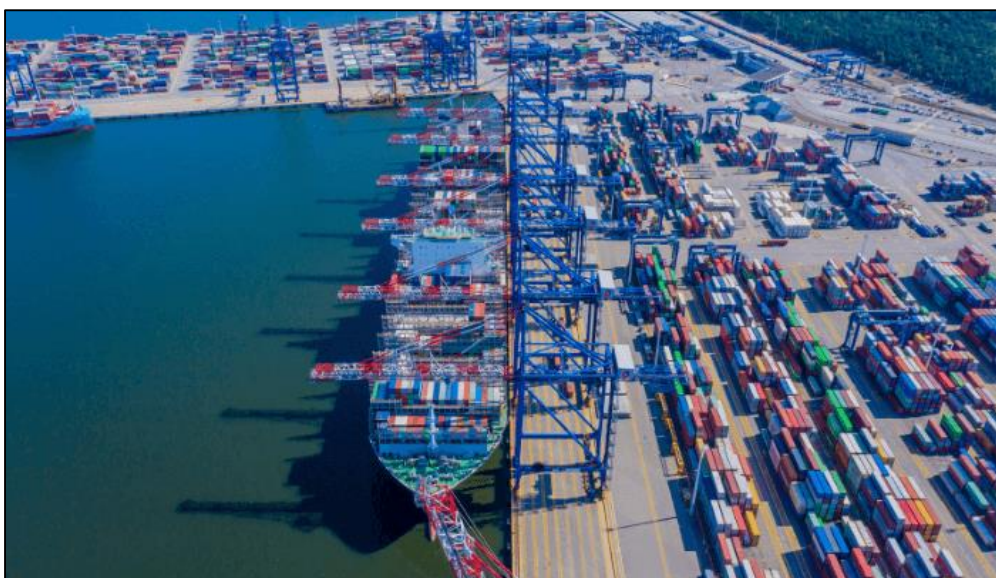
halal branding scheme, Brunei Halal, with a goal to export to foreign markets.

In 2020, Brunei's electricity production was largely based on fossil fuels; renewable energy accounted for less than 1% of produced electricity in the country.

Source: <https://en.wikipedia.org/wiki/Brunei>



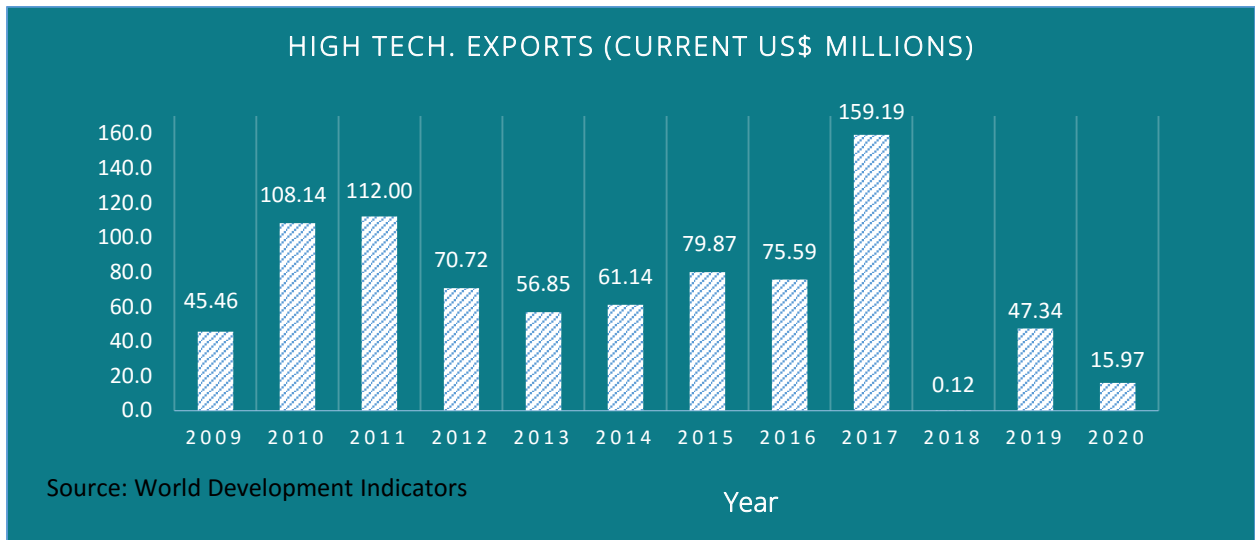
Brunei's GDP in terms of PPP increased from US\$27 billion in 2005 to US\$35 billion in 2012. After declining steeply to US\$ 26 billion in 2015, it has slowly increased to US\$ 29 billion in 2021 in PPP. The GDP (current) however shows a relatively constant figure (13-14 billion US\$) in the recent past years (2018-2021).



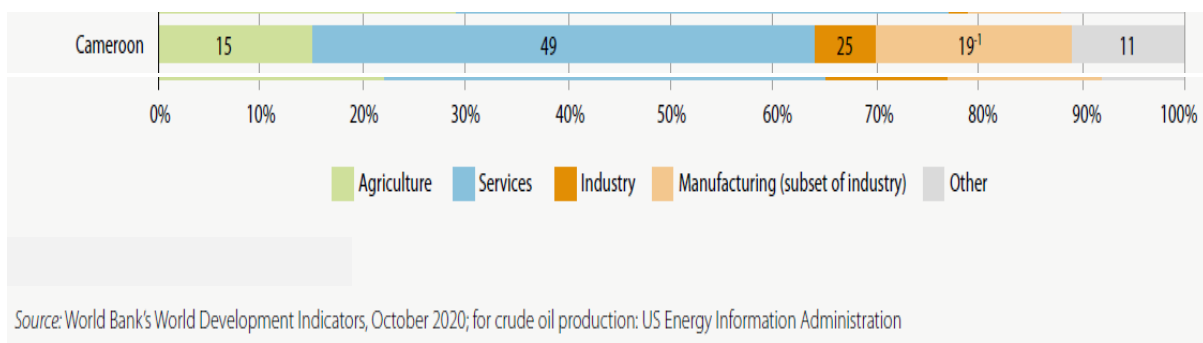
Port of Lumut

## ❖ High Technology Exports

The high technology exports of Brunei, remained almost constant from 2012-2016, with highest exports recorded in 2017 which accounts for US\$ 159 millions. After that year, exports have declined significantly to the lowest US\$ 0.12 million in 2018. In 2020, the exports had again declined to US\$ 15.97 million after increasing to US\$47.34 milion in the previous year.



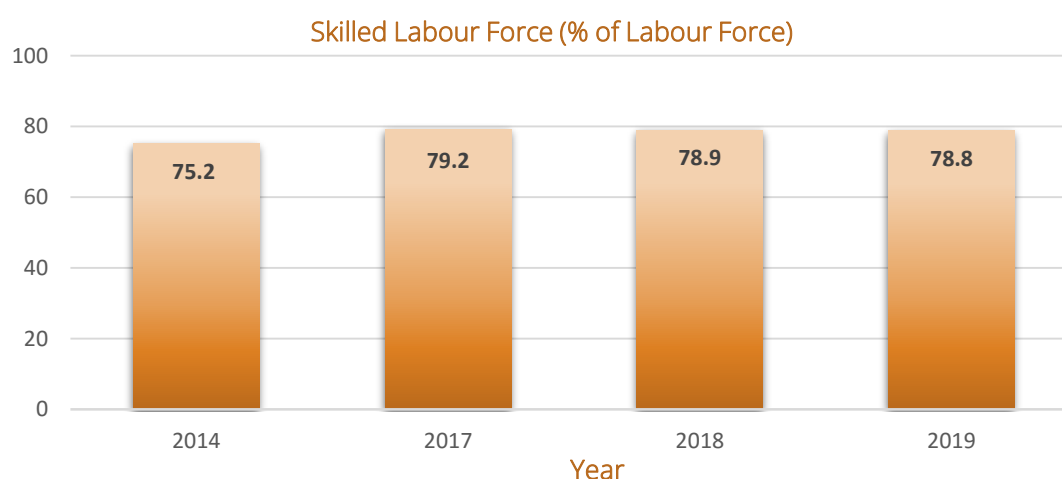
## ❖ Brunei-Darussalam: Economic Sectors Share in the GDP



The services sector contributes the largest share (49%), while industry (25%) and agriculture (15%) are the next largest contributors to the GDP.



