

Middle East Science Report

2017



Foreword

My favorite story about the ancient Arab **House of Wisdom** (*Bayt Al Hikma*) which was built during the lifetime of the **Caliph Haroun Al Rasheed** and located in the world's most famous circle city, Baghdad – mankind's first millennium capital of human culture and scientific endeavor, was how the Caliph himself use to reward authors and translators from every corner of the world with the weight of their books in gold. Mind you, these were usually very heavy leather bounded books.

The establishment of the House of Wisdom as one of history's first centers of scientific excellence helped usher in the Islamic Golden Age. This House of Wisdom for all the world would go on to achieve continued global recognition under Haroun's son, **Capilh al-Ma'mun**, who is credited with its formal institution.

From the 8th century to the 15th century AD, starting just a little over 150 years from the death of the Prophet Mohammad Peace Be Upon Him (PBUH), Islamic, Arab and Middle Eastern scientists and polymaths (including both Persian and Turkish scholars) propelled to new heights the fields of astronomy, algebra and mathematics, cartography and geography, alchemy and chemistry, anatomy and medicine, zoology and ethology (animal behavior).

For close to 800 years, scientific legends including **Hunayn ibn Ishaq** (*Johannitius*), **Al Razzi** (*Rhazeus*), **Al Zahrawi** (*Abulcasis*), **Ibn Sina** (*Avicenna*), **Ibn Zuhr** (*Avenzoar*), and **Ibn Rushd** (*Averroes*) to name just a few, would work openly as part of a scientific community, educating both Middle Eastern and Western nations in their chosen field of specialization. It was a cross cultural exchange of culture ideals and scientific enlightenment. Indeed, Ibn Sina's groundbreaking book, *Al-Qanoon Fil Tibb* ("The Canon of Avicenna"), published in the late 10th century AD, would go on to be the standard textbook of medicine for the next 700 years. Another important book, *Al Muqaddimah* ("The Prolegomena") by 'Abd al-Rahman Ibn Muhammad Ibn **Khaldun al-Hadrami of Tunis**, commonly known as **Ibn Khaldun**, laid down the foundations of different fields of knowledge, in particular the science of civilization (*Al-'Umran*) with significant contributions to economics including production, supply and demand, cost and consumption, and utility, providing notable inspiration to the so-called "Father of Economics," **Adam Smith** whose great works were published some three hundred and seventy years after Ibn Khaldun's passing.

Today, the state of Middle Eastern scientific thought has reached its nadir. This 100 page plus report over 10 sections was produced via a combined 1,000 plus man-hours. It is a humble jeu d'esprit to help return our region on a path towards zenith. We have profiled 57 institutions that have funded, supported and published close to 1,500 significant scientific papers and registered over 30,000 unique patents. However, the region is still lagging both international best practices and closer regional best practices. The Middle East boasts only a mere



two Nobel Science Prizes. My alma mater, **Columbia University**, has 61 (and a total of 82 if we include Nobel prizes in Peace, Literature and Economics).

On a more positive note, we managed to interview 20 of the brightest minds from across the Middle East and North Africa (MENA) region and it is our personal belief that brighter days for science in the Middle East are surely ahead, for these accomplished minds and their collective wisdom, is sure to inspire a new generation of MENA scientists, polymaths, scholars and technology entrepreneurs. This is acutely represented by the Global Top 10 Ranking in Science and Mathematics education achieved by the United Arab Emirates in the most recent report by the World Economic Forum (WEF). Another important recent development are the multibillion dollar education endowments of many Saudi Universities, including the world's sixth richest, **King Abdulla University of Science and Technology** (\$20 billion), **King Saud University** (\$2.7 billion) and **King Abdul Aziz University** (\$1 billion).

Unfortunately, these are the only three institutions in the region that publically announce the size of their endowments. Indeed, more transparency is needed across the region, not just in terms of the size of economic investment into science, research and education, but more importantly, more transparency is needed on the outcome of these large investments. The Caliph Haroun Al Rasheed and his sons had public libraries full of books; what do today's a contemporary patron of scientific thought have to show? Postmodern architectural buildings and fat faculty salaries are a great start, but we hope to see increased focus on the actual science itself, for the simple sake of scientific advancement, for the sake of wisdom.

Perhaps one of the greatest lasting legacies of our Middle Eastern scientific forefathers is that there are 165 stars and various star systems named in Arabic (see Appendix at the end of the report for a full and detailed list). From the expansive *as-Sahābat uş-Şaghīrah* or "small cloud" also known today as the **Andromeda Galaxy**, which was first catalogued by **Al-Sufi** in his ***Book of Fixed Stars***, to the giant *Bint ul-Jawzā'*, better known today as **Betelgeuse**, the brightest star in our nights sky. Young Middle Eastern minds need but only look up to the night's sky to find continued inspiration from these tremendous contributions of our region to science.

Sincerely,

Dr. Mussaad M. Al-Razouki (*Arrizacamus*)

Principal Author – Middle East Science Report
Chief Business Development Officer
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This report is dedicated to.....

The Middle East Science Report is dedicated in loving memory to Prof. Ahmed Zewail, the Middle East and North Africa (MENA) region's first Nobel Science Prize winner (Chemistry in 1999). And Prof. Aziz Sancar of Turkey, Nobel prize winner for Chemistry in 2015.

Ahmed Hassan Zewail (Zewaileus) Born: February 26, 1946 Died: August 2, 2016) was an Egyptian-American scientist, known as the "father of femtochemistry." Ahmed Zewail was born in Damanhur, Egypt, and grew up in Alexandria. His father worked as a bicycle and motorbike fitter before becoming a government official. After studying at the University in Alexandria, Zewail moved to the US to undertake his PhD at the University of Pennsylvania in Philadelphia. After some time spent working at the University of California, Berkeley, Zewail transferred to the California Institute of Technology in Pasadena in 1976, where he continues to work in his chosen scientific field. He was awarded the 1999 Nobel Prize in Chemistry for his work on femtochemistry ("for his studies of the transition states of chemical reactions using femtosecond spectroscopy" **Field:** chemical kinetics, physical chemistry) and became the first ever Arab to win a Nobel Prize in a scientific field.



Aziz Sancar (Binsancar) was born on 8th September 1946 in Savur in southeast Turkey to a lower middle class family. His parents had no formal education but considered education important for their children. Sancar studied at Istanbul University and at the University of Texas, Dallas, where he received his doctorate in 1977. He is currently a professor at the University Of North Carolina School Of Medicine, Chapel Hill. Aziz Sancar is married to Gwen Boles Sancar who also is a professor in biochemistry and biophysics. He was awarded the 2015 Nobel Prize in Chemistry for his work on Mechanisms of DNA Repair by Photolyase and Excision Nuclease.



Acknowledgement

We would like to thank the entire leadership team at Kuwait Life Sciences Company for their unvarnished support and we would also like to especially thank the guest contributors from across the world, representing a total of ten different metropolitan areas, who contributed their thoughts as well as their valuable time in reviewing the final product. Their detailed profiles have been included at the end of the report but we find it important to mention them by name here at the start. To honor these contributors, we have provided them with Latinized epithets in the style of the European Renaissance's appreciation for Middle Eastern scholarship.

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What's in a Name?

A short comment on the name of the report. Similar to the popular temptation to confine all the works of the 8th to 15th century AD to only Arab or Islamic scholars, we have decided to name the report the “Middle East Science Report” to captivate the collective works of both contemporary Persian and Turkish schools of scholarship. In a similar fashion to the Caliph Haroun Al Rasheed, we accepted contributions of knowledge and opinion from both Western born or Western based scholars with a strong affinity for the Middle East and North Africa region.

For the purposes of this report and primarily due to the limited availability of both primary and secondary data sources, the list of MENA countries includes: Algeria, Bahrain, Egypt, Iran, Iraq, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, Turkey, the United Arab Emirates and Yemen. In many graphs Israel, the UK and USA have been also presented as regional and international comparisons and benchmarks.

We also use the term Middle East and MENA interchangeably but expect the coverage to be synonymous. In future editions, we hope to increase the scope of study to include scholarly works from, the Indian Subcontinent, South East Asia and Sub-Saharan Africa to produce a more expansive Muslim Science Report.

This is only the beginning.



Contents

Foreword.....	2
Introduction	9
Section I: Socio-Economic Status	11
Section II: The Importance of Higher Education in Science	14
<i>University Science Programs</i>	14
<i>Tertiary Education Graduates</i>	15
<i>Graduates from International Standard Classification of Education (ISCED) 8 Programmes in Tertiary Education</i>	16
<i>Tertiary Education Enrollment Rate-Ranking</i>	17
<i>University-Industry Collaboration in R&D - Ranking</i>	18
<i>Quality of Math and Science Education - Ranking</i>	18
<i>Higher Education and Training - Ranking</i>	19
Section III: The Arab Science Spring – Science and Technology Innovation (STI) in MENA.....	20
<i>Innovation Ranking vs. Oil Production Ranking</i>	21
<i>The MENA STI Strategy</i>	22
<i>Geopolitical Events Reshaping Science</i>	23
<i>Environmental Crises Raising Expectations of Science</i>	23
<i>Public Research Budgets: A Converging, Yet contrasting Picture</i>	23
Section IV: Gross Domestic Expenditure on R&D (GERD)	25
<i>Quality of Scientific Research Institutions - Ranking</i>	26
<i>Corporate Spending on R&D - Ranking</i>	27
<i>Trends in Human Capital & Research</i>	27
<i>Trends in Business Sophistication</i>	28
<i>Trends in Knowledge and Technology Output</i>	29
<i>Trends in Creative Output</i>	30
Section V: Research Articles and Journal Publication in MENA	32
Section VI: Patents	33
Patents registered in MENA region	33
Patent Cooperation Treaty (PCT) international application	33
Comparison of ranking (Oil production Vs. PCT patents Vs. Population)	34
Section VII: Profile of Science Universities & Institutions located in MENA region.....	35
Section VIII: Companies Involved & Investing in Scientific Research and Innovation	59
Section IX: Scientific Thought Leadership in MENA	64



Section X: Conclusion – STI as a Catalyst of Change	72
About the Principal Author – Dr. Mussaad M. Al-Razouki	80
Profiles of Guest Contributors	83
References	93
Appendix	94
The World’s Richest Universities - Top 20 Universities Globally ranked by size of endowment.....	94
List of Notable Historic Middle Eastern Scholars and Polymaths	95
List of Stars and Star Systems with Arabic Names	97



Introduction

The Middle East and North Africa (MENA) region encompasses significant cultural similarities as well as highly distinct political and economic systems with a heterogeneous social fabric. Its people share a commonality of language, history and religion but their societies are at variance in terms of natural wealth, governance, currency, traditions and socio-economic systems.

It is an area of historical importance, as it is the birthplace of the world's three Abrahamic monotheistic religions. For centuries, the region was a hub of groundbreaking science. MENA has always been an area of strategic importance from the days of the earliest of empires until today, owing to its location and a wealth of subterranean natural resources, essentially in the form of oil, natural gas and phosphate. The MENA region produces over 30 million bbl or barrels of oil per day (about two thirds of which comes from the GCC and the vast majority from the MENA OPEC members – see Table of Global Oil Production in the Appendix). This represents almost 1/3 of global oil output. The region is also home to over 1/3 of the world's known gas reserves are held in this region, mostly in the peninsula of Qatar, and more than half of the world's phosphate reserves are held in Morocco alone, which is of particular importance to our planet's plant based organisms.

In light of recent international economic uncertainty and growing populism, Middle Eastern countries will have no choice but to stimulate Science, Technology and Innovation (STI) together with the education sector to mitigate global economic risk factors including population health, food, clean (fresh) water and energy security. MENA countries can also learn from the remarkable socioeconomic progress of countries such as Japan, Brazil, China, Korea and Malaysia, due in part to the development of STI related sectors

MENA governments that are dependent on both oil exports scientific/technology imports are continuously calling for the development of Knowledge Economies. But what does that actually mean? More on the development of the Middle Eastern Knowledge Economy can be found in the final section of the report.

Indeed, a wide range of recent positive MENA initiatives hitch STI to socio-economic development, more often in the field of energy. Examples are the revival of the Zewail City of Science and Technology project in Egypt, Masdar in Abu Dhabi, the Kuwait Foundation for the Advancement of Sciences (KFAS) and the establishment of the Emirates Institution for Advanced Science and Technology (EIAST) to operate Earth observation satellites – each acting as their own bright star in their own respective country, many with regional aspirations.

Presently, a significant portion of the MENA region is in turmoil. Syria, Iraq, Libya and Yemen are considered by many to be failed states emblazoned by bloody civil struggles, causing untold damage to human life, physical infrastructure and perhaps most importantly, a lost generation of intellectual development. Fifteen million people have fled their homes, many to fragile or economically strapped countries such as Jordan, Lebanon, Djibouti and Tunisia, giving rise to the largest global refugee crisis since World War II. The current turmoil in Yemen has set that country's development back several decades. Blockades and repeated cycles of violence have made Gaza's unemployment rate the highest in the world and with Gross Domestic Product at only 40% of its potential ^[1]. The relatively stable oil exporters, such as Algeria, Iran and the GCC, are grappling with low oil prices alongside chronic youth unemployment and undiversified economies. On a positive note, political developments in Kuwait, Tunisia, Morocco, and Jordan indicate that citizens are increasingly engaging in policymaking ^[2].

There remains, however, much to be done in terms of the development of STI related policies and sectors which is an important first step that MENA governments must take to foster the growth of the so-called Knowledge Economy focused on novel technologies rather than hydrocarbon resources.

It is time to focus more so on the potential of people walking the ground, rather than what is treasured underneath.



Section I: Socio-Economic Status

We have profiled 18 countries in the MENA region, inhabited by approximately half a billion people (Refer: Table-1) of which around 54 million people (including a sizeable foreign labour force) live in the six GCC countries, representing around 10% of the MENA population and considered by many to be the region's growth engine, both in terms of population growth (from both natural birth rate and immigration) and in terms of economic development.

Indicator		Total population (in thousands)							CAGR
Time		2010	2011	2012	2013	2014	2015	2016	%
Country									
Algeria		36,036	36,717	37,439	38,186	38,934	39,667	40,376	1.91%
Bahrain		1,261	1,306	1,334	1,349	1,362	1,377	1,397	1.72%
Egypt		82,041	83,788	85,661	87,614	89,580	91,508	93,384	2.18%
Iran		74,253	75,184	76,157	77,152	78,144	79,109	80,043	1.26%
Iraq		30,868	31,868	32,958	34,107	35,273	36,423	37,548	3.32%
Jordan		6,518	6,760	6,994	7,215	7,416	7,595	7,748	2.92%
Kuwait		3,059	3,239	3,420	3,594	3,753	3,892	4,007	4.60%
Lebanon		4,337	4,592	4,924	5,287	5,612	5,851	5,988	5.52%
Libya		6,266	6,289	6,283	6,266	6,259	6,278	6,330	0.17%
Morocco		32,108	32,532	32,984	33,453	33,921	34,378	34,817	1.36%
Oman		2,944	3,210	3,545	3,907	4,236	4,491	4,654	7.93%
Qatar		1,766	1,905	2,016	2,101	2,172	2,235	2,291	4.44%
Saudi Arabia		28,091	28,788	29,496	30,201	30,887	31,540	32,158	2.28%
Syria		20,721	20,501	19,979	19,323	18,772	18,502	18,564	- 1.82%
Tunisia		10,639	10,759	10,881	11,006	11,130	11,254	11,375	1.12%
Turkey		72,310	73,517	74,849	76,224	77,524	78,666	79,622	1.62%
UAE		8,329	8,735	8,953	9,040	9,086	9,157	9,267	1.79%
Yemen		23,592	24,235	24,883	25,533	26,184	26,832	27,478	2.57%
MENA Total		445,140	453,925	462,756	471,558	480,245	488,755	497,047	1.86%
Israel		7,420	7,563	7,695	7,818	7,939	8,064	8,192	1.66%
UK and NI		62,717	63,165	63,574	63,956	64,331	64,716	65,111	0.63%
USA		309,876	312,390	314,799	317,136	319,449	321,774	324,119	0.75%

Table-1, Source: UNESCO Statistics



Population growth as Compounded Annual Growth Rate (CAGR) %

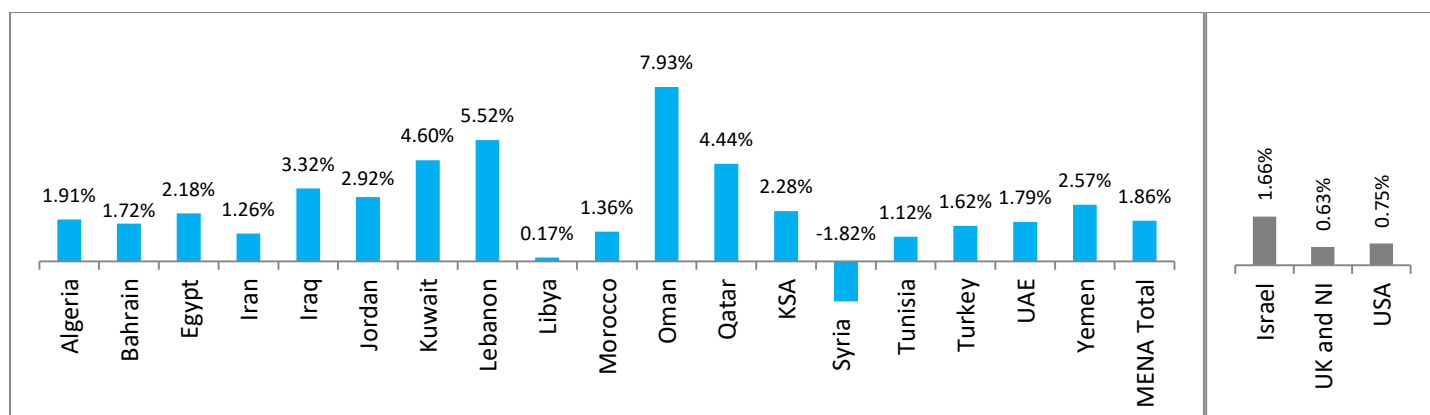


Chart-1, Source: UNESCO Statistics

The Gross Domestic Product (GDP) of MENA is calculated (Refer Table-2) at 3.5 billion USD (2015) with a Compound Annual Growth Rate (CAGR) of 2.06%, which significantly trails international best practices and regional comparisons such as the UK (3.46%), USA (3.70%) and Israel (4.79%). On a more positive note both the CAGR (2010 to 2015) and overall value of GDP for 9 out of 18 MENA countries is actually higher than Israel, UK and USA (Refer: Chart-2). It is important to note that the six (most small population) nations of the Gulf Cooperation Council contribute to over 40% of total MENA GDP.

Indicator		GDP (in million current US\$)						CAGR %
Time		2010	2011	2012	2013	2014	2015	2010 - 2015
Country								
Algeria		161,207	200,013	209,047	209,704	213,518	166,839	0.69%
Bahrain		25,713	29,044	30,756	32,898	33,851	32,221	4.62%
Egypt		218,888	236,002	276,353	286,011	301,499	330,779	8.61%
Iran		467,790	592,038	587,209	511,621	425,326	N/A	-1.89%
Iraq		138,517	185,750	218,001	232,497	223,508	168,607	4.01%
Jordan		26,425	28,840	30,937	33,594	35,827	37,517	7.26%
Kuwait		115,419	154,028	174,070	174,161	163,612	112,812	-0.46%
Lebanon		38,010	40,079	43,205	44,352	45,731	47,103	4.38%
Libya		74,773	34,699	81,905	65,504	41,143	29,153	-17.17%
Morocco		93,217	101,370	98,266	107,235	110,009	100,360	1.49%
Oman		58,641	67,938	76,341	78,183	81,797	70,255	3.68%
Qatar		125,122	169,805	190,290	201,885	210,109	166,908	5.93%
Saudi Arabia		526,811	669,507	733,956	744,336	753,831	646,002	4.16%
Syria		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tunisia		44,051	45,811	45,044	46,256	47,603	43,015	-0.47%
Turkey		731,168	774,754	788,863	823,243	798,797	718,221	-0.36%
UAE		286,049	348,526	373,430	387,192	399,451	370,293	5.30%
Yemen		30,907	31,079	32,075	35,955	N/A	N/A	3.07%
MENA		3,162,711	3,709,282	3,989,750	4,014,626	3,885,614	3,501,363	2.06%
Israel		234,322	261,764	259,614	292,408	305,675	296,075	4.79%
UK and NI		2,403,504	2,594,905	2,630,473	2,712,296	2,990,201	2,848,755	3.46%
USA		14,964,372	15,517,926	16,155,255	16,663,160	17,348,072	17,946,996	3.70%

Table-2, Source: UNESCO Statistics, N/A-Data not available

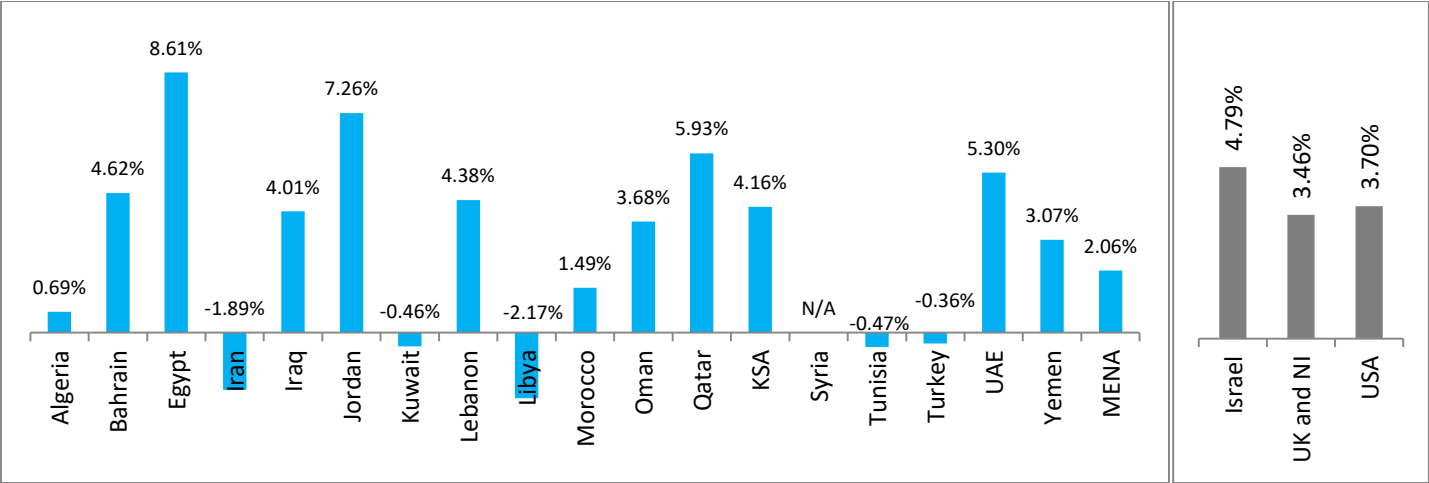


Chart-2, Source: UNESCO Statistics

Section II: The Importance of Higher Education in Science

The current link between Middle Eastern universities and industry is weak to non-existent when compared to international best practices. This weak-link is further exacerbated by populations focused on consumerism and feeble academic research requirements at many of MENA's universities and STI related institutions. The symbiotic relationship between academia and industry has a profound implication on the scientific status quo of a country - it can be a potent tool for building an institutional research capacity – in addition to forming the central pillars of a national strategy that empowers the transfer of knowledge and technology from universities to corporate organizations, which in turn can help to boost innovation and the competitiveness of both companies and the nations they are domiciled in, as well as (eventually) the entire economic system itself.

To foster a true Knowledge Economy, nations need to focus on nurturing special higher education programs that provide critical scientific skills training, improved science and technology teaching standards, which will then prepare the graduates of tomorrow for careers in scientific research and technology development. The production of employable graduates and promoting all ways of learning including distance and open learning must be a core tenant of MENA state policy.

Thankfully, both Qatar and Saudi Arabia have seen phenomenal growth in the volume of scientific publications over the past decade. Saudi Arabia now counts two universities ^[3], among the world's top 500. Many other countries in the MENA region have made grandiose plans to reduce their dependence on foreign workers by developing technical and vocational education with equal opportunities across the fathomous gender gap.

University Science Programs

University education in science has significantly grown across the MENA region; both in terms of quantity and quality, since the end of the World War II. There are ~500 universities in MENA countries, with almost half of all universities offering programs in science. We have profiled 50 of the region's top universities at the end of the report as well as seven other non-degree offering institutions focused on fostering scientific thought and technology development. According to the report's calculations, there are ~220 science universities located in MENA region, with an average of 13 universities per country (Refer Chart-3) translating to an average of one university per 2.23 million of population. Bahrain (0.36 million), Qatar (0.76 million) and Oman (0.93 million) have the best population allocation per science university. Approximately 50% of these science universities are located in three countries with Turkey (62), Iran (35) and Saudi Arabia (30) registering the most number of scientific universities. Moreover, Algeria, Egypt,

Iran, Morocco, Saudi Arabia and Turkey have a higher population per science university rate than the MENA average, with the rest of the MENA countries greatly falling below.

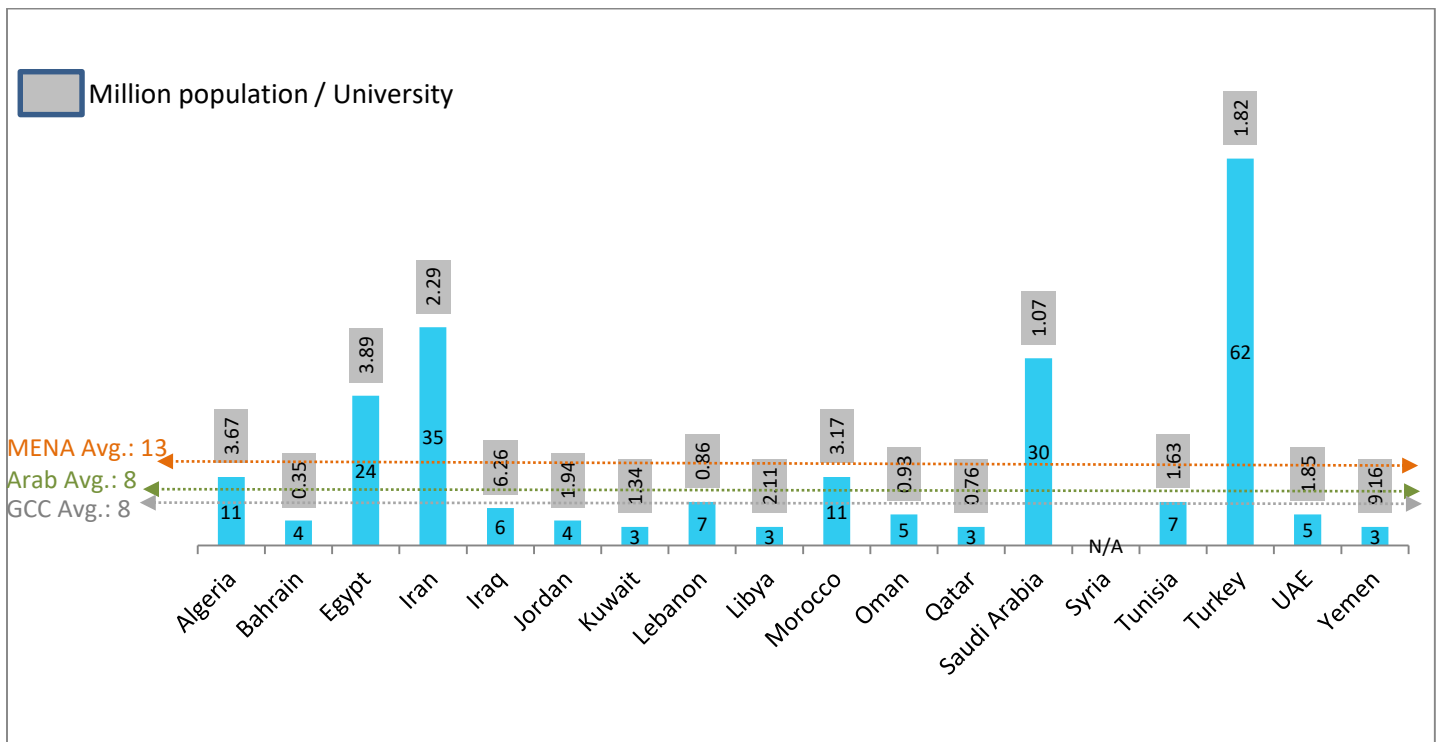


Chart-3, Source: Nature Index, QS ranking.

