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"Positioning the GCC in the AI Race: Strategic Policies, Investments, and Talent Development"

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Executive Summary

Artificial Intelligence is a novel yet transformative technological force that has tremendous economic potential and global reach, and any country that is involved in the development or investment into AI is set to benefit from it. This research seeks to give insight into how three select GCC countries - Saudi Arabia, the United Arab Emirates, and Qatar - are harnessing AI as a tool for the future and driving forward its advancement by deploying strategic policies and making targeted investments on this front. This shall be done by answering the two following key research questions[1]:

- *What are the differences in the sectoral application of AI in the stakeholder countries?*
- *What is the position of the GCC within the global AI race?*

As technologically advanced as the three countries may be, external investments and collaborations are crucial for catch-up growth as talent development and development of digital infrastructure could take a long time. Strategic investments domestically as well as foreign investments would be important sources for the efficient deployment of AI.

The research further explores the sectoral applications of AI within the GCC, in the countries of Saudi Arabia, UAE and Qatar. These countries rank relatively high within the GCC in the Oxford Insight's *Government AI Readiness Index 2024;* where the UAE ranks the highest at 13, Saudi Arabia comes in at second ranked at 23 and finally Qatar, placed in 32nd. The index explores 40 different indicators under the pillars of government, data and technical infrastructure and the technology sector.

The most crucial sectors for the implementation and development of AI across the three countries are that of education, healthcare and energy. UAE is in the lead when it comes to garnering investments, gaining institutional support and having a higher global visibility. Saudi Arabia is ranked higher overall, given the robustness of its investments however it has a more centralised national approach that focuses the AI development and investment inward for domestic use. Qatar, is smaller and more strategic with its contributions to the field of AI as it is more oriented towards being an investor and stakeholder rather than domestic capacity building.

At the core of it each sector has pivotal uses of AI; it has been optimised in the energy sector for operational efficiency, reduction of carbon emissions, efforts towards decarbonisation and sustainable development to boost the position of the GCC countries as leaders when it comes to energy innovation. With regards to the healthcare sector, AI sharpens the diagnostics process with more

[1]Please refer to the "Methodology" chapter (pp. 22) for further breakdown into sub-questions.

precision, as well as enhancing the patient care facilities while integrating data management using AI with health services. Learning, research and the development of the workforce has been greatly aided by AI; facilitating personalised learning and supporting educational infrastructure that is future-ready.

Within the global race that is more western centric, the move towards AI and technology for the GCC countries is crucial to be competitive at a global level and also comes with the potential to move away from fossil fuel dependency and leverage its more technological advantages in the global market.

Key Takeaways

Ambition is a driving force in the GCC.

Saudi Arabia, the UAE, and Qatar collectively rank high in the sphere of ambition to boost AI adoption and readiness (see for example BCG AI Maturity Index, p. 9).

The most salient issues of the GCC region identified during this project are:

- Diversification of the economy away from oil.
- Becoming an attractive hub for investment in AI.
- Developing and attracting global and local AI talent.
- Developing a comprehensive AI ecosystem across sectors that combines all relevant elements such as skills, policy / regulation, investment, and research and innovation. (see BCG AI Maturity Index).

Talent and Ecosystem Building Are the GCC's Differentiators.

While diversification away from oil and the pursuit of AI investment are widely recognized priorities, this research identifies two more strategic levers that will define the region's success in the global AI race:

1) the ability to build, attract, and retain high-quality AI talent, and

2) the establishment of integrated, cross-sector AI ecosystems.

- **Developing and attracting global and local AI talent.**

While all three countries are investing in AI education and upskilling initiatives, they differ in how institutionalized and accessible these pathways are. The UAE leads with early-stage integration and dedicated AI institutions like MBZUAI; Saudi Arabia is scaling via flagship programs like "One Million Saudis in AI"; and Qatar is leveraging its international university base. Yet gaps remain in

absorptive capacity, local talent pipelines, and talent retention, with talent ecosystems still fragmented and nascent. While **funding is abundant**, the talent gap in the GCC is **structural**, not financial, stemming from said fragmented pathways, limited institutional absorption, and underdeveloped long-term career infrastructures.

- **Developing a comprehensive AI ecosystem.** Such an ecosystem should span across sectors that combine all relevant elements such as skills, policy / regulation, investment, and research and innovation. (see BCG AI Maturity Index).

A high-performing AI system requires integration of research, education, regulation, investment, and application. While AI initiatives exist across these domains, they often operate in silos. Structural alignment, especially between public and private actors, is progressing fastest in the UAE, but remains a regional challenge. Public private partnerships are a significant driver of AI development in the region and are thus being expanded across the countries.

Sectorial use of AI.

While certain gaps need to be overcome to harness the full potential of AI in the GCC region, AI adoption in these countries is already prevalent across many sectors - for example in education, healthcare, energy, or urban development and financial services. The sectors prioritised by the respective countries are tied to national development priorities and (for the most part) embedded in strategic policies and national AI strategies.

Sectorial use cases of AI are constantly emerging alongside strategies, policies, and investments that feed into further developing and deploying AI across sectors. The evaluation and discussion of such applications in the broader context and policy / regulatory sphere remain to be done. **A gap, however, is the existence of sector-specific policies across the board** as can be seen in **Table 2:** AI Governance in Saudi Arabia, UAE, Qatar .

List of Abbreviations

AI - Artificial Intelligence

ATRC - Advanced Technology Research Council (UAE)

DOH - Department of Health

GCC - Gulf Cooperation Council

GDP - Gross Domestic Product

GenAI - Generative AI

ICT - Information and communication technology

KAUST - King Abdullah University of Science and Technology (Saudi Arabia)

KSA - Kingdom of Saudi Arabia, further referred to as “Saudi Arabia”

LLM - Large Language Model

MBZUAI - Mohamed bin Zayed University of AI (UAE)

MCIT - Ministry of Communications and Information Technology (Qatar)

NCAI - National Center for Artificial Intelligence

NDMO - National Data Management Office (Saudi Arabia)

NSDAI - Saudi National Strategy for Data and AI

NTP - National Transformation Program (Saudi Arabia)

PIF - Public Investment Fund (Saudi Arabia)

QCRI - Qatar Computing Research Institute (Qatar)

RAG - Retrieval Augmented Generation

SCAI - Saudi Company for Artificial Intelligence

SDAIA - Saudi Arabian Data and AI Authority

UAE - United Arab Emirates

USD - United States Dollar

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1. Introduction

The advent and development of Artificial Intelligence (AI) has been embraced by most of the world as *the* tool of the future, with the AI boom projected to contribute an astronomical $15.7 trillion to the global economy by the year 2030 (Yu et. al., 2024), opening up significant opportunities for Gulf Cooperation Council (GCC) countries to advance their capacity to foster artificial intelligence and to become a global AI hub (Isherwood & Chandran, 2024). According to McKinsey research commissioned in partnership with the GCC Board of Directors[2]AI has the power to transform the GCC nations' future and to bring real value to the region - value that may exceed 9% of the countries' combined GDP, or $150 billion (ibid.). Both the UAE and Saudi Arabia will benefit tremendously from AI contributing to its GDP, ranking third and fourth, respectively, behind only China and North America (Shivangi, 2018); and national AI policies are crucial in shaping and driving this growth across sectors.

The so-called "global AI race" is the geopolitical background in front of which the global development of AI is playing out. This race is evolving into a competition between US-UK and China-centric AI ecosystems, and wealthy middle powers, especially in the Middle East, are emerging as key players without clear-cut allegiance to either of the two standing AI superpowers (Manuel, 2024). These middle powers may see the spread of these new technologies as a tool for a "new era of multipolarity (Goujon, 2024). To provide the crucial resources, such as the enormous amount of electricity needed to power data centers that are needed for this transition, international investors are looking towards the Middle East for partnerships and investment opportunities to gain ground in the ever-intensifying AI Race (Carchidi & Soliman, 2024, p. 5) (Goujon, 2024).

It is against this backdrop that we place our research on the state, potential, challenges, and development of AI in the GCC region, focusing on the sectoral application, development, state, and challenges of AI within select sectors. For this purpose, we have selected three GCC case study

[2] The GCC Board of Directors is "the most influential network of senior Board Directors in the Gulf." GCC Board Directors Institute. 2025. See: https://gccbdi.org/

countries: Saudi Arabia (KSA), the United Arab Emirates (UAE), and Qatar and three focus sectors: education, healthcare, and energy.

