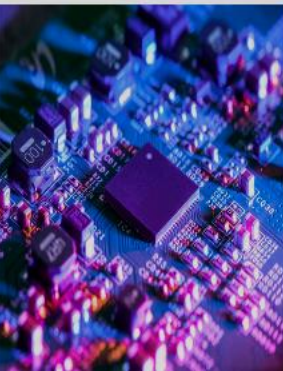
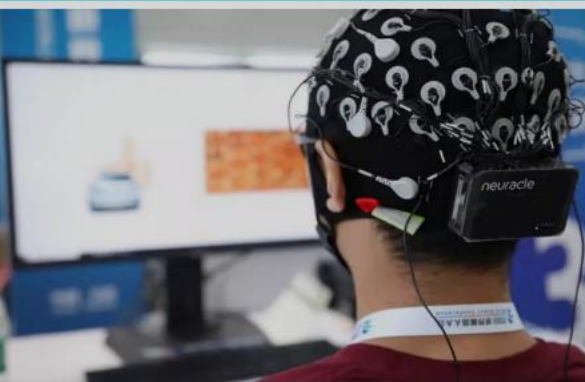




SAUDI ARABIA

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

CONTENT DISCLAIMER

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SAUDI ARABIA

officially the Kingdom of Saudi Arabia (KSA),

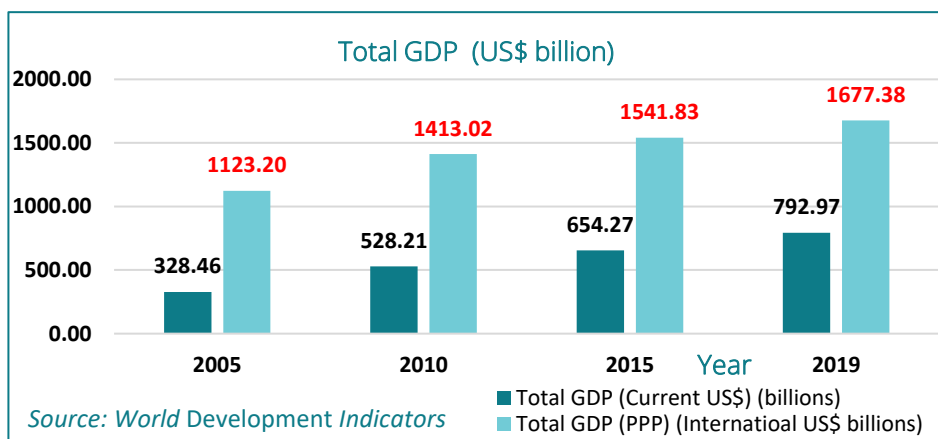
is a country in Western Asia. It spans the vast majority of the Arabian Peninsula, with a land area of approximately 2,150,000 km² (830,000 sq mi). Saudi Arabia is the largest country in the Middle East, and the second-largest country in the Arab world. It is bordered by Jordan and Iraq to the north, Kuwait to the northeast, Qatar, Bahrain, and the United Arab Emirates to the east, Oman to the southeast and Yemen to the south; it is separated from Egypt and Israel in the north-west by the Gulf of Aqaba. Saudi Arabia is the only country with a coastline along both the Red Sea and the Persian Gulf. Its largest and capital city is



Riyadh, and the country is home to Mecca and Medina, the two holiest cities in Islam. The Kingdom of Saudi Arabia was founded in 1932 by King Abdulaziz. Saudi Arabia defines itself as a sovereign Arab Islamic state with Islam as its official religion, Arabic as its official language, and Riyadh as its capital. Petroleum was discovered in Saudi Arabia in 1938 and the country has since become the world's second largest oil producer and the world's largest oil exporter, controlling the world's second largest oil reserves and the sixth largest gas reserves. The kingdom is categorized as a World Bank high-income economy with a very high Human Development Index and is the only Arab country to be part of the G20 major economies. In addition to being a member of the Gulf Cooperation Council, Saudi Arabia is an active and founding member of the United Nations, Organisation of Islamic Cooperation, Arab League, and OPEC. Source: https://en.wikipedia.org/wiki/Saudi_Arabia



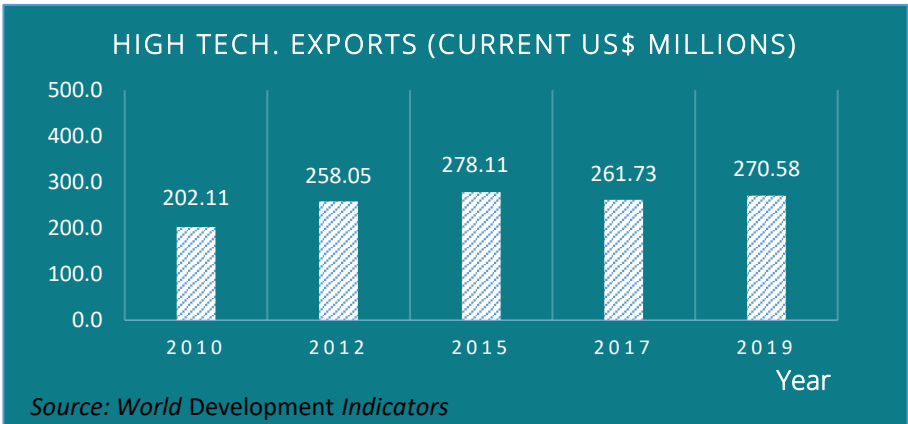
A. ECONOMIC OVERVIEW



In 2019 Saudi Arabia was the number 18 economy in the world in terms of GDP (current US\$), the number 26 in total exports, the number 32 in total imports, the number 43 economy in terms of GDP per capita (current US\$). Saudi Arabia is a major oil exporting country in the world. The main exports of 2019 include products like Crude Petroleum (\$145 billion), Ethylene Polymers (\$11.1 billion), Propylene Polymers (\$5.88 billion), Acrylic Alcohols (\$4.28 billion) and Ammonia (\$1.78 billion). A glance at Saudi Arabia's GDP per economic sector shows major proportion of the value added share of GDP is in Services (50%) and Industry (47%). (Manufacturing constitutes 13% of the industrial share of GDP). Agriculture contributes a minor 2%. Total GDP trend depicts the consistent growth in past 15 years i.e. it rose from 328.46

billion US dollars (2005) to 792.97 billion US dollars (2019). Most of Saudi goods are exported to China, India, Japan, South Korea and United States. <https://oec.world/en/profile/country/sau>