Tertiary Education Graduates

There are approximately three million tertiary educated (university) graduates matriculating out of the MENA region each year across all fields of study, which represents 0.6% of the total population, a population that is heavily youthful and is considered by many to be the youngest population in the world.

Young men and women in the MENA region are facing the highest youth unemployment levels in the world and express lower levels of trust in government than their parents. Since young people 15-29 years old exceed 30% of the working-age population in most MENA countries, governments urgently need to develop and implement strategies focused on fully engaging youth in the economy, society and scientific thought leadership.

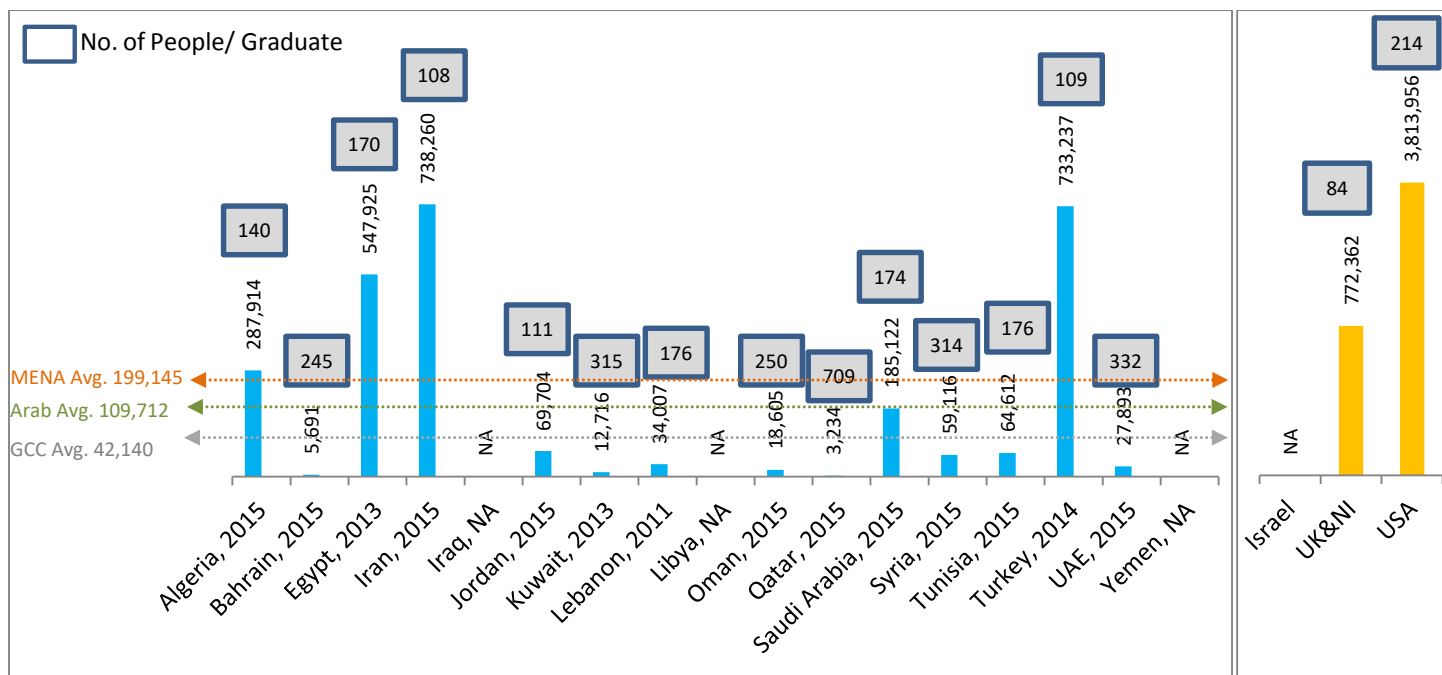


Chart-4, Source: UNESCO Statistics, NA-Data Not Available

On average, the total annual MENA tertiary graduation output is calculated as 199,145 (Refer; Chart-4) number of university graduates per country (across all fields of study). Qatar produces the smallest total number of graduates (3,234) whereas Iran produces the highest number of graduates (738,260). Furthermore, the calculated average for population per graduates for MENA with 163 peoples per graduate. This means that out of every 163 people in MENA, only one is a university graduate. Both Iran (108) and Turkey (109), although lower than the UK (84) are higher than the USA (214). Unfortunately all GCC countries (except KSA-174) produce less university graduates per capita higher than the US and UK.

Graduates from International Standard Classification of Education (ISCED) 8 Programmes in Tertiary Education

According to KLSC calculations, the MENA region produces ~22,000 ISCED graduates annually. Egypt, Iran and Turkey account for over 3/4 of these graduates. The MENA average for ISCED graduates is 1,371 per country (Refer:Chart-5) and when totalled (21,940), represents less than the total number of ISCED graduated in the UK and less than 1/3 the total number of ISCED graduates from the USA.

The ISCED classification was adopted by the UNESCO General Conference at its 36th session in November 2011. Initially developed by UNESCO in the 1970s, and first revised in 1997, the ISCED classification serves as an instrument to compile and present education statistics both nationally and internationally. The framework is occasionally updated in order to better capture new developments in education systems worldwide.

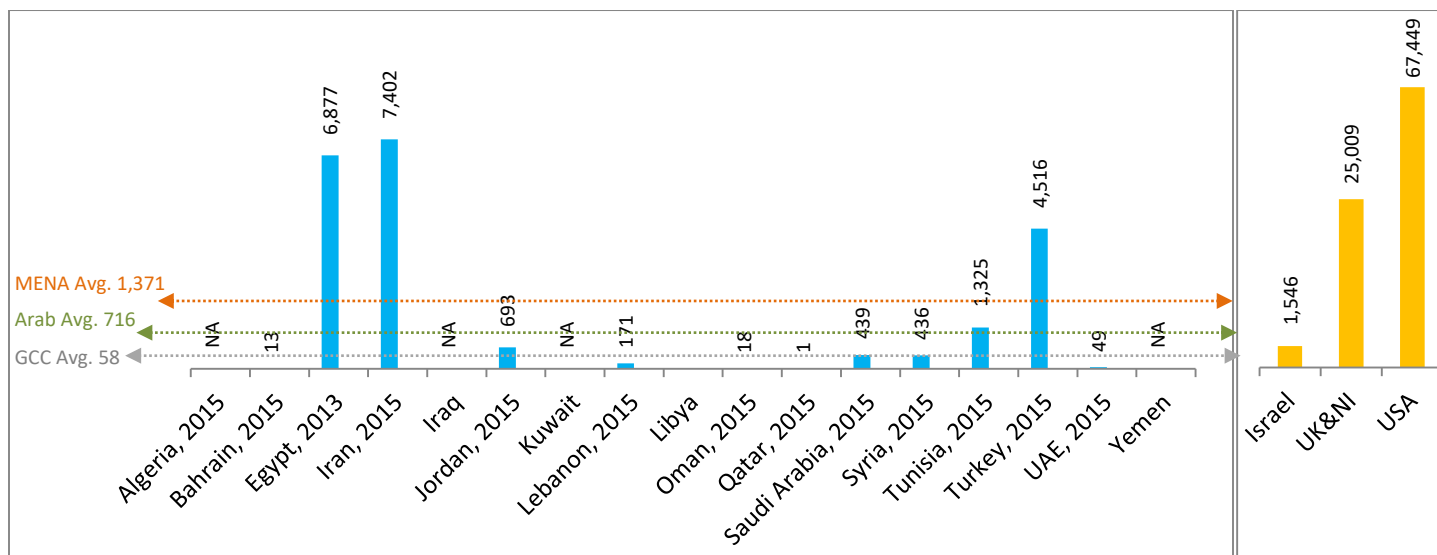


Chart-5, Source: UNESCO Statistics, NA-Data Not Available

Tertiary Education Enrollment (TEE) Rate-Ranking

When it comes to the region's global ranking vis-à-vis Tertiary Education Enrollment (TEE) data ^[4], the average ranking of MENA is 74 out of 138 (Refer; Chart-6). Turkey (17th), Iran (33rd), and Saudi Arabia (44th) are the highest ranked MENA countries in terms of the number of students enrolled in tertiary education. All MENA countries, with the exception of Turkey, rank below Israel with the vast majority (10/18) ranking in the bottom half globally and a further five ranking in the bottom third of the world. Furthermore, the Arab average is half that of Israel and the total number of GCC TEE (520) is still below all other Middle Eastern countries with the exception of Lebanon and those without any data.

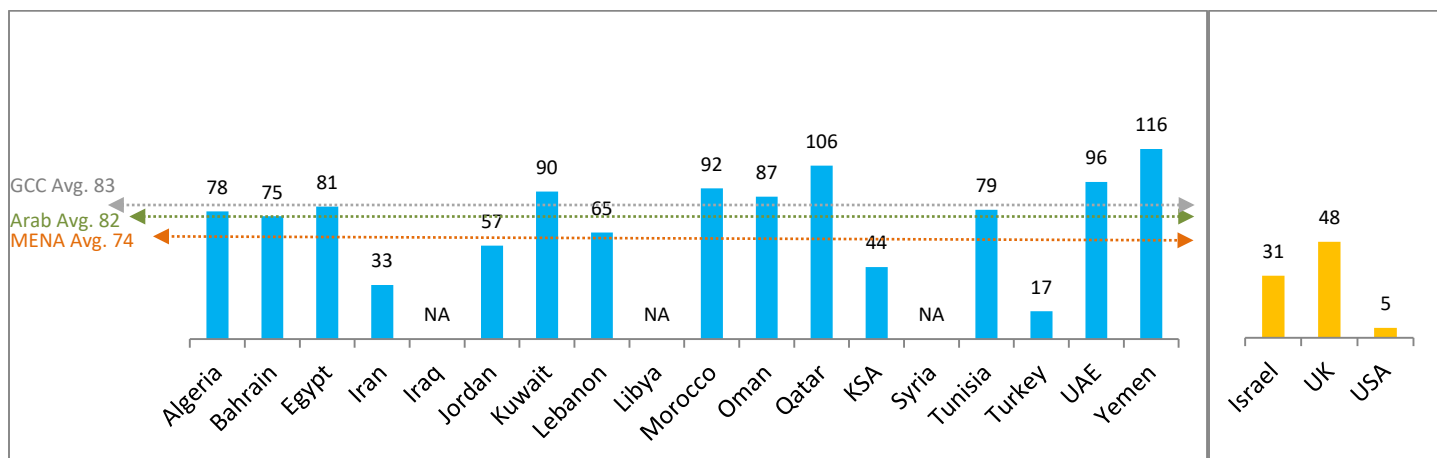


Chart-6, Source: WEF Report-2016, NA-Data Not Available

University-Industry Collaboration in R&D - Ranking

The global ranking of University-Industry Collaboration in R&D shows the average ranking of MENA to be 78 out of 138 (Refer:Chart-7.0). Qatar (10th), the UAE (25th) and Jordan (38th) are the highest ranked MENA countries. Unfortunately once again the vast majority of countries (10/18) ranked within the bottom third of the world with a further seven ranking within the bottom 15% globally.

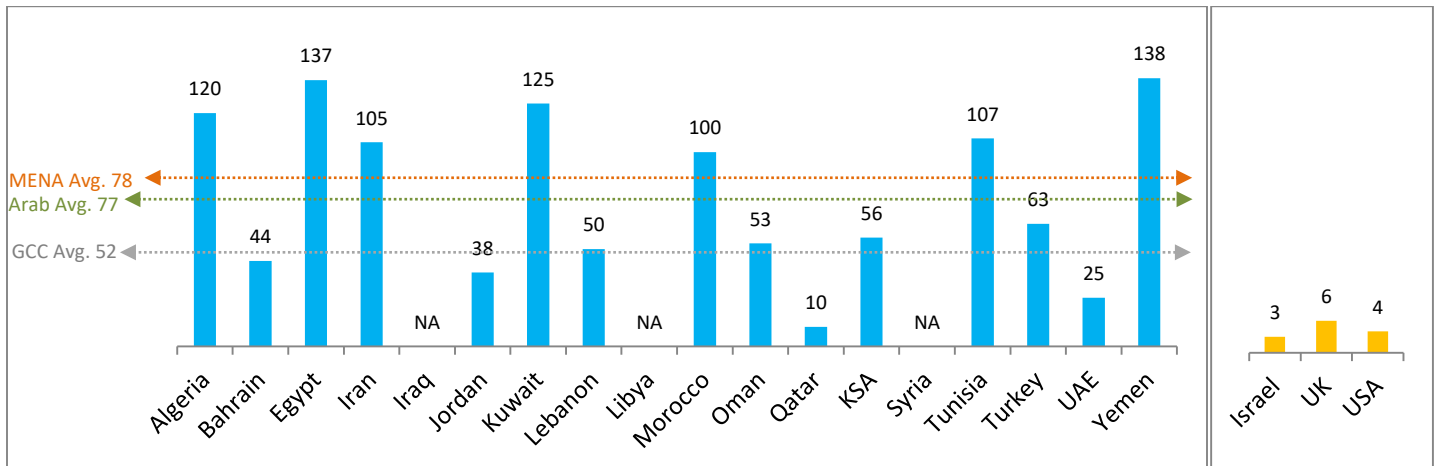


Chart-7, Source: WEF Report-2016, NA-Data Not Available

Quality of Math and Science Education - Ranking

The global ranking of Quality of Math and Science Education shows the average ranking of MENA to be 68 out of 138 (Refer:Chart-8.0). Qatar (5th), Lebanon (6th) and UAE (10th) are the highest ranked countries in MENA as well as world. With the exception of Qatar, Lebanon the UAE and Bahrain, all MENA countries rank lower than Israel, UK and USA with the vast majority (9/18) ranking in the bottom half globally and a further five ranking in the bottom third of the world.

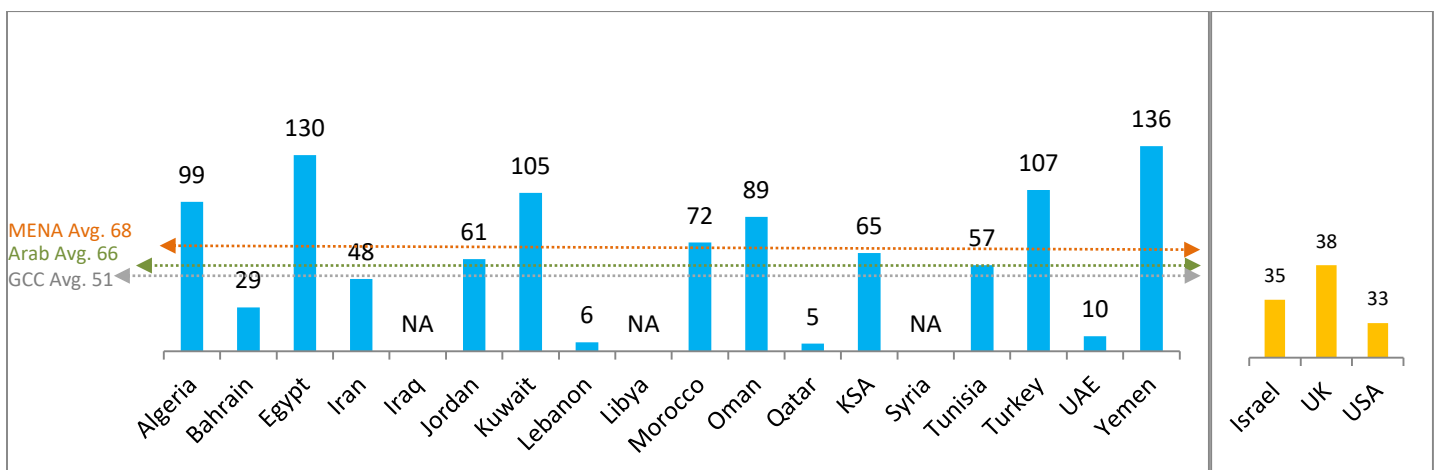


Chart-8, Source: WEF Report-2016, NA-Data Not Available

Higher Education and Training - Ranking

The global ranking of Higher Education and Training shows the average ranking of MENA to be 77 out of 138 (Refer: Chart-9). The average ranking for MENA region is performs slightly better than the Arab average (80) however the GCC average is significantly better (61). Qatar (30th), UAE (34th) and Bahrain (44th) are highest ranking MENA countries. Once again, all countries in MENA region rank below Israel the UK and the USA, with 7 out of 18 countries ranked bottom third of world.

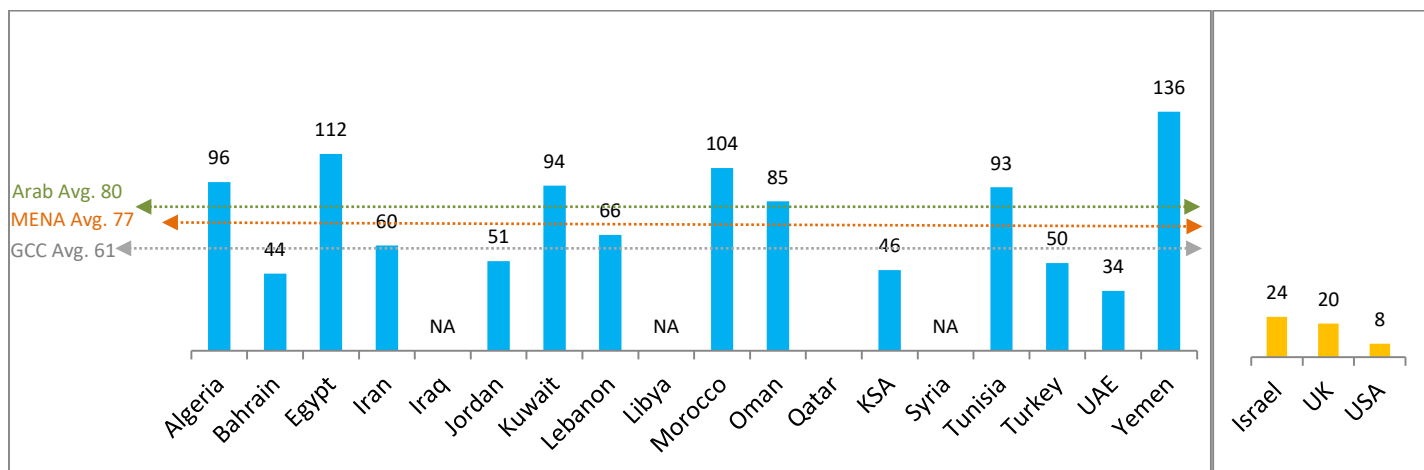


Chart-9, Source: WEF Report-2016, NA-Data Not Available

Section III: The Arab Science Spring – Science and Technology Innovation (STI) in MENA

Scientific and technological innovation is considered by many as the transformation of an idea into a new or improved product that is subsequently introduced into the market, into a new or improved operational process used in industry and commerce, or into a new approach to a social service. The word “innovation” can have different meanings in different contexts and the one chosen will depend on the particular objectives of measurement or analysis. For the purposes of this report, we define innovation as:

“Any new scientific ideation and/or implemented engineering excellence that empowers the application of novel solutions that either meets new requirements, unarticulated needs, or existing market needs in a more efficient manner thus creating added value for society.”

Unlike most regions of the developed world, the MENA region is rich in both human and natural resources. However, what many of its countries lack is a powerful, poignant and precise cultural and scientific transformation to reach worldwide recognition in education, research and economic productivity. Thankfully, there are several vanguard institutions leading the charge towards creating a positive impact, kindling hope for a successful ‘science spring’ ^[5] (for more information on these institutions see Sections VII and VIII)

The MENA region must continue to spearhead a strategy to harness science, technology and innovation for both economic and social development by improving science education, upgrading and reforming universities, building research capacity and encouraging international cooperation ^[6] and collaboration. A great example is the King Abdullah University of Science and Technology (KAUST), a flagship institution inaugurated during the reign of the late Custodian of the Two Holy Mosques, has helped usher in a fresh era of scientific discovery in the Middle East, thanks in part to its newfangled facilities and generous 20 bn USD endowment, the highest in the region and the sixth highest in the world. Another flattering flagship for the MENA region is Masdar of Abu Dhabi, the region’s top oasis of thought leadership in renewable energy, which has attracted powerful partners to the Emirati desert including companies like Credit Suisse and Siemens as cornerstone backers of the US \$250 million Masdar Clean Tech Fund. Six leading research institutions, including Imperial College, RWTH Aachen University, DLR (German Aerospace Center), University of Waterloo, Columbia University and the Tokyo Institute of Technology are all part of the Masdar Research Network ^[7]. The United Arab Emirates is investing heavily in space technologies with 5.4 billion USD ^[8] committed to sending a UAE Mars Mission by 2021 to coincide with the 50th anniversary of the founding of the UAE. Morocco and Saudi Arabia are investing in

development of solar energy ^[9]. Egypt, Morocco and Tunisia have initiated wind energy ^[10]. These are some examples of the rapidly changing context for STI in MENA.

According to most recent World Economic Forum (WEF) report, the MENA average for ‘Innovation’ ranking is 77 (again out of a total 138) (Refer: Chart-10). Qatar (18th), UAE (25th) and KSA (42nd) are the highest ranking nations in MENA. Unfortunately none of the MENA countries rank above with Israel, the USA and the UK with half of the MENA countries ranking in bottom half globally and further six countries ranking in bottom third of world.

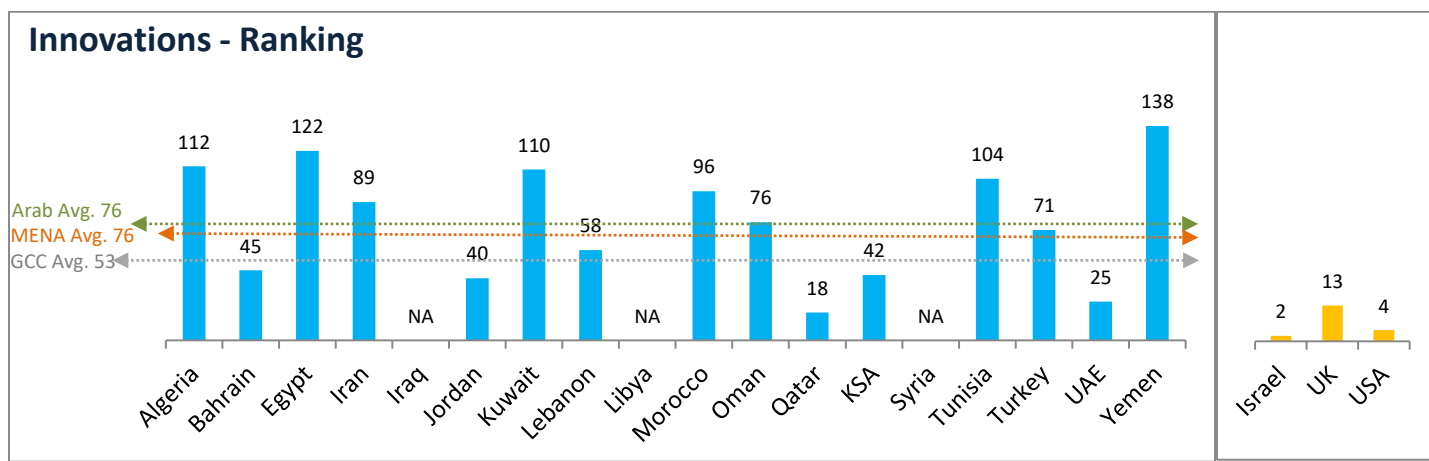


Chart-10, Source: WEF Report-2016, NA-Data Not Available

Innovation Ranking vs. Oil Production Ranking

A crude comparison of global rankings of Oil Production, KSA (2nd globally), Iraq (4th), UAE (8th), Kuwait (9th) are ranked (Refer: Chart-11 and see Appendix) in terms of global crude oil production in 2015 ^[11]. As the chart below shows, the higher the oil production, typically, the lower the innovation.

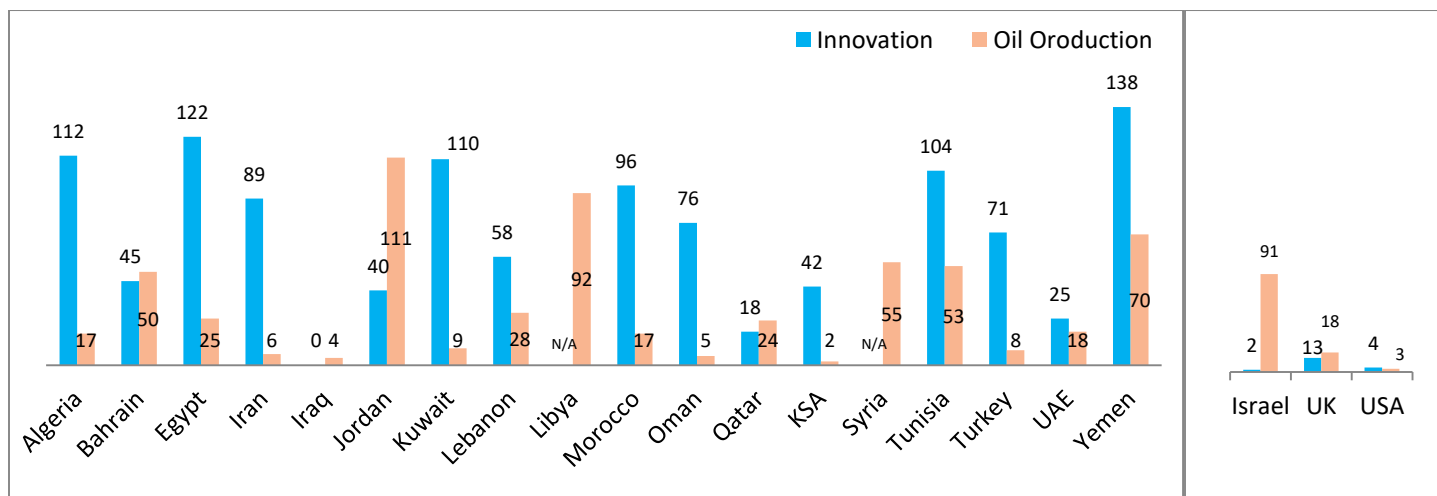


Chart-11, Source: WEF Report-2016, NA-Data Not Available

The MENA STI Strategy

An STI strategy for MENA must focus on improving science education in universities, enhancing scientific research capacity, increasing financial support for research and development and fostering regional and international scientific and educational cooperation.