The objective of this research is:

- To give an overview of key developments in the case study countries pertaining to investments, crucial AI policies, and key sectors
- and to provide a more in-depth, **diagnostic analysis** of three focus sectors, outlining relevant sub-sectors, developments, and challenges.

2. Literature Review

It is important to preliminarily state that, due to the rapidly changing nature of Artificial Intelligence, with new developments emerging almost daily, that this review of literature can by conception not be exhaustive. However, the most important trends and developments seem to remain and are only accelerated by new developments

2.1. Defining Terms: What is Artificial Intelligence (AI)?

Artificial Intelligence is a word that has echoed through the world of technology for longer than some might assume. The term was first coined in 1956 at The Dartmouth Summer Research Project of Artificial Intelligence (McCarthy, 1955). Now at the zenith of its development we have different uses of AI such as Generative AI (GenAI) and Large Language Models (LLMs).

Generative AI entails algorithms that are used to generate new content which includes, texts, images, videos and simulations. This breakthrough is crucial for fields like medical imaging. However, there are different types of AIs that serve a variety of purposes (McKinsey & Company, 2024). Particularly in the energy sector which is heavily reliant on data and analytics where there is a large volume of data. GenAI can be used to interpret and analyse this data, making the analysis process less time consuming. (McKinsey & Company, 2024)

Large Language Models

LLMs are a type of foundation model that are trained on large volumes of data that provides them with the capacity of generation of natural language and other content; furthermore expanding its capacity and the variety of tasks that it is capable of. (IBM, 2023)

Machine Learning is a category of artificial intelligence where machines are trained on data patterns without human oversight. This is specifically useful when data is robust, complex, and unmanageable. In the field of education, it can be used to tailor the learning methods according to each individual

student. DreamBox and Smart Sparrow are two such applications where the responses of students are analysed and lessons are tailored to students to ensure learning at an individual pace. (Brown, 2021)

The focus in this research is on the use of AI as both an input and an output. The **input** aspect entails using AI as a means to an end, where the application of AI makes a sector more efficient and contributes to building an enabling environment for AI to thrive. The **output** aspect is the development of AI. The engagement is with how AI can be improved and developed. This would include implementing educational reforms, or investing further in the field of AI.

2.2. Justification of Case Study Countries

At the 2023 AI Safety Summit in the United Kingdom, 28 nations, including Saudi Arabia and the UAE agreed to the Bletchley Declaration, recognizing the shared global responsibility of responsible AI risk management (UK Government, 2025).

Showing foresight and engagement in AI development proven by innovative policies, laws, and geopolitical benefits as outlined in the literature review, we have thus chosen Saudi Arabia, the United Arab Emirates, and Qatar as our three case study countries.

Country	AI Race Position[3]	Individual Justification
Saudi Arabia	"Rising Contender"	Largest GCC economy[4] by GDP with substantial public and international investment in AI. Sectoral transformation envisioned under Vision 2030.
UAE	"Rising Contender"	First country to launch an AI ministry. Proven track record of public-private collaboration and strategic investments.
Qatar	"Gradual Practitioner"	Uses strategic investments to advance AI adoption. Leverages investments strategically despite its small size, collaboration with international universities.

Table 1: Justification of Case Study Countries

[3] Further details in analysis. Schwaerzler et. al. 2024. Retrieved from: https://web-assets.bcg.com/fe/61/6962e74b44328f148c8a9ac1002d/ai-maturity-matrix-nov-2024.pdf
[4] World Bank. 2025. Retrieved from: https://www.worldbank.org/en/country/gcc

2.3. GCC Case Study Countries: Overview of Existing AI Policies

Given the great relevance of the state in the role of AI governance in Saudi Arabia, UAE, and Qatar, it is important to discuss certain aspects of the governance framework relevant for our paper. Hence, this chapter briefly gives an overview of the existing national AI strategies in our case study countries and seeks to point out any sector-relevant details within these countries' AI policies and national strategies.

High Level Overview

National AI Policies: The "OECD AI Policy Observatory" has established a sophisticated dashboard of countries' national AI strategies and policies. For Saudi Arabia it outlines 65 policies and for the UAE there are eight (OECD, 2025). As of May 15th 2025, Qatar is not part of the dashboard although it indeed has its respective national AI Strategy. This points to the fact that Qatar's primary focus is not on AI. This will be further elaborated on in the analysis and conclusion sections.

Moreover, Saudi Arabia and UAE both have a ministry specifically in charge of AI whereas this is not the case for Qatar. Qatar's coordination of AI efforts seems to involve multiple stakeholders such as the AI Committee, or the Ministry of Communications and Information Technology (MCIT), which oversees the AI Strategy. The AI Committee's function does not arise clearly from policy documents.

Ethics Framework: All three countries have some form of an **ethics framework** in place.

Sector Specific Policies: The adoption of sector-specific policies is vague to non-existent in all three countries. We have found that only Saudi Arabia has a concrete sectoral AI policy - the "Saudi Academic Framework for AI and Qualifications" - which falls into the field of education. While Qatar has a national E-Health and Data Management Strategy, this may be outdated as it was released in 2015.

AI Governance in Saudi Arabia, UAE, Qatar[5]			
Country	**Ministries**	**Government Institutions and Organisations**	**Concrete Policies**

5 "X" denotes the absence of a relevant policy.

AI Governance in Saudi Arabia, UAE, Qatar[5]			
Saudi Arabia	Saudi Data and AI Authority Ministry of Communications and Information Technology (MCIT)	National Center for AI Saudi Company for Artificial Intelligence (SCAI) Center of Excellence for Generative AI (King Abdullah University of Science and Technology) (KAUST) National Transformation Program (NTP) National Data Management Office (NDMO) Communications, Space & Technology Commission National Center for Artificial Intelligence (NCAI) Saudi Company for Artificial Intelligence (SCAI) Center of Excellence for Generative AI (KAUST) National Information Center Project Transcendence National Technology Development Program	National Strategy for Data and AI[6] (Strategy Narrative - 2020) **Ethics Framework:** Yes **Education:** Saudi Academic Framework for AI and Qualifications **Healthcare:** X **Energy:** X
UAE	Minister of State for Artificial Intelligence, Digital Economy & Remote Work Applications Office	AI Office AI and Blockchain Council National Program for AI Mohamed bin Zayed University of AI (MBZUAI) G42 (semi governmental, works closely with the govt.) Digital Dubai Authority Advanced Technology Research Council (ATRC)	UAE National Strategy for Artificial Intelligence 2031 (2018)[7] **Ethics Framework:** Yes **Education:** X **Healthcare:** X **Energy:** X
Qatar	**no centralised authority for AI →** Ministry of	Qatar Computing Research Institute (QCRI) Artificial Intelligence Committee	National Artificial Intelligence Strategy for Qatar[8] (2019) **Ethics Framework:** Yes

[6] Saudi Data and AI Authority. 2020. Retrieved from: https://wp.oecd.ai/app/uploads/2021/12/Saudi_Arabia_National_Strategy_for_Data_and_AI_2020.pdf
[7] National Program for Artificial Intelligence. 2018. Retrieved from: https://ai.gov.ae/wp-content/uploads/2021/07/UAE-National-Strategy-for-Artificial-Intelligence-2031.pdf
[8] Ministry of Transport and Communications et al. 2020. Retrieved from: https://qcai-blog.qcri.org/wp-content/uploads/2020/04/QCRI-Artificial-Intelligence-Strategy-2019-ENG.pdf

AI Governance in Saudi Arabia, UAE, Qatar[5]			
	Communications and Information Technology (MCIT) oversees AI Strategy implementation	Qatar National Cyber Security Agency	**Education:** X **Healthcare:** National E-Health and Data Management Strategy (2015) **Energy:** X

Table 2: AI Governance in Saudi Arabia, UAE, Qatar

2.3.1 Saudi Arabia: Policy and Regulatory Frameworks

The two main policy initiatives launched by Saudi Arabia to note in this context are: the "Vision 2030 Strategy" and the country's "Saudi National Strategy for Data and AI" (NSDAI) launched by Saudi Arabia's Data and AI Authority (SDAIA). Alongside these, a broad range of additional government programs, platforms, and stakeholders are relevant in this context as can be seen in the table above.

