Economics of artificial intelligence in the Gulf Cooperation Council countries

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Abstract:

This article reviews how artificial intelligence is being developed and used in key economic sectors in the Gulf Cooperation Council economies.

Keywords: Gulf Cooperation Council | artificial intelligence | machine learning | research and development

Article:

In recent years, the oil-rich Gulf Cooperation Council (GCC) economies—Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE)—have undertaken several high-profile initiatives to promote the development of the artificial intelligence (AI) industry and market. By 2030, AI's economic contribution to the GCC countries is expected to exceed US$277 billion (Figure 1). They have already achieved some global prominence in AI. For instance, according to the Oxford Insight Government Readiness Index for Artificial Intelligence 2020 report, which is based on the ability of governments to apply AI techniques to public services, five of the GCC economies ranked among the world's top 50 economies (Table 1).

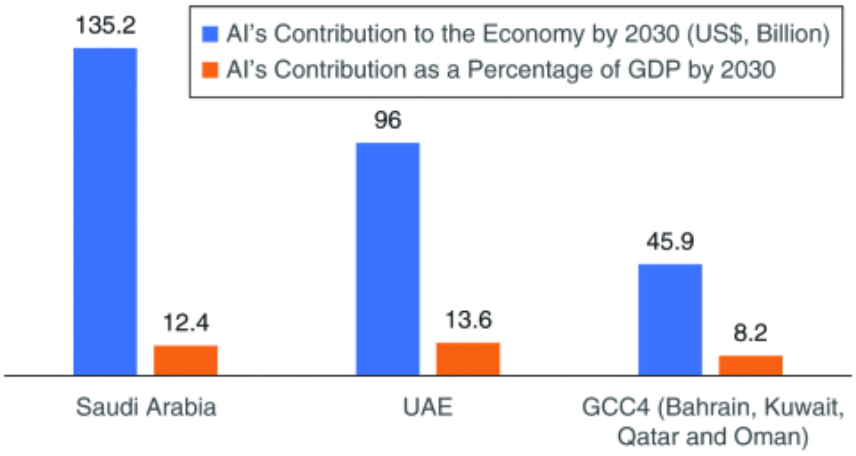

Figure 1. The economic contribution of AI to the GCC countries by 2030. (Data source: PwC.5)

Table 1. Some key indicators related to and affecting the development of the AI industry and market in the GCC countries.

Country	AI Readiness Index 2020	AI readiness rank	R&D expenditure (% of GDP)	GDP (current US$, billions)
Bahrain	54.749	43	0.1	38.47
Kuwait	N/A	N/A	0.3	136.20
Oman	52.099	48	0.17	76.33
Qatar	56.78	37	0.47	146.37
Saudi Arabia	56.226	38	0.07	700.12
UAE	72.395	16	0.7	421.14

Data source: AI Readiness Index/rank,[1] R&D expenditure,[2] GDP.[3]

While some analysts think that the Middle East and North Africa region in general is a technology "desert" that lacks ideas and impactful development of technology, a recent report has challenged this notion. The region has a "fertile" technological environment with its own independent character influenced by Western, Eastern, and local cultures.[4]

AI as a Key Component of National Strategic Frameworks

GCC governments have integrated AI into their national visions and strategic planning processes (Table 2). For instance, about 70% of 96 strategic goals under Saudi Arabia's Vision 2030 are related to data and AI.[6] In October 2020, the Saudi national AI strategy was announced, which plans to train 20,000 data and AI specialists and experts and develop an entrepreneurial ecosystem consisting of 300 active data and AI start-ups.[7] Saudi Arabia also aims to rank among the world's top 15 nations for AI by 2030.