An online science and technology observatory should be established to monitor the science and technology scene in most of the MENA countries and highlight shortcomings in implementation.

This observatory should include a portal for research, development and innovation activities and projects, a database of technological centers and universities, a directory of MENA scientists, technologists, educationists and policy-makers, science and technology indicators, and information on conferences, symposiums and workshops in the MENA region.

The strategy proposes setting up a network of science centers of excellence in the MENA countries to promote interactive approaches, excellence and innovation.

The network will use selected outstanding technological institutions and research centers associated with universities in MENA region as regional hubs to facilitate cooperation through joint research projects, and to promote high-level training.

The strategy urges MENA countries to increase financial support for research and development from the present 0.3% of gross domestic product to 3%, with the private sector contributing 30% to 40% ^[12].

This could be made possibly by creating a pan MENA fund for science and technology development, which could be supported by new financial mechanisms such as taxes and customs, according to the aforementioned strategy.

The STI strategy must focus on national and pan-Arab higher education and research initiatives in approximately 13 priority areas including biotechnology, life sciences, nanotechnology, information technology, clean water, food, agriculture technology and fishery, space, energy, desert sciences, the environment, and renewable energy.

The strategy also calls for greater mobility of scientists within the region and cooperation with international science, technology, innovation and higher education organizations.

Geopolitical Events Reshaping Science in MENA

The past five years have witnessed major geopolitical changes with significant implications for science and technology in the Middle East. These include but are certainly not limited to the Arab Spring of 2011; the US nuclear deal with Iran in 2015 ^[13] and the creation of the Association of Southeast Asian Nations (ASEAN) Economic Community in 2015 ^[14].

At first sight, many of these developments have little to do with science and technology but their indirect impact has often been significant. In Egypt, for instance, there has been a radical change in STI policy since the Arab Spring. The new government considers the pursuit of the elusive Knowledge Economy as the best way to harness an effective growth engine. The constitution adopted in 2014 mandates the state to allocate 1% of GDP to research and development (R&D) and stipulates that the ‘state guarantees the freedom of scientific research and encourages its institutions as a means towards achieving national sovereignty and building a knowledge economy that supports researchers and inventors.’ It is a good start, but 1% is nowhere near enough.

In Tunisia, there has been greater academic freedom in the past year and scientists have been developing closer international ties; Libya, on the other hand, is confronted with ongoing militant insurgency, offering little hope of a rapid revival of science and technology. Syria is in the throes of a civil war. Porous political borders resulting from the political upheaval of the Arab Spring.

Environmental Crises Raising Expectations of Science

Environmental crises, whether natural or human-made, have also influenced STI policy and governance in the past five years. The shockwaves from the Fukushima nuclear disaster in March 2011 carried far beyond Japan’s shores. The disaster prompted Germany to commit to phasing out nuclear energy by 2020 and fostered debate in other countries on the risks of nuclear energy. All GCC countries have indefinitely mothballed their sojourned attempts at developing the so-called ‘nuclear program for peaceful purposes.’

Public Research Budgets: A Converging, Yet Contrasting Picture

The past five years have seen a converging trend: disengagement in R&D by the public sector in many high-income countries (Australia, Canada, USA, etc.) and a growing investment in R&D on the part of lower income countries. There is a growing recognition in the MENA region and beyond that the development of modern infrastructure (hospitals, roads, railways, etc.) and the achievement of economic diversification and industrialization will necessitate a first step towards greater investment in STI, including the constitution of a critical mass of skilled workers.



Section IV: Gross Domestic Expenditure on R&D (GERD)

Geographically, the distribution of investment in knowledge across the world and especially within the Middle East remains unequal. The North America region still dominates globally, with 28.4% of world investment in R&D, in which USA alone consist 26.4%. China has recently moved into second place with 20.4% on the heels of its impressive economic miracle or perhaps vice versa, ahead of a pre-exit EU (19%) and (a shrinking in terms of overall population) Japan (10%). The rest of the world represents 67% of the global population but just a mere 23% of global investment in R&D, of this the MENA region represents 2.30% ^[15] GERD encompasses both public and private investment in R&D.

The share of GERD performed by the business enterprise sector (BERD) tends to be higher in economies with a greater focus on technology-based competitiveness in manufacturing, as reflected in their higher BERD/GDP ratio. Among the larger economies for which adequate primary and secondary data sources are readily available, the BERD/GDP intensity has risen noticeably in only a handful of countries including the Republic of Korea and China and, to a lesser extent, in Germany, the USA, Turkey and Poland. At best, it has remained stable in Japan and the UK and receded in Canada and South Africa while almost practically non-existent across the MENA region.

In 2013, world GERD amounted to Purchasing Power Parity (PPP) \$1,478 billion, compared to only PPP \$1,132 billion in 2007. This was less than the 47% increase recorded over the previous period (2002–2007) but it is a significant increase nevertheless. Moreover, this rise took place during a time of a global economic crisis in a post Lehman brother's world. As GERD increased much faster than global GDP, this perhaps in turn caused global R&D strength to climb from 1.57% (2007) to 1.70% (2013) of GDP ^[16].

Unfortunately, GERD has remained low in most of the MENA countries, especially in the oil-rich economies where high GDP makes it hard to increase GERD from a mathematical perspective, not to mention the willingness of both local governments and private national champions to invest heavily in R&D.

The average GERD/GDP of MENA region is 0.3% (Refer: Chart-12). The average for Arab (0.27%) region is below than MENA and above then GCC (0.25%).) Turkey (1.01%), Morocco (0.71%) and UAE (0.70) are highest GERD as percentage countries in MENA region. Unfortunately all the MENA countries GERD/GDP below than Israel (4.11%) and UK (1.70%).

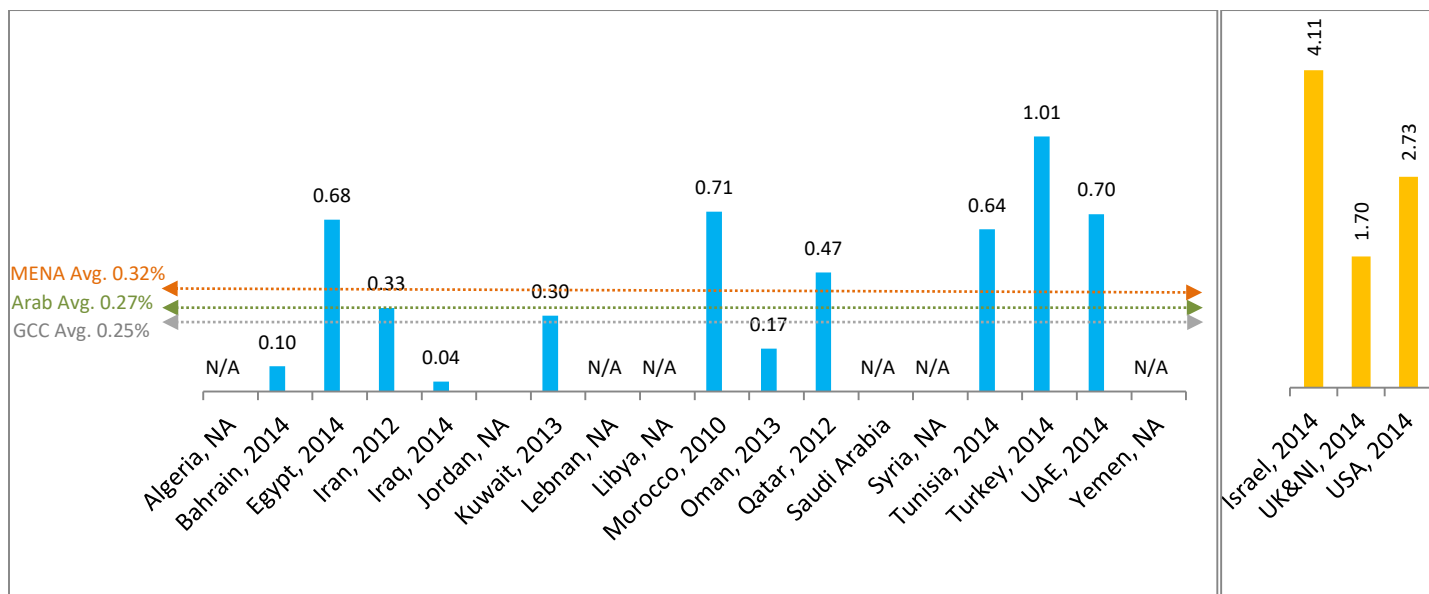


Chart-12, Source: UNESCO Statistics, NA-Data Not Available

Quality of Scientific Research Institutions - Ranking

According to the most recent WEF report, Global Ranking for Quality of Scientific Research, the average ranking of MENA is 86 out of 138 (Refer; Chart-13). Qatar (14th), UAE (27th) and Jordan (57th) are the highest ranking countries in MENA region in terms of quality of scientific research institutions. But yet again, all of the MENA countries rank below Israel (3rd), the UK (2nd) and the USA (5th) with vast majority of countries (11/18) ranking in bottom half globally, and a further nine countries ranking in bottom third of the world. The average ranking for MENA and Arab countries were similar (86th) with the GCC average (64th) only slightly better.

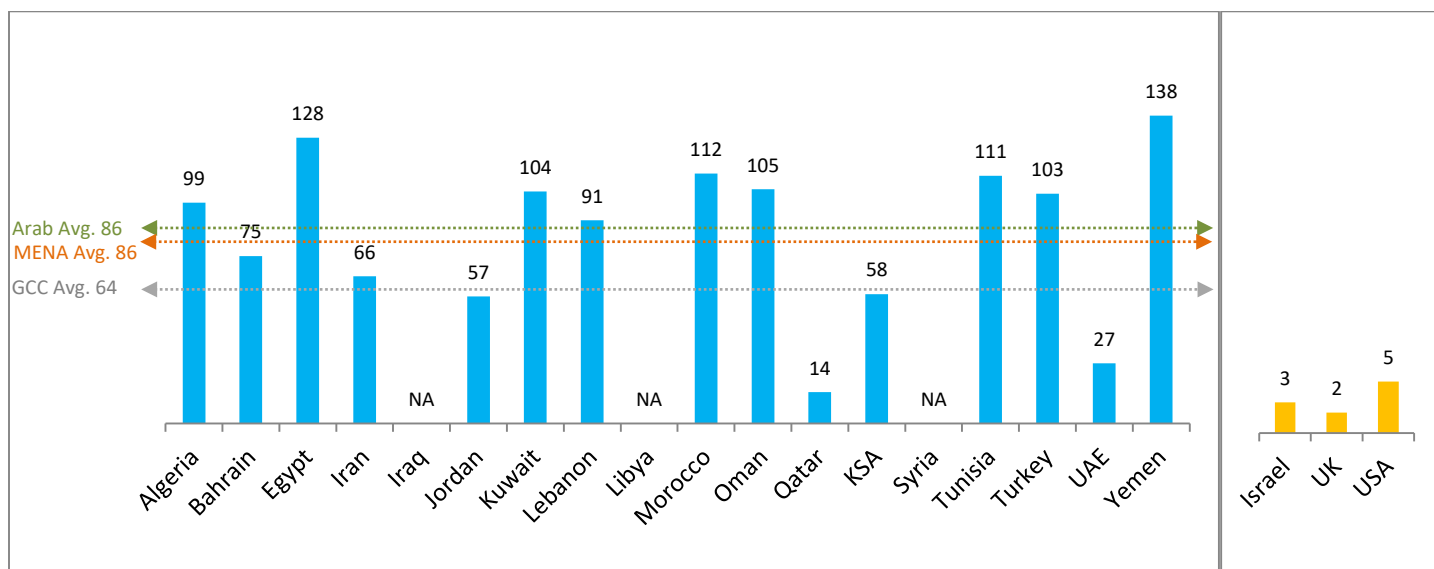


Chart-13, Source: WEF Report-2016, NA-Data Not Available

Corporate Spending on R&D - Ranking

The global ranking for corporate spending on R&D according to the most recent WEF report indicates that the average ranking of MENA is 82 out of 138 (Refer; Chart-14). Qatar (11th), UAE (22nd) and KSA (48th) are the highest ranking countries in MENA region in terms of corporate spending on R&D. All countries in MENA region except Qatar (11th), rank below the UK (17th), Israel (3rd) and the USA (2nd) with most of the countries (10/18) ranking in bottom half globally and a further six countries ranking in bottom third of the world.

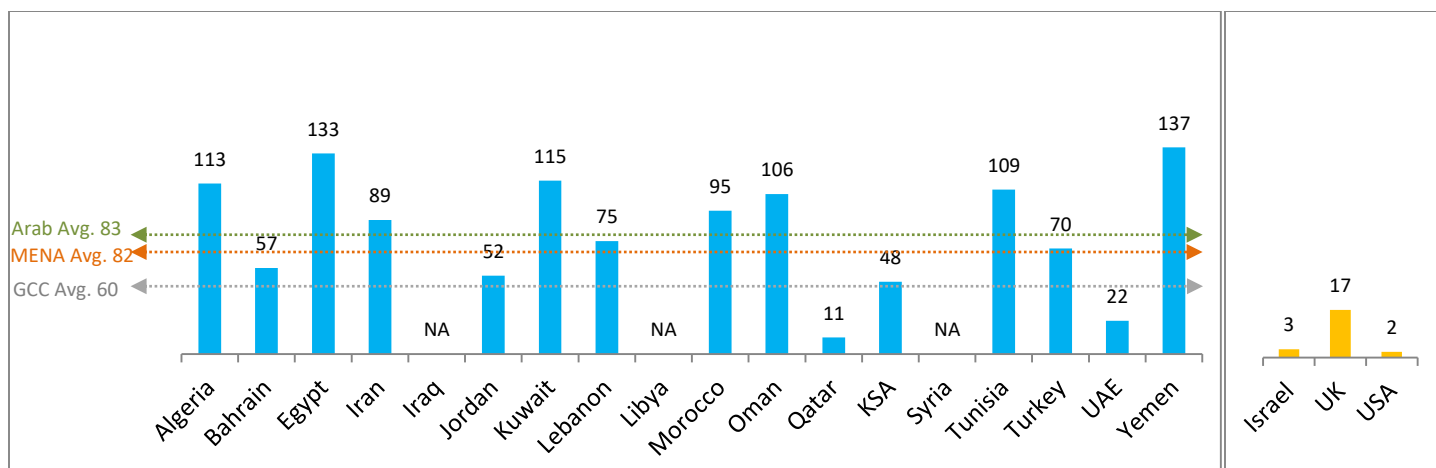


Chart-14, Source: WEF Report-2016, NA-Data Not Available

Trends in Human Capital & Research

The global human capital and research ranking is based on key indicators (Refer: Table-3) such as education, tertiary education and research & development [17].

MENA Human Capital and Research Index-2016	Country Name	Algeria	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Morocco	Oman	Qatar	Saudi Arabia	Syria	Tunisia	Turkey	United Arab Emirates	Yemen	Israel	United Kingdom	United States of America
Indicator Ranking																						
Human capital and research		79	68	82	48	n/a	86	72	76	129	61	52	59	32	n/a	45	43	41	111	16	7	14
Education		60	80	56	89	n/a	109	72	107	n/a	64	92	98	49	n/a	55	57	76	106	45	28	39
Expenditure on education		73	106	85	98	n/a	n/a	86	108	n/a	40	76	91	45	n/a	23	103	n/a	65	33	31	43
Government expenditure on education per pupil, secondary		n/a	n/a	n/a	74	n/a	85	48	109	n/a	10	55	98	66	n/a	35	n/a	65	95	79	47	44
School life expectancy		56	n/a	72	52	n/a	80	75	86	n/a	89	64	73	29	n/a	53	24	n/a	108	31	10	20
Assessment in reading, mathematics, and science		n/a	n/a	n/a	n/a	n/a	54	n/a	n/a	n/a	n/a	n/a	60	n/a	n/a	56	40	38	n/a	36	17	25
Pupil-teacher ratio, secondary		n/a	26	43	76	n/a	n/a	9	10	n/a	n/a	n/a	29	34	n/a	54	84	52	72	24	71	62
Tertiary education		64	34	103	4	n/a	57	37	38	n/a	36	5	13	28	n/a	14	49	20	106	73	6	50
Tertiary enrolment		73	70	77	31	n/a	55	84	60	n/a	85	81	97	41	n/a	74	16	89	106	29	45	5
Graduates in science and engineering		15	59	97	2	n/a	78	20	34	n/a	4	1	16	18	n/a	3	49	51	n/a	n/a	29	85
Tertiary inbound mobility		86	11	69	97	n/a	19	n/a	21	n/a	65	51	1	33	n/a	67	79	1	35	77	6	41
Research and development (R&D)		115	67	52	63	n/a	64	84	48	115	72	83	71	33	n/a	66	38	37	115	3	10	5
Researchers		n/a	n/a	54	53	n/a	n/a	79	n/a	n/a	48	80	57	n/a	n/a	42	45	n/a	n/a	1	17	21
Gross expenditure on R&D (GERD)		n/a	n/a	51	74	n/a	65	77	n/a	n/a	47	93	63	106	n/a	50	35	48	n/a	2	21	10
Global R&D companies, average expenditure top 3		45	45	45	45	n/a	45	45	45	n/a	45	45	45	45	25	n/a	45	36	41	45	19	7
QS university ranking average score top 3 universities		73	59	46	54	n/a	58	68	44	73	73	62	61	30	n/a	73	39	40	73	22	2	1

Table-3, Source: GII Report-2016, n/a-Data Not Available

The average ranking of human capital & research for MENA is 77 out of 130 (Refer: Chart-15). Saudi Arabia (32nd), the UAE (41st) and Turkey (43rd) are the highest ranking countries in MENA region. Once again, all MENA countries rank below best practices with the vast majority of countries (9/18) ranking in bottom half globally.

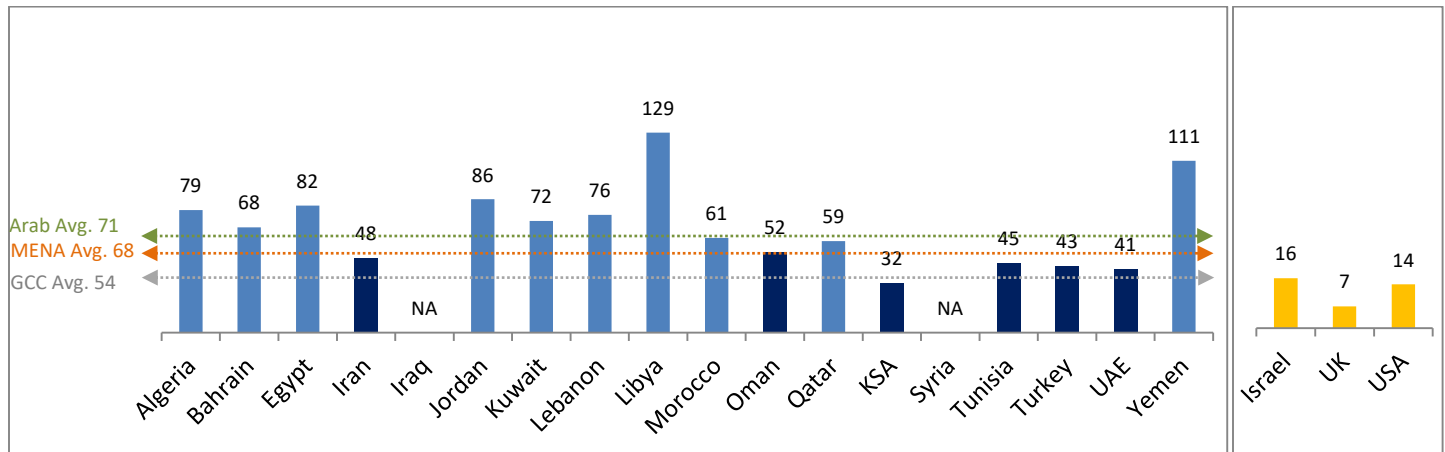


Chart-15, Source: GII Report-2016, NA-Data Not Available

Trends in Business Sophistication

The business sophistication ranking is based on indicators (Refer: Table-4) such as knowledge workers, innovation linkage and knowledge absorption.

MENA Business Sophistication Index-2016	Country Name	Algeria	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Morocco	Oman	Qatar	Saudi Arabia	Syria	Tunisia	Turkey	United Arab Emirates	Yemen	Israel	United Kingdom	United States of America
Indicator Ranking																						
Business sophistication		118	59	122	111	n/a	116	127	63	127	125	124	78	66	n/a	107	86	24	128	6	14	11
Knowledge workers		112	n/a	109	102	n/a	127	126	55	n/a	113	117	110	73	n/a	85	83	25	119	18	16	10
Employment in knowledge-intensive services		79	n/a	31	81	n/a	n/a	n/a	44	n/a	98	n/a	75	48	n/a	67	71	32	n/a	7	8	26
Firms offering formal training		85	n/a	92	n/a	n/a	94	n/a	65	n/a	66	n/a	n/a	n/a	n/a	60	61	n/a	88	82	n/a	n/a
GERD performed by business enterprise		n/a	n/a	64	61	n/a	n/a	n/a	n/a	n/a	49	71	59	n/a	n/a	n/a	36	33	n/a	1	20	10
GERD financed by business enterprise		n/a	n/a	73	49	n/a	n/a	85	n/a	n/a	52	58	60	n/a	n/a	65	20	4	n/a	43	25	9
Females employed with advanced degrees		79	n/a	77	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	78	76	n/a	n/a	72	n/a	n/a	3	18	n/a
Innovation linkages		92	15	105	65	n/a	48	94	76	122	118	80	32	35	n/a	110	93	5	128	3	8	19
University/industry research collaboration		122	84	120	94	n/a	51	98	108	124	90	67	8	37	n/a	107	59	21	n/a	7	4	2
State of cluster development		99	26	31	76	n/a	30	57	65	124	86	74	8	20	n/a	91	50	1	n/a	29	7	2
GERD financed by abroad		n/a	n/a	98	n/a	n/a	n/a	86	n/a	n/a	81	99	77	n/a	n/a	71	87	n/a	n/a	5	24	70
Joint venture/strategic alliance deals		n/a	3	27	n/a	n/a	36	15	38	n/a	71	10	8	26	n/a	n/a	56	9	n/a	22	11	17
Patent families filed in at least two offices		110	82	100	113	n/a	67	99	74	n/a	102	108	54	59	n/a	107	39	68	105	8	16	13
Knowledge absorption		104	112	118	125	n/a	57	126	71	n/a	120	123	73	102	n/a	103	72	85	128	16	33	12
Intellectual property payments		76	n/a	63	86	n/a	n/a	n/a	88	n/a	82	n/a	n/a	n/a	n/a	104	72	n/a	106	53	27	12
High-tech imports		43	97	67	109	n/a	94	105	110	n/a	n/a	116	118	78	n/a	55	49	89	103	33	23	9
ICT services imports		108	111	82	85	n/a	n/a	100	27	n/a	93	116	10	77	n/a	102	118	n/a	107	52	33	44
Foreign direct investment, net inflows		108	61	85	115	n/a	30	117	21	n/a	52	100	114	98	n/a	78	89	67	126	72	92	104
Research talent in business enterprise		n/a	n/a	71	60	n/a	n/a	n/a	n/a	n/a	67	56	46	n/a	n/a	n/a	26	n/a	n/a	1	33	5

Table-4, Source: GII Report-2016, n/a-Data Not Available

The average ranking of business sophistication for MENA is 99 out of 130 (Refer: Chart-16), UAE (24th), Bahrain (59th) and Lebanon (63rd) are highest ranking countries in MENA region. All of the MENA countries rank below Israel (6th) and UK (14th) with vast majority of countries (12/18) ranking in bottom half globally and further ten countries ranking bottom third of world. In terms of regional average ranking, GCC (80th) ranked highest than Arab and MENA (99th).

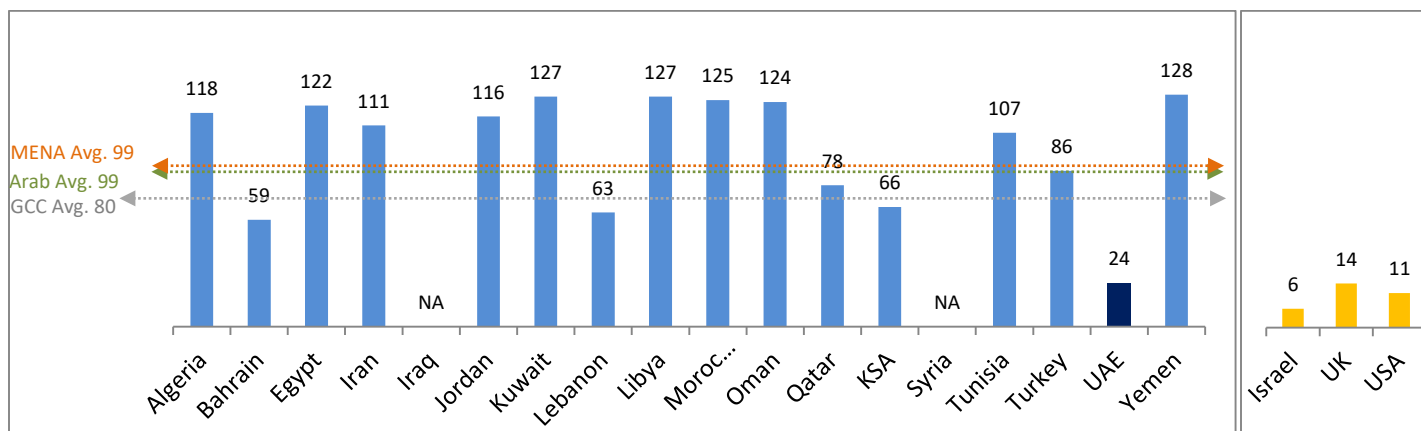


Chart-16, Source: GII Report-2016, NA-Data Not Available

Trends in Knowledge and Technology Output

The knowledge and technology outputs ranking is based on indicators (Refer: Table-5) such as knowledge creation and knowledge diffusion.