Ethics Framework

SDAIA has published the "AI Ethics Principles" (Saudi Data and AI Authority, 2023) and launched an amendment to the Personal Data Protection Law of Saudi Arabia (Al Ajlan, 2023). The country also houses the International Center for AI Research and Ethics (The International Center for Artificial Intelligence Research and Ethics, 2025).

Relevant Programs, Platforms, Policies, and Actors

Vision 2030: Launched in 2016, Vision 2030 is a "blueprint for Saudi Arabia's economic and social metamorphosis", setting the stage for the long-term development of the country's economy and society (Alberich et al., 2024). Key goals of the initiative include economic diversification away from oil, and the development of infrastructure, human capital, tourism, and education (Saudi Vision 2030, 2025).

The central themes of "Vision 2030", according to the strategy's website, are:

- "A vibrant society"
- "A thriving economy"

- "An ambitious nation"

Each theme encompasses different goals to achieve the strategy's vision by 2030 (Saudi vision 2030, 2024). To achieve these goals in their various sub components, the Kingdom has launched various national growth strategies, including the National Strategy for Data and AI.

National Strategy for Data and AI: The Saudi Data and AI Authority (SDAIA) was launched in 2019 in an effort to support the strategic priorities as set out in Vision 2030 (Memish et al. 2021, p. 141). Saudi Arabia formally launched its national AI strategy NSDAI in October 2020 during the Global AI Summit, hosted by SDAIA (Reuters, 2020).

The NSDAI is a dedicated strategy for AI and data in Saudi Arabia, calling data "the new oil" and pointing out the magnitude of opportunities arising from the implementation of artificial intelligence. The country's ultimate goal is defined as "where the best of Data & AI is made reality" (Saudi Data & AI Authority, 2025).

Sector Specific Policies

- **Education:** Saudi Academic Framework for AI and Qualifications (Saudi Data and AI Authority, 2023b)
- **Healthcare:** N/A.
- **Energy:** N/A, but SDAIA partnerships with majorly state owned oil company Aramco (Saudi Data and AI Authority, 2025)

2.3.2 UAE: Policy and Regulatory Frameworks

As the first country with an AI Minister of State and a comprehensive national AI policy positioning the country as a world leader in AI by 2031, the UAE is well-positioned on the policy front.
The United Arab Emirates aims to build its Artificial Intelligence policy on the foundation of judicious partnerships, strong support from the government and framing regulations at an international level, to harness the power of AI for sustainable development. The UAE has aligned with certain pillars such as collaboration, progress, ethics, and sustainability that act as a guiding principle (*United Arab Emirates Legislations*, n.d.).

Ethics Framework

The UAE has released the **"AI Ethics: Principles and Guidelines" white paper** that illustrates parameters which include fairness, unbiased operation of AI systems, transparent decision making, digital and physical safety, or environmental sustainability (UAE Minister of State for AI, Digital Economy & Remote Work Applications Office, 2022). It has also adopted the Federal Data Protection Law (Telecommunications and Digital Government Regulatory Authority, 2024).

Relevant Programs, Platforms, Policies, and Actors

At a domestic level, the **UAE Council for Artificial Intelligence** which is entrusted with the task of policy proposals to accommodate an AI positive ecosystem to promote collaborative work and research between the private and public sector. (*United Arab Emirates Legislations*, n.d.)

The AI and Advanced Technology Council is responsible for the development of research, finance and investment plans for the advancement of AI.

Furthermore, the emergence of generative AI poses a concern as it operates on pre-existing training data, based on pattern recognition and predictions. UAE aims to mobilise such technology to assist in various sectors such as education, media, or healthcare and follows the **Generative AI guide** (*The United Arab Emirates Government Portal*, 2024) which stipulates around 100 applications of AI.

Sector Specific Policies

- **Education:** No concrete policy documents to be found so far, though news broke in early May 2025 that the UAE is launching an AI curriculum starting in kindergarten from 2025/26 onwards (Al Amir, 2025). UAE National AI Strategy includes education aspects.
- **Healthcare** 9**:** N/A.
- **Energy:** N/A.

2.3.3 Qatar: Policy and Regulatory Frameworks

Qatar's main AI policy is the National Artificial Intelligence Strategy for Qatar, established in 2019 and overseen by the Ministry of Communications and Information Technology. According to the **National AI Strategy for Qatar** (Ministry of Transport and Communications, 2019), the strategy

9 Note: Dubai Health Strategy 2021 includes AI aspects.

focuses on six pillars: education, data access, employment, business, research, and ethics. The strategy emphasizes the need for a well-educated citizenry.

Ethics Framework

To ensure responsible and lawful AI deployment, the Ministry of Communications and Information Technology has issued the "Artificial Intelligence in Qatar - Principles and Guidelines for Ethical Development and Deployment (Ministry of Communications and Information Technology, n.d.)"

Relevant Programs, Platforms, Policies, and Actors

As Qatar has no centrally coordinating AI Ministry, the relevant programs, platforms, policies, and actors are also more fragmented. Notable actors include: Qatar Computing Research Institute, the Artificial Intelligence Committee, or the Qatar National Cyber Security Agency.

Sector Specific Policies

- **Education:** National AI Strategy references education broadly, otherwise no concrete policies.
- **Healthcare:** National E-Health and Data Management Strategy (not AI-specific) (PwC & National Health Strategy, 2015)
- **Energy:** No concrete policies to be found so far.

2.4. Strategic Investments and Initiatives[10]

The expansion of the field of AI and its sectoral application is possible and emboldened with implementations of various strategic investments.

2.4.1 Saudi Arabia:

The investment boom in AI in Saudi Arabia is driven by government and private investments alike.

Government AI spending has significantly increased in recent years. According to a report published by SDAIA, information and communication technology (ICT) spending has increased at a compound annual growth rate of 27% between 2019 and 2023, cumulating to USD 32 billion. The budget allocated for ICT in 2024 was around USD 10 billion (SDAIA, 2024, p. 19).

[10] The team decided to leave this section in the country-by-country format due to the fact that investment is more targeted at specific countries (say the development of infrastructure for data centers) than for specific sectors and sub-sectors).

Saudi Arabia's **Public Investment Fund** (PIF) is a crucial cornerstone of the Vision 2030 strategy, and supports the strategy by working towards improving businesses and charting new development sectors (Public Investment Fund, 2024). A milestone undertaking of the fund, is the 26,500 square km global hub and smart city NEOM, a massive infrastructure project wholly owned by the PIF (PIF Annual Report 2023, p. 72).

Private investments are also playing a crucial role. According to media reports from Bloomberg (Abuljadayel & Martin, 2024) and CNBC (Turak, 2024), the PIF is discussing the launch of a USD 40 billion fund for AI initiatives with venture capital firm Andreessen Horowitz (Turak, 2024), while Microsoft (Microsoft News Center, 2024) and Amazon Web Services (Amazon.com, Inc., 2024) are rapidly working on opening data centers in Saudi Arabia. The country hopes to attract USD 20 billion in total investment in AI by 2030 (SDAIA, 2020).

According to a PwC analysis, Saudi Arabia is set to gain the largest absolute benefits from the AI investment boom in all of the Middle East (GCC countries + Egypt in this analysis), with AI set to contribute more than USD 135.2 billion to the economy by 2030. This is roughly equivalent to 12% of the nation's gross domestic product (Shivangi, 2018).

Hailed as a current "flagship project" targeted at rivalling the UAE's emerging tech hub, another USD 100 billion investment is expected to be launched in Saudi Arabia. Although these plans are still under wraps, speculations exist that the structure of such a hub may follow the one of Alat, a fund dedicated to sustainable manufacturing with USD 100 billion in capital backed by the Public Investment Fund (Newman et al., 2024).

Alongside its national transformation strategies such as Vision 2030 and the corresponding Saudi Data and AI Strategy, the country also provides financial and non-financial incentives for investors, enhancing the country's attractiveness for investors (Alberich et al., 2024). Strong government backing of AI development further contributes to attractivity for investors (Middle East Briefing, 2025).

2.4.2 UAE

During the **Annual World Government Summit** meeting in 2018 the UAE declared that it aspires to become a major hub for Artificial Intelligence by the year 2031 (UAE National Strategy for Artificial Intelligence 2031, n.d.). Furthermore, this aligns with the **UAE Centennial 2071** that aims to generate economic, social and educational opportunities for its citizens.