## B. SOCIAL AND HUMAN DEVELOPMENT



Source: Human Development Report: <http://www.hdr.undp.org/en/indicators/179406>

Brunei's skilled labour force has increased from 75.2% to 79.2% of the total labour force from 2014 to 2017. However, it decreased slightly to 78.8% in 2019 as shown in above figure.

The rate of urbanisation is estimated at 2.13% per year from 2010 to 2015. The average life expectancy is 77.7 years.

Some of Brunei's key human development indicators are shown in the following table.

Series Name	2016	2017	2018	2019	2020	2021
Individuals using the Internet (% of population)	90	94.87	95	95	95	..
Labor force with advanced education (% of total working-age population with advanced education)	..	81.91	84.12	81.12	83.17	81.38
Life expectancy at birth, total (years)	74.73	74.722	74.712	74.75	74.79	..

Literacy rate, adult female (% of females ages 15 and above)	..	..	96.30	..	..	96.86
Literacy rate, adult total (% of people ages 15 and above)	..	..	97.21	..	..	97.59
Mortality rate, infant, female (per 1,000 live births)	8.2	8.3	8.5	8.6	8.7	..
Mortality rate, infant, male (per 1,000 live births)	9.8	10	10.2	10.4	10.5	..

Source: [World Development Indicators](#)

- Brunei Darussalam's HDI value for 2021 is 0.829— which puts the country in the very high human development category— positioning it at 51 out of 191 countries and territories.
- Between 1990 and 2021, Brunei Darussalam's HDI value increased from 0.770 to 0.829.
- Between 1990 and 2021, Brunei Darussalam's life expectancy at birth increased by 3.0 years, mean years of schooling increased by 1.7 years and expected years of schooling increased by 2.1 years.

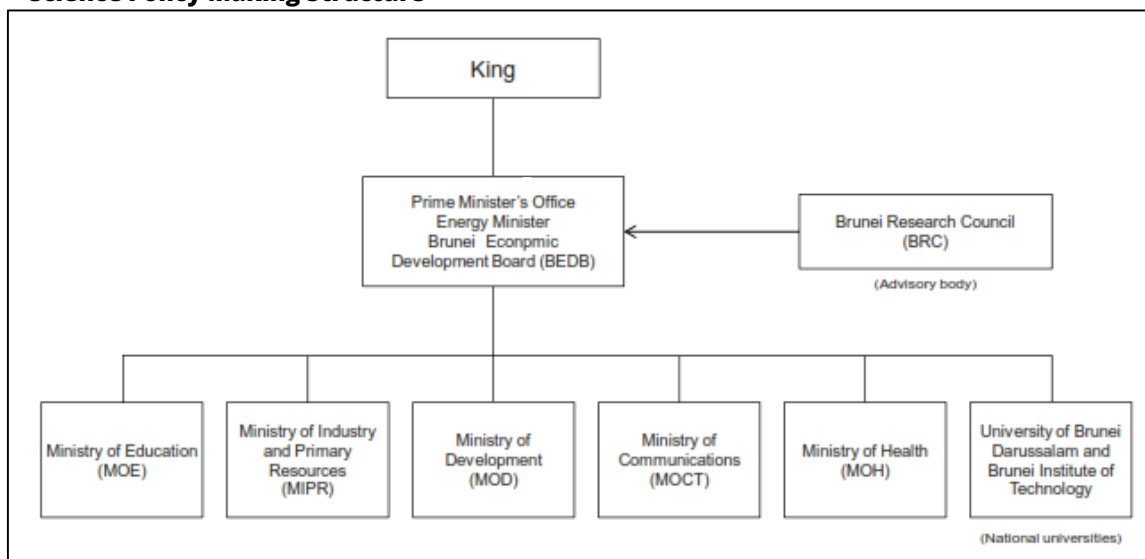




## C. KEY POLICIES AND GOVERNMENT ORGANISATIONS RELATED TO SCIENCE, TECHNOLOGY AND HIGHER EDUCATION

### ❖ Key Policy Initiatives in S&T:

**Science Policy Making Structure**



The Ministry of Development is the main agency for Science and Technology policy. The Brunei Research Council (BRC), an advisory body of the Prime Minister's Office, coordinates research funding in Brunei. "Research" fields, which are supervised by BRC, include not only science, technology and engineering but also social science, art and culture. BRC members comprise the chairman (Energy Minister of the Prime Minister's Office), the vice-chairman (Vice-minister of the Prime Minister's Office) and councilors from 12 organizations related to science and technology such as ministries, agencies and universities.

## ❖ **Policy and Trends in S&T**

### ➤ **National Vision “Wawasan Brunei 2035”:**

#### ➤ **Wawasan Brunei 2035**

In 2007, Brunei formulated “Wawasan Brunei 2035” as a long-term plan for 30 years. “Wawasan” refers to “insight” in Malay. The Plan is based on the awareness that as of 2012, petroleum resources have another 19 years and natural gas 23 years. Hence the need to develop Brunei as a sustainable society.

The vision defines the following targets by 2035 to be achieved:

1. People are well educated and highly skilled.
2. Quality of Life (QOL) is in the top ten in the world.
3. Dynamic and sustainable economy.

#### ➤ **National Development Plan (NDP):**

The National Development Plan (NDP) including the science and technology budget is formulated every five years. In the current 10th-term NDP (2012 -2017), the science and technology budget rapidly increased to US\$200 million, four times more than that of the previous term.

## ❖ **Promotion Bodies of Science and Technology**

### ➤ **Brunei Research Council (BRC)**

Of all “research” fields that are supervised by BRC, energy, environment, food safety, information and communications/automation, and healthcare are the priority research subjects in the science, technology and engineering area. The following eight points, which are the core of science and technology policy in Brunei, are referred to BRC.

- Formulation of a policy that gives direction to research.
- Establishment of an evaluation method for the proposition of research projects.
- Supervision of research activities’ compliance with national rules and regulations.
- Recognition of research clusters and placement of priority on fields that promote economic growth.
- Ensuring that research policy planning activities are in line with the nation’s development goals stated in “Wawasan Brunei 2035.”

- Improvement in the quality of research within the country
- Promotion of collaboration between the government institutions and non-government institutions
- Ensuring the return of research achievements for government and public use.

#### ➤ **Ministry of Development (MoD)**

The Ministry of Development (MOD) is the main agency responsible for Science and Technology development and policy in Brunei through the Science & Technology and International Division (STI). MoD is responsible for general science and technology affairs, nuclear power intellectual properties and standards and metrology. The Ministry also includes infrastructure development and environment.

#### ➤ **Ministry of Industry and Primary Resources (MIPR)**

The Ministry of Industry and Primary Resources (MIPR) consists of the policy planning department (Policy and Planning Division, Entrepreneurial Development Center, etc.) and the site supervising department (Agriculture and Agrifood, Forestry, Fishery, Brunei Industrial Development Authority (BIDA).

The Department of Agriculture and Agrifood supervises research and development of agricultural science and technology related to rice, vegetables, fruit and fishery products. The research institution under the department is the Brunei Agricultural Research Center (ARC). The department opened the Agro Technology Park (APT) in 2013 and changed the name to the Bio-Innovation Corridor (BIC) in 2014. The planned area of BIC was expanded to 50, km 10 times larger than that of ATP.