MENA Knowledge and Technology Outout Index-2016		Country Name	Algeria	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Morocco	Oman	Qatar	Saudi Arabia	Syria	Tunisia	Turkey	United Arab Emirates	Yemen	Israel	United Kingdom	United States of America
Indicator Ranking																							
Knowledge and technology outputs			100	61	94	65	n/a	79	51	74	129	72	95	88	75	n/a	89	45	86	124	12	9	4
Knowledge creation			104	124	70	26	n/a	60	107	55	n/a	78	113	108	66	n/a	56	35	102	127	10	9	5
Patent applications by origin			94	102	68	14	n/a	75	118	n/a	n/a	58	119	116	70	n/a	61	33	108	88	29	16	6
PCT international applications by origin			91	64	74	n/a	n/a	n/a	n/a	n/a	n/a	57	88	73	n/a	n/a	69	30	58	n/a	7	18	14
Utility model applications by origin			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	11	n/a	62	n/a	n/a	n/a
Scientific and technical publications			101	116	66	37	n/a	48	115	53	n/a	85	104	94	73	n/a	26	44	106	114	10	14	38
Citable documents H index			82	115	48	41	n/a	77	79	65	n/a	68	89	99	51	n/a	73	36	72	119	15	1	1
Knowledge diffusion			120	33	91	127	n/a	64	8	47	129	52	70	44	98	n/a	122	81	53	108	14	34	12
Intellectual property receipts			96	n/a	29	83	n/a	n/a	n/a	59	n/a	91	n/a	n/a	n/a	n/a	49	n/a	n/a	25	22	11	1
High-tech exports			119	93	89	72	n/a	78	117	98	n/a	n/a	76	121	109	n/a	39	62	111	116	16	23	26
ICT services exports			106	20	55	115	n/a	n/a	16	32	n/a	27	114	102	120	n/a	56	116	n/a	19	7	39	71
Foreign direct investment, net outflows			106	17	80	n/a	n/a	85	9	22	n/a	63	35	16	56	n/a	n/a	50	54	n/a	41	116	31

Table-5, Source: GII Report-2016, n/a-Data Not Available

The average ranking of business sophistication for MENA is 83 out of 130 (Refer: Chart-17). The UAE (45th), Kuwait (51st) and Bahrain (61st) are the highest ranking countries in MENA. Again all MENA countries rank below Israel (12th), the UK (9th) and the USA (4th) with vast majority of countries (13/18) ranking in bottom half globally and further five countries ranking bottom third of world. In terms of regional average ranking, GCC (76th) ranked slightly higher than the Arab average (87th).

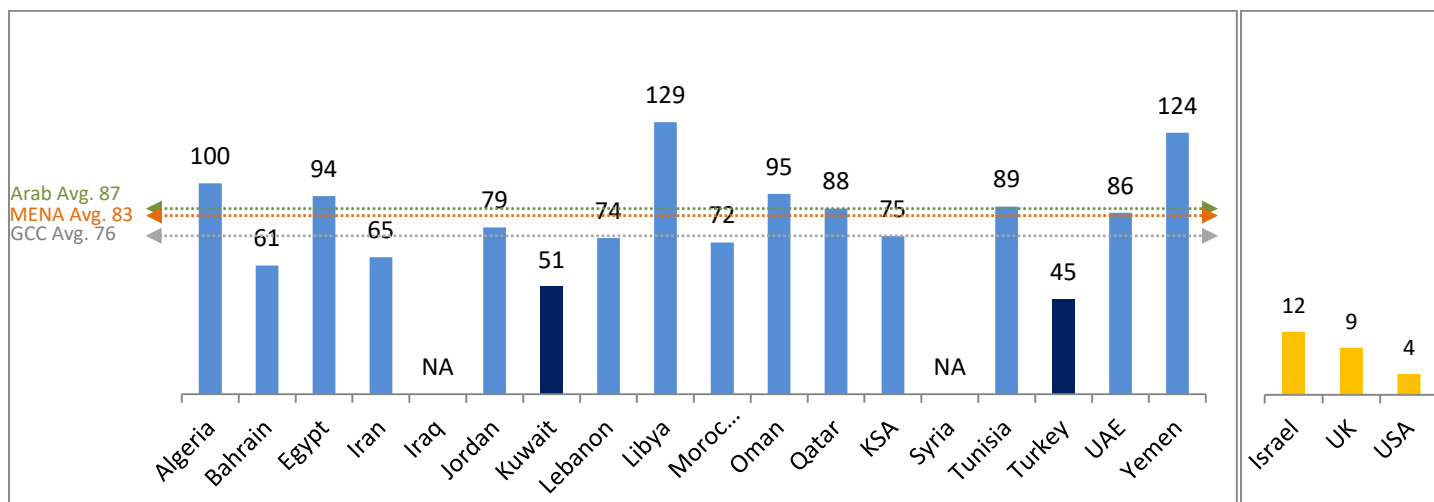


Chart-17, Source: GII Report-2016, NA-Data Not Available

Trends in Creative Output

The creative outputs ranking is based on indicators (Refer: Table-6) such as intangible assets, Trademark application class count by origin and Industrial designs by origin. The average ranking of creative output for MENA is 76 out of 130 (Refer: Chart-18). Turkey (31st), Saudi Arabia (47th) and Qatar (49th) are the highest ranking countries in MENA region. Again, all of the MENA countries rank below Israel (16th), the USA (14th) and the UK (7th) with vast majority of countries (10/18) ranking in bottom half globally and further four countries ranking bottom third of world. In terms of regional average ranking, the GCC (64th) ranked slightly above both the MENA (76th) and Arab (80th) averages.

MENA Creative output Index-2016		Country Name	Algeria	Bahrain	Egypt	Iran	Iraq	Jordan	Kuwait	Lebanon	Libya	Morocco	Oman	Qatar	Saudi Arabia	Syria	Tunisia	Turkey	United Arab Emirates	Yemen	Israel	United Kingdom	United States of America
Indicator Ranking																							
Creative outputs			122	74	97	75	n/a	78	64	51	112	67	79	49	47	n/a	81	31	70	125	26	3	13
Intangible assets			122	91	100	55	n/a	82	50	71	124	36	46	25	31	n/a	85	5	56	125	34	9	45
Trademark application class count by origin			100	103	91	n/a	n/a	64	n/a	n/a	n/a	36	n/a	105	n/a	n/a	n/a	4	96	82	90	42	78
Industrial designs by origin			57	99	n/a	20	n/a	97	n/a	n/a	n/a	8	n/a	n/a	103	n/a	58	1	102	100	n/a	n/a	62

Table-6, Source: GII Report-2016, n/a-Data Not Available

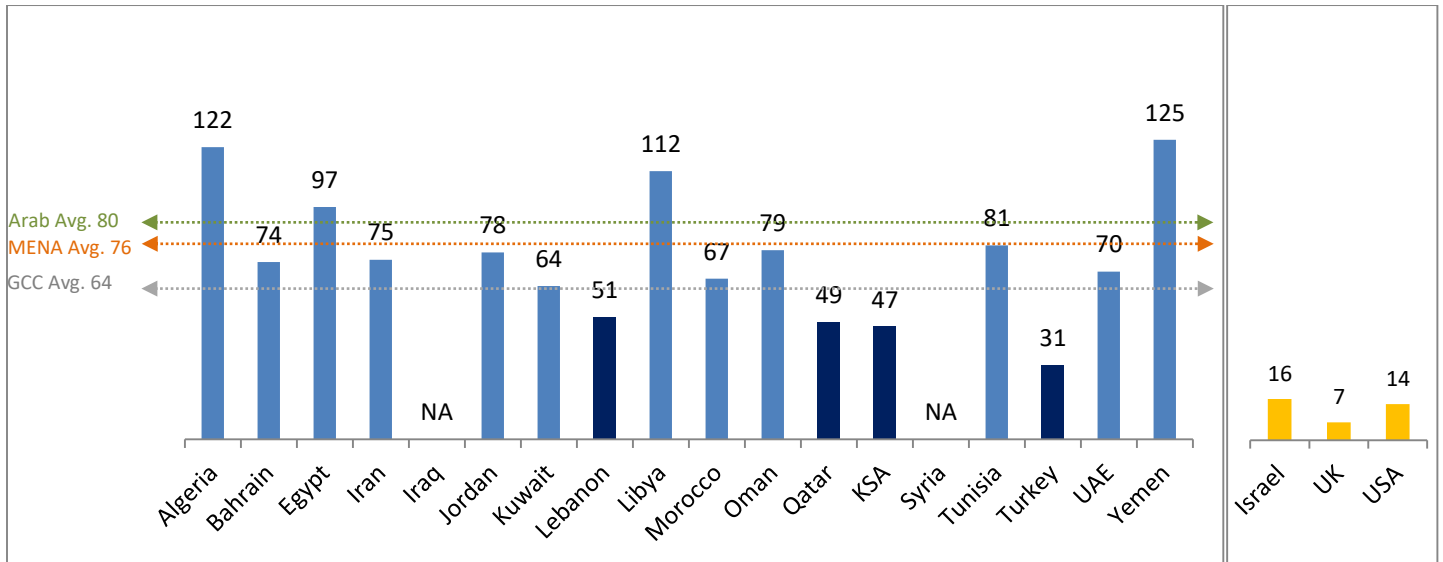


Chart-18, Source: GII Report-2016, NA-Data Not Available

Section V: Research Articles and Journal Publication in MENA

According to the Nature Index ^[18], the total article/journal publications are 1,486. The average article publication rate per country for MENA is 87 (Refer: Chart-19). KSA (481), Turkey (368), and Iran (180) publish the most articles in MENA region with five MENA countries publishing fewer than 10 internationally renowned 10 articles per year. Israel (1,238) publishes almost as many articles as the entire MENA region combined.

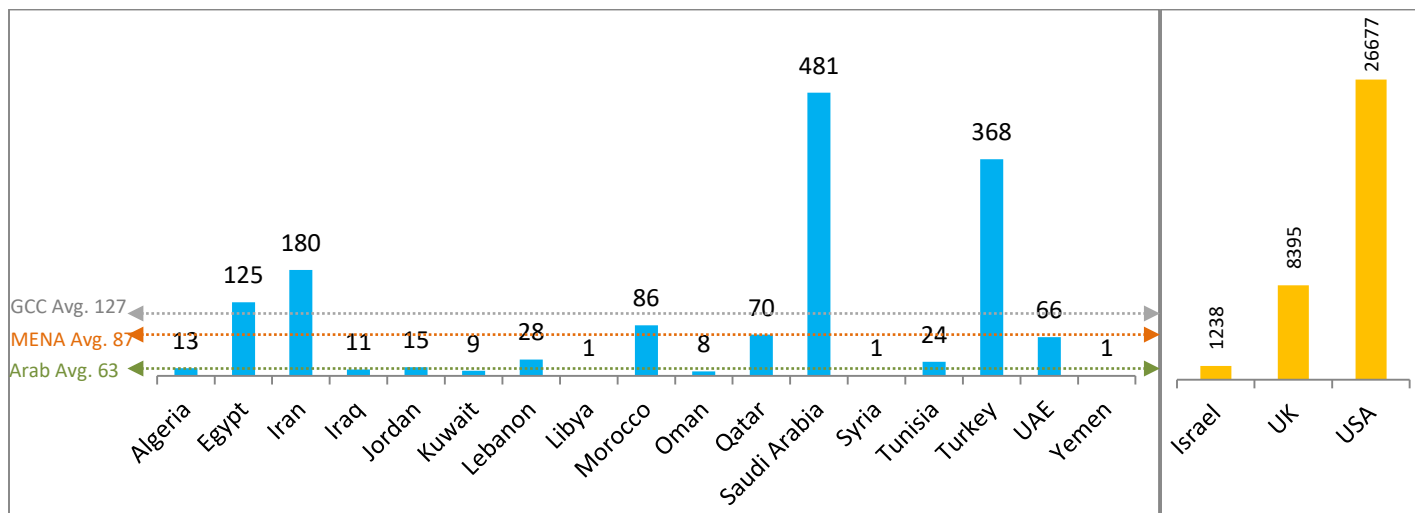


Chart-19, Source: Nature Index-2016

Articles According to Scientific Field

The Middle East produced these ~ 1500 articles (Refer: Chart-20) across different scientific field such as Chemistry, Earth & Environment, Life Sciences and Physical Sciences. Saudi Arabia produced the highest number of articles in Chemistry (242), Life Science (103) and Earth & Environment (19), whereas Turkey produced highest number (261) of articles in Physical Science. Overall MENA produces highest articles in Physical Science (53%), than Chemistry (26%), Life Science (17%) and Earth & Environment (4%).

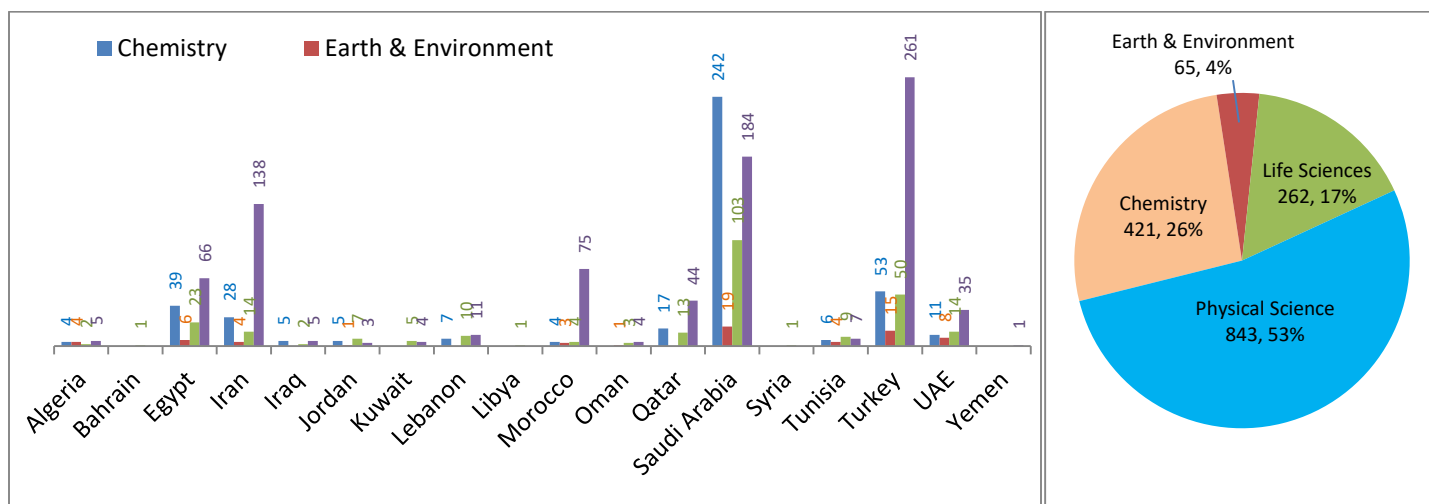


Chart-20., Source: Nature Index-2016

Section VI: Patents

A patent is a set of exclusive rights granted by law to applicants for inventions that are new, non-obvious and commercially applicable. A patent is valid for a limited period of time (generally 20 years), during which patent holders can commercially exploit their inventions on an exclusive basis. In return, applicants are obliged to disclose their inventions to the public in a manner that enables others skilled in the art to replicate the invention. The patent system is designed to encourage innovation by providing innovators with time-limited exclusive legal rights, thus enabling them to appropriate the returns from their innovative activity.

Patents registered in MENA region

The overall patents^[19] registered (Refer: Chart-21) in the Middle East is calculated to be 31,037 with a MENA average is 1,724 patents per country. Iran (14,279), Turkey (5,841) and Saudi Arabia (2,436) receive the highest number of patents in the MENA region. With the exception of Iran, all MENA register patents when compared to Israel (6,908), which also receive more than half of the total patents of all Arab countries combined (10,917).

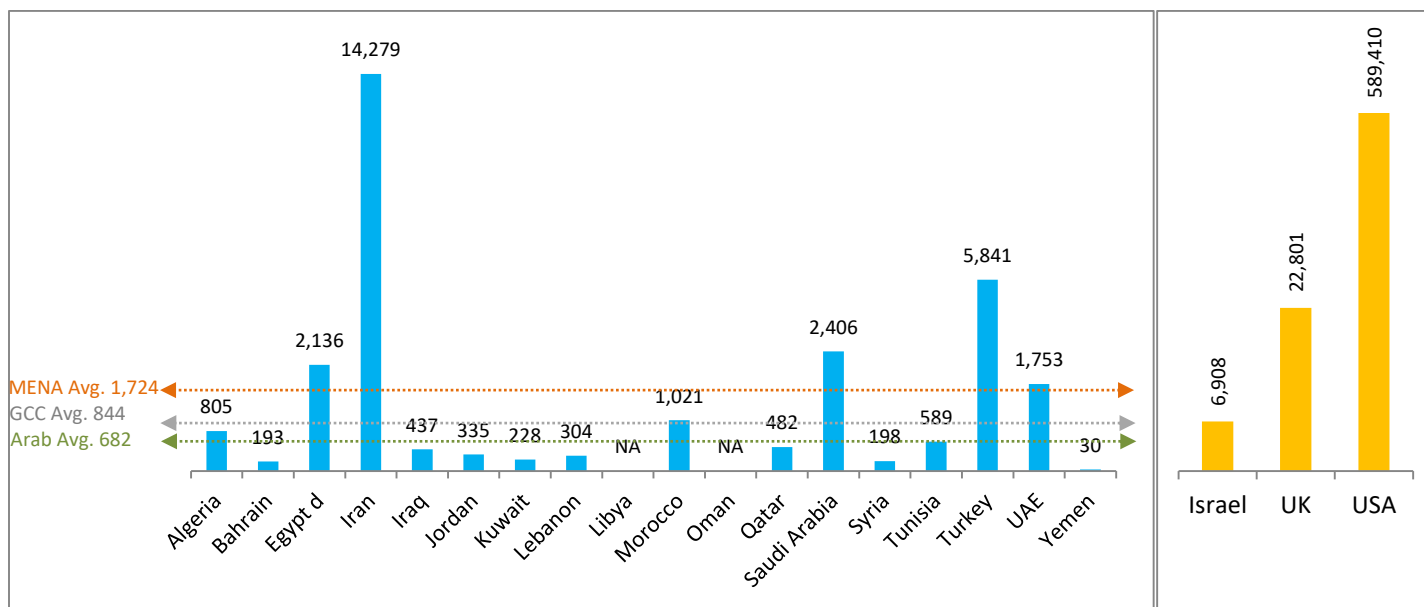


Chart-21, Source: WIPO patent report-2016

Patent Cooperation Treaty (PCT) international application

A patent application is filed through the WIPO-administered Patent Cooperation Treaty (PCT). It facilitates the acquisition of patent rights in a large number of jurisdictions. The PCT System simplifies the process of multiple national patent filings by reducing the requirement to file a separate application in each jurisdiction. However, the decision whether to grant patent rights remains in the hands of national and regional patent offices, and patent rights remain limited to the jurisdiction of the patent-granting authority. The PCT international application

processes starts with the international phase, are performed, and concludes with the national phase, during which a national or regional patent office decides on the patentability of an invention according to national law. The number of international PCT applications registered in the Middle East is calculated to be 1,585 with a MENA average is 88 patents per country (Refer: Chart-22). Turkey (1,010), Saudi Arabia (276) and UAE (77) have the highest number of PCT application in the region. All of the countries in MENA region have lower number of PCT applications than Israel (1,685), which is more than the entire MENA region and 3X more than all Arab countries combined (504).

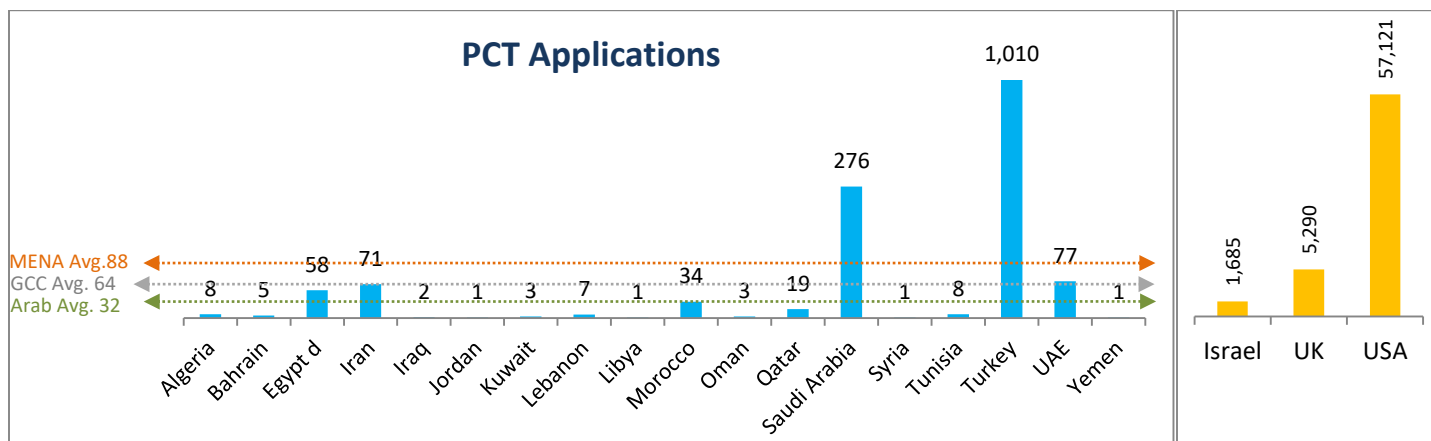


Chart-22, Source: WIPO patent report-2016

Comparison of Ranking (Oil Production vs. PCT Patents vs. Population)

Similar to oil production vs. innovation, the data also points to a high correlation between high levels of oil production and low levels of PCT patent applications in line with the size of the population.

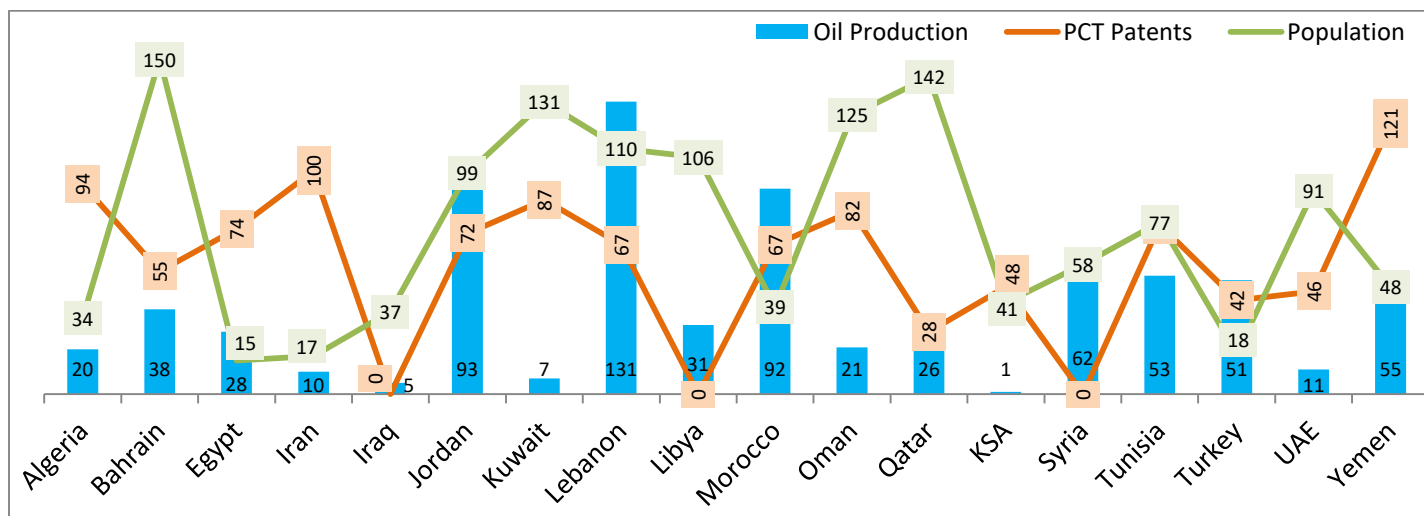


Chart-23, Source: WIPO patent report-2016, OPEC statistics


Section VII: Profile of Science Universities & Institutions located in MENA region

The People's Democratic Republic of Algeria

University of Science and Technology Houari Boumedienne (USTHB)



The University of Science and Technology Houari Boumedieme (USTHB) is a coeducational public university. The USTHB has eight faculties; such as biological science, chemistry, physics, mathematics, civil engineering, earth science, computer science and mechanical engineering.

	Type of University/Institute	Public
	Year Established	1974
	No. of Faculties	8
	No. of Teaching Staff	~ 1500
	No. of Students	~ 20,000
	No. of Alumni	*86,000
	No. of Publications	3
	Endowment/Budget Size	N/A
	Website	http://www.usthb.dz

*KLSC Calculation

University of Tlemcen



The University of Tlemcen is a coeducational public university. Tlemcen has eight faculties; such as Science, Technology, Medicine, Law and Language

	Type of University/Institute	Public
	Year Established	1974
	No. of Faculties	5
	No. of Teaching Staff	1966
	No. of Students	43,469
	No. of Alumni	*186,878
	No. of Publications	3
	Endowment/Budget Size	N/A
	Website	www.univ-tlemcen.dz

*KLSC Calculation




The Kingdom of Bahrain

Arabian Gulf University



Arabian Gulf University is a university in the city of Manama, in the Kingdom of Bahrain. It is accredited by the Ministry of Education, Bahrain, and governed by Gulf Cooperative Countries, and is a member of Federation of the Universities of the Islamic World.


	Type of University/Institute	Public
	Year Established	1979
	No. of Faculties	3
	No. of Teaching Staff	182
	No. of Students	1,510
	No. of Alumni	*5,738
	No. of Publications	3
	Endowment/Budget Size	N/A
	Website	http://www.agu.edu.bh

*KLSC Calculation

University of Bahrain



The University of Bahrain is the largest public university in the Kingdom of Bahrain. It is the only national university in the country. It has faculties such as Arts, Science, Information technology, Business administration and Applied Science.

	Type of University/Institute	Public
	Year Established	1986
	No. of Faculties	10
	No. of Teaching Staff	~2000
	No. of Students	~26,000
	No. of Alumni	~60,000
	No. of Publications	1
	Endowment/Budget Size	N/A
	Website	http://www.uob.edu.bh

*KLSC Calculation

The Arab Republic of Egypt

The American University in Cairo



Founded in 1919, AUC is a leading English-language, American-accredited institution of higher education and center of intellectual, social and cultural life of the Arab world. Its community of students, parents, faculty and staff, trustees, alumni and other generous sponsors represent more than 60 countries.



Type of University/Institute	Private
Year Established	1919
No. of Faculties	10
No. of Teaching Staff	534
No. of Students	~6,000
No. of Alumni	*58,800
No. of Publications	1
Endowment/Budget Size	600 million USD
Website	http://www.aucegypt.edu

*KLSC Calculation

Cairo University



Cairo University also known as the Egyptian University from 1908 to 1940, It was founded on 21 December 1908. It is the second oldest institution of higher education in Egypt.



Type of University/Institute	Public
Year Established	1908
No. of Faculties	20
No. of Teaching Staff	11,545
No. of Students	256,470
No. of Alumni	*2,795,523
No. of Publications	23
Endowment/Budget Size	N/A
Website	http://cu.edu.eg

*KLSC Calculation



Alexandria University



Alexandria University is a public research university in Alexandria, Egypt. It was known as Farouk University until the Egyptian Revolution of 1952, after this, its name was changed to the University of Alexandria.