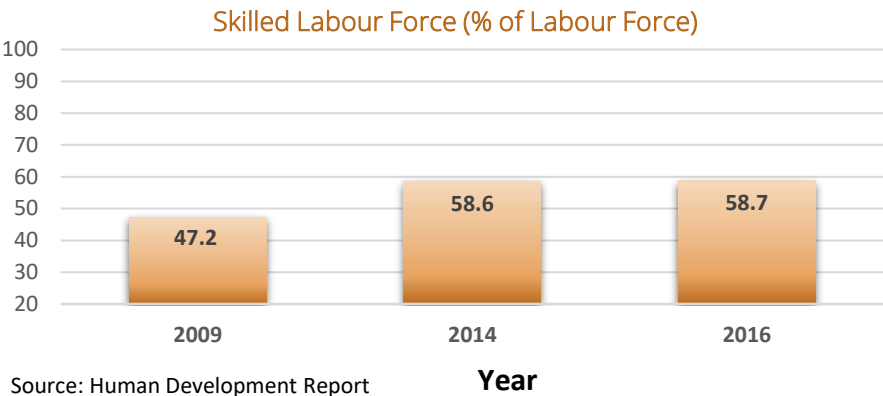
Saudi plans for diversification of the economy are reflected in the document Vision 2030 (2016). It envisions Saudi Arabia becoming a 'global investment powerhouse' with a diversified industrial base and better business environment. To support this policy, the Public Investment Fund's assets are to be carried from around US\$ 160 billion to more than about US\$ 1.9 trillion. By 2030, the share of non-oil exports in GDP is to rise from 16% to 50%. Gas is set to play a greater role in the economy, with plans to develop the Jafurah onshore gas field.



Saudi Arabia's high technology exports remained comparatively low and ranged between US\$ 202 and 278 million in the last ten years constituting only about 0.6% of the total manufactured exports.



B. SOCIAL AND HUMAN DEVELOPMENT



Saudi Arabia’s Human Development Index (HDI) value for 2019 is 0.854 - which puts the country in the very high human development category- positioning it at 40 out of 189 countries and territories. Between 1990 and 2019, Saudi Arabia’s HDI value increased from 0.697 to 0.854. Saudi Arabia also has one of the world's youngest populations, with approximately 50 per cent of its population of 34.2 million being under 25 years old. Life expectancy at birth is above 75 years in 2019, while 100% of the population has access to electricity and 96% to the internet. Saudi Arabia spends a larger portion of its GDP on education than the global average, and has achieved near universal literacy (95 percent of adults, 99 percent of youth) and enrolment rates. The percentage of skilled labor force has increased consistently from 47% in 2009 to almost 59% in 2016.



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

❖ Policy Frameworks

- Vision 2030 (2016) followed the sharp drop in oil prices over 2014–2016 and envisions Saudi Arabia with a diversified industrial base and better business environment. Vision 2030 is being implemented through 13 Vision Realization Programmes, including the National Industrial Development and Logistics Programme (NIDLP) announced in 2019. It is set to invest SAR 1.7 trillion (ca US\$ 453.2 billion) to create 1.6 million jobs by 2030 in four targeted growth sectors: mining, industry, logistics and non-oil energy.
- The National Industrial Strategy itself identifies seven priority sectors: machinery and equipment; renewable energy generation; pharmaceuticals; medical supplies; automotive industry; chemicals; and the food industry. In 2016, the government established the Industrial Clusters agency, to attract investment and oversee the implementation of the National Industrial Strategy.
- The Ministry of Communications and Information Technology has released a five-year roadmap for innovation and the digital economy, the ICT Strategy 2019–2023. The strategy targets growth

of 50% in the ICT sector by 2023, through a more technically skilled workforce, a more research-intensive start-up ecosystem and greater co-ordination.

- The National Strategy for Research, Development and Innovation was published in 2019, within the framework of the NIDLP. It identifies several challenges for the national innovation system and makes a number of recommendations that include offering grants and tax incentives to promote industrial R&D; defining clear regulatory guidelines for intellectual property ownership; and establishing technology transfer offices at local universities.

❖ **Ministries responsible for Science, Technology and Higher Education**

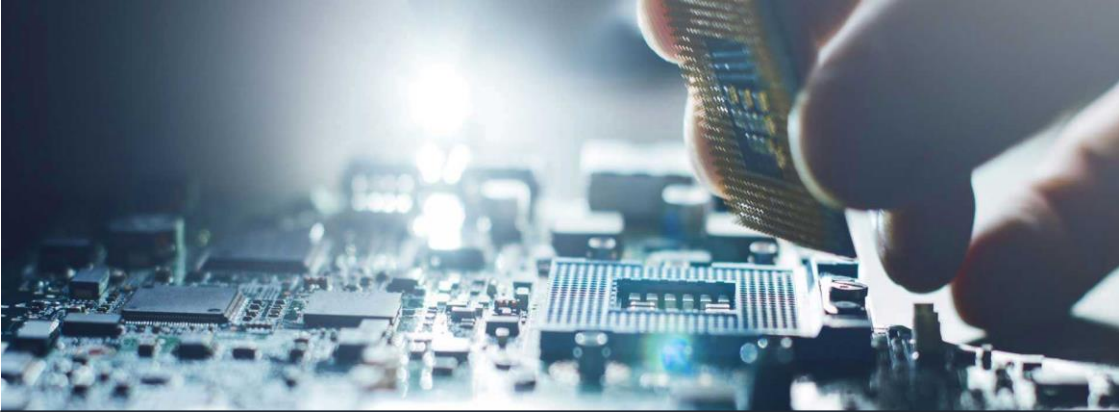
- The Ministry of Science and Technology
- King Abdul-Aziz City for Science and Technology (KACST)
- The Ministry of Agriculture.
- Ministry of Education
- Ministry of Environment, Water and Agriculture
- Ministry of Health
- Ministry of Energy, Industry and Mineral Resources
- Ministry of Communications and Information Technology