Source: [https://www.jst.go.jp/crds/pdf/en/CRDS-FY2014-OR-02\\_EN.pdf](https://www.jst.go.jp/crds/pdf/en/CRDS-FY2014-OR-02_EN.pdf)

### ❖ **Information and Telecommunications Technology**

#### ➤ **Plans for a 'Smart Nation'**

The Digital Economy Council dates from mid-2019. It released its Digital Economy Masterplan 2025 in June 2020. The mission of the Digital Economy Masterplan is to create a 'smart nation' by digitalizing industry and government services, expanding the digital economy and supporting human resources development, such as by updating curricula. The

document outlines plan to conduct an assessment of industrial readiness for Industry 4.0 and to launch a pilot projects showcasing Industry 4.0 technologies. There are also plans to develop a 'digital identity ecosystem in government, strengthen cybersecurity and launch a digital data policy.

- The country's telecoms and info-communications landscape has undergone several major developments over the past few years. In 2018, the Ministry of Communications was renamed the **Ministry of Transport and Info-communications (MTIC)** to reflect the ministry's expanded portfolio, taking into account the development of global technology and digital economy, among others.

The Sultanate through MTIC has targeted to achieve 75% of home Internet subscription by 2025, in addition to enhancing broadband connectivity.

#### ➤ **AITI**

The Authority for Info-communications Technology Industry (AITI) is a statutory body responsible for the country's telecommunications and radio communications regulation; radiofrequency spectrum planning and management; and ICT industry development.

In June 2021, AITI Strategic Plan 2020- 2025 was released which establishes AITI's vision, missions, strategic goals and strategic objectives. Its development is to support the realization of outcomes in the Digital Economy Masterplan 2025. AITI Strategic Plan aims to deliver three strategic outcomes: A Thriving Digital Industry, a Connected Nation and a Digitally Enriched Society.



#### ➤ **Unified National Networks**

Unified National Networks Sdn Bhd (UNN) is a government-linked company under Darussalam Assets Sdn Bhd. In 2019, UNN officially took over all network infrastructure operated by the existing telecommunications service providers. Since then, UNN has been actively

making the effort to expand the telecommunications infrastructure in the country.

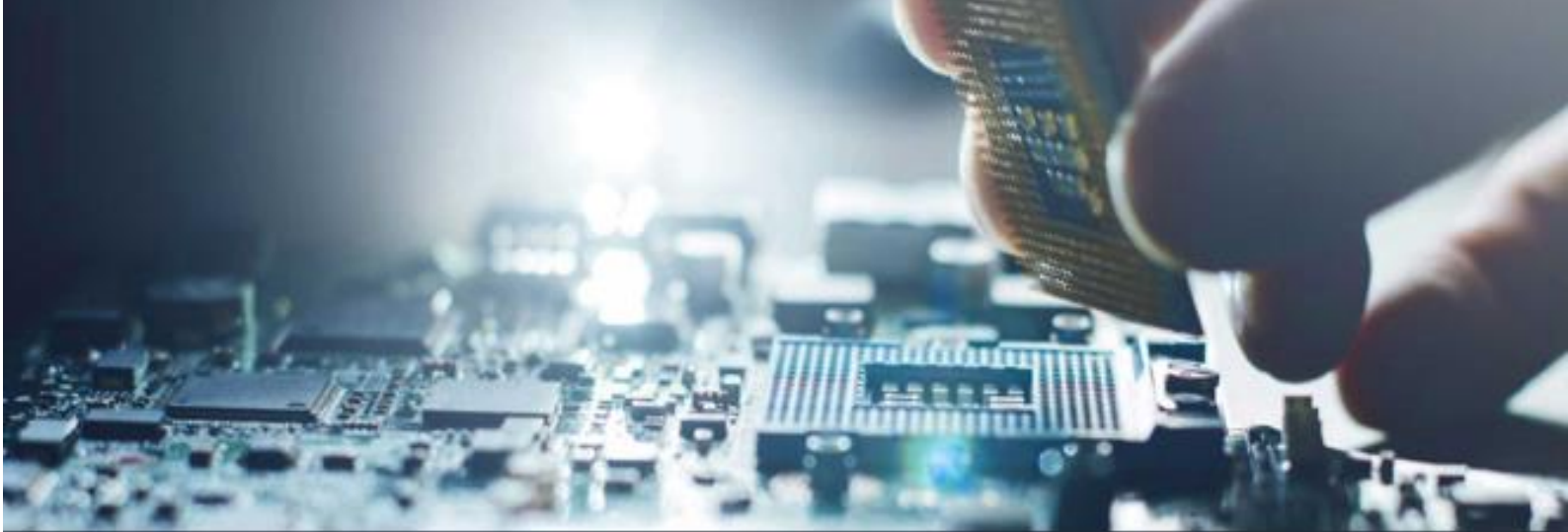


UNN marked another milestone in December 2021 when it launched a cloud hosting service– Infrastructure-as-a-Service (IaaS) which is suitable for all types of businesses, ranging from small businesses looking to host websites to mobile applications up to large enterprises who want to run their business critical applications in the cloud.

### ➤ **IMAGINE**

With the goal of supporting Brunei Vision 2035 and the Digital Economy Masterplan 2025 that aims to improve the lives of Bruneians through digital technology whether for home, work or on the move, Imagine Sdn Bhd offers customers the concept of 'Owning the Home' through its products and services in the company's role as an enabler for Brunei's Smart Nation evolution.

Apart from its household plans, *Imagine* has also been working with industry-related retailers to maximize options for customers. Its 2021 highlights include offering plans bundled with Apple products including desktop computers, Samsung device bundles for mobile as well as tablets, and even offering low-cost device plans to get connected within reach.



## D. RESEARCH AND DEVELOPMENT

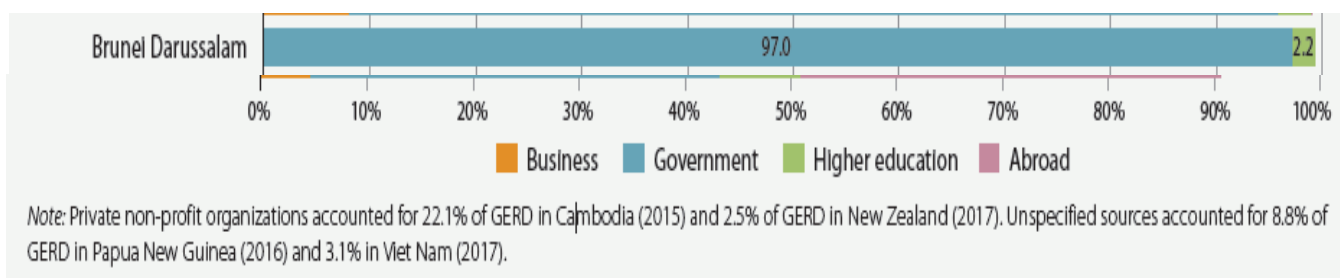
### ❖ GERD as a percentage of GDP

For the latest year available, Brunei's expenditure on R&D as a percentage of its GDP was 0.28%, in 2018. This is a small percentage and clearly suggests the need for Brunei to invest more strongly in R&D if its plans to transform into a Smart Economy are to be realized in the near future.

Source: *UNESCO Institute of Statistics*

### ➤ GERD by Source of Funds in Brunei-Darussalam, 2018

As shown below government (97%), and higher education (2.2%) are the principal sources of GERD spending in Brunei Darussalam.