The concentration of the AI infrastructure is aimed at **healthcare and cyber security**. There is an estimation that around **AED 353 billion will be contributed to the GDP as additional growth**. If tourism is chosen as a priority sector then **AED 136 billion in gains when it comes to the service sector**; furthermore, to assist such technological development.

An emerging sector that the UAE sees great potential in is healthcare. This is seen through the Dubai Genomics program which would help to usher in genome sequencing into the UAE, by utilising the diverse genetic community using science to predict risks associated with genetically related diseases. This could be crucial as there is not much foundational research into the risk of illnesses in these regions.

The UAE is on a path to root itself in a partnership with the US through companies such as IBM, Microsoft and OpenAI. **The Group 42 Holding Ltd** which is an Abu Dhabi based AI development holding company started in 2018; who has contributed hugely to the development of AI in the UAE.

Microsoft's investment of $1.5 billion in April of 2024 into G42 and the expansion of the Global Engineering Development centres that are yet to be launched. There are efforts to further develop AI in the UAE, with the emergence of the **AI Centre of Excellence -** a collaborative effort between **Mohamed Bin Zayed University of Artificial Intelligence** and **IBM** (Yousef, n.d.).
These efforts of AI integration into the UAE have also trickled to the public sector where the Dubai Electricity and Water Authority incorporated Microsoft's Copilot into their utilities and services (Yousef, n.d.).

2.4.3 Qatar

Qatar has recently partnered with a San Francisco-based company, Scale AI, to improve its public services through AI integration (Mills, 2025). Scale AI aims to develop more than 50 possible uses of AI; the five-year partnership focuses on using AI-powered tools such as predictive analytics to enhance operations across various sectors.

Despite its smaller scale, Qatar has several opportunities to position itself as an AI player. As stated above, the country's leadership has made AI a significant component of its national development strategy. It is particularly leveraging its wealth and investment capacity for this purpose. Within the country, Qatar is dedicated to building a more sustainable form of economy. To exemplify, the Fanar Arabic LLM project is tailored to the GCC region's linguistic and cultural needs and is a promising

opportunity to serve Arabic speakers within the GCC region (The Ministry of Communications and Information Technology, 2025).

Additionally, Qatar has also been building world-class infrastructure. For example, the Ministry of Communications and Information Technology of Qatar has announced its partnership with Microsoft to launch the country's first hyperscale cloud datacenter (Boutros, 2022). Meanwhile, Google also confirmed its partnership with Qatar, providing local AI computer power (Khalil & Kosta, 2023).

2.5. AI Development in the GCC: Key Sectors

2.5.1 Justification of Focus Sectors

Sector	Justification
Education	Education is directly linked to talent development and a future fit workforce. It has emerged as one of the most salient sectors in our expert interviews, particularly with regards to talent development and the need for homegrown talent. If AI is leveraged in a smart way in this sector this has the potential to optimize and fast track GCC nations' development of talent, thus advancing their position in the AI race.
Healthcare	With the growth in the aging population as well as the recent issues like the global pandemic COVID-19, technology and AI inevitably permeates the field of medicine and healthcare. Generative AI also would benefit the administrative aspect of hospitals where the registration and admissions of patients can be made more efficient. Genomic data that would emerge from the GCC could be crucial in diversification of existing data that is concentrated on western countries; this would make disease detection and predictive analysis more precise.

Energy	The energy sector was chosen because of its critical role in the GCC economies and its centrality to national development goals. As these countries seek to diversify and modernize, AI is being increasingly adopted to optimize operations and support sustainability. Analyzing this sector offers insight into how state-led innovation is transforming a traditionally fossil-fuel-dependent industry in a region undergoing rapid transition.

Table 3: Justification of Focus Sectors

2.5.2 Saudi Arabia

As per the HSBC "Saudi Arabia Trade Corridors Outlook" Saudi Arabia has made significant progress in reaching the targets set out in its Vision 2030 strategy, with the nation's GDP exceeding USD 1 trillion in 2023 for the first time in history and stepping towards its goal of developing an attractive investment landscape and diversified economy (HSBC, 2024, p. 3). As pointed out in the country's Vision 2030 strategy, Saudi Arabia is seeking to diversify its economy away from oil and push towards renewable energy, with non-oil based activities such as tourism, telecommunications and financial services already making up over 50% of the nations' GDP in 2023 (HSBC, 2024, p. 3 & 9).

Saudi Arabia is working hard towards creating a conducive environment for conducting business, which is supported by its immense GDP growth, high mobile penetration rate, and its demography, with 67% of the country's 35.2 million cities being under 35 years old (HSBC, 2024, p. 9).

According to the HSBC analysis, the main sectors targeted by the National Strategy for Data & AI are:

- **Education**
- Government
- **Healthcare**
- **Energy**
- Mobility

Saudi Arabia is making significant progress in each of the above sectors, for example with the "1 million Saudis in AI" initiative in the **education** sector, aiming to train 1 million citizens in the field of AI (Saudi Press Agency, 2024).

In terms of **energy**, the SDAIA Strategy Narrative document defines the potential roles for AI in the energy sector as follows: “Integrating Data & AI into Energy to increase capacity, enhance efficiency, and develop adjacent industries” (National Strategy for Data & AI, 2020, p. 32). This is underscored by the announced collaboration between Aramco Digital (digital subsidiary of Aramco) and AI company Groq to build the world’s largest inferencing data center which will accelerate data processing and analysis (Aramco Digital, 2024).

2.5.3 UAE

With major investments in UAE’S AI initiatives, cementing the relationship between the US and UAE, there are several collaborations that have emerged from the private sectors on **energy, healthcare,** financial services, **and education.**

The UAE also aims to further their defence manufacturing and the use of AI comes in handy for such purposes; AI is further leveraged to be used in defence industrial plants, particularly for systems that are autonomous. (*The UAE's Technology Ambitions*, n.d.)

Dell Technologies along with Pure Health in Abu Dhabi implemented generative AI in healthcare which was used in disease detection, treatment plans that are personalized in accordance with the patient and analysis of medical data (US-UAE Business Council, 2024). Additionally, the collaborative effort between the Applied AI Company and Healthpoint (Abu Dhabi) aims to reduce the cost of administration in hospitals with the use of medical coding. The Cleveland Clinic Abu Dhabi, within the M42 Network, as a collaboration with the US saw UAE’s first ever kidney transplants that were robot-assisted shows the potential that UAE has to be an AI supower. (Yousef, n.d.)

2.5.4 Qatar

The National AI Strategy for Qatar mentions the following sectors:

- Financial services
- Manufacturing
- Agriculture
- **Healthcare**
- **Education**
- **Energy**

The country has made substantial investments in education and research infrastructure - two key national sectors. Moreover, the National AI Strategy gives recommendations for integrating AI into

the education, healthcare, and energy sector, defining, among others, “precision medicine and systems biology” and “oil and gas” as “AI + X Focus Areas”.

Qatar is also committed to strategically integrating AI into its governance framework. This is a proactive approach to integrating AI across multiple sectors and is in alignment with Qatar’s broader objective of economic diversification and the transition to a knowledge-based economy (Ministry of Transport and Communications et al., 2020).

2.5.5 Overview of Other Relevant Sectors

The development of AI is better understood through the lens of sectoral applications of AI in Qatar, Saudi Arabia and UAE. The operational efficiency that is provided by AI with regards to dealing with large volumes of data, pattern recognition, predictive analysis and content generation the following sectors have benefitted the most:

- **Education**
- **Energy**
- Environmental Sustainability
- Finance
- **Healthcare**
- Industry
- Public Services/Government
- Retail & Consumer Packaged Goods
- Smart Cities & Urban Design/Infrastructure

For the purpose of the analysis of sectoral data, the main sectors are education, energy and healthcare. The sectors of education and healthcare are particularly robust, however the energy sector is salient as the GCC countries aim to move away from an oil-based economy.

3. Methodology

3.1. Research Questions

- ***What are the differences that emerge in the sectoral application of AI within the stakeholder countries?***

a) What are the selected sectors across the stakeholder countries that are most prominent when it comes to the use of AI?

b) What are the comparative advantages and limitations when it comes to the application of AI in each of the sectors across the countries?

- ***What is the position of the GCC within the global AI race?***

a) What are the countries that are at the forefront of this race within the GCC?
b) What are the policy frameworks or strategies in place to facilitate the development of AI in each of the countries?
c) What is the relevance and application of AI and how is it being developed in the stakeholder countries?