❖ **Major Research Centres and Institutes**

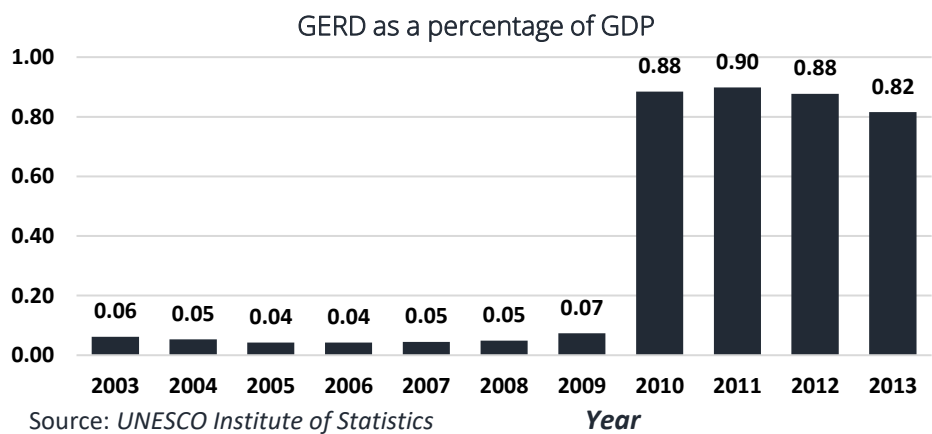
- King Abdul-Aziz City for Science and Technology (KACST) is comprised of seven institutes; four centres; five national programmes of research, development and innovation; and a number of joint research centres.
- The Ministry of Agriculture has in various regions, research centres in agriculture, livestock and fisheries.
- There are also a number of research centres in the health sector, such as the research centres at King Faisal Specialist Hospital, King Khalid Eye Specialist Hospital, and the Joint Centre for Research in

Prosthetics Devices, the National Centre for Vaccine Production in the National Guard King Abdul-Aziz Medical City, and Prince Salman Centre for Disability Research.

- King Fahd Center for Medical Research - King Abdulaziz University.
- A number of research centres in each of the Saline Water Conversion Corporation, the Saudi Wildlife Commission
- Al-Watania Poultry Institute of Technology (WIT)
- King Abdullah Petroleum Studies and Research Center
- King Faisal Specialist Hospital and Research Centre
- King Salman Center for Disability Research
- Prince Sultan Advanced Technology Research Institute
- Al-Qassim University Research Centers: Al-Qassim University currently has 53 colleges, and 5 leading research centers

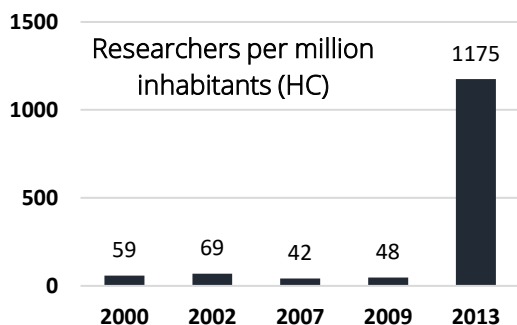
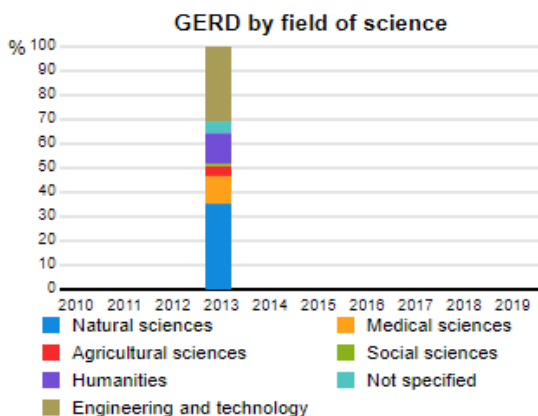


D. RESEARCH AND DEVELOPMENT



Saudi Arabian investment in S&T took a big leap in 2010 when its Gross Expenditure on R&D jumped from 0.07% of GDP to 0.88%, a ten-fold increase. No data is available for the period after 2013 but it appears that in 2013 the research and development funding has declined slightly to 0.82%. Field wise the funding appears to be concentrated in the areas of natural sciences (35%) and engineering (30.7%), followed by medical sciences (11.4%) and agriculture 4.1%. The strong support for natural sciences R&D is suggestive of national commitment towards building an indigeneous base for scientific manpower and research environment and facilities.

The largest parts of the Kingdom's expenditure on R&D are concentrated in the fields of Engineering and Technology, and Natural Sciences respectively as shown in the accompanied graph.



Source: UNESCO Institute of Statistics

Like most of the S&T indicators, the number of researchers in R&D shows a multifold increase since 2004, as shown in the figure. This is reflective of increased focus and investment in S&T data after 2013 is not available.

❖ Organization of research

Scientific Research in Saudi Arabia is organized mainly as:

- **Basic research in colleges of science:** carried out in research centres based in the college itself by faculty members.
- **Contractual research:** applied research carried out under contracts with private-sector institutions and companies at university research institutions such as the Research Institute at King Fahd University of Petroleum and Minerals, King Abdullah Institute for Consulting and Research at King Saud University, and the Institute of Research and Consultancy at King Abdul-Aziz University.

- Centres of scientific and research excellence at universities: under the Eighth Development Plan, the Ministry of Higher Education funded nine centres at the following universities: King Abdul-Aziz, King Saud, King Faisal, and King Fahd University of Petroleum and Minerals.

- Science parks linked to universities: Science parks attract mostly large companies seeking to establish advanced research centres by taking advantage of the infrastructure provided by the parks, and the human, scientific and technical potential of universities.