Source: *UNESCO Science Report 2021*

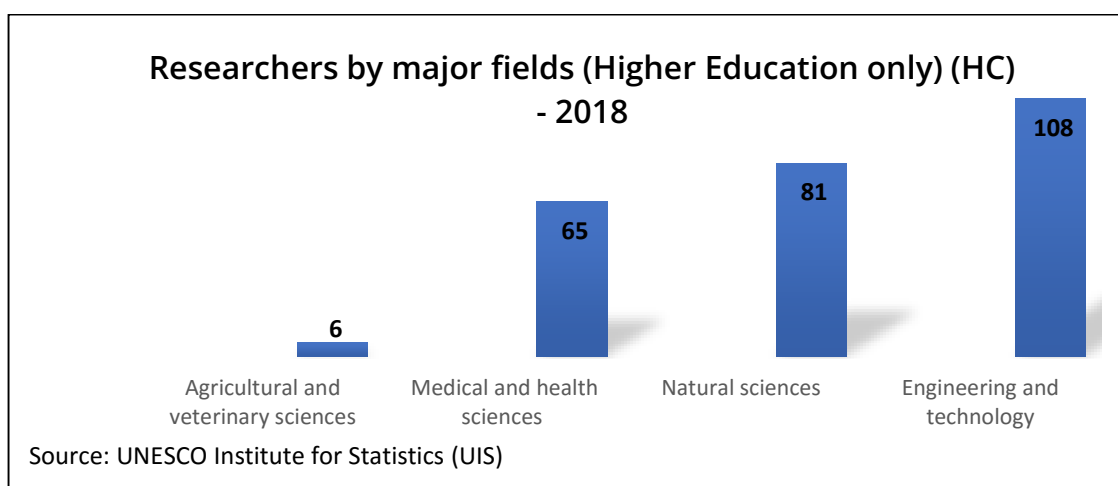
## ❖ R&D Human Capital

### ➤ Female researchers as a share of total researchers (HC) by field, 2018 (%)

	Total	Natural sciences	Engineering & technology	Health & welfare	Agricultural sciences	Social sciences & humanities
Brunei Darussalam	45.2	40.7	28.7	66.2	33.3	48.1

Source: *UNESCO Science Report 2021*

Female researchers constitute 45.2% of all research personnel. They are a major part of the health & welfare workforce, followed by social sciences (48.1%) and natural sciences (40.7%) respectively, as shown in above figure.



As the above data on the head count of researchers in Higher education institutions show, most of the researchers in the higher education institutions are active in various fields of engineering and technology, followed by natural sciences, medical and health sciences, respectively. The total number of researchers in higher education institutions is 260 and suggests strong the need for expansion.

## ❖ R&D Highlights

S&T policies in Brunei focus on energy, environment, information and communications, food safety and health.

## ➤ **National Biological Resources (Biodiversity) Policy and Strategic Plan of Action**

For a sustainable and wise use for a more prosperous living of the people of Brunei Darussalam while respecting the limits of nature and natural resources, and the integrity of all creation, the Biodiversity Policy and Plan of Action has the following objectives:

- To discover and manage the vast natural biodiversity of Brunei Darussalam through Conservation, Research & Development, Promotion and Commercialization that will accelerate national economic diversification.
- To promote an effective biodiversity protection & conservation program through an integral holistic approach, establishment of network of protected areas & other sustainable terrestrial and aquatic uses.

Source: <https://www.cbd.int/doc/world/bn/bn-nbsap-01-en.pdf>

## ➤ **Biodiversity Research - To contribute towards sustainable use and conservation of tropical biodiversity and ecosystems**

Brunei Darussalam is abundant in natural wealth, both in the pristine tropical forests and the rich, unexplored marine landscapes. As one of the top forested nations in the world, Brunei's forests are among the most diverse on Earth. Recent studies revealed over 160,000 trees from more than 1,000 different species exist within a 25-hectare forest dynamics plot at University of Brunei Darussalam's (UBD) premier international field research facility, the Kuala Belalong Field Studies Centre (KBFS). Records of new plant, animal, and microbial species discovered from the Sultanate continue to expand significantly. Bioprospecting of novel chemicals and therapeutic agents, environmental studies and research on marine biodiversity are also key strengths of biodiversity research at UBD.

➤ **Energy Research - To create a low carbon society in Brunei**

Brunei Darussalam's oil and gas industry continues to be the heart of the country's economy but it aims to lower carbon emission through the use of technology. UBD has energy research as one of its priority areas, which contributes to the economic diversification of Brunei Darussalam and innovates ways for the reduction of carbon emission. These objectives are achieved through the development and deployment of advanced materials. The energy and material science research initiative encourages collaborations with regional universities to facilitate multidisciplinary energy research.

➤ **Data Analytics - To become the focal point for Big Data Analytics in the region**

Data analytics is an emerging area that has widespread applications in different sectors; such as health care, education, finance, communication and the oil and gas sector. UBD's Institute of Applied Data Analytics has gathered a core team of experts in optimization and predictive analytics. UBD faculties and other research institutes within and beyond UBD can collaborate with this team to undertake quality research in their respective fields. The focus of the Institute is to enable multidisciplinary collaboration among experts within UBD whilst strengthening the Data Analytics expertise of the Institute.

➤ **Sensor Technology Research - to develop sensors for food security, environmental and health monitoring applications**

Sensor technology cover a wide spectrum of research topics in almost all areas of science, technology and many other disciplines. This group focuses on developing sensors for use in the key areas of Food Security & Smart Farming, Environment and Weather Monitoring using IoT (Internet of Things) and Health Monitoring. The pool of research capabilities that can be developed in this group will provide a competitive edge in training and educating students, staff and technical personnel that can support the development of a knowledge-based economy for Brunei Darussalam.

➤ **Herbal Research – to investigate the biological, chemical and pharmacological properties of local medicinal plants**

Owing to the geographical position of Brunei Darussalam, there is a wealth of unique flora and fauna, which may hold the potential to supply bioactive natural products of high commercial value. Based on traditional folklore, a number of local plants have been used to relieve common ailments, such as fatigue, diarrhea, high cholesterol and sugar levels, minor cuts and bruises, either by consuming the plants or using them as ointments and creams. However, there is little scientific evidence to support these claims. This research area focuses on investigating the biological, chemical and pharmacological properties of these local medicinal plants.

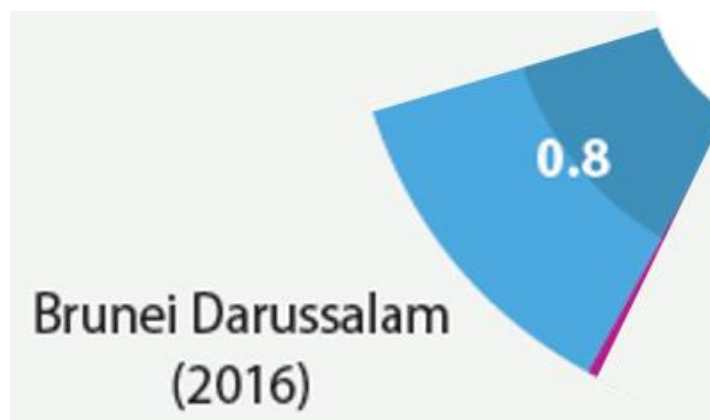
Source: <https://ubd.edu.bn/research/research-thrusts/>





## E. HIGHER EDUCATION

### ➤ Public Expenditure on Higher Education (%)

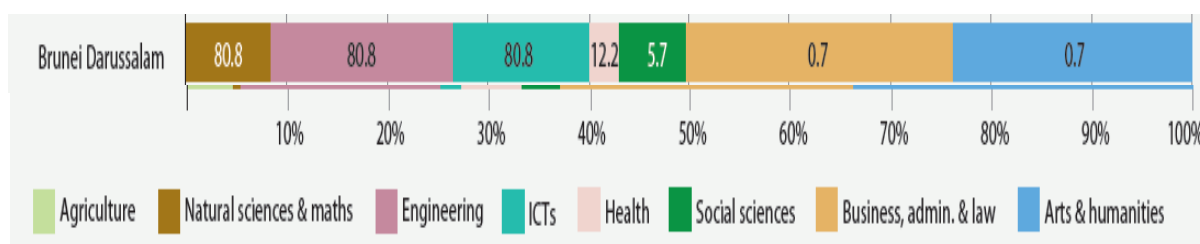


Source: *UNESCO Science Report 2021*

Brunei Darussalam spent 0.8% of its total GDP on higher education in 2018.