	Type of University/Institute	Public
	Year Established	1941
	No. of Faculties	23
	No. of Teaching Staff	8,075
	No. of Students	156,053
	No. of Alumni	*1,185,980
	No. of Publications	6
	Endowment/Budget Size	N/A
	Website	http://www.alexu.edu.eg

*KLSC Calculation

Zewail City of Science and Technology



Zewail City of Science and Technology is a nonprofit, independent institution of learning, research and innovation. The concept of the City was proposed in 1999 and its cornerstone laid on January 1, 2000. After numerous delays, the project was revived by the Egyptian cabinet's decree on May 11, 2011 following the January 25 Revolution.

	Type of University/Institute	Public
	Year Established	2011
	No. of Faculties	2 (Science & Engineering)
	No. of Teaching Staff	30
	No. of Students	350
	No. of Alumni	*420
	No. of Publications	21
	Endowment/Budget Size	N/A
	Website	https://www.zewailcity.edu.eg


*KLSC Calculation

The Islamic Republic of Iran

Institute for Research in Fundamental Sciences (IPM)



The Institute for Research in Fundamental Sciences (IPM) affiliated with the Ministry of Science, Research, and Technology, was founded in 1989 under the name of Institute for Studies in Theoretical Physics and Mathematics.


	Type of University/Institute	Public
	Year Established	1989
	No. of Faculties	9
	No. of Teaching Staff	~60
	No. of Students	~200
	No. of Alumni	*560
	No. of Publications	88
	Endowment/Budget Size	N/A
	Website	http://www.ipm.ac.ir

*KLSC Calculation

Tehran University of Medical Sciences



The first modern center of medical training in Iran was founded in 1851. It was a part of the Institute of Higher Education (*Dar-ol-Fonoon*). The School of Medicine was established as a part of University of Tehran in 1934.

	Type of	Public
	Year Established	1934
	No. of Faculties	5
	No. of Teaching Staff	1,653
	No. of Students	13,388
	No. of Alumni	*111,054
	No. of Publications	N/A
	Endowment/Budget	N/A
	Website	http://gsia.tums.ac.ir


*KLSC Calculation



Yazd University



Founded in 1976, Yazd University is a non-profit public institution located in the Iranian city and province of the same name. It has faculties such as


	Type of University/Institute	Public
	Year Established	1976
	No. of Faculties	5
	No. of Teaching Staff	389
	No. of Students	12,500
	No. of Alumni	*51,250
	No. of Publications	N/A
	Endowment/Budget Size	N/A
	Website	https://www.yazd.ac.ir

*KLSC Calculation

University of Zanjan



The University of Zanjan (ZNU) is located in Zanjan, Iran. It was founded in 1975 and organized in four faculties. Nowadays it is one the largest universities of the country with a community of around 10,000 students.

	Type of	Public
	Year Established	1975
	No. of Faculties	5
	No. of Teaching Staff	394
	No. of Students	9,444
	No. of Alumni	*39,648
	No. of Publications	N/A
	Endowment/Budget Size	N/A
	Website	https://www.znu.ac.ir

*KLSC Calculation



The Republic of Iraq

University of Baghdad



The University of Baghdad was the first university in Iraq, located in the middle of Baghdad city. In 1957, the University of Baghdad was officially established and was able to award degrees in its own name. The university has 24 colleges, 3 high study institutes and 9 centers spread in four main campuses.



Type of	Public
Year Established	1957
No. of Faculties	7
No. of Teaching Staff	7,063
No. of Students	67,994
No. of Alumni	*407,940
No. of Publications	223 (2013)
Endowment/Budget Size	N/A
Website	www.en.uobaghdad.edu.iq

*KLSC Calculation

University of Sulaimani (UOS)



University of Sulaimani (UoS) was first established in 1968, the main campus is located in the city of Sulaimani in Kurdistan of Iraq. In the beginning there were only three colleges but during the years that followed, number of the colleges increased dramatically as the result of growing demands of higher education in the country.



Type of University/Institute	Public
Year Established	1968
No. of Faculties	9
No. of Teaching Staff	~1,300
No. of Students	23,201
No. of Alumni	*113,680
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://univsul.edu.iq

*KLSC Calculation



The Hashemite Kingdom of Jordan

University of Jordan



The University of Jordan (UJ), which was founded in 1962, it has offered a wide choice of academic programs for students who can choose from more than 250 Programs from 24 schools in various disciplines. At graduate level, UJ provides 38 doctoral Programs, which represent more than 50% of doctoral programs in Jordan.



Type of University/Institute	Public
Year Established	1962
No. of Faculties	19
No. of Teaching Staff	2,121
No. of Students	26,532
No. of Alumni	*145,915
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://ju.edu.jo

*KLSC Calculation

Jordan University of Science & Technology



Jordan University of Science and Technology (JUST) is a leading teaching and research center in Jordan and in the Middle East. Our outstanding students, alongside our faculty, make JUST a distinguished institution of higher education.



Type of University/Institute	Public
Year Established	1986
No. of Faculties	13
No. of Teaching Staff	1,049
No. of Students	24,889
No. of Alumni	*77,128
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://www.just.edu.jo

*KLSC Calculation

The State of Kuwait

Kuwait Foundation for the Advancement of Sciences (KFAS)



The Kuwait Foundation for the Advancement of Sciences (KFAS) is a private non-profit organization dedicated to supporting the progress and advancement of science and technology. The main objective of KFAS is to stimulate creative initiatives and promote the construction of a solid scientific and technological base while at the same time creating an environment that encourages innovation.



Type of University/Institute	Private
Year Established	1976
No. of Faculties	N/A
No. of Teaching Staff	N/A
No. of Students	N/A
No. of Alumni	N/A
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://www.kfas.org

Dasman Diabetes Institute



To promote national welfare, the Kuwait Foundation for the Advancement of Sciences (KFAS) surveyed the top diseases affecting the Kuwaiti population. Among those diseases, diabetes was the fastest growing chronic condition. As a result, KFAS financed the establishment of the Dasman Diabetes Institute (DDI).



Type of University/Institute	Private
Year Established	2001
No. of Faculties	N/A
No. of Teaching Staff	N/A
No. of Students	N/A
No. of Alumni	N/A
No. of Publications	2
Endowment/Budget Size	N/A
Website	http://www.dasmaninstitute.or

The Kuwait Institute for Scientific Research (KISR)



KISR was established in 1967 by the Arabian Oil Company. The institute was founded to carry out applied research in petroleum, arid-zone agriculture and marine biology. KISR established as an independent public institution in 1981.



Type of University/Institute	Public
Year Established	1967
No. of Faculties	N/A
No. of Teaching Staff	N/A
No. of Students	N/A
No. of Alumni	N/A
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://www.kisr.edu.kw

Kuwait University (KU)



The university was officially inaugurated on November 27, 1966 to include the College of Science, the College of Arts, the College of Education and the College for Women. The university is the state's first public institution of higher education and research.



Type of University/Institute	Public
Year Established	1966
No. of Faculties	17
No. of Teaching Staff	1,577
No. of Students	37,365
No. of Alumni	*190,536
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://kuweb.ku.edu.k

*KLSC Calculation



The Lebanese Republic

Lebanese University (LU)



The Lebanese University was established in 1951[5] to serve the diverse social groups that make up Lebanese society, and to provide a high-level institution in which students can acquire university degrees.



Type of University/Institute	Public
Year Established	1951
No. of Faculties	14
No. of Teaching Staff	~5,000
No. of Students	~74,000
No. of Alumni	*488,400
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	https://www.ul.edu.lb

*KLSC Calculation

American University of Beirut (AUB)



Founded in 1866, the American University of Beirut bases its educational philosophy, standards, and practices on the American liberal arts model of higher education. AUB currently offers more than 130 programs leading to the bachelor's, master's, MD, and PhD degrees.



Type of	Private
Year Established	1866
No. of Faculties	7
No. of Teaching Staff	943
No. of Students	7,836
No. of Alumni	*50,000
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	https://www.aub.edu.lb

*KLSC Calculation

The Kingdom of Morocco

Al Akhawayn University Ifrane



Al Akhawayn University in Ifrane opened its doors to students in January 1995. Based on the principles of diversity and an international outlook, the university's mission is driven by values of human solidarity and tolerance. Al Akhawayn has modeled its administrative, pedagogical, and academic organization on the American university system, and English is the language of instruction.



*KLSC Calculation

Type of	Public
Year Established	1993
No. of Faculties	5
No. of Teaching Staff	139
No. of Students	1791
No. of Alumni	*4000
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://www.aui.ma

University Mohammed V – Agdal



Mohammed V University A is a public university that provides high quality education to over 20 000 students annually. Its alumni include leading government officials, ambassadors, academics, engineers, lawyers and executives.



*KLSC Calculation

Type of	Public
Year Established	1920
No. of Faculties	6
No. of Teaching Staff	1,160
No. of Students	75,403
No. of Alumni	*731,380
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://www.um5.ac.ma

The Sultanate of Oman

Sultan Qaboos University (SQU)



Sultan Qaboos University is the realization of the promise announced by His. Majesty Sultan Qaboos Bin Said during the 10th anniversary of Oman's National Day in 1980. Construction started in 1982 and the first Sultan Qaboos University students were enrolled in 1986.



*KLSC Calculation

Type of University/Institute	Public
Year Established	1986
No. of Faculties	9
No. of Teaching Staff	899
No. of Students	7,634
No. of Alumni	*23,653
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	https://www.squ.edu.om

University of Nizwa



The University of Nizwa is a non-profit academic institution, which is governed by its faculty. It shall promote positive thinking, preserve the nation's Islamic and cultural heritage and identity, faith in Allah and loyalty to the country and His Majesty. Its purpose is to broadly educate students and equip them with values, knowledge and life skills needed to enrich their lives and enable them to meaningfully contribute to the progress of society.



*KLSC Calculation

Type of	Public
Year Established	2004
No. of Faculties	4
No. of Teaching Staff	~271
No. of Students	~5,182
No. of Alumni	*6,734
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://www.unizwa.edu.om

The State of Qatar

Qatar University



Qatar University is the national institution of higher education in Qatar. It provides high quality undergraduate and graduate programs that prepare competent graduates, destined to shape the future of Qatar.


	Type of University/Institute	Public
	Year Established	1977
	No. of Faculties	9
	No. of Teaching Staff	949
	No. of Students	11,844
	No. of Alumni	*47,360
	No. of Publications	6
	Endowment/Budget Size	N/A
	Website	www.qu.edu.qa

*KLSC Calculation

Hamad bin Khalifa University (HBKU)



Hamad Bin Khalifa University (HBKU), a member of Qatar Foundation for Education, Science, and Community Development (QF), was founded in 2010 to continue fulfilling QF's vision of unlocking human potential. HBKU is an emerging research university that acts as a catalyst for transformative change in Qatar and the region while having global impact.

	Type of University/Institute	Private
	Year Established	2010
	No. of Faculties	5
	No. of Teaching Staff	N/A
	No. of Students	~500
	No. of Alumni	*700
	No. of Publications	28
	Endowment/Budget Size	N/A
	Website	https://www.hbku.edu

*KLSC Calculation

Carnegie Mellon University in Qatar



Carnegie Mellon University established to create a transformative educational experience for students focused on deep disciplinary knowledge, problem solving, leadership, communication and interpersonal skills and personal health and well-being.



*Calculated

Type of	Private
Year Established	2004
No. of Faculties	5
No. of Teaching Staff	N/A
No. of Students	~ 500
No. of Alumni	*1,300
No. of Publications	28
Endowment/Budget Size	N/A
Website	https://www.qatar.cmu.edu/

Qatar Foundation



Qatar Foundation for Education, Science and Community Development is a private, non-profit organization that serves the people of Qatar by supporting and operating programs in three core mission areas: education, science and research, and community development. The Foundation strives to nurture the future leaders of Qatar.



Type of University/Institute	Private
Year Established	1995
No. of Faculties	N/A
No. of Teaching Staff	N/A
No. of Students	N/A
No. of Alumni	N/A
No. of Publications	3
Endowment/Budget Size	N/A
Website	https://www.qf.org.qa

The Kingdom of Saudi Arabia

King Abdullah University of Science and Technology (KAUST)



KAUST advances science and technology through distinctive and collaborative research integrated with graduate education. KAUST catalyst for innovation, economic development and social prosperity in Saudi Arabia and the world. It strives to enhance the welfare of society with a special focus on four areas of global significance – food, water, energy and the environment.

	Type of	Private
	Year Established	2009
	No. of Faculties	N/A
	No. of Teaching Staff	~ 200
	No. of Students	~ 1500
	No. of Alumni	*2,400
	No. of Publications	169
	Endowment/Budget Size	20 Billion USD
	Website	https://www.kaust.edu.sa

*KLSC Calculation

King Abdulaziz University (KAU)



King Abdulaziz University (KAU) was founded in 1967 in Jeddah, Saudi Arabia. Established initially as a private university and later in 1974 King Abdulaziz University was converted to a public university by a resolution of the Council Ministers of Saudi Arabia.

	Type of University/Institute	Private
	Year Established	1967
	No. of Faculties	19
	No. of Teaching Staff	3875
	No. of Students	37,178
	No. of Alumni	*185,850
	No. of Publications	164
	Endowment/Budget Size	1 Billion USD
	Website	http://www.kau.edu.sa

*KLSC Calculation



King Saud University (KSU)



Established in 1957, to provide distinctive education, produce creative research, serve society and contribute in building the knowledge economy and community through learning, creative thinking environment, the optimal use of technology and effective international partnership.



Type of University/Institute	Public
Year Established	1957
No. of Faculties	19
No. of Teaching Staff	4,869
No. of Students	40,404
No. of Alumni	*242,400
No. of Publications	32
Endowment/Budget Size	2.7\$ Billion USD
Website	http://ksu.edu.sa

*KLSC Calculation

King Fahd University of Petroleum & Minerals (KFUPM)



King Fahd University of Petroleum and Minerals (KFUPM) was officially established on 23rd September, 1963, With vision to preeminent institution known for its globally competitive graduates, cutting edge research, and leadership in energy discoveries.



Type of University/Institute	Public
Year Established	1963
No. of Faculties	8
No. of Teaching Staff	*3,500
No. of Students	33,093
No. of Alumni	33,265
No. of Publications	11
Endowment/Budget Size	N/A
Website	http://www.kfupm.edu.sa

*KLSC Calculation



King Abdulaziz City for Science and Technology (KACST)



The King Abdulaziz City for Science and Technology (KACST) is Saudi Arabia's national science agency and home to its advanced laboratories. To help achieve the Kingdom's shift towards a knowledge-based economy, KACST is promoting the development and investment in the national system of science, technology and innovation, by orienting research outputs towards industrial diversification.



Type of University/Institute	Public
Year Established	1977
No. of Faculties	N/A
No. of Teaching Staff	N/A
No. of Students	N/A
No. of Alumni	N/A
No. of Publications	22
Endowment/Budget Size	N/A
Website	https://www.kacst.edu.sa

*KLSC Calculation

Princess Nora Bint Abdulrahman University



The Princess Noro Bint Abdulrahman university for women in Riyadh was established in 1970, with vision to become a comprehensive university for women, distinguished with its academic leadership and scientific research that contributes to building a knowledge economy with societal and international partnerships.



Type of University/Institute	Public
Year Established	1970
No. of Faculties	14
No. of Teaching Staff	~ 2,500
No. of Students	~ 52,500
No. of Alumni	*246,750
No. of Publications	N/A
Endowment/Budget Size	N/A
Website	http://www.pnu.edu.sa

*KLSC Calculation

The Republic of Tunisia

University of Tunis El Manar



The University of Tunis El Manar is a public administrative institution created in 1987 under the name of University of sciences, technologies and medicine of Tunis by Article 97 of Act No.87-83 of 31 December 1987.



Type of	Public
Year Established	1987
No. of Faculties	4
No. of Teaching Staff	3,169
No. of Students	38,000
No. of Alumni	*114,000
No. of Publications	5
Endowment/Budget Size	N/A
Website	http://www.utm.rnu.tn

*KLSC Calculation

University of Monastir



The University of Monastir is famously decentralized, noted for the independence of its various constituent faculties and institutions and schools.



Type of University/Institute	Public
Year Established	2004
No. of Faculties	5
No. of Teaching Staff	1966
No. of Students	19,973
No. of Alumni	*51,930
No. of Publications	2
Endowment/Budget Size	N/A
Website	http://www.um.rnu.tn

*KLSC Calculation

The Republic of Turkey

Istanbul Technical University



Istanbul Technical University is one of the world's oldest technical universities with a long history of 250 years. ITU offers 39 graduate programs at 13 faculties, 39 postgraduate and doctoral programs at 6 institutes on five different campuses, all of them located in the heart of Istanbul.



Type of	Public
Year Established	1773
No. of Faculties	13
No. of Teaching Staff	1,291
No. of Students	35,789
No. of Alumni	*436,625
No. of Publications	62
Endowment/Budget Size	N/A
Website	www.itu.edu.tr

*KLSC Calculation

Middle East Technical University



Middle East Technical University is founded on November 15th, 1956 to contribute to the development of Turkey and Middle East countries and especially to train people so as to create a skilled workforce in the fields of natural and social sciences.



Type of University/Institute	Public
Year Established	1956
No. of Faculties	5
No. of Teaching Staff	~ 1,106
No. of Students	~ 28,000
No. of Alumni	~170,800
No. of Publications	74
Endowment/Budget Size	400 Million USD
Website	http://www.um.rnu.tn

*KLSC Calculation



Bilkent University



Bilkent University – the first private, nonprofit university in Turkey – was founded on October 20, 1984, by Professor İhsan Doğramacı, M.D., with the fundamental aim of creating a center of excellence in higher education.



Type of	Private
Year Established	1984
No. of Faculties	9
No. of Teaching Staff	~ 1,000
No. of Students	~ 13,116
No. of Alumni	*43,263
No. of Publications	2
Endowment/Budget Size	N/A
Website	http://w3.bilkent.edu.tr

*KLSC Calculation

Sabanci University



Sabanci University established to to develop internationally competent and confident individuals, enriched with the ability to reflect critically and independently, combined with a strong sense of social responsibility.



Type of University/Institute	Private
Year Established	1994
No. of Faculties	3
No. of Teaching Staff	384
No. of Students	4,967
No. of Alumni	*9,280
No. of Publications	156
Endowment/Budget Size	N/A
Website	https://www.sabanciuniv.edu

*KLSC Calculation



The United Arab Emirates

United Arab Emirates University



The first and foremost comprehensive national university in the United Arab Emirates. Founded in 1976 by the late Sheikh Zayed Bin Sultan Al Nahyan, UAEU aspires to become a comprehensive, research-intensive university.



Type of University/Institute	Public
Year Established	1976
No. of Faculties	9
No. of Teaching Staff	946
No. of Students	~ 14,000
No. of Alumni	*57,400
No. of Publications	574
Endowment/Budget Size	N/A
Website	http://www.uaeu.ac.ae

*KLSC Calculation

American University of Sharjah



Founded in 1997 by His Highness Sheikh Dr. Sultan bin Muhammad Al Qasimi, Member of the Supreme Council of the United Arab Emirates and Ruler of Sharjah.



Type of University/Institute	Private
Year Established	1997
No. of Faculties	3
No. of Teaching Staff	370
No. of Students	5,545
No. of Alumni	*11,080
No. of Publications	2
Endowment/Budget Size	N/A
Website	https://www.aus.edu

*KLSC Calculation

Khalifa University of Science, Technology and Research



Khalifa University is an independent, non-profit, coeducational institution inaugurated in 2007 as part of an Abu Dhabi Government initiative. Khalifa University is supported by the UAE government and owned entirely by the Emirate of Abu Dhabi.



Type of University/Institute	Public
Year Established	2007
No. of Faculties	2
No. of Teaching Staff	182
No. of Students	1,875
No. of Alumni	*2,255
No. of Publications	2
Endowment/Budget Size	N/A
Website	http://www.kustar.ac.ae

*KLSC Calculation

Masdar Institute of Science and Technology



Masdar institute established on 2007 with objectives of continually evolve interdisciplinary, collaborative research and development capability in advanced energy and sustainability and Educate students to be innovators with the breadth and depth to develop technology and enterprises in the region and globally.



Type of Institute	Private
Year Established	2007
No. of Faculties	N/A
No. of Teaching Staff	85
No. of Students	456
No. of Alumni	*910
No. of Publications	2
Endowment/Budget Size	80 Million USD
Website	https://www.masdar.ac.ae

*KLSC Calculation



State of Palestine

Palestinian Neuroscience Initiative



The Palestinian Neuroscience Initiative (PNI) was established in 2009 at Al-Quds University as a nucleus for a future Palestinian Neuroscience Institute. It encompasses research and educational programs in cognitive neuroscience, molecular neuroscience, neurogenetics, neuropharmacology and neuropsychiatry.



Type of Institute	Private
Year Established	2009
No. of Faculties	N/A
No. of Teaching Staff	N/A
No. of Students	N/A
No. of Alumni	N/A
No. of Publications	2
Endowment/Budget Size	N/A
Website	http://neuroscience.med.alquds.edu/

Section VIII: Companies Involved & Investing in Scientific Research and Innovation

National Technology Enterprises Company (NTEC)



NTEC was created to utilize its broad objectives and technology focus being: Information & Communications Technologies, Life Sciences & Healthcare Technologies, Energy, Renewable Energy, and Water & Environmental Technologies.

Type of University/Institute	Private
Year Established	2002
Paid Up Capital	100 Million Kuwaiti Dinars (~350 Million USD)
Assets under Management	Enertech, Impulse, Kuwait Life Sciences Company (KLSC), Global Innovations Company and National Advisory Services Company (NASCO)
Investment Sector	Energy, Information Technology and Healthcare
Notable Investments	Plug power, Heliocentris, Luminus, Immatix, Stemcyte, Futuretec
Notable Partnerships	Massachusetts institute of technology unit-USA, KFSA, GUST,
Website	https://www.ntec.com.kw

Kuwait Life Science Company (KLSC)



Kuwait Life Science Company is a fully owned subsidiary of (NTEC) that focuses on healthcare innovative concepts and demanded services which have a clear unmet need. KLSC supports both public and private sectors to access emerging technologies and operates in healthcare investment, medical technologies and training.

Type of University/Institute	Private
Year Established	2010
Paid Up Capital	15 Million Kuwaiti Dinars (~53 Million USD)
Portfolio Companies	eCore MENA, Clinart, Life science Academy (LSA), Innomedics, NewBridge Pharmaceuticals
Investment Sector	Healthcare
Other Notable Investments	Quanta and Immatix Biotechnology
Notable Partnerships	QuintilesIMS, Cerner Corporation, GE Global Innovations Council. UK Healthcare
Website	www.klsc.com.kw

Impulse



Impulse International is a venture capital firm based in Safat, Kuwait. The firm invests in late stage and growth stage companies operating in the technology, ICT solutions and security solutions sectors. It also does direct investment to lead both government and private sectors.

Type of University/Institute	Private
Year Established	2010
Paid Up Capital	15 Million Kuwaiti Dinars (~53 Million USD)
Assets Under Management	Alien, Future Tec and Palringo
Investment Sector	Information Technology
Notable Investments	Adludio, Careem
Website	www.impulse.com.kw

Enertech



EnerTech Holding Company is a fully owned subsidiary of the National Technology Enterprises Company (NTEC) and was established in 2012 as a Kuwaiti Holding Company. The firm prefers to invest in the energy, clean tech, recycling, water, waste management and renewable energy sectors. It is based in Safat, Kuwait.

Type of University/Institute	Private
Year Established	2012
Paid Up Capital	15 Million Kuwaiti Dinars (~53 Million USD)
Assets under Management	Conduit Ventures, Element partners, CMEA capital
Investment Sector	Alternative energy and Energy efficiency, Water, Environment and Oil & Gas
Notable Investments	Red wave energy, Morgan solar, Tougas oilfield solutions
Website	www.enertech.com.kw



Taqnia



TAQNIA Investments is a venture capital firm based in Riyadh, Saudi Arabia. The firm prefers to invest in the life sciences and health, security and defense, information and communication technology, material sciences, energy and environment and water technology sectors.

Type of University/Institute	Private
Year Established	2011
Paid Up Capital	N/A
Assets Under Management	N/A
Investment Sector	Life Science, Health, Security & Defense, IT, Material Science and Energy,
Notable Investments	Manufacturer Satellite Equipment, Carbonics, Flux,
Website	www.taqn timer.com

Dubai Silicon Oasis



Dubai Silicon Oasis Authority, a 100% government-owned free zone that promotes modern technology based industries with urban master-planned community, state-of-the-art infrastructure and in-house business services, with mission to create a universally recognized state-of-the-art "technology oasis" by facilitating and promoting technology-based industries, research and development within a fully integrated community

Type of University/Institute	Public
Year Established	2004
Paid Up Capital	N/A
Assets under Management	N/A
Investment Sector	Dubai smart city, Dubai Islamic development center
Notable Investments	N/A
Website	www.dsoa.ae



Masdar



Masdar Capital is a private equity and venture capital arm of the Abu Dhabi government-owned Mubadala Development Company. The firm manages the investments made in the energy sector with a focus on renewable energy, sustainable urban development, carbon capture and storage project development, and clean technology.

Type of Company	Private
Year Established	2006
Paid Up Capital	N/A
Assets under Management	N/A
Investment Sector	Renewable energy
Notable Investments	Dudgeon Offshore Wind, rePlanet holdings, FRX polymers, London Array1
Website	www.masdar.ae

Mubadala



Mubadala Investment Company is an investment firm formed by the merger of two Saudi sovereign wealth funds, International Petroleum Investment Company and Mubadala Development Company. The firm is based in Abu Dhabi, United Arab Emirates.

Type of Company	Private
Year Established	2006
Paid Up Capital	N/A
Assets under Management	N/A
Investment Sector	Renewable energy
Notable Investments	Dudgeon Offshore Wind, rePlanet holdings, FRX polymers, London Array1
Website	www.mubadala.com

Oman Technology Fund



With objective of the incubation funds is to support, accelerate and growth the successful development of angel or startup companies by providing entrepreneurs with an array of services.

Type of Company	Private
Year Established	2016
Paid Up Capital	150 Million USD
Assets under Management	N/A
Investment Sector	Early stage technology ventures
Notable Investments	N/A
Website	http://www.otf.om

Qatar Science and Technology Park



Qatar Science & Technology Park (QSTP) is a home for international technology companies in Qatar, and an incubator of start-up technology businesses.

Type of Company	Private
Year Established	2009
Paid Up Capital	800 Million USD
Assets under Management	N/A
Investment Sector	Startups
Notable Investments	N/A
Website	www.qstp.org.qa

Section IX: Scientific Thought Leadership in MENA

During the preparation of the report, we had reached out to 80 of the MENA regions top scientific minds. Unfortunately only 21 responded with significant contributions to the following section of the report. That represents a percentage of just below 30% and highlights the collective apathy many of the region's top minds have for actual scientific thought. It is our fervent hope that future editions of this report will gather higher levels of support from the top minds, top universities and the top scientific institutions of the region.

Selection of Qualitative Questions and Answers from MENA Thought Leaders (Anonymized)

Why is so important about science and technology?