❖ **Private Sector Research and Development**

- Several private-sector companies started establishing R&D centres and units; notably, the Saudi Basic Industries Corporation (SABIC), the Saudi Arabian Oil Company (Saudi Aramco), and the Arabian Metals Company, as well as the companies of the Economic Offset Programme, such as: the Aircraft Complementary Equipment Company, the International Systems Engineering Company, the Al-Bilad Catalyst Company, the Obeikan Technical Fabrics Company, and the United Lubricant Oil Company.
- Aramco's R&D centre founded in 2004 focuses its research on oil, gas, energy; nanotechnology; biotechnology; microbiology; and new materials. The centre collaborates with several national and foreign universities and research institutes and seeks to attract talented scientists and researchers.
- The Saudi Polyolefins Company is establishing a centre specializing in plastics manufacture. The company also cooperates with several universities in the Kingdom in research projects, in addition to its relations with institutes of technology within the Kingdom and abroad.
- DEEF for Pharmaceutical Industries, which produces medical supplies and various types of medicines, is adopting a long-term R&D strategy aimed at creating new high-tech products. The company is cooperating with local and international research

research centres, universities and specialist laboratories. To enhance their productive capacities and competitiveness, other companies, such as CAD Middle East Pharmaceutical Industries, Al Salam Aircraft Company, and Manafeth Ambulance and Handicap Vehicles Company are in the process of establishing R&D activities.

Source: Ministry of Economy and Planning

❖ **New Developments in R&D**

- Saudi Arabia is the largest producer of desalinated water in the world. It aims to hoist production from 60% to 90% of urban needs by 2030. In 2015, Advanced Water Technology, the commercial arm of the King Abdulaziz City for Science and Technology, partnered with the Spanish firm Abengoa to build one of the world's first large-scale solar-powered desalination plants near Al Khafji City. Inaugurated in November 2018, the plant can treat 60,000 m³ of seawater per day.
- The Research Products Development Company was established in 2015. Touted as the national centre for technology development and commercialization, this entity develops and tests prototypes and helps to prepare inventions for their commercial launch.
- Projects are in the pipeline for smart urban centres which incorporate a host of novel technologies. One notable example is the new Saudi city of Neom, a futuristic city to be located near the borders of Egypt, Israel and Jordan that is one of the more prominent projects within Saudi Arabia's Vision 2030.
- Neom is expected to serve as a hub for nine focal sectors, including technological and digital sciences, food production, biotechnology and advanced manufacturing. There are plans for autonomous transportation systems and electric vehicles, seaports and manufacturing plants that will make use of 3D printing and robotics. Robotics and AI are to be integrated in all aspects of daily life.

- In January 2021, the kingdom unveiled plans for The Line, a 170-km long belt connecting smart cities without the need for cars or roads. Residents will be able to satisfy all of their needs within walking distance and will have access to nature. Communities will be hyper-connected through AI and powered by 100% clean energy.
- The electric vehicles industry is among those being funded by the Public Investment Fund. In 2018, the US-based company Lucid Motors raised more than US\$ 1 billion from this fund to support product development. In January 2021, talks were underway to establish a factory for electric vehicles near Jeddah.



E. HIGHER EDUCATION

With one of the fastest-growing higher education systems in the Middle East, Saudi Arabia offers a number of world-class institutions. Seven Saudi universities are ranked in the QS World University Rankings 2021, and the nation claims 21 of the top 100 universities in the Arab region, in the QS Arab Region University Rankings 2021. Saudi Arabia has also been featured as having the 36th best higher education system in the world, in the first edition of the QS Higher Education System Strength Rankings.

Top ranked Saudi Universities:

1. King Abdulaziz University (KAU) is first in the 2021 Arab rankings and places joint 143rd in the world rankings. Located in the city of Jeddah. As of 2017, King Abdulaziz University features in the top 150 of the QS World University Rankings by Subject for mechanical engineering, agriculture & forestry and pharmacy.
2. King Fahd University of Petroleum & Minerals is located in the city of Dhahran, and has a current enrolment of more than 7,000 students. In the QS World University Rankings by Subject 2020, it is ranked among the world's top 25 universities for mineral and mining engineering, as well as the top 100 for chemical, electrical and mechanical engineering.

3. King Saud University comes sixth in the 2021 edition of the QS Arab Region University Rankings, and joint 287th in the latest world rankings. It has more of a focus on the life sciences alongside engineering. In the QS World University Rankings by Subject 2017, King Saud University is ranked among the world's top 150 for mechanical engineering, agriculture and pharmacy.

Other universities in Saudi Arabia which feature in the top 50 of the QS Arab Region University Rankings 2018 are:

4. Umm Al-qura University
5. King Khalid University
6. King Faisal University
7. Alfaisal University
8. Imam Abdulrahman Bin Faisal University
9. Prince Mohammad bin Fahd University

11 more Saudi universities are ranked in the top 100.

Enrollement in Higher Education

Evolution of the number of students and instructors (1990–2017)

Year	Number of Students		
	Male	Female	Total
1990–1991	132,827	71,934	204,761
1995–1996	128,873	108,359	237,232
2000–2001	195,052	237,296	432,348
2005–2006	268,080	368,365	636,445
2010–2011	497,705	523,583	1,021,288
2015–2016	829,609	792,832	1,622,441
2016–2017	871,794	809,119	1,680, 913

Source: Saudi Ministry of Education (MOE, 2019).

In terms of graduating programs, the higher concentration of Iran's tertiary graduates are in the field of Engineering (28.2%), Business, admin & law (26.6%), Arts and Humanities (15.4%). The smaller concentration is observed in the field of Health (7.4%), ICTs (6.9), Social Sciences (6.6%), Natural Sciences & maths (6.2%) and Agriculture (2.7%).