An integral part of GCC economies' national visions is to create favorable conditions for entrepreneurship and investment in the AI sector. For example, during the 2008–2018 period, the UAE invested US$2.15 billion in AI.[16] Saudi Arabia has invested in AI-driven tech companies through its stake in the Softbank Vision Fund and the national public investment agency.[17] The country has set a goal of attracting US$20 billion in investments by 2030 from foreign and local sources.[7] Oman has created a sovereign Oman Technology Fund to attract foreign entrepreneurs. Its projects include 1) pre-seed fund program Techween; 2) Wadi Accelerator, which provides start-up funding of up to US$100,000; and 3) Jasoor Ventures, to support companies' growth.[18] Likewise, the UAE aims to enhance the country's competitive advantage in AI investments.

GCC economies have also established the organizational and administrative infrastructures to enhance their AI readiness. The UAE was the world's first Ministry of AI.[16] In March 2021, Qatar's cabinet approved the establishment of an AI committee under the Transport and Communications Ministry (MoTC). The committee will supervise the programs and initiatives related to AI launched by the state and coordinate with relevant agencies in developing plans and program. In Bahrain, government agencies such as the Information and eGovernment Authority, Tamkeen (tasked to modernize the labor market), the Central Bank of Bahrain, and the Economic Development Board have launched initiatives to develop AI and other technologies.[19]

Table 2. AI's roles in national strategic frameworks of the GCC countries.

	Key strategy document/vision	Some key goals	Major activities
Bahrain	Digital Strategy 2022	Use digital technologies to strengthen government services, processes, and decision making and data-sharing capability[8]	2020: Launched the first AI academy[9]
Kuwait	New Kuwait 2035 Vision 2035	Adopt AI within government agencies to contribute to the vision[10]	The Central Agency for Information Technology Agency has teamed up with Microsoft to launch a training program for senior government officials. The goals are to enhance knowledge and confidence in AI.[11]
Oman	Vision 2040 e.Oman 2030	Build a foundation to utilize and benefit from digital technologies, mainly AI to increase productivity, and create jobs[12]	The Information Technology Authority 4.0 Digital Trends Forum, which stressed the importance of AI as a key fourth industrial revolution technology, was formed.[13]
Qatar	National Vision 2030 National AI Strategy, (launched in 2019)	Produce "world-class AI applications" and establish the country as an efficient consumer of AI, with "a properly educated citizenry, sound laws and ethical guidelines"[14]	Focus was centered on education, research, data access, employment, business, and ethics.
Saudi Arabia	Vision 2030	Transform the country into "an Industrial Powerhouse and a global logistics" Reduce dependence on oil, diversify the economy, and develop public service sectors	Plans were made to open a national center for AI, an AI regulator, a national data management office, an AI college. Established an intellectual property office in 2017
UAE	Vision 2021, Artificial Intelligence Strategy 2031	Contribute to the objectives of UAE Centennial 2071, boost government performance, and create new markets with high economic value[15]	2015-2018: Dubai attracted US$21.6 billion in foreign direct investments for AI and robotics.[16] 2019: Abu Dhabi has established the world's first research-based AI university, which specializes in computer vision, ML, and natural language processing.

ML: machine learning.

Key Areas of AI Deployment

Data-rich companies in the region are already using machine learning (ML) to enhance performance (see "Abu Dhabi National Oil Company's Panorama Initiative"). However, not all economic sectors are equally affected by AI. According to Accenture's study of 15 industries in the UAE, AI's biggest economic contributions are likely to be in 1) financial services, 2) health care, or 3) transportation.20 We will look at AI-led transformation in these industries and some examples of AI deployment.

Finance

The focus of AI in the financial service industry has been on providing high-quality customer experience using solutions such as chatbot, robo-advisory platforms, and customer service

robots. For instance, the UAE's Emirates National Bank of Dubai (NBD) has developed AI-based personal banking assistant Eva, which attempts to provide near-human customer service. Emirates NBD's lifestyle banking arm Liv also offers a conversational chatbot as well as a customer service robot "Pepper." AI-based robo-advisory platforms are also being used by financial services players. For instance, wealth management robo-advisor Sarwa, which was developed within the Dubai International Finance Center (DIFC) in 2018,21 had over 25,000 registered users as of March 2021.[22] They offer advanced investment services at a low cost by using AI to allocate and manage funds.[17]

Health Care

Health-care organizations in the region are found to be enthusiastic about integrating AI into their operations. A survey found that more than 50% of health care organizations' strategic initiatives focused on AI and data analytics.[23] AI is expected to find use in a number of applications such as robot doctors and diagnostics.