Looking back through history, the world has experienced 4 industrial revolutions: the first saw the mechanization of production using water / steam power, the second was about mass production / assembly lines, the third enabled automation through computers and information technology, and finally today's fourth industrial revolution is bringing on the digital age through the convergence of physical, virtual/digital, and biological worlds. While each industrial revolution brought bigger and better advances, they all have one thing in common – i.e. they all enabled economic growth by increasing productivity and efficiency, driving inclusion / reducing poverty, improving quality of life / access to education and healthcare, and creating high-skill jobs / raising global income levels. In doing so, advances in science and technology have repeatedly transformed all aspects of business, society and human life.

What are some of the main challenges facing the science community in MENA?

A key challenge in MENA today is the lack of an end-to-end ecosystem that promotes advancement in science, technology and innovation. On one hand the region has a large youth population (~60% of population under 25 years of age) and at the individual level people are highly technologically savvy (high penetration of smartphones and social media usage). Simultaneously, however, there is relatively low adoption and investment in science and technology by governments and private sector. Furthermore, there is a lack of infrastructure, governance / policies, and funding available to promote advancement in these fields. This creates a huge bottle-neck in the system, making it difficult to achieve progress and capture the full potential at the speed needed.

Another key issue facing the science community in MENA relates to the talent pool / human capital. One aspect of this is the lack of leading local universities / research institutions that draw top science and engineering talent to the region. Another key aspect is the gender inequality and struggle to retain women in STEM fields. Today,



women comprise ~50% of the STEM graduates in MENA, yet less than ~20% women are actually working in STEM related fields.

What is the major regional challenge in MENA that you feel the science community must tackle as a top priority?

The ideology of science is what needs the utmost attention as an urging priority. The science community needs to consider looking at the relationship and analogy between science and ideology. In general the propositions of ideological knowledge when compared to the Scientific's are anti-empirical, confusing, shy away from counter-examples, and are underpinned by attitude that is potentially maniacal and omnipotent. On the other hand scientific knowledge is regulated by logic of methodology, empirical references, and is animated by a depressive attitude . It is therefore significant to highlight the importance of positioning scientific thinking in the ideology of nations of the MENA Region.

Development is inevitably linked with science. The argument here follows more or less a “science in science out” approach. If educational, cultural, and behavioral practices within a community are inter-linked with science as one core societal value, such practices would evolve and consequently reflect onto a viable politico-economic system that is both vitalizing and being vitalized by science. In other words we start and end with science (science in, science out). It is therefore the duty of the science community to work on reshaping science perception, and showcasing the unique role of science and technology in development of nations. Scientific thinking should be simplified and re-introduced into the community level. Tools to transform such knowledge into technology need to co-exist. Such tools maybe rising of new entrepreneurship, diffusion of new business models, transformations in health care provision systems, and unleashing leadership of young talents.

What are some of the top trending fields in science that are going to revolutionize the world in the next five years?

The digital age will bring several new advances in the field of science and technology. Some top trends that we should all look out for are

- Internet of Things & Big Data – Smart devices & sensors are collecting more real-time data than ever before and the ability to mine this data for real-time insights can create unprecedented value across industries. Leading companies have already started to embrace this (e.g. Amazon, Google, GE), and the full potential will continue to be realized as more and more corporations and governments start to implement it going forward.

- Additive Manufacturing – 3-D printing technology is revolutionizing all industries – including manufacturing, consumer goods, automotive, healthcare, etc. It will enable on-demand production of goods with exact specifications at the click of a button – practically eliminating waste, inefficiencies, and dependence on international sourcing.
- Artificial Intelligence & Robotics – Advances in AI and machine learning are creating technology that can mimic the human brain and behavior. In the future man-made machines will be able to make split-second, human-like decisions, solve problems, interact socially, and learn / process new information. The application of such technology will be far-reaching and transformational.

The impact of each of these trends will be enormous both at a macro and micro level – it will touch governments / policy, industries / private corporations, as well as individual households. Ultimately, how we, as a society, manage the ethical and human implications and risks of these technologies will define their long-term viability and sustainability.

Which of those fields of science do you see the MENA region become globally competitive in?

- Robotics and Drones
- Space sciences
- Personalized Medicine
- Cloud Technology
- Data security
- Consumer driven healthcare

How can we improve STEM education in MENA?

Improving STEM education and developing a robust talent pipeline is critical for MENA. To do this, we need investment & commitment from both public and private sector champions to ensure highest levels of impact and visibility. We need to set tangible short and long-run targets for the region to drive momentum and ensure long-term commitment to this priority. Secondly, we need to foster collaboration and increase communication to raise awareness and promote the sciences amongst the youth. For example, this can be done through the development of specialized science & technology focused communities and curriculums that are committed to talent development. Lastly, we need to be inclusive and ensure the next-generation of female talent is given equal opportunity to advance in STEM related fields. This will require us to change the current mindset and establish the right support networks by encouraging today's female leaders to serve as role models and mentors for the youth.

Scientists must put heavy emphasis on developing innovation and entrepreneurship. How can we encourage innovation to all across MENA?

Given the current focus on economic diversification across MENA, driving innovation and entrepreneurship is increasingly relevant and critical. Silicon Valley is successful because it is a complete ecosystem that brings together a clustering of the brightest minds and all necessary enablers in a single hub to realize the power of innovation and entrepreneurship. Re-creating this type of an ecosystem to support successful innovation requires several key ingredients to come together and work in harmony.

- Robust and diverse talent pool ... this requires local / regional universities and research institutions to train the brightest minds & enable a healthy talent pipeline
- Funding and investors that can enable scale and high impact execution
- Partnership and collaboration from private sector / industry to ensure ideas are commercially viable and relevant
- Government support, infrastructure, as well as the necessary governance frameworks and policies needed to support an entrepreneurial, innovation driven ecosystem

As a tool to inspire future generations, what do you see as your greatest achievement when it comes to science?

The greatest achievement in science that novel technique to test human DNA and accurately predict any given patient's response / sensitivity level to radio-therapy and chemo-therapy ahead of treatment being administered. By using science to correlate outcomes with treatment plan, this innovation delivers great impact in reducing morbidity rates and improving overall patient outcomes, as well as providing a more efficient approach for all stakeholders (i.e. patients, doctors, insurers) from a healthcare economics perspective.

Word Cloud Qualitative Analysis of MENA Scientific Thought Leader Contributions

The Importance of Science and Technology in the Middle East



Main Challenges Facing the Science Community in MENA



Top Trending Fields in Science -Revolutionize the World in the Next Five Years



Science & Technology Fields –MENA Becoming Globally Competitive



Ways to Improve STEM Education in MENA



Ways to Encourage Innovation to Across MENA

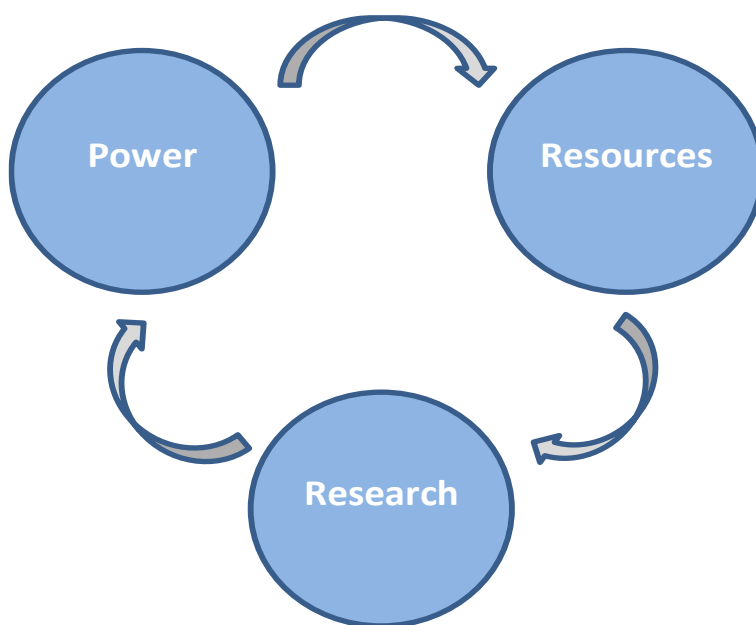


Greatest Achievement of Top MENA Science Thought Leaders



Section X: Discussion and Conclusion – STI as a Catalyst of Change

The Scientific Revolution's feedback loop needs more than just research to make progress. It depends on the mutual reinforcement of science, politics and economics. Political and economic institutions provide the resources without which scientific research is almost impossible. In return, scientific research provides new powers that are used, among other things, to obtain new resources, some of which are reinvested in research^[20].



It therefore seems appropriate that the final section of this report is represented by the symbol X. As any high school graduate can proudly proclaim, Algebra was born in books of Baghdad, during the Golden Age of the medieval Middle East (750 to 1258 AD), and its early form can be seen in the work of **Muhammad Al-Khwarizmi** and his 9th century book, *Kitab al-jabr wal-muqabala* (*Al-Jabr* later morphing into Algebra in English).

In a recent TED talk, the director of *The Radius Foundation*, **Terry Moore**, posited that the use of “x” in this way began with the inability of Spanish scholars to translate certain Arabic sounds, including the letter sheen “ش” (or shin). Indeed, the word for an “unknown thing” in Arabic is *shay’a* “شيء” which appeared many times in early mathematical works.

Now, since Spanish scholars had no corresponding sound for “sh,” they went with the “ck” sound, which in classical Greek is written with the chi symbol, X. Moore theorizes, as many others before him have done, that when this was later translated into Latin, the chi (X) was replaced with the more common Latin x.

This Middle East Science Report covers many of the important trends and scientific aspiration for the region, and like the work of Terry Moore, builds on research already published. But it is certainly is nowhere near a complete appreciation. Thankfully there is a willingness and a growing acceptance from within the Middle East to follow the worldwide trend of STI as a driver of development – a catalyst of change. At the same time, the statistical data on basic STI indicators remain patchy, especially within the MENA countries. Nevertheless, there is a growing awareness of the need for reliable data to enable monitoring of national science and innovation systems and inform policy.

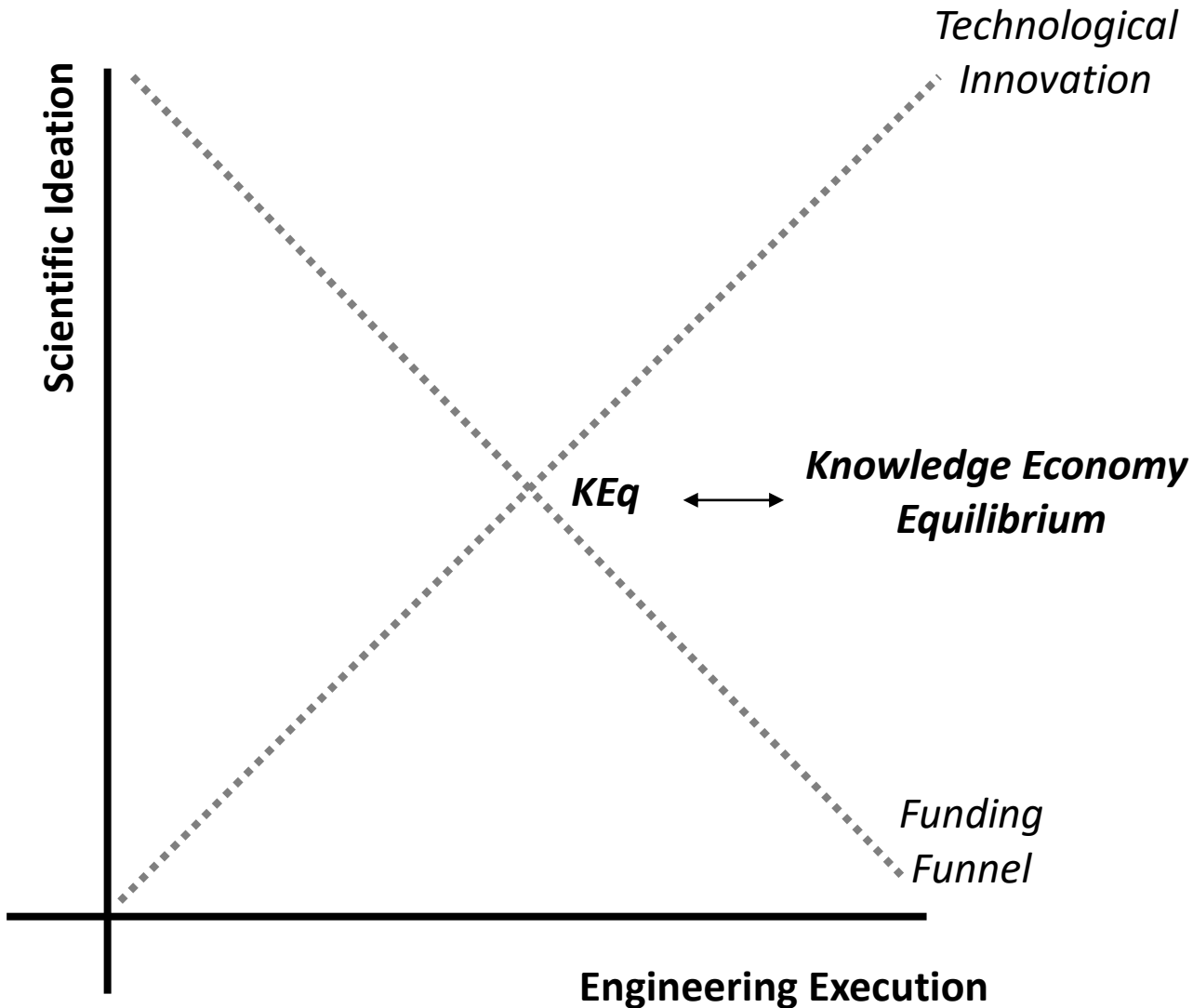
Developing a successful national science and innovation policy remains a very difficult task. Realizing the full benefit from science- and innovation-driven economic development requires moving in the right direction in a number of different policy fields simultaneously, including those affecting education, basic science, technological development and its consequence of mainstreaming green technologies, business R&D and economic framework conditions

The MENA Strategy for Science, Technology and Innovation endorsed by the Council of Ministers of higher Education and Scientific Research in the Arab World in 2014 proposes an ambitious agenda. Countries are urged to engage in greater international co-operation in 14 scientific disciplines and strategic economic sectors, including nuclear energy, space sciences and convergent technologies such as bio-informatics and Nano-biotechnology. However, we believe that we need more than just mere works, the region is hungry for concrete and decisive decision making, and most importantly – action. Only in this respect, can Middle Eastern government’s help propel their hydrocarbon and tourism based economies past the *KEq* or Knowledge Economy Equilibrium into a new epoch focused on Technological Innovation.

Surpassing the Knowledge Economy Equilibrium

(Notice the return of the all-important 'X')

ILLUSTRATIVE



The above illustrative chart highlights an important take away that large funds (primarily from the public sector, including the military) are required during the initial stages of technological innovations, where scientific ideation is at its highest. Anecdotally, thousands of ideas must be carefully fostered and selectively funded to generate a handful of innovative technologies that can dynamically grow the economy and help transform it from an economy dying of consumption into a Knowledge Economy thriving on innovation.

The private sector must also be encouraged to not only contribute to the R&D effort by investing early in the funding funnel, but also then taking over the proverbial baton from the public sector and leading the engineering execution of new technologies and innovations through commercialization.

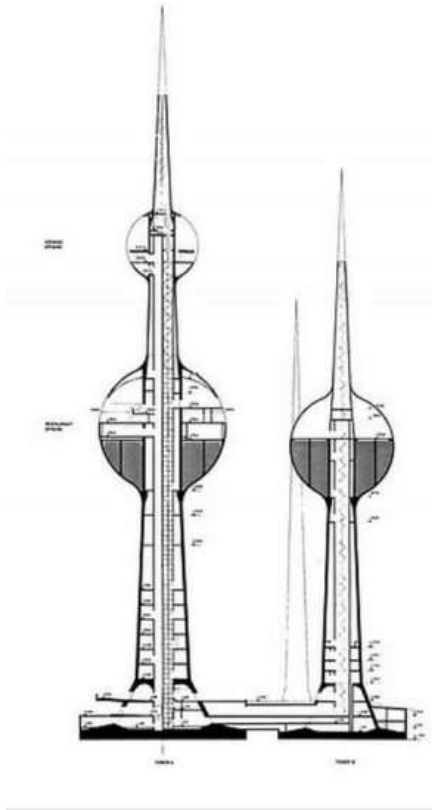
For the Middle East countries, it is imperative to accelerate the transfer of innovative technologies by developing educational large-scale pilot projects in priority areas, including renewable energy systems. This will also help to build up a critical mass of technologists in the region. The MENA region needs more champions of science and technology, including in the political arena, to bring about the positive change to which it aspires.

Throughout the report, we have uncovered noble individual efforts across each of the countries and institutions profiled, however, there remains a festering lack of coordination between different important stakeholders within each of the nation states in the Middle East. With the exception of Jordan, none of the countries profiles has a Higher Scientific Council or Ministry of Science and Technology (like in Pakistan). This is certainly an area of ‘low-hanging fruit’ for many a Middle Eastern government, as developing a National Science Roadmap or a Higher Council focused on fostering scientific research across different government agencies is a simple matter of political willpower. Below is a high level example of a future envisioned cooperative state for the Kuwaiti Science Ecosystem.

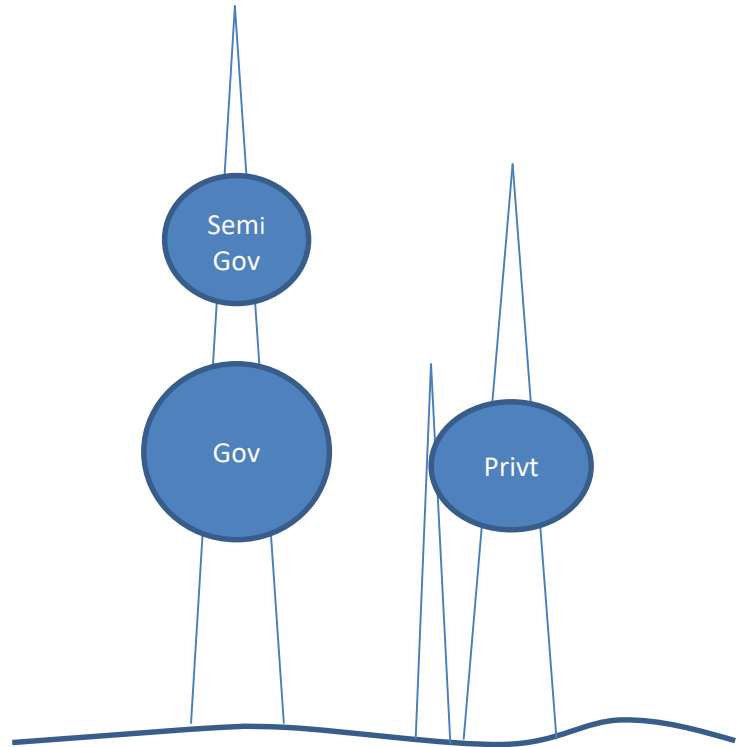


Spheres of Science:

Future Envision State of Kuwaiti STI Ecosystem



**“Inspirational
Architecture of the
1980s”**

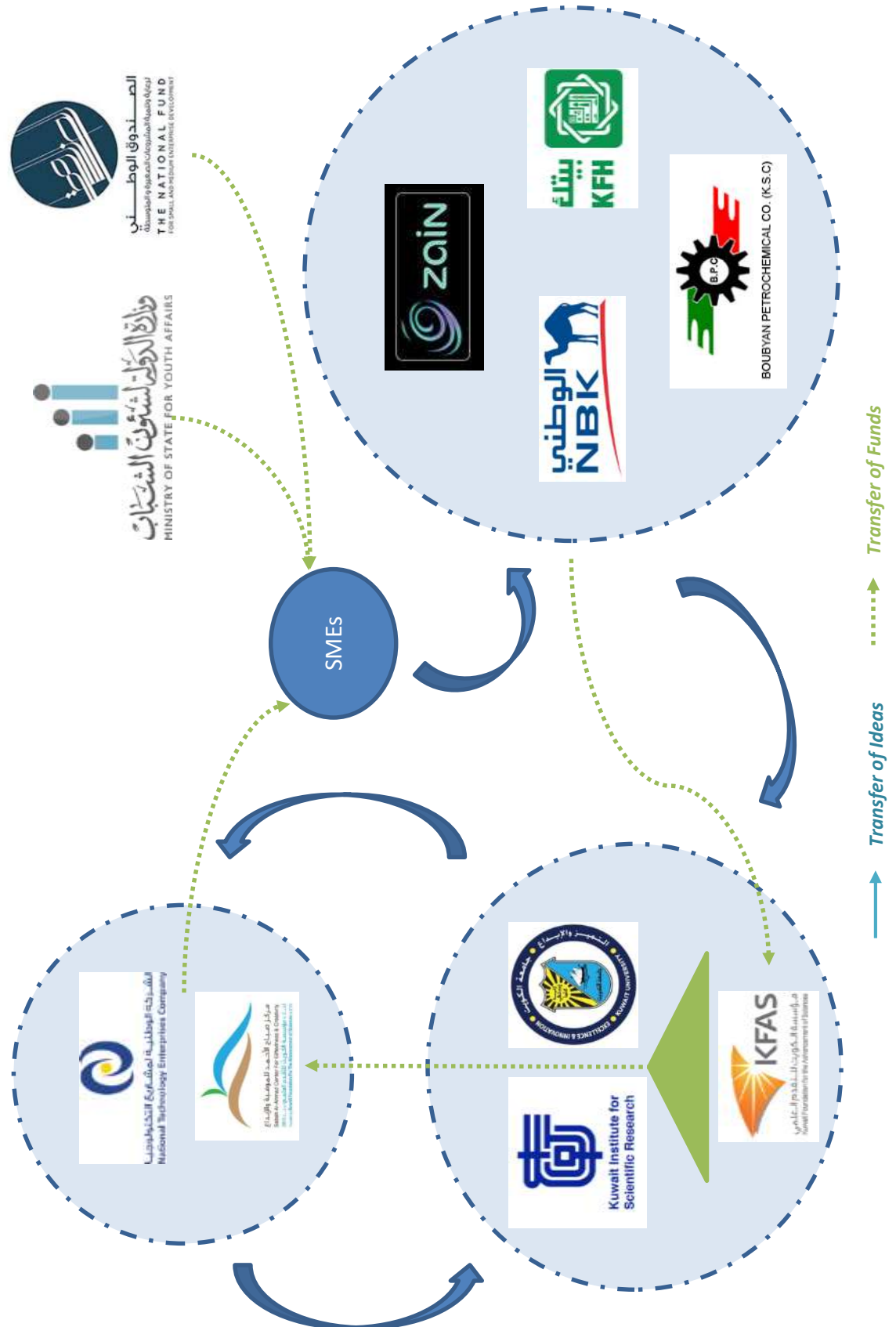


**“Inspirational
Ecosystem of the
2020s”**

Kuwait’s most famous spheres are arguably those that adorn the Kuwait Towers, the country’s national landmark and the inaugural recipient of the Aga Khan Award for Architecture in 1980. 37 years later, the most important spheres to develop and inspire the future youth of Kuwait are the three sphere of Government, Semi-government and Private contributions to the science, technology and innovation sector – who have chosen not to work in individual siloes, but intermurally with a singular vision to elevate Kuwait into a Knowledge Economy.

National STI Roadmap: Suggested Example from Kuwait

Spheres of Science National Ecosystem Example: Kuwait (Select Entities)



The Scientists Journey – Kuwait Example Continued

Today in Kuwait, a scientist's journey is indirectly supported by multiple public, semi public and private entities. Also cross collaboration between these entities does exist in a limited fashion, STI in Kuwait is not as of yet governed or coordinated by a single entity. A Kuwaiti scientists may apply for a grant provided by the Kuwait Foundation for the Advancement of Sciences and conduct his or her research at the Kuwait Institute for Scientific Research or one of the many faculties at Kuwait University. Research grants in Kuwait typically fall in the one to two million KD (~3.3 USD to 6.6 mn USD) range. That same scientist may then apply separately to the KFAS funded Sabah Al Ahmad Center for Creativity and Giftedness (SACC) who would help protect any innovation generated by the research by internationally licensing the Intellectual Property (IP) and developing an early prototype in exchange for a small equity stake or licensing fee. SACC essentially covers all these costs up to ~400,000 KD (~1.33 mn USD). SACC in turn, works closely with the government owned by privately managed National Technology Enterprises Company (NTEC) to both initially vet and continuously commercialize different science and technology inventions that are now patent protected. NTEC and SACC would help said scientist incubate a company, which could then receive further financing either via the *Mubadarat* program of the Ministry of State for Youth Affairs (if the scientists happens to be between the ages of 14 to 34) which provides up to 25,000 KD (~82,500 USD) in grants, or the National Fund for SME Development which provides low interest loans of up to 500,000 KD (~1.65 mn USD) for any company owned by a Kuwaiti entrepreneur.

All in all, the Kuwaiti public and private sector provides close to three million KD or ~10 million USD in total financial funding funnel support per scientist, almost one million KD (~3.3 million USD) is earmarked for commercial development. Unfortunately, many of Kuwait's current and future scientists are either unaware that these programs exists or do not know where to get started.

Furthermore, once this Kuwait scientific SME is properly incubated and developed, it will then grow into a large private company that could eventually list its shares to back to the public on the Kuwait Stock Exchange (KSE), in turn spawning more local jobs and economic value, which would then circle back into the 1% taxation on scientific funding collection by KFAS from profitable companies listed on the Kuwait Stock exchange. The foundation of the Knowledge Economy of Kuwait has indeed been set in motion, yet still requires further coordination and collaboration.



Despite many Middle Eastern Heads of State having committed to raising GERD to 1% of GDP more than 25 years ago, not a single Arab country has yet reached that target. Several MENA governments are setting up observatories to improve the monitoring of their science systems through data collection and analysis. Others should follow suit, in order to monitor the effectiveness of national policies and form a network of observatories to ensure information- sharing and the development of common indicators. Some are already taking this course of action; Lebanon, for instance, is participating in a platform linking Mediterranean observatories of STI. A great example from the developing world is the African Science and Technology Indicators Initiative, which has spawned an observatory based in Equatorial Guinea. A number of MENA economies are also establishing observatories of STI, including Egypt, Jordan, Lebanon and Tunisia.

Perhaps it is time to consider a similar pan-Arab or pan-MENA initiative. Perhaps it is time for us to pool our collective MENA resources rather than operating in the aforementioned individualized siloed efforts. Who will build the next circular city? Which city will be the Baghdad of the 21st century and help light humankind's seventh millennia.

The burning question remains, who will take the lead on hosting the new House of Wisdom?

About the Principal Author – Dr. Mussaad M. Al-Razouki (mussaad@klsc.com.kw)

[Dr. Razouki](#) has over 15 years of experience in venture capital and private equity investment with a focus on healthcare and technology, shifting from an excellence in clinical practice and research to the management and financing of healthcare and education systems. A graduate of **Columbia Business School**, Dr. Razouki is the first ever Arab national to receive an MBA with a focus on Healthcare Management and Finance. Dr. Razouki is a member of the **Hermes Honors Society** of Columbia Business School, an honor bestowed on the top 1000 global alumni of the university. An Oral and Maxillofacial surgeon by training, Dr. Razouki has completed clinical rotations at New York Presbyterian Hospital of **Columbia University Medical Center**, Harlem Hospital, **Cleveland University Hospital** of Case Western Reserve University and Mass General Hospital of **Harvard University**. Dr. Razouki graduated with Cum Laude Honors from **Creighton University** with Bachelors in Biology (Ethology) and TPP (Theology, Philosophy and Political Science).

