

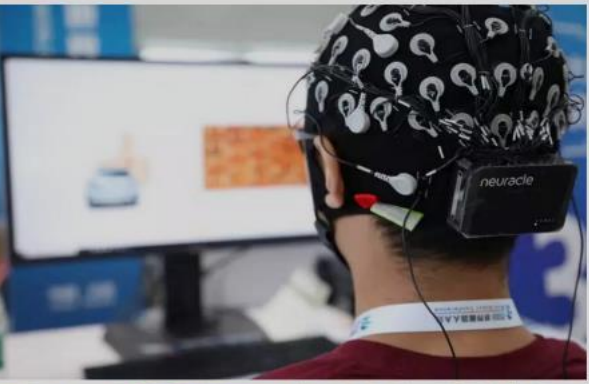




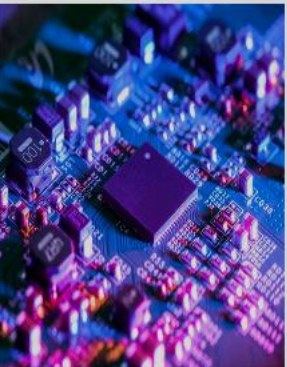
UNITED ARAB EMIRATES

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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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.

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UNITED ARAB EMIRATES

A Middle Eastern country located at the eastern end of the Arabian Peninsula. It borders about 410 km with Oman and 457 km with Saudi Arabia, and has maritime borders in the Persian Gulf with Qatar and Iran. Its coastline is 1318 km long. The country is enjoying a unique strategic location because of the Southern approach to the Strait of Hormuz, a vital transit point for world oil. The government system is a federation with specified powers delegated to the UAE Federal Government and other powers reserved to member emirates.

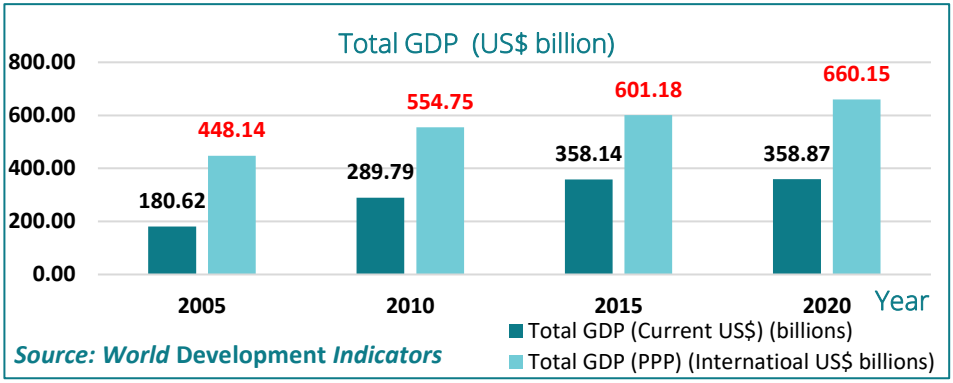
The UAE can be divided into three geographical zones: a flat, low-lying, barren coastal plain; rolling sand dunes that stretch from the coast into the expanse of a vast desert land; and a rugged mountain range, shared with Oman, in the north and east. UAE contains the world largest sand desert named Rub' al-Khali ("Empty Quarter"). The estimated population of UAE in 2020 was 9.89 million.

(Sources include: World Bank)

UAE stands at sixth and seventh in the list of largest oil and natural gas reserves occupying countries in the world, respectively. Dubai is the most populous city of UAE which is considered as global city and international hub. UAE is a powerful federation and a member of most of the major inter-government organizations which include The Organization of Islamic Cooperation (OIC), United Nations (UN), the Arab League, OPEC, the Non-Aligned Movement, and the Gulf Cooperation Council (GCC).

Abu Dhabi is the national capital of UAE federation. The official religion among the UAE is Islam, which is about 76% of country's population, and official language is Arabic. UAE comprises numerous other religious groups, which include Hindus, Buddhists, Christians, Sikhs and others. For many years, UAE was mainly relying on the oil and gas export but in past decade, the country's economic focus shifted to tourism, real estate and business industry.

A. ECONOMIC OVERVIEW



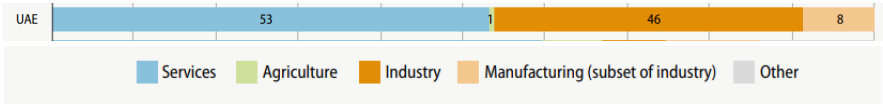
Source: World Development Indicators

- In 2019, UAE was the 28th economy in terms of GDP (Current US$) and 22nd economy in terms of GDP per capita (current US$). Between 2005 and 2019, the total GDP of UAE increased by almost 99% in terms of current US dollars, while in terms of the purchasing power parity the total GDP increased by 47%. Travel and Tourism Industry is considered as the key economic growth sector for the UAE and it contributed about US$64 billion to UAE's economy in 2016.

  (Source: World Travel & Tourism Council – WTTC)

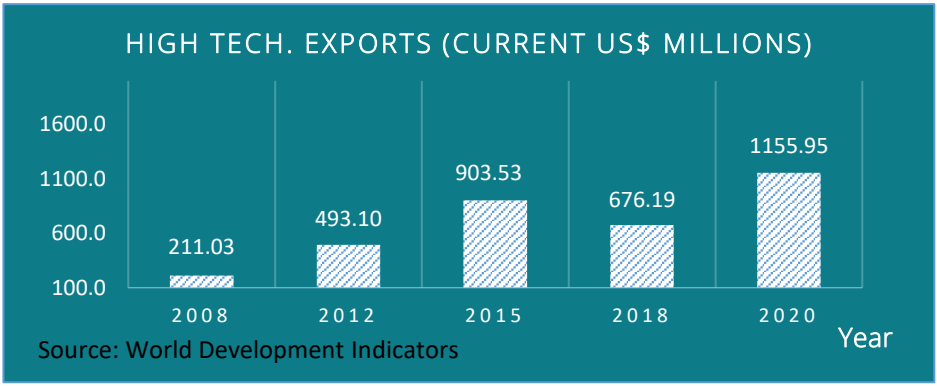
- **GDP per economic sector 2019**

  The major contributions to UAE's economy are summarized in the accompanying figure.