(Source: UNESCO Science Report 2021)

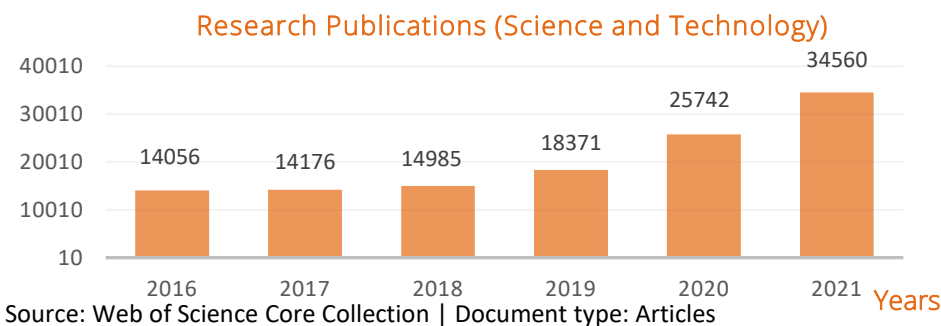
Percentage of graduates from Science, Technology, Engineering and Mathematics programmes in tertiary education, both sexes (%)

2005	2007	2009	2010	2012	2015	2017	2018	2019	2020
18.3	24.55	24.7	35.8	29.3	24.0	21.9	21.1	22.3	23.4

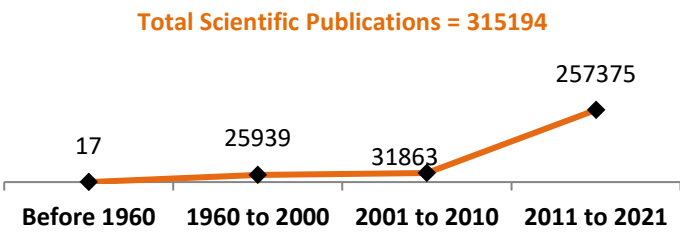




F. RESEARCH PUBLICATIONS



❖ Saudi Arabia has shown a marked increase in research publications in recent years. According to UNESCO analysis the number has increased by 200% between 2011 and 2019 and grew at an average annual rate of 14.37%. According to COMSTECH analysis of publications on web of science, the number of scientific research papers in Impact factor journals in 2021 was over 34000. The country was being ranked third amongst the OIC member states and top amongst the Arab countries in terms of number of publications.



- ❖ In order to elucidate the research scholarly output of Kingdom of Saudi Arabia (KSA), on 22nd July 2022, the data was retrieved from Scopus. In total KSA has published 315194 documents. Almost 92% documents are published in the 21st century. In fact from 2011 to Dec 2021, 81.65 % (or 257375) documents are published. They majorly comprised of research articles (n= 251927), conference papers (n= 34216), reviews (n= 14857) and book chapters (n= 4989). Since 248192 documents are in the last decade (from 2012-2021), therefore some relevant bibliometric data was collected. For example, 248192 documents received 4137329 citations or 16.7 citations per publications (CPP). Another classical indicator is 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 FWCI for KSA was found to be 1.5, which means, that the articles received 50 % higher citations as compared with global average. The per year data is presented in the table.

S#	Title	Overall	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	SO	248192	12495	15355	18104	20114	21413	22074	23908	28147	37666	48916
2	Citations	4137329	324631	382924	469634	544374	534415	498887	449908	371114	365914	195528
3	FWCI	1.5	1.3	1.2	1.37	1.45	1.51	1.53	1.53	1.47	1.55	1.66
4	CPP	16.7	26	24.9	25.9	27.1	25	22.6	18.8	13.2	9.7	4

- ❖ It is noteworthy that Scopus provides break up details (in different subjects) of all publications. Twenty-seven major subjects are covered by Scopus. For each subject details about total number of publications (or scholarly output/SO), citations, number of authors, CPP and FWCI are provided. The highest documents are published in Engineering (n= 52352), followed by Medicine (n= 47140), and Computer Science (n= 38041). However, the citations were noted for Chemistry (n= 902901), Engineering (n= 832912) and Materials Science (n= 819868). While the highest CPP and FWCI was obtained for Multidisciplinary Area (n=27.7) and Chemical Engineering (n=1.77), respectively.

S#	Subject Area	SO	Citations	CPP	FWCI
1	Engineering	52352	832912	15.9	1.69
2	Medicine	47140	701171	14.9	1.39
3	Computer Science	38041	443657	11.7	1.52
4	Materials Science	37949	819868	21.6	1.7
5	Chemistry	37174	902901	24.3	1.59
6	Physics and Astronomy	35090	649601	18.5	1.72
7	Biochemistry, Genetics and Molecular Biology	29298	678946	23.2	1.47
8	Mathematics	27769	296127	10.7	1.67
9	Chemical Engineering	19963	536185	26.9	1.77
10	Agricultural and Biological Sciences	16964	333912	19.7	1.62
11	Environmental Science	16708	349095	20.9	1.66
12	Energy	15627	310448	19.9	1.68
13	Pharmacology, Toxicology and Pharmaceutics	14465	195993	13.5	1.18
14	Social Sciences	10469	86013	8.2	1.35
15	Earth and Planetary Sciences	10398	130056	12.5	1.33
16	Immunology and Microbiology	6797	112002	16.5	1.14
17	Multidisciplinary	6782	188050	27.7	1.34
18	Business, Management and Accounting	5232	54848	10.5	1.31
19	Dentistry	4740	37516	7.9	0.93
20	Decision Sciences	4310	40095	9.3	1.42
21	Economics, Econometrics and Finance	3268	38720	11.8	1.64
22	Neuroscience	3128	60815	19.4	1.35
23	Arts and Humanities	2695	16944	6.3	1.48
24	Nursing	2531	28551	11.3	1.42
25	Health Professions	2459	25839	10.5	1.39
26	Psychology	1591	23367	14.7	1.61
27	Veterinary	1550	12581	8.1	1.42

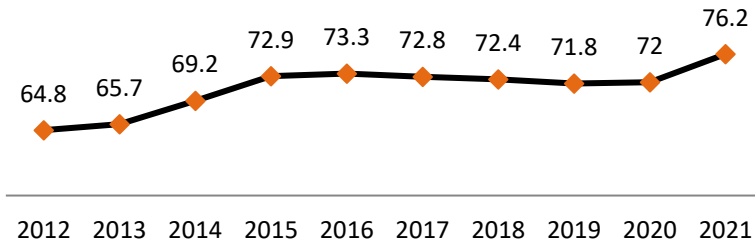
- ❖ In order to describe the quality of publications, Scopus has ranked all journals in seven different quartiles or categories i.e. from Q1 to Q7. For example Q1 and Q7 groups include the top 1% and 75 to 100% journals. Out of 248192 publications, 217742 can be divided in all seven categories. In other words 30450 publication sources do not have citescore data. The highest documents are published in Q5 group (60694/27.8%) and Q4 (53226/24.5%). We presented the per details in all 7 quartile groups.