3.2. Scope

The scope of this paper is to examine the GCC's positioning in the global AI race, centred on Saudi Arabia, UAE, and Qatar. It establishes the framing of the GCC as a potential global AI hotspot within the AI race, focusing on strategic policies, investments, and relevant sectors in the literature review before moving to the analysis where a cross-country sectoral analysis of education, energy, and healthcare is conducted.

Using a literature review, desk research, and interviews the study evaluates AI's development, investments, and impact in the region, addressing a key research gap in the GCC context.

3.3. Limitations

- **Limited number of interviews.**

  Due the paucity of time as well as limited responses received, despite the large number of interviewees contacted, the number of interviewees aimed for (10) was halved to 5. There were a limited number of interviewees from each of the sectors. This made receiving inputs from experts in the field a challenge when it came to understanding certain nuances to the current state of AI within the sectors. In the education sector there is great reliance on one single interview with Ms. Manail Anis Ahmed.

- **Publicly available in-depth information on certain sectors is limited.**

  While there was a significant amount of articles and papers analysing the relevance and use of AI on a broader level, there were certain restrictions on accessibility to data when looking at the specific sectors. Specifically, publicly available information in the energy sector across the three countries is limited due to the secretive nature of the sector. Thus the inferences and analyses are drawn from limited data, leading to a potential lack of robustness in sources that could have improved the impact of the research.

- **Solely analysis of English documents.**
  A significant number of documents that would have been relevant for the research were in Arabic, and since the team had no knowledge in Arabic the research had to be restricted to the English documents. Attempts to translate were not made due to the possibility of misinterpretation and mistranslation of information, potentially undermining the findings of this paper. The use of AI for translation was not considered due to similar concerns.

3.4. Analytical Framework

Our analytical framework consists of two core elements: sector charts and stakeholder charts[11].

The sector charts serve as a diagnostic mapping and framework of sectors and sub-sectors, outlining specific AI applications, relevant partnerships, and use cases. The stakeholder charts, while not yet including the power-interest components as originally planned, provide a detailed mapping of key stakeholders by country, sub-sector, and stakeholder category.

We envision both the sector and (sub-)sector and stakeholder charts[12] as the foundation for a future power-interest mapping. A draft of such a mapping could be based on Ruehle (2020, pp. 187-189).

3.5. Data Collection Strategy

Desk Research

The desk research conducted for this report is the result of a comprehensive review of secondary literature, news articles, policy reports and documents, white papers, academic papers, and relevant (mostly government) website entries on the topic.

Interviews

Though originally 10 interviews were planned, this was not possible.[13]An extended desk review was conducted to complement the reduced scope of interviews as our primary data collection strategy. Where relevant, insights from our five successful interviews were analysed and incorporated into the analysis section.

[11] To be found in the appendix due to word-count constraints.
[12] Please note that the stakeholder chart for the education sector and its sub-sectors beyond talent development and higher education as the focus areas could not be completed due to time constraints.

[13] See “Limitations” section.

4. Analysis

4.1. Education[14]

Education is one of the key pillars to expanding the GCC nations' comparative advantage in the development and deployment of AI technologies. A future-fit workforce is the cornerstone of an economy that is setting itself up for the future.

Based on desk research and interview insights the two (out of 8) sub-sectors of higher education and talent development are most interesting for our analysis. These two sectors are foundational for developing a functioning AI ecosystem - an element the GCC is working on building with a focus on both homegrown and international talent for sustainable growth.

The chart below outlines the identified specific applications in the two sub-sectors, showcasing select examples of these applications in the three case study countries. It is meant to help identify where efforts remain limited or uneven and provides a basis for the text-based analysis of the two sub-sectors below.

[14] **Chapter Limitation:** A clear limitation of this chapter is that the information presented within the body of the text is mostly derived from insights from one interview with GCC expert Ms. Manail Anis Ahmed. The researchers have chosen to accept this limitation and to use these insights to make up the majority of this chapter as the information provided by Ms. Ahmed is not available with mere desk analysis and gives substantial depth and relevance to this section of the report.

Examples				
Sub Sector	**Specific Application**	**Qatar**	**Saudi Arabia**	**UAE**
Higher Education	• AI Competency Frameworks for Students and Teachers • University Degrees in AI • Industry-Academia Collaboration • Faculty Expertise • Intelligent Tutoring Systems (ITS) • Adaptive Learning Systems • Predictive Analytics • Emotional and Social Learning Support	• Qatar Computing Research Institute • University of Doha for Science & Technology • Qatar University • Hamad bin Khalid University • Qatar Environment and Energy Research Institute • Qatar Foundation - Carnegie Mellon University Partnership[15] **Western Style Higher Education Institutions:** • CUQ Ulster University (Qatar) • Arkansas State University (Qatar)	• King Saud University - IBM Partnership[16] • Al Baha University - IBM Partnership[17] • KAUST • King Abdulaziz University • King Saud University • Alfaisal University • Taif University • Prince Nouf University • Dar Al-Ekma University • King Fahd University of Petroleum and Minerals **Western Style Higher Education Institutions:** • **None**	• Mohamed bin Zayed University of AI • MBZUAI Nexus • Abu Dhabi University • Khalifa University **Western Style Higher Education Institutions:** • Heriot-Watt University Dubai • British University in Dubai • University of Birmingham (Dubai)
Talent Development / Attraction	• Vocational & Technical Training • AI Training Programmes / Skill Development Programs • AI Certificate Programs • Industry-integrated AI courses • Technical Skill Certifications • AI-enabled simulators (virtual reality / augmented reality) for technical training • Incubators / Accelerators / Sandboxes	• TASMU Accelerator and Innovation Lab • Qatar Digital Academy • Mada Academy Trainings (i.e. AI for Inclusive and Accessible Education)[18] • Qatar Foundation (e.g. Fanar LLM)	• King Saud University - IBM Partnership • Humain - Amazon Web Services[19] • One Million Saudis in AI • Tuwaiq Academy - UC Berkeley - Future Tech Leaders Program • National IT Academy - Microsoft Partnership • Human Capability Development Program • KAUST Academy • Fuel Program ("train 100k citizens in digital jobs within the first year") • SDAIA Academy	• Accenture + Commercial Bank of Dubai → Data and AI Training[20] • ADNOC Technical Academy: Specialised professional training programs[21] • UAE AI Summer Camp • One Million Arab Coders • Digital Dubai-Microsoft AI Skills Program[22]

Table 4: Education Sector Table on Examples and Sub-Sectors.

4.1.1 Higher Education

Overview

Higher education is central to how GCC countries are preparing for a future with AI as a centerpiece. Universities are expected to train local talent and attract international expertise while contributing to research and innovation.

Similarities, Differences, and Comparative Advantages

Across the case study countries, there are AI degree programmes, public-private partnerships, and efforts to attract Western-style higher education institutions. In the latter realm, Qatar and the UAE are ahead, welcoming more Western models of teaching and learning. However, only one of the three

[15]Qatar Foundation. 2025. Retrieved from: https://www.qf.org.qa/stories/carnegie-mellon-university-and-qatar-foundation-extend-partnership-for
[16]IBM. 2025. Retrieved from: https://mea.newsroom.ibm.com/ibm-ksu-collaboration
[17]IBM. 2024. Retrieved from: https://mea.newsroom.ibm.com/IBM-and-Al-Baha-University-Announce-Plans-to-Establish-a-Center-of-Excellence
[18]Mada Academy. 2025. https://academy.mada.org.qa/course/ai-for-inclusive-and-accessible-education/
[19]Amazon. 2025. Retrieved from: https://www.aboutamazon.com/news/company-news/amazon-aws-humain-ai-investment-in-saudi-arabia
[20]Accenture. 2025. Retrieved from: https://newsroom.accenture.com/news/2025/accenture-and-commercial-bank-of-dubai-launch-data-and-ai-training-programme-to-elevate-employee-skills-and-customer-experience
[21]ADNOC Technical Academy. 2025. Retrieved from: https://ata.ac.ae/Pages/english?pid=3a79345e-9270-4b96-bca2-d10c8997d010&mid=cb75b3d8-a209-47de-a03a-d290158d37b5
[22]Malin. 2025b. Retrieved from: https://www.middleeastainews.com/p/digital-dubai-microsoft-ai-skills

countries has its own AI university: The Mohamed bin Zayed University of AI (MBZUAI) in the UAE.