In the UAE, the Ministry of Health and Prevention and the Dubai Health Authority (DHA) plan to incorporate AI into medical services across health care providers and promote innovation in the industry. The DHA has also signed memorandums of understanding with international companies to introduce AI-based health care solutions.[23] Abu Dhabi's Department of Health (DoH) has also launched an AI laboratory, which aims to develop innovative solutions in wellness and prevention, chronic disease management, clinical care, and regulatory management.[24]

Dubai has tested a virtual health app to provide remote general practitioner consultations. AI pods that are free to use will do quick health scans for the public and generate results immediately. The DHA carried out several proofs of concepts (PoCs) of such solutions. One was with India-based provider of AI-powered diabetic retinopathy screening Artelus. In the PoC, it took only 10 min for a doctor to see the results after a patient conducted the test, which currently takes four days.[25]

In Saudi Arabia, AI's incorporation in health care has been a part of the country's national strategic agenda. The Ministry of Health has formulated its Digital Health Strategy as a key component of Vision 2030. A major goal is to promote reinvention in health care delivery and facilitate new models of care using AI and other technologies. The General Directorate for Research and Studies has been encouraging and promoting AI-related research projects as part of its Health System Research Fund Program 2020–2023.

Transportation

AI solutions have found a wide range of applications in the private and public sectors. In mid-2021, the UAE's Roads and Transport Authority started a trial of Alibaba Cloud's "City Brain" system, which uses AI and advanced algorithms to manage traffic. The system receives data from an electronic ticketing card (NoI) used for all mode of public transport in Dubai, operating buses and taxis as well as the Enterprise Command and Control Center (EC3), which controls all means of public transportation. The City Brain system analyses these data and sends instant

notifications to improve bus schedules and routes. The system is expected to increase bus ridership by 17%, reduce average waiting time by 10%, and reduce journey time by 5%.[26]

AI-based systems have been introduced in Dubai to monitor taxies and school buses to detect drowsy and distracted driving and to ensure that the driver and passengers wear face masks and maintain social distancing.[27] The system tracks school buses' route and makes sure that the buses comply with safety regulations when students and attendants board and get off the buses.[28] AI drones have also been deployed to detect violations by heavy trucks.[29]

Dubai-based international express, mail delivery, and logistics services company Aramex utilizes cloud-based ML models to enhance performance and reduce costs. The company's operations generate more than 10 million history tracking records daily. As of May 2021, Aramex's data lake had about 10.2 TB of data, which powered several ML use cases. Over 450,000 predictions were generated per day. Each prediction is generated in 1.1125 ms.[30] ML models helped to increase accuracy of delivery predictions by 74%, which reduced call center volumes by 40%. When customers have realistic delivery time frames, they are less likely to call in to check about their deliveries.[31] The ML models also helped develop intelligent address prediction models to address challenges associated with the lack of proper physical addresses in the region. It converts descriptive addresses into geolocations.[32]

Enablers, Opportunities, and Barriers

There are a number of factors that have enabled the adoption of AI in GCC economies and provided opportunities for companies and consumers to benefit from this technology. First, the GCC economies' oil-based prosperity allows them to invest in new technologies such as AI. The region's sovereign wealth funds that are available for investment in real and financial assets are estimated at US$3 trillion.[33] The gross domestic product (GDP) of the GCC is over US$1.5 trillion (Table 1). These economies are in position to buy or lease state-of-the-art quantum computers to run complex ML models.