S#	Title	Overall	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	Pub in top 1% Sources (Q1)	5306	226	268	433	527	624	595	520	531	570	1012
2	Pub in top 1% (Percent)	2.4	2.3	2.2	2.9	3	3.4	3.1	2.5	2.2	1.7	2.2
3	Pub in top 5% Sources (Q2)	23857	1090	1325	2030	2338	2385	2327	2347	2499	3251	4265
4	Pub in top 5% (Percent)	11	10.9	10.9	13.4	13.4	13	12.3	11.4	10.1	9.5	9.3
5	Pub in top 10% Sources (Q3)	48826	1929	2439	3411	4222	4470	4476	4838	5335	7465	10241
6	Pub in top 10% (Percent)	22.4	19.2	20	22.5	24.2	24.3	23.6	23.4	21.7	21.8	22.2
7	Pub in top 25% Sources (Q4)	102052	3927	4811	6290	7916	8562	8836	9450	11241	16428	24591
8	Pub in top 25% (Percent)	46.9	39.2	39.4	41.4	45.4	46.6	46.6	45.7	45.6	48	53.4
9	Pub in top 50% Sources (Q5)	162746	6550	8263	10565	12542	13456	14089	15299	18200	26237	37545
10	Pub in top 50% (Percent)	74.7	65.3	67.7	69.6	72	73.2	74.3	74	73.9	76.6	81.6
11	Pub in top 75% Sources (Q6)	201487	8942	10895	13706	15973	16977	17597	19012	22549	31974	43862
12	Pub in top 75% (Percent)	92.5	89.2	89.3	90.2	91.7	92.4	92.8	92	91.5	93.4	95.3
13	Pub in top 100% Sources (Q7)	217742	10028	12198	15190	17420	18377	18969	20661	24642	34230	46027
14	Pub in top 100% (Percent)	100	100	100	100	100	100	100	100	100	100	100

- ❖ The list of top ten most productive universities is provided in the table. For each university the number of publications, citations, number of authors involved in research, CPP and FWCI is presented. Based on the number publication, King Saud University can be ranked as #1 university with 52524 publications. However, King Abdulaziz University obtained the highest citations (n=1268711). While, the highest FWCI was recorded for King Abdullah University of Science and Technology (n-2.02).

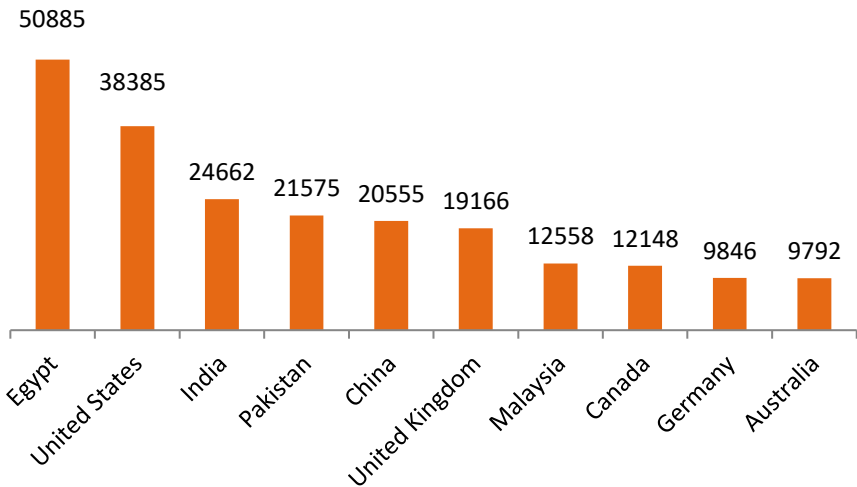
S#	Institution	SO	Citations	CPP	FWCI
1	King Saud University	52524	884964	16.8	1.46
2	King Abdulaziz University	47648	1268711	26.6	1.96
3	King Abdullah University of Science and Technology	20927	586061	28	2.02
4	King Fahd University of Petroleum and Minerals	15847	284849	18	1.55
5	King Khalid University	9943	87614	8.8	1.27
6	Taif University	9117	73787	8.1	1.35
7	Imam Abdulrahman Bin Faisal University	8414	88759	10.5	1.33
8	Prince Sattam Bin Abdulaziz University	7844	69937	8.9	1.47
9	Taibah University	7327	82664	11.3	1.23
10	Umm Al-Qura University	7254	72360	10	1.18

International Collaboration (%)



- ❖ On average 72.1% documents are published in international collaborations. As shown in the figure, the rate of collaboration increased from 64.8% (in 2012) to 76.2% (in 2021). KSA published the highest number of documents with Egypt (n=50885), followed by USA (n=38385) and India (n=24662).

The Top Ten Collaborating Countries in KSA





G. INTERNATIONAL AGREEMENTS IN S&T

- An MoU was signed between KACST and the Beijing University of Chemical Technology in Riyadh, with a view to cooperating in scientific and technical research, in selected areas of common interest.
- A protocol was signed between KACST and The Scientific and Technological Research Council of Turkey “TÜBİTAK”, with a view to cooperating in areas of natural sciences, industrial research, development and innovation, engineering, technology, medical and health sciences, agricultural sciences as well as social and human sciences-related research.
- The protocol between KACST and The National Academy of Sciences of Belarus, was signed in in 2016 in Minsk, to cooperate in order to widely implement the outcomes of joint scientific activities.
- The agreement on science and technology cooperation between the Government of the Kingdom and the Government of the Republic of Belarus, signed in Minsk, with a view to cooperating in areas of energy, agricultural and production technologies,

medical and pharmaceutical technologies, nanotechnology, biotechnology, information and communication technologies and modern materials.