### ➤ Distribution of Tertiary Graduates in Brunei-Darussalam by Programme, 2019 or closest year (%)

An overwhelming percentage (80.8%) of the tertiary graduates were cumulatively in the fields of science, engineering, ICTs and Agriculture. Another 12.2% were in the fields related to health.



Source: *UNESCO Science Report 2021*

### ➤ **Share of Female Tertiary Graduates by Field, 2018 (%) in Brunei-Darussalam**

	Agriculture	Engineering	Health & welfare	Natural sciences	ICTs	Social sciences & journalism	Business, admin. & law	Arts & humanities
Brunei Darussalam	-	52.3	76.5	73.4	41.9	74.1	68.3	67.1

Source: *UNESCO Science Report 2021*

It is evident from above figure that the largest ratio of female tertiary graduates was in the fields of health and welfare (76.5%). However, they also constituted 73.4% of natural sciences graduates and 52.3% of engineering graduates. The data reflects the positive trend of acquiring higher education in scientific and technological fields amongst Brunei females.

### ➤ **Leading Brunei Darussalam Universities**

Following is the list of major universities of Brunei Darussalam.

University Name	National Ranking	Global Ranking
University of Brunei Darussalam	1	2719
Universiti Teknologi Brunei	2	3555
University Islam Sultan Sharif Ali	3	9062
Politeknik Brunei	4	15660
Laksamana College of Business	5	20568
Institute of Brunei Technical Education	6	20638
Seri Begawan Religious Teachers University College	7	20940

Source: <https://www.webometrics.info/en/Asia/Brunei%20Darussalam>

- **University Brunei Darussalam (UBD)** established in 1985 as the country's premier national university. UBD offers diverse graduate studies with graduate research scholarships. With eight academic faculties, eight research institutes and two academic service centers, UBD is well-equipped to provide multidisciplinary programmes in a bid to produce students with greater adaptability, independence and drive to succeed.

- **Sultan Sharif Ali Islamic University** is Brunei's second university. It was established in 2007 as the first national Islamic university in Brunei. The overall aim of the new university is to become a centre for the spread of Islam in the region.
- **Universiti Teknologi Brunei (UTB)** is a national research university based in Bandar Seri Begawan, Brunei. It was established as a higher learning institution in 1986, offering Higher National Diploma programs in engineering, business and computing. The institution was upgraded to a university in 2008 and its name was changed from Institut Teknologi Brunei to Universiti Teknologi Brunei.
- **Politeknik Brunei** is the first polytechnic in Brunei. The establishment of Politeknik Brunei was consented by His Majesty the Sultan and Yang Di-Pertuan of Brunei Darussalam in 18 October 2008. This technical education transformation was a timely response towards the evolution of the local and global economic landscape, which directly affected the current and future skilled workforce requirements of the nation.



Universiti Teknologi Brunei



University Islam Sultan Sharif Ali



Politeknik Brunei



University of Brunei Darussalam

## ❖ Scholarships

Over the past decade since higher education was introduced in the Sultanate, the government has awarded thousands of scholarships to both locals as well as non-locals to study in University Brunei Darussalam.

There are several scholarship schemes available for prospective local and international students.

- **Brunei Darussalam Government Scholarship** schemes are offered to citizens of Brunei Darussalam and international students to provide financial aid in the perusal of knowledge from undergraduate to graduate studies.
- **UBD Graduate Research Scholarship:** The UBD Graduate Research Scholarship is a competitive scheme awarded to quality PhD students with a strong desire to work in an international and competitive research-intensive environment.
- **UBD Bursary:** The UBD Bursary is another funding scheme offered by University Brunei Darussalam to Doctor of Philosophy applicants from any programmes offered by the university with the vision of refining local minds who will be the next generation of academics in the institution.

Source: <https://ubd.edu.bn/admission/scholarship/>



## F. RESEARCH PUBLICATIONS

In this section, we will provide numerical data about all the science and technology research publications (**Scholarly output**) of Brunei Darussalam. Note that the SO includes:

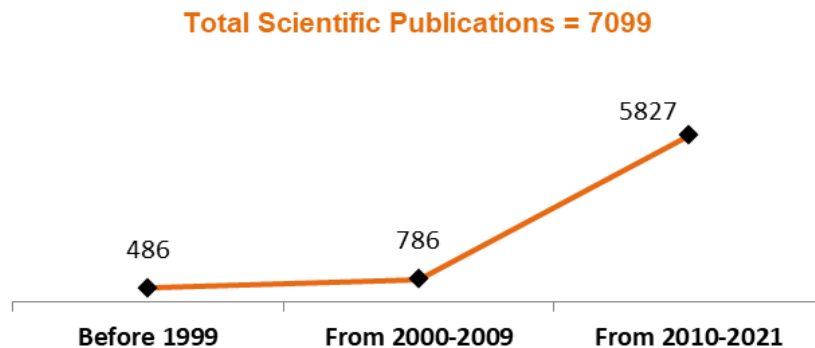
- Journal publications
- Book series
- Stand-alone books (including edited volumes, monographs, text books and reference works)

➤ **Based on the scholarly output we will provide and analyze the last ten years (from 2012 to 2021) data. We will present:**

1. The per year publications.
2. Quality of publications as indicated by:
  - a) The per year citations,
  - b) Citations per publications and
  - c) Field weighted citation impact.
3. The quality of publications as represented by the purpose, the publications distribution in different quartile groups.
4. The number of papers in different subject areas will be provided.
5. The top ten most productive universities based on the number of publications.
6. The percent (%) international collaboration and the top ten collaborating countries.

The data was retrieved from Scopus, Brunei Darussalam published 7099 research documents. They majorly comprised of articles (n=4667),

conference papers (n=1112), reviews (n=354), book chapters (n=507), letters (n=153), editorials (n=91), notes (n=127), errata (n=16), short surveys (n=10), books (n=52), data papers (n=9), retracted and 1 document were not undefined. The per era documents are presented in the figure.



1. In the table, the per year (from 2012 to 2021) number of publications or scholarly output (SO), citations, and citations per publications (CPP) of 32306 documents are presented.
2. The highest documents are published in 2021 (n=928), followed by 2020 (n=793) and 2019 (n=627).
3. The quality of publications can be presented by citations, which were 94275, or the CPP was 17.2.
4. Article Field Weighted Citation Impact (FWCI) indicates “how the number of citations received by an article compares to the average or expected number of citations received by other similar publications”. The total FWCI was found to be 1.56 which indicates that the articles received 56 % higher citations as compared with global average.

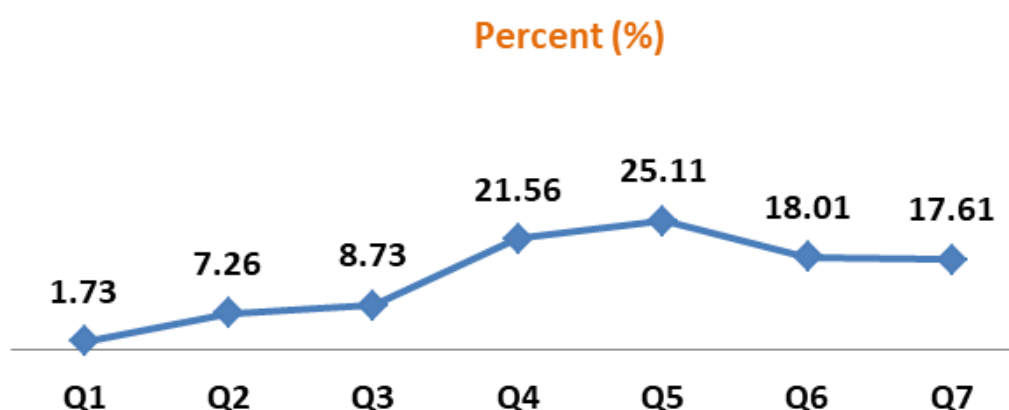
S#	Title	Overall	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Scholarly Output	5486	251	300	395	458	568	558	608	627	793	928
2	Citations	94275	3327	3701	5299	9081	13723	12498	22337	8231	10140	5938
3	Citations per Publication	17.2	13.3	12.3	13.4	19.8	24.2	22.4	36.7	13.1	12.8	6.4
4	Field-Weighted Citation Impact	1.56	0.78	0.74	0.75	1.1	1.32	1.94	3.26	1.34	1.44	1.69

Scopus has categorized all journals in seven quartile (Q) groups (from Q1 to Q7). For example, Q1 is occupied by the top 1%, and Q7 is occupied by journals in the 75 to 100% group. The per year publications details in different quartile groups are presented in the table.