Source: UNESCO Science Report 2021

- The top exports of United Arab Emirates are Crude Petroleum ($57.2B), Refined Petroleum ($32.1B), Gold ($21.4B), Jewelry ($13.7B), and Broadcasting Equipment ($12B). In 2019, UAE was the world's biggest exporter of Rolled Tobacco ($3.81B), Postage Stamps ($759M), Sulphur ($679M), Gravel and Crushed Stone ($390M), and Limestone ($369M).
  Source: https://oec.world/en/profile/country/are



- Between 2008 and 2020, the trend of high technology exports depict a remarkable improvement. Commencing with a low value of about US$211 million in 2008, it increased 4.5 folds to reach the highest value of US$1155.95 million in 2020. High technology exports were 5.2% of total manufactured exports and manufacturing industry contributed a value of 9.7% in the UAE's GDP in 2020.

- In addition to the federation's plan at national level for economic growth and stability, the emirates also have their own strategic frameworks to look after and grow their socio-economic development indicators. Abu Dhabi's **Ghadan 21 (Tomorrow 21)** is one instance of such emirate level economic development programmes. It was adopted by Abu Dhabi in 2018 to improve the business environment and accelerate economic growth through the endowment of US$ 14 billion in funding until 2021. Many oil-exporting countries after overseeing the volatility of oil prices

commenced the diversification of their economic sector by investing in many other priority sectors to have a comparative advantage.

- **The Abu Dhabi Economic Vision 2030** is the same genre blueprint to diversify the emirate's economy by doing investments in the sector of tourism, manufacturing, healthcare, logistics, financial services, education, aerospace and telecommunications. The plan is already paying off as the stats reflect that in 2010, the non-oil goods trade which was 3.9% of the total Abu Dhabi's trade in goods has jumped to 19.5% in 2018.

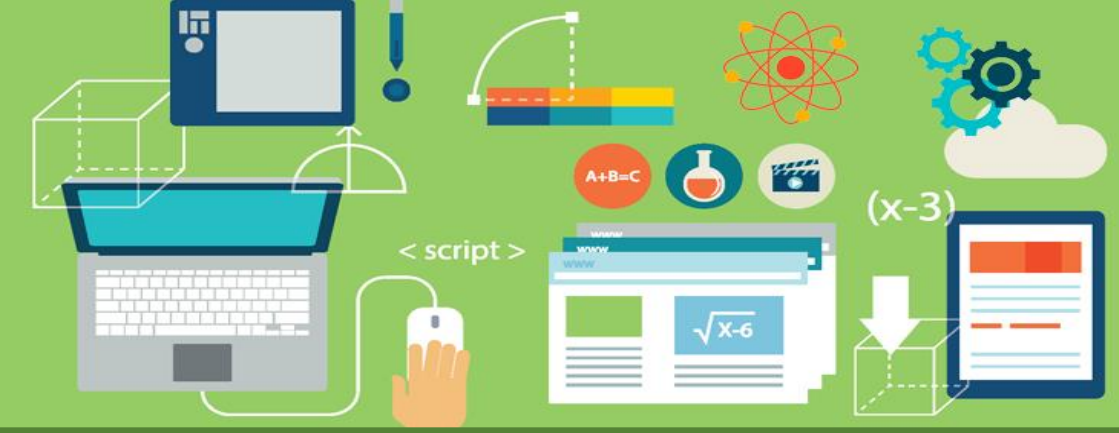
B. SOCIAL AND HUMAN DEVELOPMENT

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

- The percentage of employed population increased from 74.3% in 2005 to 80.2% in 2019 giving evidence of flourishing society of UAE. One hundred percent of UAE population have access to electricity while 98.5% have access to internet. In 2005, the life expectancy rate at birth in UAE was 75.37 years which increased up to 78 years in 2019 with the mortality rate of 7.5 (under 5 year age) out of 1000 live births.

- The literacy rate among people aged 15 years and older has increased from 90% in 2005 to a remarkable value of 97.6% in 2019. CO_2 emission value has decreased to 20.8 metric tons per capita in 2019, which was 29.1 metric tons per capita in 2001. Time required to start a business in UAE has decreased from 19.3 days (in 2005) to a short time period of 3.8 days (in 2019).

- UAE set a goal to provide healthy and sustainable lifestyle to the residents. **The Masdar City project** is an instance of this goal, which is under development since 2008. The aim is to develop the world's most sustainable metropolis. So far, one city block is built with about 1300 residents but more work is going on.



C. KEY GOVERNMENT ORGANIZATIONS RELATED TO SCIENCE, TECHNOLOGY AND HIGHER EDUCATION

❖ **Policy Frameworks**

Up Until now, the major policy that is helping the UAE leapfrog to achieve its global ambition and vison is **"The Science, Technology and Innovation Policy (2015)"**. There are two policy frameworks being driven under this STI policy, **UAE Vision 2021** and **The National Innovation Strategy (NIS)**. The pillars of UAE Vision 2021 have been mapped into six national priorities, viz. Sustainable Environment and Infrastructure; World-Class Healthcare; First-Rate Education System; Competitive Knowledge Economy; Safe Public and Fair Judiciary; Cohesive Society and Preserved Identity.

The National Innovation Strategy (NIS) is considered the main umbrella of the Science, Technology and Innovation policy of UAE. Their aim is to make UAE among the world's most innovative countries by the Golden Jubilee of the Union. The strategy aims to achieve this goal through the following:

1. Ensuring an innovation friendly ecosystem (including enhanced regulatory framework, technology infrastructure, supporting services, investments and incentives).