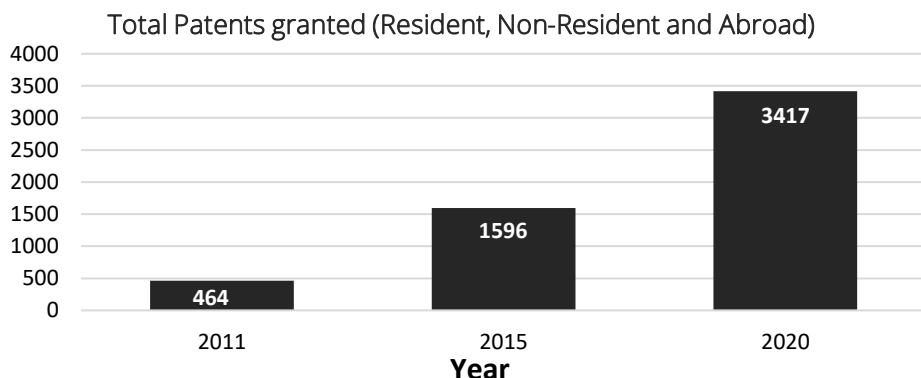
- The agreement between KACST and the Saudi Huawei Investment Technology Co., Ltd, signed on 21/1/2016, in order to establish future communication centers for LET and 5G technologies.
- The agreement between the Government of the Kingdom, represented by KACST, and the Government of China, represented by the Ministry of Science and Technology, signed in Riyadh.
- The MoU between KACST and the China Satellite Navigation Bureau, signed in Riyadh, in order to cooperate in the fields of the BeiDou Navigation Satellite System.
- The memorandum of understanding between the Government of the Kingdom and the Government of the republic of Tajikistan, signed in Riyadh, dated 23/3/1437H, in order to enhance, expand and strengthen the exchange and cooperation in science and technology.

Source: King Abdulaziz City for Science and Technology (KACST), Vision 2030: Annual Report 2016



INNOVATION

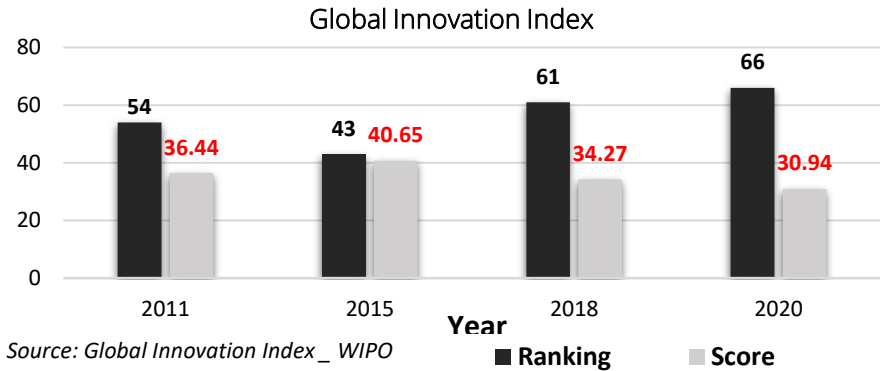
H. INNOVATION, ENTREPRENEURSHIP & TECHNOLOGY PARKS



Source: WIPO: https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?cod

Consistent with the emphasis of the government on indigeneous development, there is a steady rise in the number of patents obtained by Saudi Arabia as shown above. The number of all patents, resident, non-resident and from abroad have more than doubled between 2015 and 2020 to almost 3500. Efforts to improve the business environment have paid off; the World Bank identified Saudi Arabia as the most improved country in its Doing Business 2020 report. In October 2019, Riyadh Bank became the country's first bank to establish a venture capital fund focused on Fintech. Through the Digital Partnership Programme, the bank will invest SAR 100 million (ca US\$ 26.7 million) in building partnerships between entrepreneurs and tech companies and

supporting tech start-ups in fintech (FF, 2019). Saudi Arabia’s ranking with regards to the GII is currently 5th in the OIC with a score of **30.94** while it has an **international ranking of 66**. The GII score of KSA has remained relatively unchanged over the past 20 years.



• **Technoparks and Incubation Centres**

Technology and Innovation Plan in the kingdom of Saudi Arabia is funded and managed by KACST, King Abdul Aziz City for Science and technology. In 2007, the KACST launched the Badir Programme for Technology Incubators and Accelerators. Over 2007–2017, the programme served 200 start-ups and, according to an external impact assessment, contributed SAR 2.1 billion (ca US\$ 560 million) to the economy.

- Two other key science and technology parks are as follows:
- 1. The Riyadh Techno Valley (RTV)** The Kingdom of Saudi Arabia has adopted a long term economic strategy that shifts its focus to develop a knowledge-based economy. King Saud University (KSU) is seeking to play a full part in this strategy through the development of a substantial science and technology park, “Riyadh Techno Valley - King Saud University (RTV-KSU)”, on its Riyadh campus. 3 main areas proposed for research are Chemicals Technologies and Materials, Biological, Agricultural, and Environmental technologies and Information and Communications Technologies.

2. KAUST Research and Technology Park. Located 80 kilometres north of Jeddah on the Red Sea, a few minutes from King Abdullah Economic City, the park currently covers roughly 2.7 million square meters of space near the heart of King Abdul Aziz University of Science and Technology, KAUST's campus. The park fosters links between KAUST and industry - as well as among the network of tenants, startups and service providers located there. Key facilities include incubators for technology startups, dedicated research facilities and services, outdoor testing facilities & field stations, access to world-class procurement and supply chain management services and to KAUST's state-of-the-art Core Labs, a chemical warehouse, hazardous materials storage & disposal and business and marketing consultation services. Main technology sectors covered are Biotechnology, Chemistry and Chemicals, Energy and Environment.