Moreover, all governments are expanding AI-related degree programs. All universities listed in the chart above have AI-related undergraduate or graduate degree programs, often coupled with computer science or engineering.

Saudi Arabia is rapidly scaling up its AI higher education focus through institutions like KAUST and its many other universities offering AI-specific programs and academia-industry collaboration initiatives such as the KAUST-IBM AI upskilling partnership (IBM, 2025).

Qatar follows a more internationally-minded path, attempting to attract Western-style universities and positioning Doha as a hub (c.f. University of Doha for Science and Technology, 2024). In this context it is important to keep in mind Qatar's smaller scale and reduced ambition to become a top player in the AI race, so attracting international talent is more intuitive.

The UAE as a Potential Leader

The newly introduced undergraduate AI program at MBZUAI stands out due to its design targeted at giving the option of following two pathways for students (Malin, 2025). They can either choose to pursue the BSc in AI with a focus on business or a focus on engineering. This is an example of how the UAE is trying to incentivize building AI skills from the onset of students' academic career and how it is diversifying its workforce to generate diverse **inputs for its AI ecosystem** through the two different tracks of the degree.

This follows an international trend of AI-related degree programs and AI graduates increasing internationally (Maslej et. al., 2025, p. 22). With regards to the Middle East in particular, UNESCO states:

"In the Middle East, the United Arab Emirates leads with a significant 36% increase [in AI-related degree programs], reflecting the region's strong push to become a global hub for technology and innovation (UNESCO, p. 26)."

The UAE has shown foresight again very recently, as it announced that it will be integrating AI into the education curriculum, beginning in kindergarten, from the 2025/26 academic year onwards (Al Amir, 2025). Given the fact that the labour market is evolving and adapting to the development and integration of AI, the education sector and its policies must follow suit. The UAE is thus implementing AI in the curriculum starting with its youngest citizens, which demonstrates its

ambition to build a talent pipeline for the future. While the country is expanding its role in the AI race by attracting international faculty and students today, it is likely that strategies such as the AI curriculum implementation will lead to the desired outcomes in the future. This shows a strategic approach to building a streamlined talent pipeline, integrating both higher education and primary education simultaneously.

Challenges

One major issue is talent retention: In places like the US, merely around 20% of AI PhDs stay in academia after graduation, compared to over 40% a decade ago. This is an "intensifying brain drain from universities into industry" (Maslej et. al., 2025, p. 22). The GCC countries may risk facing the same pattern, especially if local research funding, or AI-specific job opportunities in academia remains limited[23].

As mentioned by an interviewee pursuing a PhD in education at a Swiss University, educators need to rethink their roles and adapt to the constantly changing educational environment. This also holds true for the GCC countries.

Moreover, higher education institutions still remain under-involved in the conception of comprehensive AI regulations and ethics frameworks. While both Saudi Arabia and the UAE approach higher education in their national AI strategies with a focus on two out of three crucial areas as identified by UNESCO research on the role of higher education in national AI strategies (UNESCO, p. 20), Qatar lacks all three areas. The areas and the breakdown of their implementation per country are as follows:

Saudi Arabia:

1) *AI Education, workforce*
2) *Lifelong training / research and development*

UAE:

1) *AI Education, workforce*
2) *Lifelong training / research and development*

Qatar: *not on table*

[23] See chapter 4.2.2 for comparison. The talent development / attraction sub-sector is facing similar issues as these areas are not isolated from one another.

The third component, regulations and ethics framework, was present in none of the three countries, which raises concerns over a lack of higher education institutions' involvement in shaping crucial AI ethics and regulatory frameworks[24].

4.2.2 Talent Development / Attraction

Overview

In all three countries, efforts to attract and build AI talent - such as the One Million Saudis in AI or One Million Arab Coders initiatives - are underway. However, there is a lack of streamlined, accessible pathways. While the GCC has the financial capacity to attract top-talent, and the infrastructural ambition to compete on the global scale of the AI race - shown through the establishment of AI-focused institutions such as MBZUAI - Manail Anis Ahmed, our primary source for the education chapter, highlights that there is a significant gap between ambition and execution. There are currently no clear, coordinated systems in place to attract top AI talent, especially from global talent pools.

According to her, this opportunity that arises from talent increasingly looking outwards, perhaps due to geopolitical shifts, is not yet being recognised and acted upon by GCC countries. For instance, France has recently extended calls to US-based researchers to relocate and apply for grants (Chrisafis, 2025); an approach the select GCC countries have yet to adopt.

Similarities, Differences, and Comparative Advantages

All three case study countries have existing initiatives that seek to build AI skills and talent development, be it the UAE AI Camp (United Arab Emirates Minister of State for AI, Digital Economy & Remote Work Applications, 2022), the skills development partnership between IBM and King Saud University, or the Qatar Digital Academy (Ministry of Communications and Information Technology, 2025). However, these pipelines are still in early stages of development. Programs such as the One Million Saudis in AI or One Million Arab Coders show the countries' dedication to scale local capacity, but without an in-tandem development of structures to absorb and retain these skills these initiatives may not be sustainable in the long run.

Common issues, however, persist across the countries. There is a level of tension between attracting foreign expertise and building local talent. While both are needed to grow a sustainable AI ecosystem, Ahmed notes that policy efforts to attract international experts are not accompanied by robust efforts to fully embed them. There is often a lack of clear job-descriptions, long-term research placement

[24]See: *"Table 2 Inclusion of HE in NAIS"*. *UNESCO. 2025. p. 21*

opportunities, or entrepreneurial futures for highly-skilled individuals. In many cases, foreign experts are hired into conventional roles within existing institutional structures. This in turn limits their capacity to innovate or contribute to sustainable ecosystem development.

The UAE as a Potential Leader

Of the selected GCC countries, the UAE appears best positioned to make a bridge between its talent strategies and long-term ecosystem building due to its long history of absorbing migrants and established infrastructure to support foreign professionals.

The UAE is already well underway to build the ecosystem necessary to sustain innovation: attracting top talent, providing them with meaningful work, and enabling them to train the next generation. This cycle is the backbone of any lasting AI ecosystem: the people that make up the system. According to Ahmed, one of the GCC's greatest untapped comparative advantages lies in its potential and opportunity to adapt existing AI technologies to local cultural contexts.

Given the fact that the GCC countries are not pioneers in building foundational AI models, their advantage may lie in adapting existing models to their respective cultural contexts. For example by embedding ethical, linguistic, and cultural specificities into foreign technologies. This approach may allow the region to leapfrog certain stages of AI development and would allow it to develop a value proposition within the global AI ecosystem.

Moreover, Ahmed states, the demographic profile of students in universities in the Gulf presents an opportunity as they include significant representation from Muslim or Muslim-majority countries that feel more inclined to study and reside in a familiar context. This makes the GCC an attractive alternative to the West, particularly amid increasing global polarization and immigration constraints elsewhere.

However, these advantages remain underleveraged and -developed. While Saudi Arabia scores high on the "hiring vibrancy" metric in the 2025 Stanford AI Index (Maslej et. al., 2025, p. 232), Ms. Ahmed points out that the GCC still largely lacks the kind of self-perpetuating AI ecosystems seen in Brazil or India (c.f. strategy&. 2024). There, talent produced domestically is more directly absorbed by an existing industry and research environment.

Challenges

As Ahmed points out, what is missing across the board is policy follow-through and the element of talent absorption:

- Incentives for technology companies to establish headquarters in the region.

- More support for academic research-industry partnerships-
- Job descriptions catered to AI's dynamic nature.
- Paths to naturalization.

Much of this remains aspirational as of now and is yet to be discussed in a broader policy forum or integrated concretely into policies and initiatives.