2. Creating a culture of innovation among individuals, firms, and the public sector.

3. Focusing on seven main sectors to lead innovation on the national level.
   Source: https://www.moei.gov.ae/en/innovation/innovation-science-technology-and-innovation-policy.aspx; | UNESCO Science Report 2021

In addition to above mentioned policies, the other related polices include:

- Strategy for the Fourth Industrial Revolution (2017)
- United Arab Emirates' Strategy for Artificial Intelligence 2031 (2017)

❖ Ministries responsible for Science, Technology and Higher Education

➢ **Ministry of Education (MoE):** The mission of ministry is to develop an innovative Education System for a knowledge and global competitive society that includes all age groups to meet future labour market demand, by ensuring quality of the ministry of education outputs, and provision of best services for internal and external customers.
Source: https://www.moe.gov.ae/En

➢ **Ministry of Industry & Advanced Technology (MoIAT):** (MoIAT) aims to boost the UAE's industrial sector and increase its contribution to the GDP. It develops laws and policies to establish a world-class industrial development framework to attract FDI and bright minds, enhance in-country value (ICV), foster entrepreneurship, create jobs, upskill local talent and boost exports of 'Made in the Emirates' products.
Source: https://moiat.gov.ae/en/

- **The Ministry of Higher Education and Scientific Research (MOHESR):**
  The Ministry has a number of departments, including the Commission for Academic Accreditation (CAA), which provides institutional licensure and degree accreditation CAA for private universities and their academic programmes in the UAE.

- Following are the names of few major research centres/institutes of UAE contributing to different research areas of S&T:

- The National Space Science and Technology Center (NSSTC) – UAEU
- Zayed bin Sultan Al Nahyan Center for Health Sciences – UAEU
- Khalifa Center for Genetic Engineering and Biotechnology – UAEU
- Emirates Center for Mobility Research – UAEU
- National Water and Energy Center – UAEU
- The Big Data Analytics Center – UAEU
- Arabian Center for Climate and Environmental Sciences (ACCESS) – NYUAD
- Center for Astro, Particle, and Planetary Physics – NYUAD
- Center for Artificial Intelligence and Robotics – CAIR
- Center for Behavioural Institutional Design (C-BID)
- Center for Cyber Security – NYUAD
- Center for Genomics and Systems Biology – NYUAD
- Center for Interacting Urban Networks (CITIES)
- Center for Global Sea Level Change – NYUAD
- Center for Quantum and Topological Systems – NYUAD
- Center for Smart Engineering Materials (NYUAD-CSEM)
- Center for Space Science – NYUAD
- Neuroscience of Language Lab (NeLLab-NYUAD)
- Public Health Research Center (PHRC – NYUAD)
- International Center for Biosaline Agriculture (ICBA)

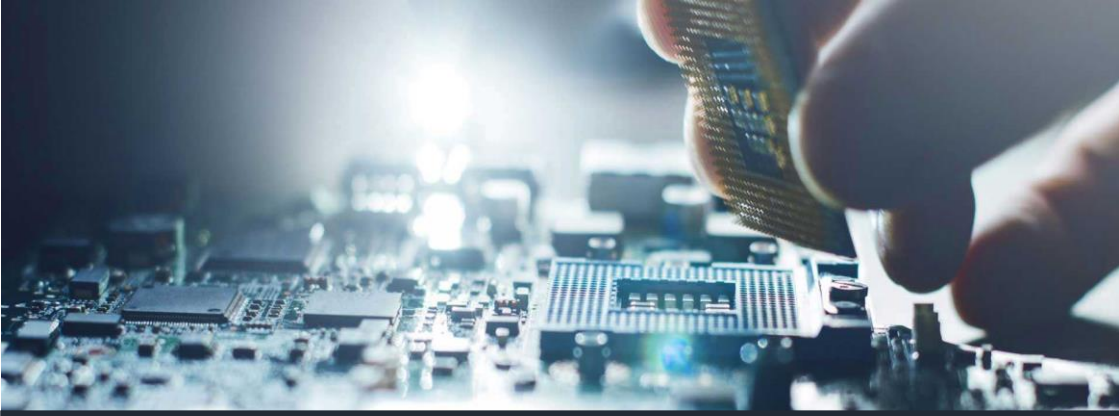
❖ Masdar Institute

Masdar Institute (MI) is Khalifa University's flagship sustainability-focused research institute. As a research institute, MI also connects fundamental research with practical application through its partnership with local and international organizations, like the major renewable energy and sustainable urban development leader Masdar. As the UAE's premier cross-disciplinary institution for clean energy, water and the environment, Masdar Institute continues to seek the most efficient and cost-effective solutions for the UAE. Masdar institute is developed in collaboration with the Massachusetts Institute of Technology (MIT).

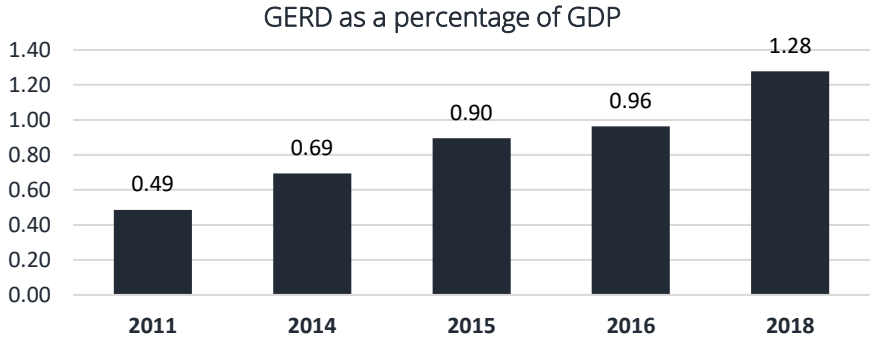
➢ Masdar Institute Research Centers and Affiliated Centers

- Emirates Nuclear Technology Center
- Center for Membranes and Advanced Water Technology
- Advanced Power and Energy Center
- Sustainable Bioenergy Research Consortium
- Emirates Nuclear Technology Center.

Source: https://www.ku.ac.ae/institute/masdar-institute



D. RESEARCH AND DEVELOPMENT



Source: UNESCO Institute of Statistics

- In 2018, UAE ranked top in the list of Arab states by devoting 1.28% of total GDP to the R&D sector. UAE's gross expenditure on R&D, GERD has increased approximately 2.6 folds (in 2018) which was 0.49% of total GDP in 2011. The GERD grew at an average rate of 28%, this improvement giving credence to the seriousness of UAE in the development of research and innovation sector. According to WIPO GII 2018 report, UAE ranked 4th in the world for R&D financed by business sector.