In 2007, Dr. Razouki joined the world's largest and oldest strategic consulting firms, **Booz Allen Hamilton**, which at the time was operating in over 100 countries across six continents with four billion dollars in revenue. Dr. Razouki had the honor of working with all six GCC Ministers of health and completed health and public sector projects across the GCC, Lebanon and Egypt.

In 2009, Dr. Razouki was selected to join the **Office of Tony Blair** to lead the development of the Kuwait 2030 Vision for Health, Education and Entrepreneurship together with the Council of Minister of Kuwait. Dr. Razouki was also selected to head the Prime Minister's Early Warning System Committee on Health and played an integral part in the establishment of the Kuwait Talent Bank.

In 2011, Dr. Razouki and his partners completed the purchase of a Kuwait based healthcare development company, which was rebranded as [Kleos Healthcare](#). Today, Kleos is widely recognized as a regional thought leader on Middle East healthcare, with a variety of projects in its pipeline ranging from developing a Medical Takaful Insurance company to working on a 750 mn USD government PPP.

In 2015, Dr. Razouki was the first ever Kuwaiti doctor to complete the “*Reforming of Public Systems: Health, Higher Education and Finance*” Executive Education course at the prestigious Grande École, **Paris Institute of Political Studies** (“Sciences Po”).



Dr. Razouki believes that the future of healthcare is approaching the singularity of coalescing the physical world with the digital. As a result, Dr. Razouki has incubated, funded and developed multiple local, regional and international digital health platforms including the [2014 LTE MENA winner](#) for best mobile application - [AbiDoc](#) - the region's first online appointment booking platform and call center and Kuwait's largest network of private hospitals, clinics and doctors, [MEDtrip](#) – the world's top medical tourism platform with offices in Denver, Colorado and Cebu, Philippines, and [Cera Care](#), a London based digital health company focused on excellence in elder care across Europe, which was [awarded](#) the Healthcare Startup of the Year 2016 at the Healthcare Startup Awards, from over 1000 entries.

In 2015, Dr. Razouki was presented with the **Kuwait e-Award** for best eHealth application by His Highness Sheikh Sabah Al Ahmed Al Sabah, the Emir of Kuwait. Dr. Razouki was also selected by **Stanford Medicine** as part of a group of 20 global authors to write a chapter on digital health investing in the upcoming Springer published book: *Digital Health: Scaling Healthcare to the World*. He is the only author from the Arab World. During 2015, Dr. Razouki was also an **Industry Expert Board Member** at Al Ayadi Al Baytha Health Company, a 50 mn USD fully owned company of [Al Khabeer Capital](#), which is one of Saudi Arabia's largest and most active private equity investors with over **three billion dollars of assets under management**. Dr. Razouki worked together with the turnaround team at Al Khabeer and the asset's management to unlock unrealized value in one of Saudi Arabia's fastest growing medical services companies.

In 2016, Dr. Razouki was selected by the Abdul Rahman Al Sumait Award Executive Committee to represent the science community in Kuwait and present at the first ever meeting of the committee. The Committee is co-chaired by His Excellency Sheikh Sabah Khalid Al Hamad Al Sabah, Kuwait's Minister of Foreign Affairs and Mr. Bill Gates. At one million USD it is the largest science prize awarded in for scientific achievement in Africa. Dr. Razouki was also nominated as one of the [top five venture capital investors](#) in the Middle East and North Africa by Arabian Business. Dr. Razouki also [won two awards](#) at the seventh annual **Middle East Healthcare Leadership Awards** for both **Middle East Public Private Partnership of the Year** for the Jaber Hospital PPP Sustainable Hospital Project as well as **Healthcare Entrepreneur of the Year**.

In 2016, Dr. Razouki was also selected to participate in the prestigious [World Economic Forum Global Health and Healthcare Community](#) Meeting as part of the [Future Trends in Health Task Force](#) which was Chaired by Dr. Melanie Walker, Advisor to the President of the World Bank, Dr. Jim Young Kim. Dr. Razouki was the only participant from Kuwait and had the honor of having **seven out the 10 final key technological trends and themes** accepted in the final outcome report of the forum.



[Dr. Razouki](#) is the current Chief Business Development Officer of [Kuwait Life Sciences Company](#) (KLSC) where he is part of a team that manages over 100 million dollars in assets under management including local, regional and international investments on behalf of the Kuwait Investment Authority, the sovereign wealth fund of Kuwait. Dr. Razouki is a regional thought leader within the Middle East life sciences industry and has championed the building of strong pillars of the local life sciences ecosystem including the region's premiere pharmaceutical licensing and distribution platform; [NewBridge](#) - a 50 mn USD revenue company operating across all 22 MENA countries including Iraq, Iran and Turkey as well as South Africa, [Clinart](#) – the region's top Clinical Research Organization (CRO) and host of the first ever Phase II Clinical Trial in the history of Kuwait at the Dasman Diabetes Institute, [eCore](#) – the region's top active pharmaceutical ingredients licensor and distributor, the [Life Sciences Academy](#) – the region's first ever training and development company focused on the healthcare and life sciences industry as well as [Innomedics](#) – one of Kuwait's top medical device distribution companies that pioneered the distribution of personalized digital health products in the region.

At KLSC, Dr. Razouki and his team have partnered with some of the world's top life science venture capital funds including, [New Leaf Venture Partners](#) in New York, [Wellington Partners](#) in Munich and [Kearny Venture Partners](#) and [Presidio Partners](#) both of which are based in San Francisco. Notable direct and indirect investments include: [CRISPR Therapeutics](#) - a leading personalized genomic medicine company based in Cambridge, Massachusetts (NASDAQ: [CRSP](#)), [iRhythm Technologies](#), based in San Francisco, which closed 56% above its listed stock price on the first day of its IPO (NASDAQ: [IRTC](#)), [Quanta Fluid Solutions](#) – one of the world's first home hemodialysis manufacturers, [Median Technologies](#) – a leading global provider of medical imaging solutions, especially in the field of oncology based in France (EPA: [ALMDT](#)) and SuperSonic Imagine – a leading global provider of medical ultrasound solutions also based in France (EPA: [SSI](#))

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For more in depth KLSC report please visit: www.klsc.com.kw/reports

Profiles of Guest Contributors

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Mustafa Ergen is Chief Technology Advisor in Türk Telekom and president of venture funded Ambeent Wireless focusing 5G WiFi. Previously, Mustafa co-founded Silicon Valley startup WiChorus Inc. to focus on 4G technologies and company is acquired by Tellabs \$200M. Previously, he was a National Semiconductor Fellow [now TI] at the University of California Berkeley, where he co-founded the Distributed Sensing Lab, focusing on statistical sensor intelligence and vehicular communication. Mustafa completed PhD and MS degrees in electrical engineering in UC Berkeley.. He has more than 39 patent applications, many publications and authored three books and he is recently awarded Doçent title. He serves in boards of public and private holdings. He is also national delegate in 5G Infrastructure Association and Horizon2020 ICT Program of European Union and advisor at Berkeley Program on Entrepreneurship and Development. He is also an adjunct associate professor at KOC University. He also served in the board of trustees of TOBB University of Economics and Technology and was co-host in TV show on Bloomberg HT about entrepreneurship.

Ms. Valentina Qussisiya

Chief Executive Officer

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Valentina Qussisiya, CEO of Abdul Hameed Shoman Foundation (AHSF), an active member of The Scientific Research Fund board of trustees and a member of Al-Balqa' Applied University board of trustees, and a member of College Council at faculty of Arts and Design at University of Jordan. As the CEO of AHSF, Valentina is leading the Foundation's efforts to invest in cultural and social innovation to positively impact the communities through its three pillars; thought leadership, arts and literature, and employment and innovation. Before joining AHSF, Valentina held the position of Director General of Jordan River Foundation where she played a key role in initiating and supporting youth empowerment, entrepreneurship, and child safety programs. Her career spanned the areas of cultural promotion, social development focusing on poverty alleviation, local governance, child protection, economic development and women/youth empowerment in addition management, planning, and communications. Valentina holds a Master's degree in management studies with a focus on applying business process re-engineering on income-generating projects. In 2010, Valentina was awarded the Eisenhower Fellowship and was named as 2010 Ward Wheelock Fellow.



Mr. Joe W. Henein

President & CEO

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Joe Henein is a senior executive with an accomplished career extending over 30 years in the pharmaceutical industry, and covering many geographies including; USA (Global), Europe, and the Middle East/Africa. Joe holds a Pharm D Degree. Joe joined NewBridge as President and CEO. Prior to that Joe worked in Corporate Pharma, mostly Wyeth Pharmaceuticals which ended up in Pfizer, after which he immediately joined NewBridge. He worked in many disciplines in the industry, most notably as Vice President and Global Commercial Chair for number of therapeutic areas in Wyeth, like Infectious Diseases, and Women's Health Care. He also assumed the role of VP & Regional Managing Director for Wyeth in MEA from 2005-2010. Joe served in various Wyeth executive committees during his tenure as; Global Development Council, Global Development Strategy Board, and European Operation Council. On the industry level, he also served as the Vice Chair for the PhRMA MEA Committee and the Chair for the PhRMA MEA Ethics Review Board. Joe often speaks in many Pharma Conferences including International Market Access and Compliance Forums.

Prof. Fahd Al-Mulla

Founder and CEO

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Fahd Al-Mulla is professor of molecular pathology and genomic medicine at Kuwait University and adjunct Faculty at Marshall University, Joan C. Edwards School of Medicine USA. Fahd established 2 laboratories at Kuwait University. Fahd is the Founder and Director of a private diagnostic genomic medicine center called Genatak, he has pioneered the use of next generation sequencing and microarrays in diagnostics and precision medicine. His research led to the identification of two novel metastasis suppressor genes, namely Carbonyl Reductase and Raf Kinase Inhibitory Proteins, which he and his team characterized further and their therapeutic roles in cancer. He has spearheaded and initiated the 'Genome Arabia' project. Fahd received his Medical Doctorate and Ph.D. from Glasgow University. He is a Fellow of the Royal College of Physicians of Edinburgh. He currently holds 4 patents related to diabetes, wound healing and cancer. He established Technology Transfer and Patenting office in Kuwait University; also he serves as Chair of the Evidence group in the Global Genomic Medicine Collaborative and served as a Chair of the International Confederation of Countries Advisory Council of the Human Variome Project.



Dr. Riad Hartani

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Riad has spent the last two decades contributing to the development of Internet, Mobile and Artificial Intelligence (AI) technologies, mostly out of the Silicon Valley as a hub, building multiple leading technology startups, advising on strategic investments and rolling out innovative technologies all over the world. Most recently, he jumpstarted “Padovani Ventures”, a multi-disciplinary advanced technology initiative. He co-founded Companies such as Xona Partners, iValley.co. He has been in the leadership team of various Silicon Valley technology startups, including: Wichorus, Inc., Anagran, Inc. and Caspian, Inc. He lead and contributed to advanced research teams in prestigious R&D labs in University California at Berkeley-USA, National Research Council- Canada, France (Scientific National Research Center), Korea (Telecommunications Research Institute) and Japan (Hitachi Central Research Labs & AI Labs). Riad was born and grew up in Algiers. He published/presented over 200 research, industry and Internet standards papers. He holds Doctorate in Computer Science (AI) with highest honors from the University of Paris, and was a post-doctoral fellow at University of California at Berkeley.

Dr. Hasan Al-Nashash

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Hasan Al-Nashash is a professor and former chair of the department of Electrical Engineering at the American University of Sharjah. The main themes of Dr. Al-Nashash's research work are in the areas of neuroengineering and analog microelectronics. Dr. Al-Nashash has received a number of awards. In addition, he designed and developed several electronic instruments to measure various biodynamic parameters. He is the author of more than 120 refereed journal and conference papers, 5 book chapters and 2 issued US patents. He was involved in establishing several electrical engineering departments and biomedical engineering specialization in Jordan, Oman and the UAE. He is a senior member of the IEEE and the former Middle East and Africa representative on the IEEE-EMBS Administrative Committee. He worked closely with several biomedical engineering departments and hospitals at the National University of Singapore, Johns Hopkins University, the American Hospital in Dubai, Khelifa Hospital in Ajman and Jordan University Hospital.



Dr. Bahareh Azizi

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Dr. Bahareh Azizi is currently a Consultant for the Kuwait Foundation for the Advancement of Sciences (KFAS) working on strategic initiatives with the Strategic Planning and Evaluation Unit and the Research Directorate at KFAS. Prior to joining KFAS in 2016, Dr. Azizi was working at the Dasman Diabetes Institute in Kuwait since 2012, where she was the Head of Basic Science and Director of Business Development. Besides working on research administration, Dr. Azizi was engaged in research involving the understanding the prevalence of childhood obesity among school children. Prior to moving to Kuwait, Dr. Azizi was a general faculty member at the Georgia Institute of Technology (Georgia Tech), where she was engaged in research and teaching, and continues to maintain those research activities to date. Advising her graduate student, Dr. Azizi's research focuses on trying to understand the molecular relationships between ligand and protein, on a structural level, by designing ligands to activate nuclear receptors, a subfamily of proteins involved in gene regulation and consequently, implicated in several complications, such as cancer and diabetes. On a personal front, in 2016, she started volunteering at one of the local museums, *Dar Al-Athar Al-Islamiyah*, and teaches science and math to children and adults on the weekends. Dr. Azizi is a Tseu Cruddas Senior Fellow at Harris Manchester College, at Oxford University.

Mr. Najati Ali-Hasan

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Najati Ali-Hasan is the founder of Anchor I.T. Consultancy – a company established in Dubai to advise and assist Middle East healthcare organizations deliver on its goals and achieve its missions via the effective use of technology. Najati is considered a thought leader on healthcare automation, value-based care, revenue cycle management. Najati's experience spans the United States, the G.C.C. and Africa having worked at major providers of care and later suppliers of health I.T. services & solutions. Najati is well versed on current G.C.C. market & industry trends and is known to deliver trusted assessments and recommendations to his clients. Najati has a Masters in Business Administration degree from Southern Illinois University with emphasis on hospital administration and I.T.



Dr. Shadi Abu-Hayyeh

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Dr. Shadi Abu-Hayyeh is currently working as Assistant Director (Middle East) at Healthcare UK, part of the British Government, Department for International Trade. In parallel, he is an Honorary Research Fellow at King's College London where he is developing a program of translational research to understand how brown fat (good fat) can be pharmacologically manipulated to improve clinical markers of obesity. Shadi completed his undergraduate studies in Molecular Biology at King's College London, where he was inspired to pursue postgraduate studies in translational medicine, undertaking an MSc in Molecular Medicine and a PhD in Clinical Genetics at Imperial College London. His postdoctoral research interests have focused on energy metabolism, where he has published extensively about the liver's role in altered metabolism of bile acids, fats, and sugars under certain disease conditions. Early on in his scientific career, Shadi recognized the importance of private sector participation in clinical and scientific research. He spent several years at Accenture London, as a Health and Life Sciences Consultant where he successfully led on projects to redesign FTSE100 pharmaceutical company R&D processes, as well as driving strategic programs of work to identify high performance factors of the top 10 global pharmaceutical companies. He took his commercial experiences back into academia by becoming a London Business School Technology Transfer Fellow, actively working with scientific researchers and clinicians to commercialize their intellectual property.

Dr. Sameer Fahed Al-Zenki

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Dr. Sameer is the Director of Science and Technology Environment and Life Sciences Research Center, he holds Ph.D. in Food Science and Agricultural Chemistry and Member of the Institute of Food Technologists (IFT), Member of the Canadian Institute of Food Science and Technology (CIFST) and KISR representative in the Food Safety Committee (2003 to date). He has published work in 30 national and international journals.



Ms. Zeina Ali Siam

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Eng. Zeina Ali Siam is a PhD candidate in Population Health Sciences at Harvard University. Her research focuses on health financing and health systems strengthening in the Middle East and North Africa Region. Siam obtained her Masters in Epidemiology and Statistics from Harvard University, after acquiring a Bachelor of Science Degree in Biological Engineering from Massachusetts Institute of Technology (MIT). Prior to joining Harvard, Siam was an officer at the World Health Organization Eastern Mediterranean Regional Office in Cairo working on health systems development. Siam was also a consultant at the World Bank Middle East and North Africa HNP Unit in Washington DC in 2013, and a member at Microclinic International between 2014 and 2015. Siam is a former fellow at the FXB Center for Health and Human Rights in Harvard. She has been actively engaged with the online educational platform, *Edraak*, as an instructor for courses on various public health topics. Zeina Siam obtained several awards throughout her academic pursuit. She is a *Tau Beta Pi Engineering Honor Society* member. She was three times the recipient of the *Harvard Presidential Scholarship*. She has several publications on public health in the Middle East.

Dr. Mohamed Gad

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Mohamed Gad is a Medical doctor, and currently a Health Economist in Global Health Development Group at Imperial College London. He has previously worked as a NICE International Associate, in leading research work that studies the needs and the steps required towards capacity building for Health Technology Assessment (HTA) in healthcare systems for developing Evidence-Based Policy Making capabilities. He studied medicine and surgery and graduated from Ain Shams University in Cairo, Egypt. He has master's degree in Health Economics and Management at Erasmus University Rotterdam and Management Center Innsbruck. He has also worked at the World Health Organization (WHO) where he participated in developing the 2015 Global survey on Health Technology Assessment by National authorities. Consequently, he participated in the WHO Eastern Mediterranean Offices' Second Inter-Country Meeting on HTA where the first EMRO-HTA network launch took place. Mohamed is an associate member of the World Medical Association (WMA), member of Junior Doctors Network, and Ex-president & Alumni of Egyptian Medical Students Association (EMSA).



Dr. Manar Al Moneef

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Dr. Monar Al Moneef currently working as Chief Growth Officer for GE in the Middle East, North Africa, and Turkey (MENAT) region. Responsible for driving the growth strategy for GE by creating and executing on growth initiatives; identifying and developing new business opportunities; building capacity and capabilities. Prior to that she led marketing for the downstream business at GE Oil & Gas globally based out of Florence, Italy. She was responsible for driving the commercial strategy for GE Oil & Gas downstream business. Prior to that, I was the Managing Director of Imagination Breakthrough in the Middle East region. Also she was responsible for leading the business development efforts for GE healthcare. Prior to joining GE, She was the Director General of Health Care & Life Sciences at the Saudi Arabian General Investment Authority (SAGIA). She led all health care and life sciences investments in Saudi Arabia and positioning Saudi Arabia globally as a premier investment destination. Monar hold an MBA from Harvard Business School, a Doctoral Degree in Molecular Oncology from Oxford & Leicester University and a Master Degree in Molecular Medicine form Cambridge University, United Kingdom.

Dr. Malek El Hussein

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Malek El Hussein serve as Healthcare Operating partner, Alternative investments at Qatar first Bank, a healthcare platform who invest into healthcare industry across the MENA region since March 2016. Prior to Qatar first bank, he was worked seven (2009 to 2016) years in GE Healthcare, Middle East, Africa, Turkey & CA, Russia & CIS, where he positioned various position such as the General Manager, Manager and Business development Director. Prior to joining GE Healthcare, Malek spent seven years as the Director for ECRI Institute a collaborating center for the World Health Organization in the Middle East. Malek serves as board member for American University of Sharjah, Engineering Department and board member at Khalifa university, Abu Dhabi, Biomedical Engineering Department. Malek is a lead reviewer for the Central Board for Accreditation of Healthcare Institutions in Saudi Arabia. Malek was appointed as an external advisor for IFC/Worldbank for medical devices manufacturing investment committee. Malek holds a Bachelor of Engineering from the Lebanese University and Master Degree in Biomedical Engineering.



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Hayat Sindi is a leading biotechnologist and a champion of science and technology in the Middle East. She has PhD in biotechnology from Cambridge and degree in pharmacology with honors from King's College London. In 2011 she launched i2, the Institute for imagination and Ingenuity, In 2013 Sindi was one of the first 30 women to be appointed to the Saudi Arabia's highest consultative body, the Shura Council, and is one of 25 global experts selected by United Nations (UN) Secretary General Ban Ki Moon to be a member of the newly constituted UN Scientific Advisory Board. Sindi is also a Goodwill Ambassador for Sciences at UNESCO. In 2012, she was chosen by National Geographic as Explorer. Also she was named one of Newsweek's "150 Women Who Shake the World". Hayat was named by Forbes number 2 the most powerful Arab women in kingdom of Saudi Arabia. Sept 2014 Hayat Sindi received Clinton Global Citizen Awards "leadership in Civil Society" for her work to encourage innovation and entrepreneurship among young people in the Middle East. 2015 Sindi was invited by UN Environment programme to be an Honorary Advisor for the Eye on Earth Summit. She was selected among the think tank of 50 scholars by Robert boch academy in Berlin. Recently, Dr Sindi was asked by Prime Minister of Malaysia to join his Science and Innovation advisory council to support the country vision 2020".

Dr. Andy Poh

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Andy Poh currently working as Advisor -Healthcare Strategy & Policy in Prime Minister's Office, United Arab Emirates. A passionate healthcare strategist by destiny, and coincidentally doctor, with a career track of global senior executive roles in the governmental and private sectors. He has Bachelor of Medicine and Bachelor of surgery degree. Also Fellow of the Australasian College of Health Service Management.



Dr. Saba Alzabin

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Saba received her BSc and BA in pre-medicine and architecture from New York University. She was then awarded a scholarship by the National Institutes of Health in the USA to pursue a PhD which she has completed at New York University School of Medicine in Basic Medical Science with a focus on molecular oncology and immunology. As a post-doctoral associate, Saba joined the Kennedy Institute of Rheumatology at Imperial College London, U.K., where she conducted a translational research project that resulted in the identification of the basis for patients who are non-responders to TNF- α blockade, leading to the development of combinatorial immuno-therapy for a range of autoimmune diseases such as arthritis and psoriasis. In 2012, she joined the University of Oxford where, in collaboration with a UK-based biotech company Epistem Ltd., she has been responsible for translating *in vitro* and *in vivo* platforms for inflammatory diseases from academia into industry to support the pre- and early clinical phases of drug development. Saba is an avid promoter of cross academic-industrial collaborations and education. In addition to her role as a senior scientist, she is an honorary lecturer and co-supervisor of doctoral students.

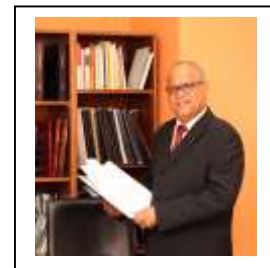
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Dr. Syed Aljunid is currently appointed as the Founding Professor in the Department of Health Policy and Management, Faculty of Public Health, Kuwait University from 1st January 2016. He also serves a Senior Research Scientist in Kuwait Institute for Scientific Research. He was the Founding Head of International Centre for Casemix and Clinical Coding, a centre of excellence on casemix and health economics research in Faculty of Medicine UKM, which was established in 2011. He is the first Malaysian to obtain PhD in Health Economics from London School of Hygiene and Tropical Medicine in 1995. He was appointed as the first Professor of Health Economics in Malaysia by UKM in 2000. Prior to this he served as a Senior Research Fellow of United Nations University International Institute for Global Health from 2006 to 2014. He obtained his MD from National University of Malaysia and Master of Science in Public Health from National University of Singapore. He has conducted more than 50 research projects.



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Majid Alghaslan is a recognized technology and thought leader in Saudi Arabia. Majid now is in the private sector as a serial entrepreneur engaged in the transformation of the Kingdom towards a Knowledge Based Economy and Society given his background and experience in Technology and the Energy Industry. He was a founding member of the King Abdullah University of Science & Technology (KAUST). He leads developmental projects in KAUST such as “Shaheen” supercomputer and KAUST IBM Center for Extreme Computing Research. He was also a key architect for the KAUST partnership with University California San Diego (UCSD). Majid was also instrumental in creating the Saudi Arabian Advanced Research & Education Network (SAAREN) with a 10Gbps link speed across Saudi Arabia and connected to the research & education networks around the globe. Majid also brought into the Kingdom MIT Media Labs “FabLab” that has now grown into multiple labs within Saudi Arabia to empower the youth of the country into next generation technologies and digital fabrication. Prior to KAUST Majid worked in Saudi Aramco as Vice President in USA. He has bachelor’s degree in Computer Science in University of the Pacific, Stockton, Calif.