List of Science Parks:

1. Prince Abdullah Bin Abdulaziz Science Park (PASP), Dhahran
2. Jeddah BioCity Science (JBC), Jeddah
3. King Abdulaziz City for Science and Technology (KACST), Riyadh
4. King Abdulaziz and His Companions Foundation for Giftedness and Creativity, Riyadh
5. Saudi Organization for Industrial Estates and Technology Zones, Riyadh
6. Prince Mohammad Bin Fahd Bin Abdulaziz University, Al-Khobar
7. KAUST Research and Technology Park, Thuwal
8. Research Products Development
9. Makkah Techno Valley, Makkah
10. Dhahran Techno Valley Company, Dhahran
11. Knowledge parks, King Abdulaziz University, Jeddah.
12. Riyadh Techno Valley - King Saud University, Riyadh





I. COMBATING THE COVID-19 PANDEMIC

The KSA was able to successfully contain the outbreak and prevent a second COVID-19 wave by effectively curbing the rising number of infections in real time using technological means by directly integrating digital tools in mitigation measures and containment methods.

➤ **Vaccine Development and administration:**

- Saudi Vaccine and Biomanufacturing Centre is a research facility being constructed at the KAUST Research and Technology Park in Saudi Arabia for the development of vaccines and biopharmaceutical products. It is the first-of-its-kind research and development centre being developed in the Middle East. The facility is being jointly developed by Research Products Development Company (RPDC), a subsidiary of Saudi Technology Development and Investment Company (TAQNIA), King Abdullah University of Science and Technology (KAUST), and SaudiVax, under a development and operation agreement signed in March 2018.

Source: <https://www.pharmaceutical-technology.com/projects/saudi-vaccine-biomanufacturing-centre/>

- As of November 2021, 50 million doses of the vaccine have been administered and 23.1million people, representing 66.4% of the population have been fully vaccinated.

- Saudi Arabia's Imam Abdul Rahman bin Faisal University has started the first phase of clinical trials supported by the Ministry of Education to produce a COVID-19 vaccine, after it finished the laboratory experiments and proved their effectiveness. The university has signed a contract with one of the largest specialised companies in the UK and Sweden, and worked with leading companies in the production of vaccines and medicines such as AstraZeneca, with the aim of creating appropriate quantities for use in the first phase of clinical trials.

It also signed a contract with a centre specialised in conducting clinical trials, to work with the research team in the processes of preparation and supervision of the protocol of the clinical stage, and to provide volunteers to participate in clinical studies, and to conduct all tests to assess the immunity provided by the vaccine.

Source: <https://gulfnews.com/world/gulf/saudi/saudi-arabia-starts-clinical-trials-to-produce-covid-19-vaccine-1.77054262>

- SaudiVax, a biopharmaceutical manufacturing company located in the KAUST Research & Technology Park, recently collaborated with experts at the University of Pittsburgh and Merck France to develop and manufacture a coronavirus preventative drug.

In February of 2020, SaudiVax paired with the Center for Antibody Therapeutics within the Division of Infectious Diseases at the University of Pittsburgh to research and license the drug for the Middle East region.

Source: <https://www.kaust.edu.sa/en/news/kaust-partner-sauidivax-advances-treatment-for-covid-19>

- Saudi Arabia is reported to have invested a total of \$713 million to support the global fight against COVID-19, including donations to Gavi, the COVAX Facility and CEPI and has also delivered bilateral assistance to a number of countries, including Yemen, Syria and Sudan, and aid to others via third-country delivery points.

Source: <https://www.arabnews.com/node/1886111/saudi-arabia>

➤ **Mobile applications and digital solutions to support the country's efforts to curb the spread of the novel coronavirus.**

- The Saudi authorities utilized different technological tools to aid in managing and combating the COVID-19 pandemic. In the case of Al Madinah Al Mounawarah, after the implementation of several technologies, the most important being Tawakkalna, the number of active daily cases decreased by 61%.

Source: <https://www.cio.com/article/193222/saudi-arabias-technology-investments-pay-off-in-coronavirus-battle.html>

- The Central Appointment System (Mawid) is an example of a successful digital service. The mobile app, which was launched by the Saudi Ministry of Health last year, is being used to streamline individual applications for COVID-19 tests and has become central to the Kingdom's coronavirus response.
- Health electronic surveillance network: The health electronic surveillance network provided a robust online solution in response to the pandemic. The system was an integrated public health information system that created an extensive and easily accessible database on one platform to overcome the challenges of linking all health care sectors in the country. This network contributed to disease detection, response, prevention, control and community health monitoring, and enabled decision-makers to implement necessary measures based on timely and high-quality data.
- Mass screening programmes

Saudi Arabia launched a mass screening programme for early detection and immediate control of the spread of COVID-19. The first stage focused on screening individuals in highly populated districts through field tests; this was implemented in 807 locations. The second stage was facilitated through the Mawid app self-assessment tool, which classifies users as low or high risk. The low-risk group was the targeted population and was screened in designated primary care centres. The third stage was screening suspected COVID-19 cases with no symptoms at

specialized drive-through testing centres, so-called Takkad centres. The implementation of Tetamman clinics (specialized fever clinics) was another initiative devoted to screening people suspected of having COVID-19 without prior appointments.

➤ **Increasing Localized Medical Manufacturing Amid COVID-19 Crisis:**

Concerns regarding a worldwide shortage of sanitizers, face masks, and ventilators, which are essential in the fight against COVID-19, has pushed Saudi Arabia to increase local production for these items. The recent statistics from the Saudi Food & Drug Authority showed that local factories have been producing 3.7 million face masks per week. Presently, more than 49 factories in Saudi Arabia produce more than 1.5 million liters of sanitizer. The Kingdom has also stopped exporting all medical devices when the pandemic broke out, ensuring its hospitals are equipped to handle a large number of patients



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