❖ Expenditure on R&D by Sector

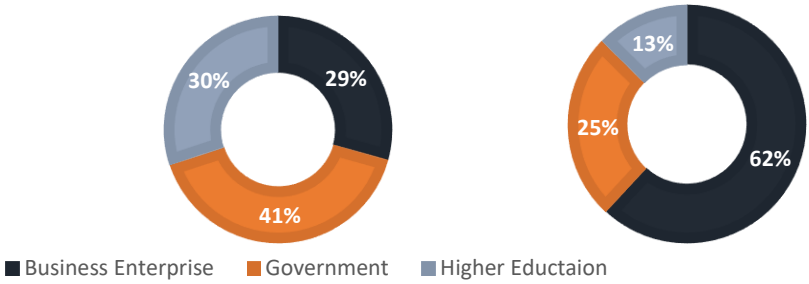
The business sector of UAE is showing high interest in research and development. The highest number of researchers (77.90%) are employed by Businesses while Higher Education (11.3%) and Government (10.8%) employ a much smaller percentage.

Source: UNESCO Science Report 2021

Researchers (FTE) by sector of employment in the UAE, 2016 (%)

❖ Until 2011, the business enterprises were not greatly interested in the R&D sector but due to subsequent policies and ambitious efforts of the government towards innovation and formulation of businesses friendly policies, business enterprises received motivation to start investing in research and development. According to UNESCO Institute of Statistics data, in 2018, Business enterprises contributed 61.93% value added share of GERD. Meanwhile, Government and Higher Education contributed minor share of 25.42% and 12.65% respectively. The shift in R&D investment from Government to the business sector is evident from the data.

GERD BY SECTOR OF PERFORMANCE (%)
2011 (LEFT) ; 2018 (RIGHT)



Source: UNESCO Institute of Statistics

❖ **Researchers Intensity:**

In 2018, the researchers' intensity of UAE was 2378.9 researchers per million inhabitants (FTE) which was 74% higher than the average global density of researchers i.e. 1368 researchers per million inhabitants (FTE). Taking a look at the accompanying graph, it can be observed that the Researchers per million inhabitants (FTE) of UAE in 2018 has increased by 20% of since 2015.

❖ **Key Areas of focus**

➢ **Renewable energy and Water Desalination**

- **Solar Energy**

The UAE was ranked third in the world in the production of concentrated solar power (CSP) in 2013. In 2014, roughly 140 MW of solar power was being generated in the UAE. The world's largest solar power plant is being built in Abu Dhabi. The plant will be fully operational by the year 2022 and will increase Abu Dhabi's solar power capacity to approximately 3.2 gigawatt. WAM. https://wam.ae/en/details/1395302858072

Key solar parks are:

- Shams 1 in Abu Dhabi: Shams 1 is the world's largest CSP plant. It was launched in March 2013. The USD 600 million, 2.5 square kilometre plant has the capacity to feed 100 MW of electricity into the national grid, enough to power 20,000 homes and divert 175,000 tonnes of CO2 per year from the atmosphere.

- Mohammed bin Rashid Al Maktoum Solar Park: The emirate of Dubai announced in January 2012 that a 1 GW Mohammed bin Rashid Al Maktoum Solar Park would be built in phases and completed by 2030 in Seih Al Dahal. This is the largest single-site solar park in the world, based on the IPP model. It will generate

1,000 MW by 2020 and 5,000 MW by 2030.
Source: https://u.ae/en/information-and-services/environment-and-energy/water-and-energy/types-of-energy-sources/solar-energy

- **Water Desalination Projects**

  The UAE is developing three new water desalination projects to help boost sustainability and achieve water security goals. They will be developed in Abu Dhabi, Dubai and Umm Al Quwain, with a combined capacity of 420 million imperial gallons of water per day. Once commissioned in 2023, the projects will increase the installed water desalination capacity of UAE to 1,590 million imperial gallons per day and will help the country overcome the challenges of water scarcity in future under its UAE Water Security Strategy 2036. As well as desalination, the UAE is looking at other greener options such as atmospheric water generation, or AWG, to supplement clean drinking water in homes and institutions. A pilot project is to be initiated at Abu Dhabi's Masdar City as part of the UAE's efforts to produce clean water in a more sustainable way.
  Source:
  https://www.thenationalnews.com/business/economy/2021/09/21/uae-to-develop-three-new-water-desalination-projects-to-address-water-security-needs/

- **Space Science and Technology**

  UAE is seeking opportunities to explore space, develop satellite communications technology and latest space technologies. UAE is aiming to develop a lunar rover and send it to the moon by 2024 and named this mission as **Emirates Lunar Mission – 2024.** In 2019, the government launched the National Space Strategy 2030, which sets the general framework for the UAE's space industry and activities carried out by public and private sectors for the years leading up to 2030. UAE has launched several satellites

which are currently orbiting around the world, some of them are: DubaiSat1, DubaiSat2, YahSat1, YahSat2, KhalifaSat, and Nayif-1. UAE Space Agency launched a 3 year intensive Arab Space Pioneers' programme which aims to invest in Arab youth who, in corollary, can robustly contribute to the global science community and drive scientific, economic and social development in their societies.

The **Emirates Mars Mission** is a United Arab Emirates Space Agency unmanned space exploration mission to Mars. The **Hope** orbiter was launched on 19 July 2020, and went into orbit around Mars on 9 February 2021. The mission design, development, and operations are led by the Mohammed bin Rashid Space Centre (MBRSC). The spacecraft was assembled in the United States at the University of Colorado Boulder's Laboratory for Atmospheric and Space Physics (LASP). The Emirates Mars Mission arrived at Mars, performing a successful orbit entry maneuver and the United Arab Emirates became the first Arab country and the fifth country to reach Mars and the second country to successfully enter Mars' orbit on its first try.