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Appendix

The World's Richest Universities - Top 20 Universities Globally Ranked by Size of Endowment

S. No.	University Name	Endowment Size	Location
1	Harvard University	\$32.7 Billion	Cambridge, MA
2	University of Texas System	\$25.4 Billion	Austin, TX
3	Yale University	\$23.9 Billion	New Haven, CT
4	Stanford University	\$21.4 Billion	Stanford, CA
5	Princeton University	\$20.7 Billion	Princeton, NJ
6	King Abdullah University of Science and Technology	\$20 Billion	Thuwal, Saudi Arabia
7	University of California System	\$13.141 Billion	Oakland, CA
8	Massachusetts Institute of Technology	\$12.4 Billion	Cambridge, MA
9	Texas A&M University	\$11.1 Billion	College Station, TX
10	Northwestern University	\$9.78 Billion	Evanston, IL
11	University of Michigan	\$8.27 Billion	Ann Arbor, MI
12	Columbia University	\$8.2 Billion	New York, NY
13	University of Cambridge	\$8.1 Billion	Cambridge, UK
14	University of Pennsylvania	\$7.7 Billion	Philadelphia, PA
15	University of Chicago	\$7.55 Billion	Chicago, IL
16	Washington University in St. Louis	\$7.2 Billion	St. Louis, MO
17	Duke University	\$7 Billion	Durham, NC
18	University of Notre Dame	\$7 Billion	South Bend, IN
19	University of Oxford	\$7 Billion	Oxford, UK
20	Emory University	\$6.7 Billion	Druid Hills, GA



List of Notable Historic Middle Eastern Scholars and Polymaths

Arabic Name	Greek Name	Dates	Accomplishments	Publications
Hunayn ibn Ishaq	<i>Johannitius</i>	809–873	Assyrian scholar and physician renowned for his work in translating Greek scientific and medical works into Arabic	<i>Ten Treatises on Ophthalmology</i> ; Arabic translations of Galen's Commentary
Al Tabari		838 – c. 870 CE	Wrote the first encyclopedia of medicine and was an early pioneer of pediatrics. Known notably as a teacher of Al Razzi	<i>Firdous al-Hikmah (Paradise of Wisdom)</i>
Al Razzi	<i>Rhazeus</i>	865-925	Persian physician, alchemist and chemist who was the first to differentiate smallpox from measles and who discovered kerosene	<i>Kitab al- Mansoori; Al-Hawi; Kitab al-Mulooki; Kitab al-Judari wa al- Hasabah</i>
Al Zahrawi	<i>Abulcasis</i>	936–1013	Known as the inventor of modern surgery . Performed the first caesarean operation and created the first pair of forceps	<i>Kitab al-Tasrif</i>
Ibn Sina	<i>Avicenna</i>	980-1037	Regarded as the " Father of of modern medicine and clinical pharmacology ." Published Al-Qanoon Fil Tibb, the pre-eminent medical encyclopedia of that time. It remained a standard textbook of medicine for the next 700 years	<i>Al-Qanoon Fil Tibb ("The Canon of Avicenna"); al-Isharat wa-'l-tanbihat (Remarks and Admonitions), Danishnama-i 'ala'i (The Book of Scientific Knowledge)</i>

Ibn Zuhr	<i>Avenzoar</i>	1091–1161	Pioneered experimental surgery and postmortem autopsy. His conclusion that the disease scabies was caused by a parasite established him as the first parasitologist	<i>Kitab al-Taisir fi al-Mudawat wa al-Tadbir (Book of Simplification concerning Therapeutics and Diet); Kitab al-Iqtisad fi Islah al-Anfus wa al-Ajsad</i>
Ibn Rushd	<i>Averroes</i>	1126–1198	Influential Islamic religious philosopher who integrated Islamic traditions and Greek thought. His commentaries on Aristotle's works reintroduced Aristotle to the West	Wrote over 67 original works, including, <i>The Incoherence of the Incoherence (Tahafut al-tahafut)</i> .
Ibn Al Nafis		1213 – 1288	Known as the "Father of Circulatory Physiology", with his most notable discovery being the discovery of Pulmonary Circulation	<i>The Comprehensive Book on Medicine; Commentary on Anatomy in Avicenna's Canon; The Polished Book on Experimental Ophthalmology</i>
Ibn Khaldun		1332 - 1406	North African Arab historiographer and historian. He is claimed as a forerunner of the modern disciplines of sociology and demography	<i>Muqaddimah or Prolegomena</i>
Al Ruhawi		1200's	Wrote the first medical ethics book	<i>Adab al-Tabib (Practical Ethics of the Physician) or "Practical Medical Deontology"</i>
Sabuncuoğlu Şerafeddin		1385–1468	Ottoman surgeon and physician who authored one of the earliest surgical books	<i>Cerrahiyyetu'l-Haniyye (Imperial Surgery)</i>

List of Stars and Star Systems with Arabic Names

S. No.	Common name	Arabic name (Transliteration)	Meaning	Arabic name
1	Acamar	<i>Ākhir un-Nahr</i>	End of the river	آخر النهر
2	Achernar	<i>Ākhir un-Nahr</i>	End of the river	آخر النهر
3	Acrab	<i>al- 'Aqrab</i>	the Scorpion	عقرب
4	Açubens	<i>az-Zubānā</i>	the Claw	الزباني
5	Adhafera	<i>aḍ-Ḍaḡīrah</i>	the Braid or Curl (of the lion's mane)	الضفيرة
6	Adhara	<i>al- 'Adhārā</i>	the Virgins	العذارى
7	Adhil	<i>adh-Dhayl</i>	the Tail	الذيل
8	Adib	<i>adh-Dhi'b</i>	The wolf	الذئب
9	Ain	<i>'Ayn</i>	the Eye (of the bull)	عين
10	Albali	<i>al-Bālī</i>	the Swallower	البالع
11	Alchibah	<i>al-Khibā'</i>	the Tent	الخباء
12	Alcor	<i>al-Khawwār</i>	the Faint One	الخوار
13	Aldebaran	<i>ad-Dabarān</i>	the Follower (of the Pleiades)	الدبران
14	Alderamin	<i>adh-Dhirā 'u l-Yamīn</i>	the Right Arm (of Cepheus)	الذراع اليمين
15	Alfirk	<i>al-Firqah</i>	the Flock of sheep	الفرقة
16	Algebar	<i>(Rijl) ul-Jabbār</i>	(Foot of) the Giant	رجل الجبار
17	Algedi	<i>al-Jady</i>	the Goat	الجدي
18	Algenib	<i>al-Janb</i>	the Flank (of Pegasus)	الجنب
19	Algieba	<i>al-Jab'hah</i>	the Forehead (of the Lion)	الجبهة
20	Algol	<i>(Ra'as) al-Ghūl</i>	(Head of) the Ghoul	رأس الغول
21	Algorab	<i>al-Ghurāb</i>	the Crow	الغراب
22	Alhena	<i>al-Han 'ah</i>	the Brand (on the neck of the camel)	الهنعة
23	Alioth	<i>Al-Jawn</i>	The black horse "John"	الجون
24	Alkaid	<i>al-Qā'id (banāt na 'ash)</i>	the Leader (of the mourning maidens)	القائد بنات نعش
25	Alkes	<i>al-Ka's</i>	the Cup	الكأس
26	Almak	<i>al- 'Anāq al-Arḍ</i>	the Caracal	عناق الأرض
27	Almeisan	<i>al-Maysān</i>	the Shining one	الميسان
28	Alnair	<i>an-Nayyir</i>	the Bright one	النَّير
29	Alnasl	<i>an-Naṣl</i>	the Blade	النصل
30	Alnilam	<i>an-Niẓm</i>	the String of Pearls	النَّظْم



31	Alnitak	<i>an-Niṭāq</i>	the Girdle (Orion's Belt)	النطاق
32	Alphard	<i>al-Fard</i>	the Solitary one	الفرد
33	Alphecca	<i>(Nayyir) al-Fakkah</i>	(the Bright one of) the Broken (Ring)	نير الفكّة
34	Alpheratz	<i>(Surrat) al-Faras</i>	(Navel of) the Mare	سُرّة الفرس
35	Alrescha	<i>ar-Rishā'</i>	the Well-Rope	الرشاء
36	Alsafi	<i>ath-Athāfiyy</i>	the Tripods	الأثافيّ
37	Alsu hail	<i>Suhayl</i>	Glorious	سهيل
38	Altair	<i>(an-Nisr) uṭ-Ṭā'ir</i>	the Flying (Eagle)	النسر الطائر
39	Altais	<i>at-Tays</i>	the Goat	التيس
40	Alterf	<i>aṭ-Ṭarf</i>	the View (of the Lion)	الطرف
41	Aludra	<i>al-'Udhrah</i>	Virginity	العذرة
42	Alula Australis, Alula Borealis	<i>(al-Qafzat) ul-Ūla'</i>	the First (Leap)	القفزة الأولى
43	Alya	<i>al-Alyah</i>	the fatty Tail of a sheep	الألية
44	Angetenar	<i>'Arjat un-Nahr</i>	Curve of the River	عرجة النهر
45	Ankaa	<i>al-'Anqā'</i>	Phoenix	العنقاء
46	Arkab	<i>al-'Arqūb</i>	the Hamstring	العرقوب
47	Arneb	<i>al-Arnab</i>	the Hare	الأرنب
48	Arrakis	<i>ar-Rāqiṣ</i>	the Dancer	الراقص
49	Atik	<i>al-'Ātiq ath-Thurayyā</i>	the Shoulder (of Perseus)	عائق الثريا
50	Auva	<i>al-'Awwā'</i>	the Barking (Dog)	العواء
51	Azha	<i>(Persian: Ōshyōneh) Āshiyānah</i>	(Ostrich) Nest	أشيانه
52	Baham	<i>Sa'ad ul-Biham</i>	Luck of the Young Beasts	سعد البهام
53	Baten Kaitos	<i>Baṭni Qayṭus</i>	Belly of Cetus	بطن قيطس
54	Beid	<i>Bayḍ</i>	Eggs	بيض
55	Benetnash	<i>Banāt un-Na'ash</i>	Daughters of the bier	بنات النعش
56	Betelgeuse	<i>Ibṭ ul-Jawzā'</i>	Armpit of the Central One	إبط الجوزاء
57	Botein	<i>al-Buṭayn</i>	the Belly (of the ram)	بطين
58	Caph	<i>al-Kaff ul-Khaḍib</i>	the Palm (reaching from the Pleiades)	الكف الخضيب
59	Celbalrai	<i>Kalb ur-Rā'ī</i>	the Shepherd's Dog	كلب الراعي
60	Chort	<i>al-Kharat</i>	the Rib	الخرت

61	Cursa	<i>Kursiyy al-Jauzah</i>	the Chair or Footstool (of Orion)	الكرسي
62	Dabih	<i>Sa 'ad udh-Dhābiḥ</i>	the lucky star of the Slaughterer	سعد الذابح
63	Deneb	<i>Dhanab ud-Dajājah</i>	Tail of the hen	ذنب الدجاجة
64	Deneb Algedi	<i>Dhanab ul-Jady</i>	Tail of the goat	ذنب الجدي
65	Deneb Dulfim	<i>Dhanab ud-Dulfin</i>	Tail of the Dolphin	ذنب الدلفين
66	Deneb Kaitos	<i>Dhanab ul-Qaitos (ul-Janūbīyy)</i>	(Southern) Tail of Cetus	ذنب القيتوس الجنوبي
67	Denebola	<i>Dhanab ul-Asad</i>	Tail of the lion	ذنب الاسد
68	Diphda	<i>aḍ-Ḍifda ' ath-Thānī</i>	the (second) Frog	الضفدع الثاني
69	Dschubba	<i>al-Jab'hah</i>	the Forehead (of the scorpion)	الجبهة
70	Dubhe	<i>Kāhil ud-Dubb</i>	(the back of) the Bear	كاهل الدب
71	Dziban	<i>adh-Dhi'ban</i>	the Two Wolves or Jackals	الذنبان
72	Edasich	<i>adh-Dhikh</i>	the Hyena	الذئخ
73	El Nath	<i>an-Naṭḥ</i>	the butting (of the bull's horns)	النطح
74	Eltanin	<i>at-Tinnin</i>	the Great Serpent	التنين
75	Enif	<i>al-Anf</i>	the Nose (of Pegasus)	الأنف
76	Errai	<i>ar-Rā 'ī</i>	the Shepherd	الراعي
77	Fomalhaut	<i>Fum al-Ḥūt</i>	Mouth of the Whale	فم الحوت
78	Furud	<i>al-Furud</i>	the bright Single ones (but see that article)	الفرد
79	Gienah	<i>al-Janāḥ</i>	the Wing	الجناح
80	Gomeisa	<i>al-Ghumaiṣā'</i>	the Bleary-eyed one	الغميصاء
81	Hadar	<i>Ḥaḍār</i>	Settlement	حضار
82	Hamal	<i>Rā's al-Ḥamal</i>	(head of) the Ram	رأس الحمل
83	Heka	<i>al-Haq 'ah</i>	the White Spot	الهقعة
84	Homam	<i>Sa 'ad al-Humām</i>	the Lucky star of the High-minded	سعد الهمام
85	Izar	<i>Al-Izar</i>	The girdle, or, The loin-cloth	الإزار
86	Jabbah	<i>al-Jab'hah</i>	the Forehead (of the scorpion)	الجبهة
87	Kabdhilinan	<i>Ka 'ab Dhiy l- 'Inān</i>	the Shoulder of the Rein-holder	كعب ذي العنان

88	Kaffaljdhma	<i>al-Kaff al-Jadhmā'</i>	the Cut-short Hand	الكف الجذماء
89	Kaus Australis, Kaus Media, Kaus Borealis	<i>al-Qaws</i>	the Bow	القوس
90	Keid	<i>al-Qaiḍ</i>	the (broken egg) Shells	القيض
91	Kitalpha	<i>Qit'at al-Faras</i>	Part of the Horse	قطعة الفرس
92	Kochab	<i>al-Kawkab</i>	the Star	كوكب
93	Kurhah	<i>al-Qurḥah</i>	the Blaze on a horse's brow	القرحة
94	Lesath	<i>al-Las'ah</i>	The sting	اللسعة
95	Luh-Denebola / Denebola	<i>Dhanab al-Asad/al-Layth</i>	the lion's tail	ذنب الاسد/الليث
96	Maasym	<i>al-Mi'asam uth-Thurayyā</i>	the Wrist (of Hercules)	معصم الثريا
97	Maaz	<i>al-Mā'az</i>	the he-Goat	المعز
98	Mankib	<i>Mankib (ul-Faras)</i>	the Shoulder (of the Horse)	منكب الفرس
99	Marfik	<i>al-Mirfaq</i>	the Elbow	المرفق
100	Markab	<i>Markab (ul-Faras)</i>	the Saddle (of the Horse)	مركب الفرس
101	Matar	<i>al-Sa'ad ul-Maṭar</i>	the lucky star of Rain	سعد مطر
102	Mabsuta	<i>adh-Dhirā'u l-Mabsūṭah</i>	the Outstretched (Paw)	الذراع المبسوطة
103	Megrez	<i>al-Maghriz</i>	the Base of the bear's tail	مغرز
104	Meissa	<i>al-Maysān</i>	the Shining one	الميسان
105	Mekbuda	<i>adh-Dhirā'u l-Maqbūḍah</i>	the Folded (Arm)	الذراع المقبوضة
106	Menkalinan	<i>Mankib Dhiyi l- 'Inān</i>	Shoulder of the Rein-holder	منكب ذي العنان
107	Menkar	<i>al-Minkhar</i>	the Nostril	المنخر
108	Menkent	<i>Mankib ul-Qanṭūris</i>	the Shoulder of the Centaur	منكب قنطورس
109	Menkib	<i>Al-Mankib uth-Thurayyā</i>	"The shoulder" of the Pleiades	منكب الثريا
110	Merak	<i>al-Marāq</i>	the loins (of the bear)	المراق
111	Mintaka	<i>al-Minṭaqah</i>	the Belt (of Orion)	المنطقة
112	Mirak	<i>al-Marāq</i>	the Loin-cloth	المراق

113	Mirfak	<i>al-Mirfaq uth-Thurayyā</i>	the Elbow	مرفق الثريا
114	Mizar	<i>al-Mi'zar</i>	the Apron	المنزر
115	Mothallah	<i>Ra'as ul-Muthallath</i>	(Head of) the Triangle	الرأس المثلث
116	Muphrid	<i>Mufrid ur-Rāmiḥ</i>	the Solitary one of the Lancer	المفرد الرامح
117	Murzim	<i>al-Murzim</i>	the Herald	المرزم
118	Nashira	<i>Sa'ad Nāshirah</i>	Lucky star of Nashirah	سعد ناشرة
119	Nekkar	<i>al-Baqqār</i>	the Cattleman	البقار
120	Nihal	<i>an-Nihāl</i>	(camels) Quenching their thirst	النهال
121	Nusakan	<i>an-Nasaqān</i>	The two arrays	النسقان
122	Nushaba / Alnasl	<i>Zujji n-Nashshāba [Zujji n-Nashāba?] / an-Naṣl</i>	the Arrowhead	رُجَّ النشابة / النصل
123	Okda	<i>al-'Uqdah</i>	the Knot	العقدة
124	Phact	<i>(al-)Fākhithah</i>	the Dove	فاخثة
125	Phad	<i>(al-)Fakhidh</i>	the Thigh	فخذ
126	Pherkad	<i>(al-)Farqad</i>	the Calf	فرقد
127	Rasalased	<i>Ra'as ul-Assad</i>	Head of the lion	رأس الأسد
128	Rasalgethi	<i>Ra'as ul-Jathī</i>	Head of the Kneeler	رأس الجاثي
129	Rasalhague	<i>Ra'as ul-Ḥawwā'</i>	Head of the Snake-man	رأس الحواء
130	Rastaban	<i>Ra'as uth-Thu'abān</i>	Head of the Snake	رأس الثعبان
131	Rigel	<i>Rijl ul-Jabbār</i>	Foot of the Giant	رجل الجبار
132	Rigilkent	<i>Rijl ul-Qanṭūris</i>	Foot of the Centaur	رجل القنطورس
133	Risha	<i>ar-Rishā'</i>	the Well-Rope	الرشاء
134	Rukbah	<i>ar-Rukbah</i>	the Knee	الركبة
135	Rukbat	<i>Rukbat ur-Rāmī</i>	Knee of the archer	ركبة الرامي
136	Sabik	<i>as-Sābiq</i>	the Preceding	السابق
137	Sadachbia	<i>Sa'ad ul-Akhbiyyah</i>	Lucky star of the Tents	سعد الاخبية
138	Sadalbari	<i>Sa'ad ul-Bārī'</i>	Lucky star of the Splendid one	سعد البارع
139	Sadalmelik	<i>Sa'ad ul-Malik</i>	Lucky star of the King	سعد الملك
140	Sadalsuud	<i>Sa'ad us-Su'ūd</i>	Luck of Lucks	سعد السعود
141	Sadr	<i>aṣ-Ṣadr</i>	the Breast (of the hen)	الصدر
142	Saiph	<i>as-Sayf</i>	the Sword (of Orion)	السيف
143	Scheat	<i>as-Sā'id</i>	the Shoulder	الساعد

144	Shaula	<i>ash-Shawlāh</i>	the Raised (tail of the scorpion)	الشولة
145	Shedir	<i>as-Ṣadr</i>	the Breast	الصدر
146	Sheliak	<i>ash-Shiliyāq</i>	Lyra	الشلياق
147	Sheratan	<i>ash-Sharāṭān</i>	the Two Signs	الشرطان
148	Sirrah	<i>Surratu l-Faras</i>	Navel (of the Mare)	سُرَّةُ الفرس
149	Skat	<i>as-Sāq (or Shi'at)</i>	the Leg (or the Wish)	الساق / شئت
150	Sulafat	<i>as-Sulḥafāh</i>	the Tortoise	السلحفاة
151	Talitha Australis, Talitha Borealis	<i>al-Qafzat uth-Thālathah</i>	the Third Leap (of the ghazal)	القفزة الثالثة
152	Tania Australis, Tania Borealis	<i>al-Qafzat uth-Thāniyah</i>	the Second Leap (of the gazelle)	القفزة الثانية
153	Tarf	<i>aṭ-Ṭarf</i>	"The glance" of the lion	الطرف
154	Thuban	<i>ath-Thu'abān</i>	the Snake	الثعبان
155	Unukalha	<i>'Unuq ul-Ḥayyah</i>	Neck of the Snake	عنق الحية
156	Vega	<i>an-Nisr ul-Wāqi'</i>	the Falling Eagle	النسر الواقع
157	Wasat	<i>Waṣṭ us-Samā'</i>	"Middle" of the sky	وسط السماء
158	Wezen	<i>al-Wazn</i>	the Weight	الوزن
159	Yed Posterior	<i>Mu'akhhir Yad ul-Ḥawwā'</i>	(Back of the Snake Man's) Hand	مؤخر يد الحواء
160	Yed Prior	<i>Muqaddim Yad ul-Ḥawwā'</i>	(Palm of the Snake Man's) Hand	مقدم يد الحواء
161	Zaurac	<i>az-Zawraq</i>	the Boat	الزورق
162	Zavijava	<i>Zāwiyat ul-'Awwā'</i>	the Angle of the Barking Dog	زاوية العواء
163	Zawiah	<i>az-Zāwiyah</i>	The angle	الزاوية
164	Zubenelgenubi	<i>az-Zubān ul-Janūbiy</i>	Southern Claw (of the scorpion)	الزبان الجنوبي
165	Zubeneshamali	<i>az-Zubān ush-Shamāliy</i>	Northern Claw (of the scorpion)	الزبان الشمالي
166	Andromeda Galaxy	<i>as-Sahābat us-Ṣaghīrah ("small cloud")</i>	"little cloud" was the Arabic name for the Andromeda Galaxy, which was first mentioned by Al-Sufi in his Book of Fixed Stars	السحابة الصغيرة

Global Ranking List of Oil Producing Nations and Per Barrel Output

No.	Country	Production (bbl/day)
1	Russia	10,250,000
2	Saudi Arabia(OPEC)*	10,050,000
3	United States	8,744,000
4	Iraq (OPEC)*	4,836,000
5	People's Republic of China	3,938,000
6	Iran (OPEC)*	3,920,000
7	Canada	3,893,000
8	United Arab Emirates (OPEC)*	3,188,000
9	Kuwait (OPEC)*	3,000,000
10	Brazil	2,624,000
11	Venezuela (OPEC)*	2,316,000
12	Mexico	2,193,000
13	Norway	1,763,000
14	Kazakhstan	1,746,000
15	Nigeria (OPEC)*	1,476,000
16	Angola (OPEC)*	1,507,000
17	Algeria (OPEC)*	1,171,000
17	Oman	1,008,435
18	United Kingdom	978,000
19	Colombia	955,000
20	Azerbaijan	876,000
21	Indonesia	847,000
22	India	736,000
23	Malaysia	668,000
24	Qatar (OPEC)*	639,000
25	Egypt	582,000
26	Ecuador (OPEC)*	555,000
27	Argentina	536,000
28	Libya (OPEC)*	528,000
29	Congo, Republic of the	317,000
30	Vietnam	312,000
31	Australia	292,000
32	Thailand	265,000
33	Sudan and South Sudan	255,000
34	Turkmenistan	235,000
35	Equatorial Guinea	227,000
36	Gabon (OPEC)	210,000

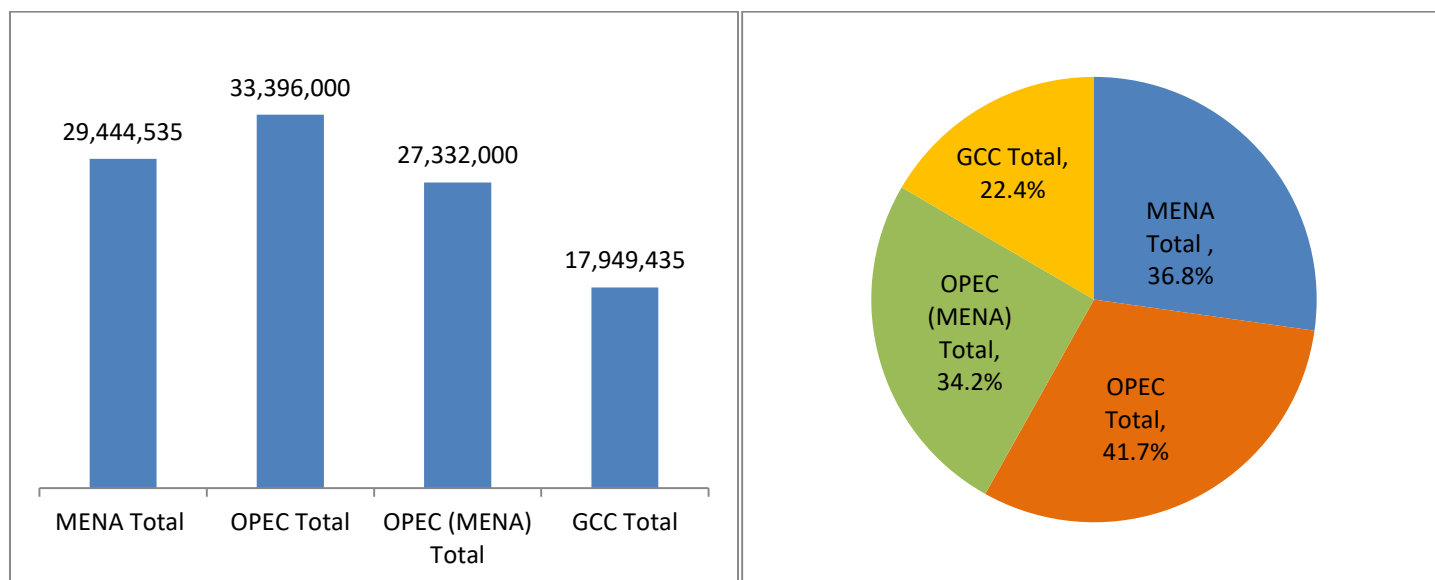


37	Denmark	149,000
38	Chad	115,000
39	Brunei	113,000
41	Italy	90,000
40	Pakistan	96,600
42	Uzbekistan	85,000
43	Cameroon	81,000
44	Romania	80,000
45	South Korea	79,000
46	Timor-Leste	76,000
47	Trinidad and Tobago	75,000
48	Bolivia	67,000
49	Ukraine	66,000
50	Bahrain	64,000
51	Netherlands	64,000
52	France	61,000
53	Turkey	61,000
54	Ghana	59,000
55	Tunisia	59,000
56	New Zealand	50,000
57	Cuba	49,000
58	Germany	48,000
59	Spain	40,000
60	Poland	39,000
61	Peru	39,000
62	Ivory Coast	37,000
63	Papua New Guinea	34,000
64	Syria	33,000
65	Belarus	32,000
66	Austria	27,000
67	Philippines	26,000
68	Hungary	25,000
69	Taiwan	22,000
70	Yemen	22,000
71	Albania	21,000
72	Myanmar	21,000
73	Democratic Republic Congo	20,000
74	Niger	20,000
75	Singapore	20,000
76	Croatia	18,000
77	Chile	15,000



78	Virgin Islands, U.S.	15,000
79	Guatemala	14,000
80	Suriname	14,000
81	Belgium	13,000
82	Estonia	13,000
83	Sweden	12,000
84	Czech Republic	11,000
85	Finland	10,000
86	Lithuania	9,100
87	Slovakia	9,100
88	Greece	8,700
89	Portugal	7,100
90	Mauritania	6,000
91	Israel	5,800
92	Morocco	5,100
93	Bangladesh	4,800
94	Japan	4,000
95	Switzerland	3,900
96	Bulgaria	3,400
97	Aruba	2,800
98	Jamaica	2,100
99	Paraguay	2,000
100	South Africa	2,000
101	Belize	1,800
102	Netherlands Antilles	1,500
103	Uruguay	1,200
104	Barbados	1,000
105	Georgia	1,000
106	Latvia	1,000
107	Ireland	900
108	Puerto Rico	700
109	Costa Rica	300
110	Slovenia	300
111	Jordan	200
112	Malawi	200
113	Tajikistan	200
114	Zambia	200
115	Ethiopia	100
116	Hong Kong	100
117	Zimbabwe	100

Oil Producing Nations Analysis



Further Background on NTEC and KLSC

[Kuwait Life Sciences \(KLSC\)](#) was established in 2010, with a paid up capital of 15 million Kuwait Dinars (KD) which is equivalent to approximately \$53 million US Dollars. KLSC is fully owned by [National Technology Enterprises Company](#). National Technology Enterprises Company (NTEC) was incorporated in November of 2002, by the Kuwait Council of Ministers as a fully owned company by the Kuwait Investment Authority (KIA), the sovereign wealth fund of the State of Kuwait. Capitalized at 100 million Kuwait Dinars (KD) which is equivalent to approximately \$350 million US Dollars, NTEC aims to play a vital role in servicing major stakeholders in Kuwait and the Middle East region with their technology requirements.

KLSC focuses on healthcare innovative concepts and demanded services which have a clear and unmet need in the Middle East and North Africa (MENA) region. KLSC has been designed as an integrated healthcare company building unique projects and is considered one of the pioneer venture capitalist and private equity companies in the Middle East that invests globally and operates regionally seeking to advance healthcare services and systems within the region. KLSC supports both public and private sector stakeholders to access emerging technologies, establish unique projects and adapt best practices prevailing in today's healthcare field. KLSC operates in healthcare investment, life sciences training, medical technology and pharmaceutical distribution.