4.2. Healthcare

Sub-sectors	Qatar	Saudi Arabia	UAE
Disease Detection/Precision Medicine/Personalised Healthcare	• Qatar Genome Program • AMAL-For-Qatar, [25]revolutionising prenatal, incorporating AI into ultrasound scans for precision. [26] •	• Saudi Arabia Programme • Collaboration with Orion, world's largest exchange of health information, will harness data of 32 million people. [27] • Saudi Genome Project	• Digital twins project; creating virtual models of material objects, to provide precise simulations; mimics the patient's physiology. [28] • Emirati Genome Programme •
Telemedicine/Remote Healthcare	• Self-assessment chatbots in 6 different languages •	• Seha Virtual Hospital (elaborated in the analysis) •	• Agreement with US based software company CareAI in 2023 • Altibbi- largest platform for digital health services/consultations. • Department of Healthcare RemoteCare App • EJADA AI system; for preemptive measures for preventive diseases. [29]

[25] Retrieved from: https://researchportal.hbku.edu.qa/en/projects/amal-for-qatar-advancing-precision-medicine-with-ai-mediated-for-
Retrieved from:
[26]https://www.emro.who.int/fr/noncommunicable-diseases/highlights/qatar-remote-ncd-health-services-provision-during-the-covid-19-pandemic.html

[27] Retrieved from: https://www.weforum.org/stories/2024/10/digital-innovation-reshaping-healthcare-middle-east/
[28] Retrieved from: https://www.weforum.org/stories/2024/10/digital-innovation-reshaping-healthcare-middle-east/
[29] Retrieved from: https://www.pwc.com/m1/en/publications/healthcare-reboot-for-the-gcc.html

Smart (administrative efficiency) /Virtual Hospitals	• The E-Jaza system enables the provision of e-sick leaves by the healthcare providers after a consultation wherever necessary. [30] • •		• Mubadala Health along with G42 Healthcare, clinical LLM answering medical questions with high quality answers.

Table 5: Healthcare Sector Table on Examples and Sub-Sectors

Overview

The introduction of Artificial Intelligence in the field of healthcare and medicine has been imperative; as it progressively closes the gap between the shortage of healthcare workers and those that require essential healthcare services. There are 4.5 billion people currently that do not have access to basic healthcare. The inefficiency in the healthcare system is also exacerbated by the expected shortage of healthcare workers of about 11 million by the year 2030. The health sector can benefit greatly from the operational efficiency and accuracy that AI can provide. Administrative efficiency with the use of AI to document and take notes, would greatly reduce diagnostic time, medical imaging could be more precise, AI could also aid in the identification and treatment of rare diseases. Remote healthcare and telemedicine are major developments for patients who may not be able to reach hospitals.
Relevant use cases at the global level include Microsoft's Dragon Copilot, which listens and takes notes on consultations.

ChatRWD that utilises Retrieval Augmented Generation System, combined with LLMs to garner systems and improve outputs, 58% accuracy (compared to initial 2-10%). The RAG prioritises the most legitimate sources as compared to LLMs that gathers data from a variety of sources that may not always be reliable, so the RAG makes the systems more accurate. (World Economic Forum, 2025)

AI is increasingly appealing to the GCC countries due to the economic output that is to be generated as a result of its implementation; the estimates are in the upwards of $320 billion by the year 2030. (*How Digital Innovation Is Reshaping Middle East Healthcare*, 2024)

Similarities, Differences, and Comparative Advantage

Optimisation and development of healthcare technologies becomes imperative when the wave of AI emerges among the GCC countries particularly UAE, Saudi Arabia and Qatar. The robust healthcare sector in the Middle East is booming with the implementation of up and coming technology developments and investment in the healthcare sector. The GCC as such is estimated to reach about $135.5 billion by the year 2027 (World Economic Forum, 2024). The fundamental sectors that will

[30] Retrieved from: https://researchportal.hbku.edu.qa/en/projects/amal-for-qatar-advancing-precision-medicine-with-ai-mediated-for-

experience the fruits of such investments are remote healthcare, predictive analysis and disease prevention, robotics in surgery, genomics and nanomedicine. (Parks, 2024)

Steady investments have been a major factor in the development of AI in the healthcare sector; Saudi Arabia's allocation of over $50 billion into various initiatives to bolster the development in digital healthcare services for the purpose of optimisation and increased accessibility. (*How Digital Innovation Is Reshaping Middle East Healthcare*, 2024)

Abu Dhabi Telemedicine Centre, offers diagnostics services as well as virtual consultations. The establishment of such infrastructures lessens the burden on physical medical infrastructure. Consequently, there is a need for skilled workers (Parks, 2024). Similarly, a major breakthrough in the realm of remote healthcare is the world's largest virtual hospital, Saudi Arabia's Seha Virtual Hospital that connects around 130 hospitals across and over 8 specialised clinics that include blood and kidney disease, heart disease, geriatric diseases etc. The multidisciplinary committees have a virtual psychology, virtual heart team as well as a virtual diabetes team; making these basic necessities extend to people across the country (World Economic Forum, 2024).

Saudi Arabia in its Vision 2030 plan aims to develop the healthcare sector with the assistance of technology; a significant application of this is in the realm of cancer diagnosis and the planning of treatments at the King Faisal Specialist Hospital in Riyadh (Bhandari, 2024). Qatar with the use of AMAL-For-Qatar that is an AI mediated process that is revolutionary for prenatal care that integrates AI with fetal ultrasound, during 12-13 week scans. This would improve the precision of scanning and detecting delta defects and abnormalities potentially being life saving for the fetus and mother.

The genome projects across the board for all the countries namely the Saudi Genome Program, the Emirati Genome Programme and the Qatar Genome Program. Each of the projects aim to gather genome data from their population and add to the genetic data on the Arab population. This would contribute greatly to the field of precision medicine where population specific data could narrow down specific diseases and risks that are evident in a population set, and would provide more precise information that would make diagnosis more efficient.

There is a wealth of opportunities that can be built upon in the field of precision medicine. The emergent telemedicine and remote healthcare after COVID-19 would make healthcare more and more accessible to people who cannot afford to reach hospitals. AI will be crucial in assisting healthcare providers, in making more accurate diagnosis more efficiently.

UAE and Saudi Arabia are progressing well when it comes to healthcare and AI. However, since Qatar assumes a more stakeholder role generally in the field of AI and has a much smaller population than the two other countries; it is unlikely that Qatar aims to or will catch up to the progress shown by

Saudi Arabia and UAE, nonetheless the implementation of AI in Qatar is still relevant and adds to the GCC's emerging position in the AI race.

Challenges

Healthcare and medicine can be seen as precarious as it deals with the health and well being of people, and minor mismanagements can have dire and even fatal consequences. The AI systems by no means are perfect or infallible; thus if there are any missteps in the diagnostic or treatment process the responsibility and accountability is ambiguous. If it is a GenAI product that is providing recommendations based on the symptoms entered, in case the diagnosis is inaccurate is it the responsibility of the AI. Unless the regulations on AI in healthcare are explicit and defined it will be difficult to mitigate the risks of AI without as much human oversight.

There is a persistent AI trust gap that is the summation of all the issues with AI dependent on its use and application. The black box problem here also becomes relevant where organisations may not aim to be as transparent about the process of how an output is generated so as to maintain its competitive advantage, to prevent the potential of lawsuits or be safe from subjection to hacks (Chakravorti, 2024). The healthcare industry deals with a lot of sensitive and private information of patients, the access to such data can be misused if there are not strong cybersecurity safeguards in place such data is at risk. If the patient data is not adequately 'de-identified'; where the identifiable information of a patient is removed such as the name etc.; then identification becomes easy, as the patient data is usually imbued with details that are necessary (making cybersecurity measures even more crucial). (*How Digital Innovation Is Reshaping Middle East Healthcare*, 2024)

AI comes with the cost of impacting labour and employment. Although the shortage of healthcare workers can be mitigated by AI in healthcare; however the more AI is integrated into healthcare the more there is a risk of loss of jobs. It would be beneficial for AI to augment the role of healthcare professionals rather than displace them entirely due to the operational efficiency provided. AI assists the role of radiologists to identify and diagnose conditions a lot faster.

The accessibility to the virtual and remote healthcare facilities is contingent on access to the internet as well as the digital infrastructure. Smaller low income regions may not be as well connected as the larger and more commercialised regions of the country, so there is a lack of equitable access to the facilities enabled by AI that are meant to be more accessible even remotely.