More details: https://u.ae/en/about-the-uae/science-and-technology/key-sectors-in-science-and-technology/space-science-and-technology

E. HIGHER EDUCATION

University Name	National Ranking	Global Ranking
Khalifa University of Science and Technology, Abu Dhabi	1	945
United Arab Emirates University, Al Ain	2	1254
University of Sharjah	3	1757
Zayed University	4	-
American University of Sharjah	5	-
Ajman University	6	-
Al Ain University	7	-

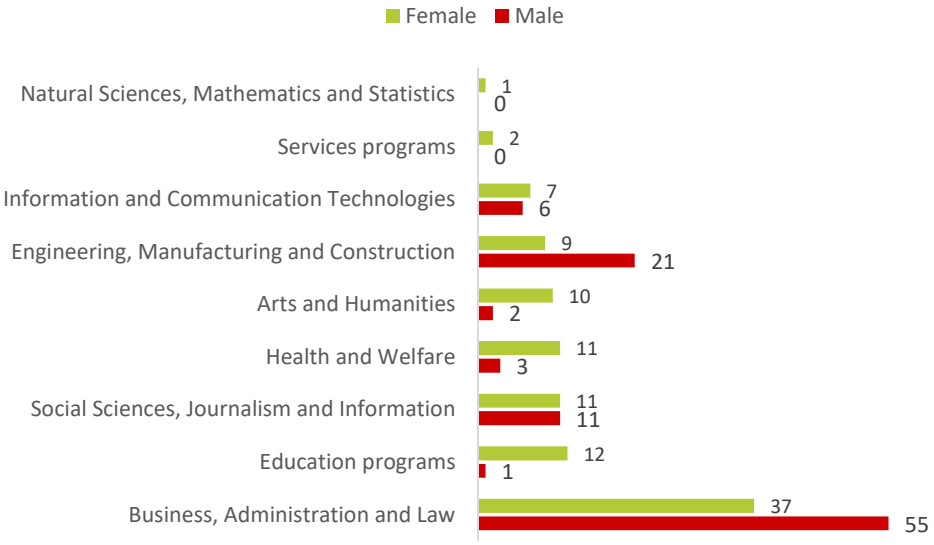
Source: https://cwur.org/2021-22/country/united-arab-emirates.php

- The International Association of Universities lists a total of 53 higher education institutions.

https://www.whed.net/results_institutions.php

- UAE is home to a wide range of public and private universities. The government is making efforts in establishing an excellent and diversified system of higher education. The Ministry of Education established the Commission for Academic Accreditation (CAA) with the mission to promote educational excellence across diverse institutions of higher learning in the UAE.

Share of tertiary graduates in the UAE in 2019, by study field and gender (%)



Source: https://cwur.org/2021-22/country/united-arab-emirates.php

- In 2019, the higher concentration of male tertiary graduates were in the fields of Business, Administration and Law (55%). The second higher concentration is in the field of Engineering, Manufacturing and Construction (21%). Furthermore, the data show that the female tertiary graduates were also in higher concentration in the field of Business, Administration and Law (37%). Second higher concentration for females was in the field of Education programs (12%). Other fields with lesser concentration of tertiary graduates can be viewed in the accompanied graph.

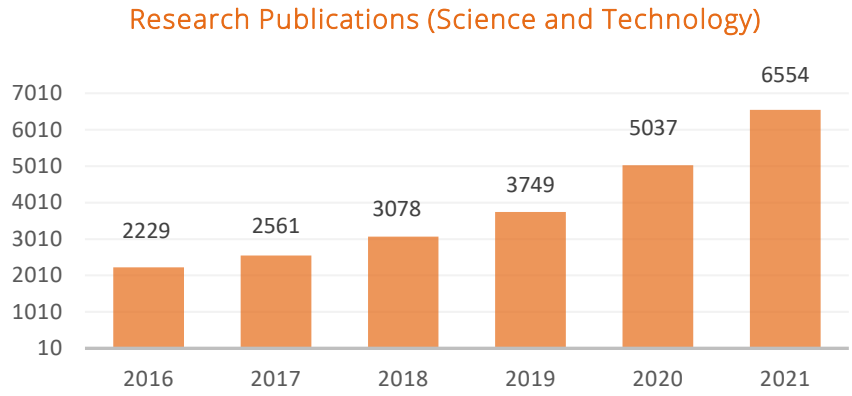
- In September 2017, Ministry of Education launched the National Strategy for Higher Education 2030. The strategy sets out to build and achieve the highest scientific and professional education standards to serve the UAE's future generations by providing them with the necessary technical and practical skills to drive the economy in both public and private sectors. UAE higher education institutions can be divided into three categories: public, private, and Global Partnerships.

- **Public Institutions:** UAE citizens can attend government institutions free of charge, and the UAE has one of the highest application participation rates in the world. Public institutions include the UAE University (UAEU), Zayed University (ZU),and Higher Colleges of Technology (HCT), the largest higher educational institution with an enrolment of over about 16,000 students. More than 10,000 of the current students are female.

- **Private Institutions:** Private institutions are playing an important role in education across the UAE. A high percentage of students in the UAE are enrolled in private schools, e.g. 50% of all students are in private schools in Dubai and 40% in Abu Dhabi. Some of the key private institutions are the Khalifa University of Science and Technology, the Petroleum Institute, the Masdar Institute, and the American University in Dubai (AUD), in Ras Al Khaimah (AURAK), Sharjah (AUS) and the Emirates (AUE), respectively, besides the University of Sharjah (UOS), the Ajman University of Science and Technology (AUST), and the Abu Dhabi University (ADU).

- **Global Partnerships:** A number of international universities have campuses and programs in the UAE. New York University, The Rochester Institute of Technology, The Sorbonne and Johns Hopkins' Bloomberg School of Public Health are some of the leading institutions that have partnered under this scheme.

F. RESEARCH PUBLICATIONS

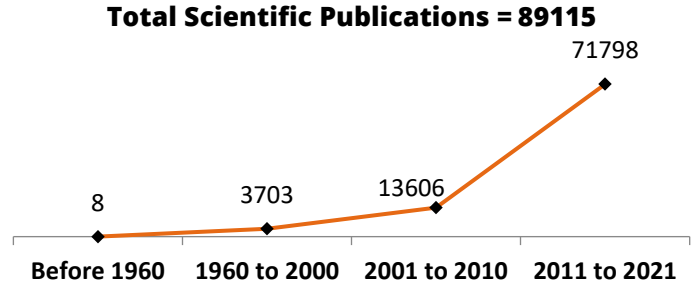


Source: Web of Science Core Collection | Document type: Articles

- There is a consistent increase in number of research publications from UAE in the field of science and technology. In 2016, the number of scientific research publications were 2229 which increased by around 195% to 6554 in 2021. In Arab states, UAE ranks second in the list of most scientific publications (739) per million inhabitants in 2019.