It is noted that 1260 papers in the last ten years were published in those journals/sources, which do not have cite score data. The per year breakup for the remaining 4226 papers are presented in the table below.

S#	Title	Overall	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Pub in top 1% Sources (Q1)	73	2	1	0	4	10	7	13	9	16	11
2	Pub in top 5% Sources(Q2)	380	11	11	19	31	53	30	52	36	57	80
3	Pub in top 10% Sources(Q3)	749	25	25	33	61	92	63	98	82	121	149
4	Pub in top 25% Sources(Q4)	1660	52	64	80	145	175	166	167	185	270	356
5	Pub in top 50% Sources(Q5)	2721	81	112	144	231	282	287	267	320	448	549
6	Pub in top 75% Sources(Q6)	3482	117	146	184	289	342	351	356	429	563	705
7	Pub in top 100% Sources(Q7)	4226	184	220	247	361	414	424	427	501	669	779

In the table the overall percentage of publications in various Q-groups is presented. In particular, the highest documents are published in Q5 and Q4 followed by Q6 and Q7.



In the following table we describe the number of publications in Brunei Darussalam in sixteen (16) major research areas;

- The highest number of documents were published in;
  - Engineering (n=1255)
  - Social Sciences (n=915) and
  - Medicine (n=912)

The highest number of citations were noted for the following areas:

1. Medicine (n=28483)
2. Energy (n=13052) and
3. Engineering (n=12762)

The number of authors, citations per paper (CPP) and field weighted citation impact (FWCI) for all 27 areas are described in the following table.

S#	Subject Area	SO	Citations	Authors	CPP	FWCI
1	Engineering	1255	12762	765	10.2	1.11
2	Social Sciences	915	6406	629	7	1.43
3	Medicine	912	28483	930	31.2	2.92
4	Computer Science	752	7119	475	9.5	1.08
5	Environmental Science	592	10775	471	18.2	1.73
6	Materials Science	576	9592	335	16.7	1.36
7	Energy	560	13052	365	23.3	1.22
8	Agricultural and Biological Sciences	512	7949	326	15.5	1.34
9	Physics and Astronomy	452	6513	350	14.4	1.57
10	Earth and Planetary Sciences	398	4849	314	12.2	1.12
11	Business, Management and Accounting	357	2166	285	6.1	0.77
12	Chemistry	356	10159	216	28.5	1.64
13	Chemical Engineering	326	8837	204	27.1	1.66
14	Arts and Humanities	315	1454	219	4.6	1.53
15	Biochemistry, Genetics and Molecular Biology	293	5985	317	20.4	1.18
16	Mathematics	276	1811	235	6.6	0.75

**NOTE:** The total scholarly output (SO) may be different from the sum total of publications (sorted according to Journal classification) because the same publication may be appearing under various classifications, concurrently.

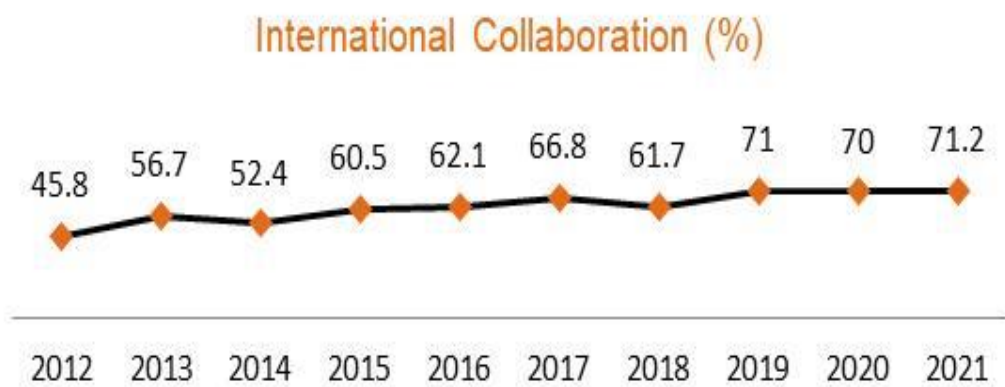
### ➤ Most Productive Universities

The list of some of the most productive universities is provided in the following table.

S#	Institution	SO	Citations	CPP	FWCI
1	University of Brunei Darussalam	3491	64104	18.4	1.69
2	Institut Teknologi Brunei	1279	17768	13.9	1.27
3	Raja Isteri Pengiran Anak Saleha Hospital	414	4295	10.4	0.61

### ➤ International Collaborations

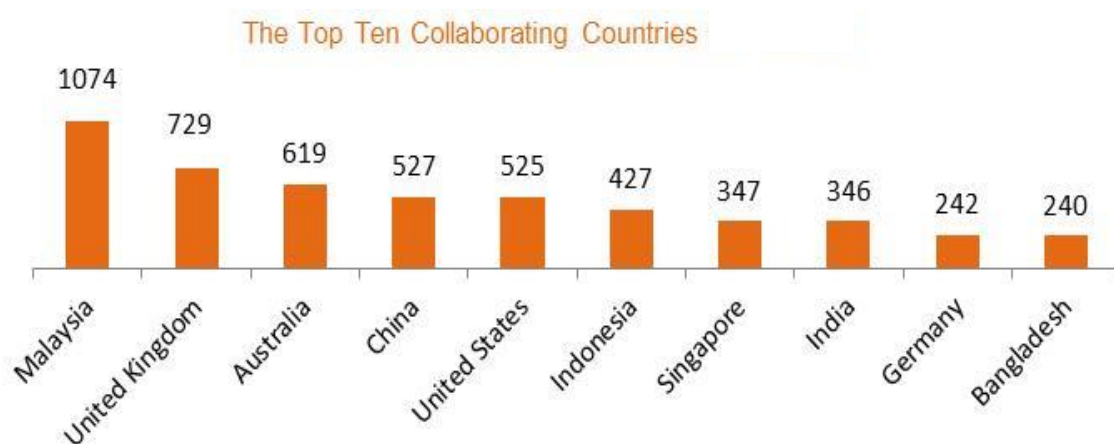
Brunei Darussalam has published 64.4 % (average of the last ten years) documents in strong international collaboration. The increasing rate of yearly collaboration (from 2012 to 2021) is presented in the figure.



The largest number of documents were published in strong collaboration with

1. Malaysia (n=1074),
2. UK (n=729) and
3. Australia (n=619).

The data of the top ten collaborating countries is presented in the figure.