Second, legislative and policy reforms have been undertaken to stimulate AI adoption and attract foreign investment in the technology sector.[34] For instance, Abu Dhabi's DoH has also developed an AI policy to regulate AI use in the health care sector.[24]

Consequently, GCC free zones have more developed guidelines and regulations for data protection. For instance, the DIFC has its own legal system and courts with jurisdiction over corporate, commercial, civil, employment, and trust matters. Another free zone is Dubai Healthcare City, which provides medical services. Likewise, the Qatar Financial Center, which was established to attract international financial services, follows legal structure based on English common law rather than Sharia law. These free zones have enacted data protection laws modeled after the European Union (EU)'s data protection directive to regulate the processing, storage, and transfer of personal data.

Finally, about 70% of the GCC's population is under the age of 30.[24] The young population is likely to be more open and comfortable with AI-based solutions, creating opportunities for new business models for AI companies. For instance, a PwC survey found that the proportions of

respondents willing to replace human doctors with AI and robots in Saudi Arabia, the UAE, and Qatar were 66%, 62%, and 65%, respectively. The corresponding proportions for Germany and the United Kingdom were 41% and 39%, respectively.[35]

Despite the potentials noted earlier, GCC economies have many challenges to overcome. First, the latest available data from the World Bank shows that no GCC country's R&D expenditure as a proportion of GDP is more than 0.7% (Table 1). As a point of comparison, in a neighboring country, Israel, R&D expenditure was 4.11% of GDP. This means that GCC economies place less emphasis on advancing foundational technologies and research. An upshot is that GCC AI companies are heavily application-focused.

Second, the GCC economies' current level of digital skills is insufficient to meet the need for the development and implementation of AI projects. A study of the consulting firm Strategy& Middle East and LinkedIn found that there is a severe shortage of the digital skills such as statistical analysis and data mining, and algorithm design in the region. For instance, in 2015, the GCC's ratio of digital jobs to the total workforce was 1.7% compared to 5.4% in the EU. Three major factors have been recognized that have led to the skills shortage: the lack of high-quality academic training, inadequate on-the-job instruction, and a cultural mindset that keeps people away from careers in the digital field and entrepreneurship.[36] In particular, women and girls in the region shy away from digital careers. Sociocultural ideas regarding what is an appropriate career for women limit their opportunities to study science, technology, engineering, and mathematics-related subjects. In the UAE, for instance, the proportion of female students enrolled in the IT field is only 2%.[37]

Third, with some exceptions such as Dubai, the region's geopolitics have hindered the ability to attract foreign investment, skilled workers, and entrepreneurial talents.[38] Such concerns have been especially salient in Saudi Arabia due to the country's conservative outlook, despite recent reforms.[39]

Finally, an obstacle that has to be overcome by the region's policy makers concerns the fear that robots will take people's jobs. Additionally, there is the suspicion of Western dominance in the region's AI industry and market, much like in the early days of the oil industry.

AI has already impacted key economic sectors in GCC economies with the deployment of apps and platforms such as chatbots, robot doctors, AI diagnostics, robo-advisory financial platforms, customer service robots, and City Brain. Meeting their longer term AI goals would require GCC economies to increase R&D spending to contribution to fundamental theories and develop enabling technologies. But if GCC economies are to successfully develop the AI industry as a means to reduce the current reliance on oil, there has to be a long-term cultural shift in their populations' attitudes toward careers in the digital services and entrepreneurship, apart from more start-ups and increases in AI investment.

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Abu Dhabi National Oil Company's Panorama Initiative

The UAE's state-owned oil company, Abu Dhabi National Oil Company, has started mining its terabytes of data for generating new insights and training ML models.[S1] In 2020, its ML initiative Panorama was estimated to generate over US$1 billion in "business value" in the previous three years.[S2] Panorama utilizes half a century of historic data and real-time information from millions of sensors that measure relevant parameters related to operational and maintenance conditions, functioning of critical infrastructures, weather and climactic conditions, and energy use. Data related to health, safety, and environmental information as well as finance and accounting are also fed to the Panorama ML algorithms. Panorama is reported to run entire scenarios in 2 or 3 min that took up to six months for previous systems.[S1]

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