- UAE researchers published nearly seven times more publications than the expected number in the field of eco-construction materials. Likewise, their scientists published over four times more papers than would be expected on carbon capture and storage. Between 2017 and 2019, top five partners for scientific co-authorship with UAE are USA (3,451), UK (1782), Canada (1421),

Saudi Arabia (1253) and China (1161). UAE ranked 3rd, 2nd, and 2nd in the list of top 10 Arab countries by publication intensity on AI & robotics, Energy, and Material Science respectively in the period of 2016–2019.



Source: Scopus

- The per era publications of UAE is described in the figure. Only 8 documents were published before 1960. While 77.32 % documents (or 68947) are published in the last ten years. They received 866477 total citations or 12.6 citations per publications (CPP). We also tried to provide details about the article field weighted citation impact (FWCI), which "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 overall FWCI for the last ten years was 1.45, which means, that the articles received 45 % higher citations as compared with global average. The per year details are described in the table.

S#	Title	Overall	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Scholarly Output (SO)	68947	3235	3574	3817	4961	5761	6598	7315	9370	10831	13485
2	Citations	866477	53404	73526	72920	102118	103495	104490	107250	101995	94465	52814
3	FWCI	1.45	0.95	1.19	1.27	1.41	1.38	1.32	1.46	1.41	1.51	1.77
4	CPP	12.6	16.5	20.6	19.1	20.6	18	15.8	14.7	10.9	8.7	3.9

S#	Subject Area	SO	Citations	Authors	CPP	FWCI
1	Engineering	19572	213305	11142	10.9	1.43
2	Computer Science	15250	136316	8408	8.9	1.49
3	Medicine	11400	210538	9938	18.5	1.98
4	Social Sciences	7469	51859	5543	6.9	1.28
5	Physics and Astronomy	6736	87445	4186	13	1.45
6	Energy	6709	81637	7062	12.2	1.39
7	Materials Science	6674	99350	4235	14.9	1.41
8	Mathematics	5923	48466	3470	8.2	1.48
9	Business, Management and Accounting	5620	58330	3759	10.4	1.33
10	Biochemistry, Genetics and Molecular Biology	4896	90186	4403	18.4	1.34
11	Earth and Planetary Sciences	4838	38061	5413	7.9	0.95
12	Environmental Science	4783	76333	4466	16	1.58
13	Chemistry	4105	83813	2827	20.4	1.42
14	Chemical Engineering	3840	68726	3115	17.9	1.44
15	Economics, Econometrics and Finance	2947	24312	1799	8.2	1.43
16	Decision Sciences	2711	19092	2554	7	1.6
17	Agricultural and Biological Sciences	2500	33628	2383	13.5	1.37
18	Pharmacology, Toxicology and Pharmaceutics	2088	22560	2064	10.8	1.05
19	Arts and Humanities	2022	10923	1433	5.4	1.42
20	Multidisciplinary	1354	29735	1855	22	1.35
21	Immunology and Microbiology	1085	18407	1339	17	1.38
22	Psychology	1015	13384	838	13.2	1.67
23	Neuroscience	952	16807	953	17.7	1.36
24	Dentistry	864	6650	744	7.7	1.06
25	Nursing	708	8562	1044	12.1	1.6
26	Health Professions	602	6463	842	10.7	1.84
27	Veterinary	334	1975	359	5.9	1.09

Source: Scopus

- The data about the number of publications per subject area was also obtained. Its note worthy that Scopus provides the stated information in 27 different areas of research. For example UAE published the highest documents in Engineering (n=19572), Computer Science (n=15250), Medicine (n=11400), Social Sciences (n=7469) and Physics and Astronomy (n=6736). While, the lowest documents are published in Neuroscience (n=952), Dentistry (n=864), Nursing (n=708), Health Professions (n=602) and Veterinary (n=334). The citations detail for each research areas is also provided. For example, the highest citations were recorded for Engineering (n=213305) and Medicine (n=210538). While, the lowest citations were recorded for Health Professions (n=6463) and Veterinary (n=1975). In the same vein, the highest CPP was noted for Multidisciplinary (n=22) and Chemistry (n=20.4). The FWCI for each subject is also provided in the table.

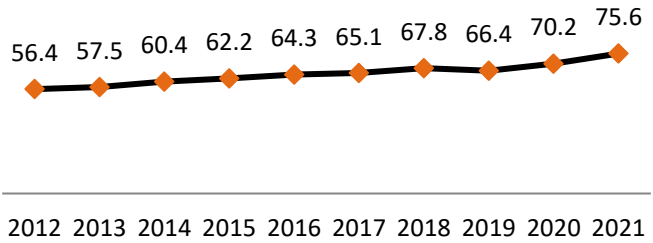
- Scopus also categorized the journals in seven different categories or quartiles. For example, the top 1% or the highest ranked journals are included in Q1 and Q7 presents the 75 to 100% group. In the last ten years UAE has published 52277 research documents in Q1 to Q7 sets. The highest documents are published in Q5 (n=13365/26.6%) and Q4 (n=12767/24.4%). The per year breakup details in all seven quartile sets are presented in the table.

Sr. No.	Title	Overall	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Pub in top 1% Sources (Q1)	1563	34	54	89	104	131	125	163	186	270	407
2	Pub in top 1% (Percent)	3	1.7	2.3	3.4	3	3.3	2.6	2.9	2.7	3	3.5
3	Pub in top 5% Sources (Q2)	6972	237	289	373	511	525	551	726	874	1191	1695
4	Pub in top 5% (Percent)	13.3	11.6	12.5	14.3	14.6	13.1	11.6	13	12.7	13.4	14.5
5	Pub in top 10% Sources (Q3)	13286	431	519	635	900	1003	1198	1347	1586	2249	3418
6	Pub in top 10% (Percent)	25.4	21.2	22.4	24.3	25.7	24.9	25.2	24.1	23.1	25.4	29.2
7	Pub in top 25% Sources (Q4)	26053	839	1022	1191	1699	1930	2218	2679	3246	4548	6681
8	Pub in top 25% (Percent)	49.8	41.2	44.2	45.6	48.5	48	46.6	48	47.2	51.3	57
9	Pub in top 50% Sources (Q5)	39418	1387	1643	1907	2575	2922	3496	4063	5000	6819	9606
10	Pub in top 50% (Percent)	75.4	68.2	71	73	73.5	72.7	73.4	72.8	72.8	77	82
11	Pub in top 75% Sources (Q6)	47824	1780	2096	2372	3190	3699	4284	5085	6164	8196	10958
12	Pub in top 75% (Percent)	91.5	87.5	90.6	90.8	91	92	90	91.1	89.7	92.5	93.5
13	Pub in top 100% Sources (Q7)	52277	2035	2314	2611	3504	4021	4761	5582	6870	8861	11718
14	Pub in top 100% (Percent)	100	100	100	100	100	100	100	100	100	100	100