## G. International Cooperation and Support Initiatives (selected)

### ❖ MoU's and Agreements

- The Prime Minister of Bangladesh made an official visit to Brunei Darussalam on 21-23 April 2019 and signed six Memorandum of Understanding (MoU) between the two governments. The signed MoUs/Agreements included those in the areas of Scientific and Technical Cooperation in the field of Agriculture, Fisheries, Livestock, and the Supply of Liquefied Natural Gas (LNG), respectively.
- In January 2023 Turkish Yunus Emre Insitute (YEE) and Brunei Technical Education Institute (IBTE) signed a memorandum of understanding (MoU) aiming to provide students and academics from IBTE and 209 Turkish universities with access to further educational development and exploration opportunities. Within the scope of the signed MoU, it is aimed to prepare the legal framework for long-term cooperation between educational institutions in both countries.
- Brunei and Pakistan established a Joint Consultation for Bilateral Cooperation on 5 March 1996 aimed at consolidating and developing economic, commercial, education, scientific, technical and cultural cooperation between the two countries. Since then, two Joint Consultation Meetings (JCM) have been held in Islamabad

(October 2000) and Bandar Seri Begawan (March 2006). A number of cooperative agreements are in place which includes:

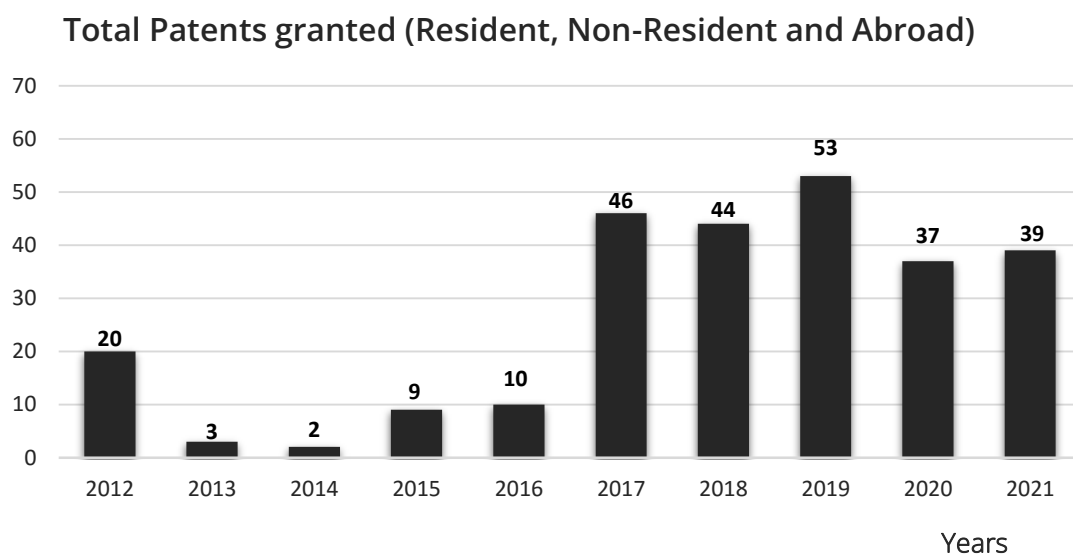
- Agreement on the Establishment of Joint Commission for Bilateral Cooperation (5 March 1996);
- MOU on Cooperation in the fields of Culture and related activities (7 May 2005);
- MOU on Health Cooperation (23 August 2007).
- India and Brunei in 2008 signed various MOUs including those on:
  - Cooperation in Information and Communications Technology
  - Cooperation in the Operation of Telemetry Tracking and Telecommand Station for Satellite and Launch Vehicles and for Cooperation in the Field of Space Research, Science and Applications
  - On the Establishment of Nalanda University (10 October 2013)
- Japan has signed bilateral agreement with Brunei on Cooperation in Science and Technology, and Joint Committees aiming to promote cooperative relationships in the field of science and technology. Under the agreements the Ministry of Education, Culture, Sports, Science and Technology (MEXT), has been undertaking a variety of cooperative activities, including information exchange on R&D and joint research, through a joint committee on cooperation in science and technology, and other councils.

Source: [https://www.meti.go.jp/english/policy/economy/industrial\\_technology/pdf/0123\\_04.pdf](https://www.meti.go.jp/english/policy/economy/industrial_technology/pdf/0123_04.pdf)

# INNOVATION

## H. INNOVATION, ENTREPRENEURSHIP & TECHNOLOGY PARKS

### ❖ Award of Patents



Source: WIPO: [https://www.wipo.int/ipstats/en/statistics/country\\_profile/](https://www.wipo.int/ipstats/en/statistics/country_profile/)

### Total Patents granted (Resident and Abroad)

Year	Resident	Non-Resident	Abroad	TOTAL
2012	-	-	20	20
2013	-	-	3	3
2014	-	-	2	2
2015	-	-	9	9
2016	-	-	10	10
2017	6	35	5	46

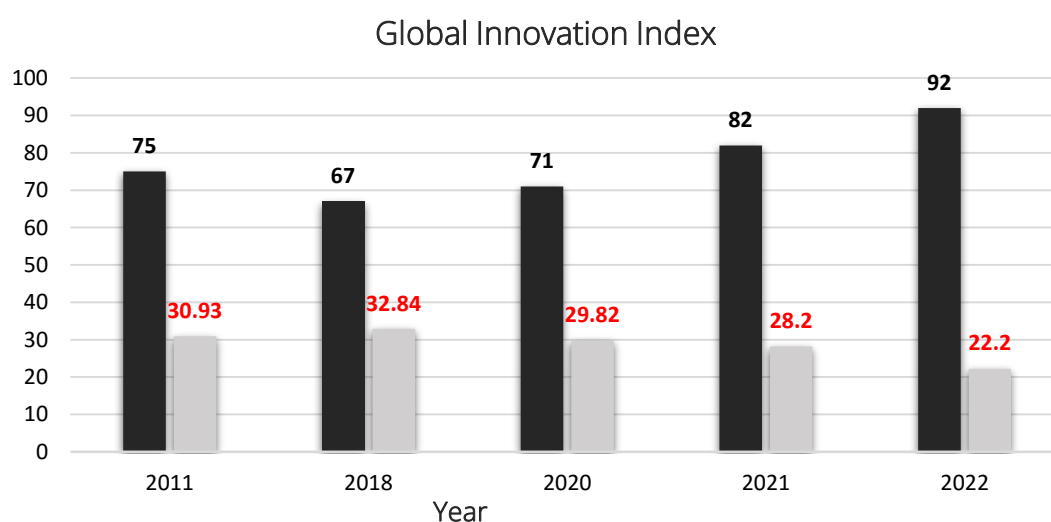
Year	Resident	Non-Resident	Abroad	TOTAL
2018	6	37	1	44
2019	2	48	3	53
2020	-	27	10	37
2021	-	31	8	39

Source: [https://www.wipo.int/ipstats/en/statistics/country\\_profile/profile.jsp?code=BN](https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=BN)

The preceding data on patents granted to Brunei nationals/residents shows that in earlier years almost all the patents were awarded in the *Abroad* category to Brunei residents abroad. However, since 2017 there is a significant shift of patents to the non-resident category suggesting that foreign sponsored R&D is taking place in Brunei in growing numbers.

### ❖ Business Environment in Brunei Darussalam

The Global Innovation Index ranking of Brunei Darussalam has decreased somewhat, from 75 in 2011, to 92 in 2022. Its GII score has also declined consistently from 30.93 in 2011 to 22.2 in 2022. This suggests that the innovation ecosystem of Brunei has not kept pace with the changing needs and consequently there is a loss in its comparative standing.



Source: Global Innovation Index \_ WIPO

■ Ranking ■ Score

Comparatively,

- Brunei Darussalam ranks 49th among the 51 high-income group economies.
- Brunei Darussalam ranks 13th among the 17 economies in South East Asia, East Asia, and Oceania

Source: [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_gii\\_2021/bn.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021/bn.pdf)

## ❖ **Technoparks and Incubation Centers**

### ➤ **GLOBALink; Huawei's Training Program**

Huawei Technologies in Brunei officially launched its "Seeds for the Future" 2022 program for nurturing local information and communications technology (ICT) talents.