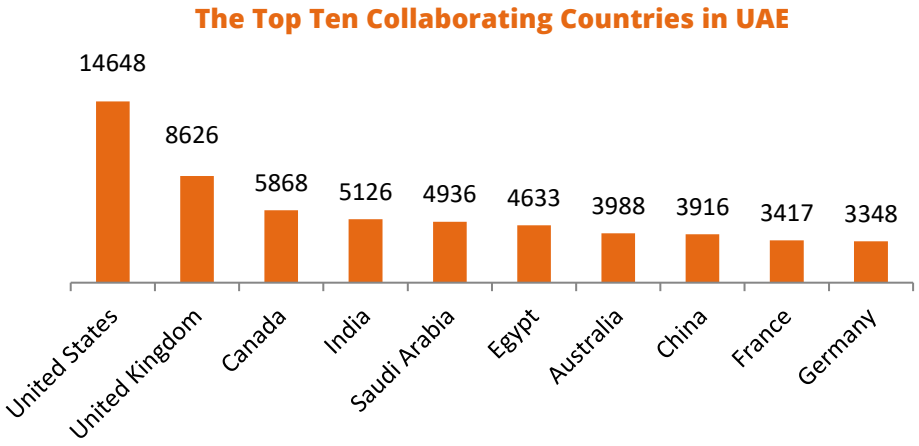
S#	Institution	SO	Citations	Authors	CPP	FWCI
1	Khalifa University of Science and Technology	12862	200557	3541	15.6	1.39
2	United Arab Emirates University	10294	171633	3831	16.7	1.69
3	University of Sharjah	7578	107510	2531	14.2	2.02
4	NYU Abu Dhabi	4902	96927	1464	19.8	1.94
5	American University of Sharjah	4286	49093	1733	11.5	1.27
6	Zayed University	3028	32764	901	10.8	1.59
7	Abu Dhabi University	1800	20125	662	11.2	1.54
8	Higher Colleges of Technology	1751	10534	994	6	1.01
9	Ajman University	1517	8331	710	5.5	1.33
10	Al Ain University of Science and Technology	1475	8375	390	5.7	1.14

- In UAE, the highest documents are published by Khalifa University of Science and Technology (n=12862) and United Arab Emirates University (n=10294). Both universities also received the 1st and 2nd highest citations. However, the highest CPP was noted for NYU Abu Dhabi (n=19.8). The scholarly output citations, number of authors, CPP and FWCI for all ten universities is provided in the table.

International Collaboration (%)



- In the last ten year, UAE showed a higher rate of international collaboration. The per year data is presented in the figure. Precisely, the highest documents were published with USA (n=14648), followed by UK (n=8626) and Canada (n=5868). The data is for the top ten collaborating countries in also presented in the figure.



Source: Scopus

G. INTERNATIONAL COOPERATION AND SUPPORT INITIATIVES

- **Israel-UAE Space Programme Cooperation**
  The UAE Space Agency has signed MoU to work in collaboration with The Israel Space Agency to boost cooperation in scientific research, space exploration and knowledge transfer. The UAE will exchange research and develop scientific instruments for Israel's Beresheet-2 mission to land a spacecraft on the Moon by 2024 as part of the landmark agreement. Universities in Israel and the UAE will also launch collaborative research projects.

- **China-UAE Cooperation and Exchanges in STI**
  Cooperation between UAE and China is flourishing in the field of STI. Trials of desert sea rice in Dubai are an example of UAE China cooperation. Chinese company SinoPharm and G42 Group of UAE launched cooperation on the COVID-19 vaccine. In 2021, the UAE University and the Chinese Academy of Sciences signed a MoU to deepen cooperation in science and innovation between the two countries. In 2019, the UAE and Huawei signed a cooperation agreement for the construction of 5G in the UAE.

- **Russian-UAE Cooperation and Business Council**
  Hub71, Abu Dhabi's global tech ecosystem, has signed a partnership

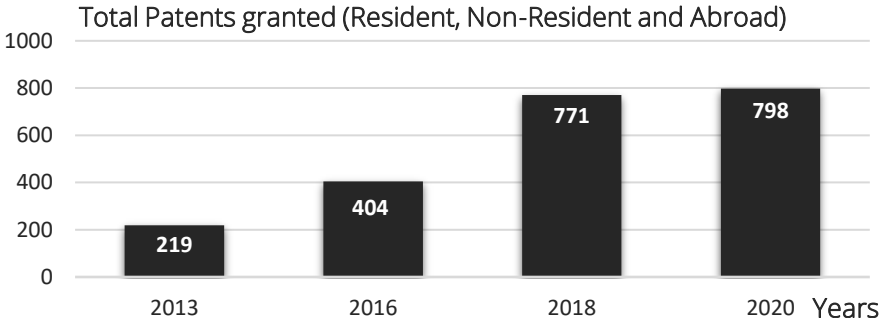
with Sber, Russia's largest commercial bank. The partnership aims to increase market access and the long-term commercial potential of innovation-led enterprises.

❖ US-UAE Partnerships

In 2014, The Harvard University and the Government of UAE launched the Emirates Leadership Initiative (ELI). This is a five-year innovative new education program that promotes educational exchanges between UAE and US. Furthermore, UAE and US Institutions have many partnerships in the field of health care, business, sports and culture, academia and energy.

More details: https://www.uae-embassy.org/uae-us-relations/key-areas-bilateral-cooperation/uae-us-partnerships

H. INNOVATION, ENTREPRENEURSHIP & TECHNOLOGY PARKS



Source: WIPO: https://www.wipo.int/ipstats/en/statistics/country_profile/

- About number of patents granted, UAE's record show a very strong increasing trend. In 2013, the total patents granted were 219 but it increased nearly 3.6 times in 2020 and reached the impressive number of 798. In 2019, IP5 granted 260 patents to UAE. (The IP5 is a forum of the five largest intellectual property offices in the world and handles about 80% of the world's patent applications).

- In 2020, UAE ranked 34th in Global innovation index while in the latest WIPO GII 2021 report it is ranked 33rd among the 132 economies featured in the GII 2021. However, GII score has remained almost unchanged in this period, suggesting that no major improvements in the innovation ecosystem have taken place in this period. The country ranks 3rd among the 19 economies in Northern Africa and Western Asia.

- **HUB71** is launched under the Ghadan 21 programme through the collaboration of government-run Mubadala Investment Company and multinational tech giants such as Microsoft (USA) and Softbank (Japan). HUB71 provides start-ups with office space, funding, health insurance and subsidized housing.

- **Dubai Internet City** was established in 2000 and it is UAE's leading tech hub where regional headquarters of many multinational companies are located including Microsoft and IBM. It is hosting almost 1600 companies, many SMES, Research centers and startups.

- In 2017, UAE also launched the **UAE Strategy for the Fourth Industrial Revolution**. The main vision behind this strategy is to bring disruptive technological changes to the key areas that include education, health, food security, urban planning and defence through Industry 4.0 technologies.

- UAE also introduced its first national research funding platform named as **Researcher platform** (researcher.ae). Researcher.ae aims to diversify the UAE's economy by creating Emirati High Tech Innovative Companies. Researchers are funded under three main programmes of Researchers.ae: Sandooq Al Watan Fellowship programme, SWARD programme and Grants programme.

- UAE also lauched its industrial strategy plan named **"Operation 300bn"**, a comprehensive 10-year plan based on the 300-Billion initiative that aims to establish the UAE's industrial sector by providing financial and policy support to 13,500 micro and small enterprises in the UAE to encourage more private capital to engage in technology and innovation.

❖ **Technoparks and Incubation Centers:**

The UAE government is strongly promoting the culture of innovation and R&D competitiveness. It is establishing Technology parks in various regions of the country. Following is the list of some technology parks and incubation centers in UAE:

- CERT Technology Park (CTP), Dubai
- Dubai Internet City (DIC), Dubai
- Dubai Knowledge Park
- Dubai Media City (DMC)
- DuBiotech, Dubai Biotechnology and Research Park (DBT)
- Dubai Industrial City (DINC)
- Dubai TechnoPark
- United Arab Emirates University Science and Innovation Park
- Dubai Silicon Oasis
- Sharjah Research Technology and Innovation Park (University City, UAE)
- Sheikh Mohammed bin Rashed Technology Park
- CERT Technology Park, Abu Dhabi
- TechnoPark, Dubai
- Dubai World Central (Aviation City)

I. COMBATING THE COVID-19 PANDEMIC

UAE is leading globally in many ways for tackling the COVID-19 pandemic.

❖ Vaccine Development and Administration:

- There are five vaccines being used against COVID-19 throughout UAE, free of charge, viz. Sinopharm, Pfizer-BioNTech, Sputnik-V, Oxford-AstraZeneca and Moderna. According to UAE's National Emergency Crisis and Disaster Management Authority (NCEMA), Until December 2021, 100% of the population have received single dose of vaccine and 91.97% of the population is fully vaccinated.

- UAE is the first country in the Arab world to develop and produce a COVID-19 vaccine named **"Hayat-Vax"**. It is a joint venture between Sinopharm CNBG with Abu Dhabi's G42. Around two million doses of Hayat-Vax are currently produced per month in a plant owned by Julphar in Ras Al Khaimah.

- Dubai Health Authority (DHA) also published **Covid-19 Awareness Guide** for the citizens.

- NCEMA launched a platform named **"Weqaya (weqaya.ae)"**, with an aim to raise public health issues and spreading awareness among the members of society in UAE. They provide best medical advice and practices to help people stay healthy and protected from pandemics.

❖ Indigenous production to meet pandemic requirements

- Abu Dhabi Medical Devices Company, together with international partners, has provided more than 500 million syringes and needles for the COVID-19 vaccines, equivalent to 25% of UNICEF and COVAX's global needs by 2021.

  Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8421098/)

- ViroMasks is a UAE based company that designed the mask which use intelligent textile technology to eliminate a range of bacteria and viruses that come in contact with its surface. This mask as reported by HeiQ Viroblock NPJ03 is tested effective 99.99% against SARS-CoV-2 virus in 30 minutes of contact.

- The experts at Higher Colleges of Technology (HCT) has developed and manufactures 3D printed Ventilator Splitter for treating multiple patients with a single ventilator, in hospitals' Intensive Care Units. Source: https://hct.ac.ae/en/news/hct-develops-manufactures-3d-printed-ventilator-splitter-uaes-fight-coronavirus/

❖ Hope Consortium for vaccines storage and distribution

Hope consortium was founded in UAE to facilitate the availability of COVID-19 vaccines throughout the world through public-private partnership. It has created UAE's largest freezer farm with an overall capacity of 53 units. This facility has the capacity to store over 11 million doses of COVID-19 vaccine at ultra-cold temperatures. Its main aim was to deliver 18 billion doses of vaccine by the end of 2021.

❖ Mobile application to support the country's efforts to curb the spread of the novel coronavirus.

- UAE introduced the COVID-19 contact-tracing app to its citizens named **"Al Hosn"**, which not only helps to request an appointment for a vaccine immediately but also serves as the national vaccine registry.

- The Emirate of Abu Dhabi also Launched Malaffi programme, the establish health information exchange which collects and share vaccination information with more than 100 healthcare facilities connected to electronic medical records.

- The other indigenous apps used for raising awareness about the vaccination and immunization programmes launched by the government include: COVID-19 UAE, MOHAP app, MOHAP-SHEFAA, Health Heroes Game app, Tateem, and the UAE RADR app.

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