As a flagship global Corporate Social Responsibility program of Chinese tech giant Huawei, "Seeds for the Future" was first initiated in 2008 and designed to develop skilled, local ICT talents and bridge communication between countries and cultures. "Seeds for the Future" 2022 online training program attracted a total of 55 local students from University of Brunei Darussalam, Brunei Technological University and Sultan Sharif Ali Islamic University as well as five other institutions. The Program will contribute to local ICT talent ecosystem development.

Source: <https://english.news.cn/20221018/e019ed9d245d407582a2b3759f2ce171/c.html>

### ➤ **Anggerek Desa Technology Park Phase 3, Brunei**

Located in the capital of Brunei, Bandar Seri Begawan, Anggerek Desa Technology Park Phase 3 was a prestigious project for P.A.Y. Architects and NBK by Hunter Douglas. After a year of intense construction activities, it is now ready to cater to international and local companies in the creative and information technology industry. Initiated by the BEDB, the USD 14 million Design & Technology (D&T) building, was designed to

complement the establishment of the iCentre and Knowledge Hub as a step in progressing towards a full-fledged Anggerek Desa Technology Park (ADTP). The project features a “green” office building with a Green Mark Gold Certification from the Building and Construction Authority (BCA) of Singapore. The park focuses on light and tech based industry. Business Support Centre (BSC), which started operations in April 2016 and aims to help facilitate SME operations and attract FDI is located in the Anggerek Desa Technology Park. It will act as a single portal for businesses to access and submit applications for licences, permits and registrations, as well as paying taxes and applying for industrial land permits.

Source: <https://nbkterracotta.com/project/anggerek-desa-technology-park-phase-3-brunei/>



[brunei/](https://nbkterracotta.com/project/anggerek-desa-technology-park-phase-3-brunei/)

### ➤ **The Bio-Innovation Corridor Industrial Park**

It is an initiative led by the Ministry of Industry and Primary Resources, aims to attract investments and promote the development of Halal Certified Industries in Brunei. It also aims to create a mixed use environment to accommodate research and innovative technology applications.



The Bio-Innovation Corridor Industrial Park

### ➤ **The Energy Incubation Programme:**

The Energy Incubation initiative is a collaboration between Ministry of Energy (ME) and Darussalam Enterprise (DARE) to provide Micro, Small and Medium Enterprises (MSMEs) an incubation programme that offers relevant training programmes, co-working space, mentorship and information on upcoming tenders. The aim of this programme is to help entrepreneurs participate in the Oil & Gas industry.

Source: <https://www.dare.gov.bn/energy-incubation-centre>

### ➤ **UBD Startup Centre**

Startup Incubation Centre for UBD alumni and graduating students to take a chance to spin-off their amazing ideas into a successful venture. UBD Startup Centre (USC) provides a platform and the ecosystem for startup growth within the university that includes facilities, co-working space, mentoring and network support.

Source: <https://startupcentre.ubd.edu.bn/>





## I. COMBATING THE COVID-19 PANDEMIC

### ❖ Government Initiatives

#### 1. Brunei COVID-19 AirLab:

The lab speeds up COVID-19 test results as Health Ministry rushes to expand testing capacity to 8,000 tests a day. The mobile inflatable COVID-19 testing laboratory can process 5,000 tests a day at BRIDEX.

The inflatable testing facility, named Brunei COVID-19 AirLab, can process up to 5,000 swab tests a day once. It started operations on August 19, 2021.



#### 2. Helping Hand Against COVID-19

When the second COVID-19 wave hit Brunei, the DST has put in their best efforts to provide support to the government, specifically the Ministry of Health (MoH) and the Ministry of Education (MoE) in fighting against the challenges that were brought by the pandemic. A major support provided by DST, in September 2021, an EMAS (Emergency Medical Ambulance Services) 991 call centre, was set up with DST's call centre

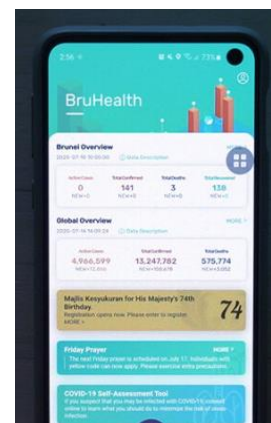
solutions to modernise and enhance the EMAS 991 call centre features under the MoH. DST also aided the MoH by contributing mobile phones with Mobi SIM cards to assist the ministry in their daily operations to keep track of the daily conditions of those in isolation and quarantine. Routers were also set up to provide a wireless broadband connection for frontliners.

Other than contributing and supporting the MoH, DST collaborated with the MoE to launch EduPack Prihatin to help underprivileged students in Brunei with their online studies. With EduPack Prihatin, everyone in Brunei was given a chance to donate to the cause of helping



### 3. BruHealth – Gov.BN

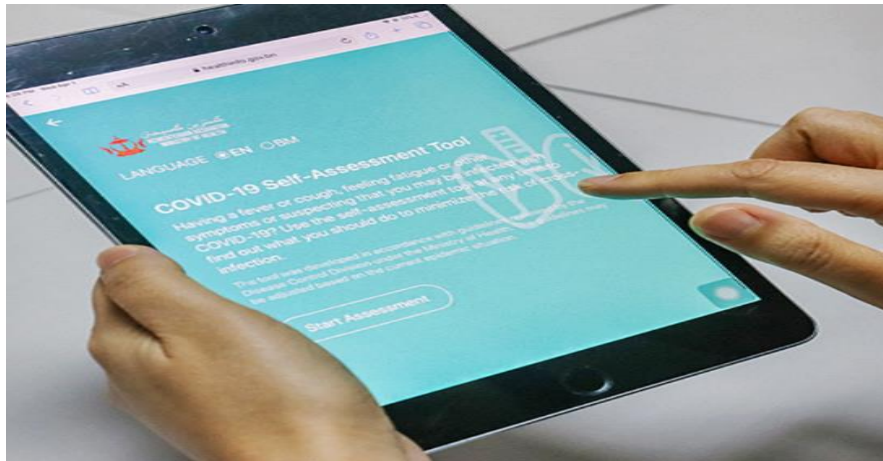
BruHealth Portal is developed by the Government of Brunei to engage its residents during the COVID-19 pandemic. The app provides residents of Brunei updates on COVID-19 development and related policy measures, monitors health conditions of residents of Brunei through the self-assessment feature and tracks risk exposure of residents of Brunei using the Bluetooth and GPS tracking features contains a number of features, such as the latest statistics and trends on the COVID-19 situation in Brunei and globally, a personal assessment code and self-assessment tool, and Government press releases related to COVID-19 and FAQs. The activity tracer of confirmed cases in Brunei, and locations of clinics and hospitals. A QR code scan that allows users to scan QR codes at locations that have applied for the BruHealth QR code.



Source: <https://www.gov.bn/Lists/Mobile%20Apps/NewDisplayForm.aspx?ID=27>

## ❖ AI Enabled COVID-19 Web Application

Artificial intelligence (AI)-powered web application aided Ministry of Health in combating the spread of COVID-19 in Brunei Darussalam. Since it was launched on March 2020, 27,000 individuals submitted their self-assessment. The application has many features which allows users to take maximum benefit out of it.



*A user accessing the COVID-19 Self-Assessment Tool. PHOTO: BAHYIAH BAKIR*

The COVID-19 Knowledge feature provided health education resources for users to get a deeper understanding of the virus through library articles and informatics, along with the Frequently Asked Questions (FAQs) feature. Meanwhile, the 'Nearby' feature is divided further into two: Hotspots which shows a map of the country where users are able to see hotspot locations from the previous Day 1, Day 7, Day 14 and Day 21, based on contact tracing information that has put together a map of confirmed case activities on certain dates; and the second is the Medical Resources option that informs the public of the nearest medical centers such as flu and swabbing centers, public hospitals, health centers and national isolation centers.

Source: <https://www.mofe.gov.bn/Lists/News/NewDispForm.aspx?ID=110>



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