4.3. Energy

Examples				
Sub Sector	**Specific Application**[31]	**Qatar**	**Saudi Arabia**	**UAE**
Oil and Gas	• digital transformation • predictive maintenance to optimize operation • carbon monitoring/ decarbonization/	most information cannot be found online besides very general ones.	• **Aramco Digital + aramcoSAIL (The Saudi Accelerated Innovation Lab):** it drives digital transformation to meet energy demands, boost fuel efficiency, and cut CO_2 emissions. It uses predictive maintenance to optimize operations and implements carbon monitoring initiatives to support sustainability.[32]	**ADNOC** uses AI to drive decarbonization, emissions reduction, and operational efficiency[33]It optimized its operations through AI at its Bu Hasa oilfield, resulting in a 3-5% increase in production[34]
Water Utilities	• predictive maintenance • operation optimization	Qatar is revolutionising desalination operations and maintenance (O&M) by effectively using Artificial Intelligence (AI) to optimise	AI enhances desalination by predicting maintenance needs, optimizing operations, selecting sites and	• **DEWA** is using GenAI to accelerate digital transformation and

[31] Addressing differences in formatting across sections: The author of this section points out that it may be more salient to keep the extra column titled "Specific Application" in the energy sector table for structural reasons and better specification of sector-wide application.
[32]Dr. Ahmad Al-Harb, 2025, retrieved from: https://zenodo.org/records/14769392
https://www.aramco.com/en/what-we-do/energy-innovation/digitalization/ai-and-big-data
[33] Adnoc,retrieved from: https://adnoc.ae/en/ai-and-energy-report
[34] MBGCorp, 2025, retrieved from: https://www.mbgcorp.com/ae/insights/ai-ml-importance-in-oil-gas-sector/

		operations and save energy[35]. ● Utilizes AI, machine learning, and big data analysis. ● Supports real-time monitoring of consumption patterns. ● Enables strategic planning for electricity and water distribution. ● Enhances sustainability and reliability of services	technologies, monitoring water quality, detecting membrane fouling, and integrating renewable energy for greater efficiency.	enhance customer services. It is also applying AI to optimize energy and water network management, using predictive analytics and maintenance and load management[36]. ● **EtihadWE**: leak detection technologies, smart meter rollout, and AI-powered services[37].
Power Transmission and Distribution	● real-time data processing	● **Kahramaa** is partnering with Siemens to implement Advanced Metering Infrastructure, representing the infrastructure of smart electricity and water meters. It will be deployed enabling electricity and water meters installation and its integration with the remote monitoring and reading platform. This reduces waste, and monitors consumption details accurately, momentarily at any time. [38]	● **GE Manufacturing Technology Center (GEMTEC)** drives grid automation and digitalization, modernizing Saudi Arabia's electrical network for greater efficiency, reliability, and sustainability. ● **GE Saudi Advanced Turbines (GESAT)** supports local production of high-voltage switchgears. Expanding both projects boosts electricity capacity and speeds the shift to a smarter, interconnected grid. ● **GE Vernova's cooperation with Saudi EXIM Bank**: expands exports of Saudi high-tech energy solutions and supports economic diversification beyond oil [39].	**TQTA** Transmission is building advanced power grid infrastructure to support AI-driven energy demand[40]. Smart grid modernization includes: ● Real-time data processing to monitor grid conditions instantly ● Predictive analytics to forecast energy demand and potential issues ● Autonomous decision-making to balance energy supply and demand dynamically
Renewable Energy and Clean Tech	● forecast energy demand	● **QatarEnergy** launched a *Real-Time Operations Center* for upstream operations. This center uses remote monitoring and advanced data analytics (powered by AI).	Most information on how AI has been implemented remains confidential. However, AI has been applied to forecast energy demand and variations in renewable energy production based on weather patterns, allowing power plants to adapt their output as needed[41].	● **Masdar's** AI-driven renewable energy initiatives. Using AI to optimize energy efficiency, managing complex energy systems, and reducing greenhouse gas emissions[42].

[35] Shafeeq Alingal, 2023, retrieved from: https://www.gulf-times.com/article/657028/qatar/kahramaa-launches-ai-enabled-platform-to-ensure-better-customer-experience
[36] Government of Dubai, 2024, retrieved from: https://www.dewa.gov.ae/en/about-us/media-publications/latest-news/2024/02/dewas-adoption-of-generative-ai
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[37]waterHQ, 2024 retrieved from:
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[38] Kahramaa, 2020, retrieved from https://www.km.qa/MediaCenter/pages/NewsDetails.aspx?ItemID=349
[39] Saudi arabia energy, 2025, retrieved from: https://saudienergyconsulting.com/insights/articles/saudi-energy-innovations-ge-vernova-invests-in-saudi
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[41] Saudi Arabia energy, 2024, retrieved from: https://saudienergyconsulting.com/insights/articles/predicting-energy-demand-with-ai-in-saudi-arabia

[42] Masdar, 2024, retrieved from: https://masdar.ae/en/news/newsroom/adnoc-masdar-and-microsoft-release-powering-possible-ai-and-energy-for-a-sustainable-future

		Vessel Vetting with AI: The in-house *Serdal* system for vessel vetting integrates artificial intelligence to enhance: • Accuracy and speed of risk assessments • Safety and compliance in marine logistics • Environmental and safety standards across the supply chain		• **DEWA (Dubai Electricity and Water Authority)** Implements generative AI (Microsoft Copilot) and autonomous energy systems through its Digital DEWA strategy [43]. • **TAQA & EWEC** Developing AI-enabled power grid infrastructure and 24/7 renewable dispatch projects combining

Table 6: Energy Sector Table on Examples and Sub-Sectors

Overview

Artificial Intelligence (AI) is increasingly being deployed across the energy and utilities sectors in the Gulf Cooperation Council (GCC) countries—specifically Saudi Arabia, the United Arab Emirates (UAE), and Qatar. This analysis goes beyond descriptive summaries to evaluate AI adoption through key analytical lenses: strategic alignment with national visions, technological capacity, environmental impact, transparency, and regional positioning.

Importantly, the availability and clarity of public information vary significantly across the region. While some entities publish detailed updates and case studies, other sectors remain under-documented. As a result, this analysis draws from both available data and inferred trends based on stakeholder roles and known project partnerships.

Similarities, Differences, and Comparative Advantages

Strategic Alignment: Energy Sector AI as a Policy Tool

Each country embeds AI in its energy sector to different extents, depending on its national strategy. Saudi Arabia uses AI to support Vision 2030, particularly in Aramco and its subsidiaries, to diversify the economy, enhance operational efficiency, and localize energy innovation. Initiatives like Aramco Digital and aramcoSAIL embody this strategic direction. Similar alignment is seen in GE Vernova's grid modernization programs, which are clearly linked to economic diversification.

[43] All retrieved from government of dubai https://www.dewa.gov.ae/en/about-us/media-publications/latest-news/2024/02/dewas-adoption-of-generative-ai
https://www.dewa.gov.ae/en/about-us/media-publications/latest-news/2025/03/dewa-announces-roadmap
https://www.dewa.gov.ae/en/consumer/useful-tools/consumer-faqs
Digital DEWA, retrieved from: https://digital.dewa.gov.ae
Jonathan Spencer Jone, 2025, retrieved from https://www.smart-energy.com/industry-sectors/digitalisation/dewa-to-embed-generative-ai-across-its-operations

The UAE takes a more public-facing approach through its AI Strategy 2031 and Net Zero 2050 goals, where entities like DEWA, ADNOC, and Masdar integrate AI as part of their long-term clean tech strategy. AI is not an add-on but a strategic enabler of climate and digital ambitions.

Qatar, while emphasizing AI in its National Vision 2030, offers fewer concrete examples of sectoral alignment. Some AI tools in QatarEnergy and KAHRAMAA are aligned with sustainability and digitalization goals, but a lack of public strategy documents specific to energy leaves the degree of alignment unclear.

Technological Capacity: External Partnerships vs. Local Development

The energy-AI landscape in the GCC is shaped heavily by international collaborations. In Saudi Arabia and the UAE, partnerships with Siemens, Microsoft, IBM, and GE play central roles in deploying AI for desalination, smart grids, and emissions monitoring. However, the UAE is distinct in developing its own AI infrastructure, including institutions like MBZUAI and the Digital DEWA initiative.

Saudi Arabia is investing in domestic capacity as seen in its GE Saudi Advanced Turbines (GESAT) program, but much of the AI expertise still comes via foreign firms. The presence of a government-owned player like Aramco helps centralize this development, but broader ecosystem independence is still in progress.

Qatar's AI initiatives in the energy sector rely heavily on entities like Siemens and Microsoft. The Qatar Computing Research Institute (QCRI) has potential to contribute more deeply, but for now, the role of domestic AI expertise appears limited and mostly research-oriented, not yet applied at scale.

Competing to Lead the AI-Energy Future

Across the GCC, the UAE positions itself most clearly as a regional AI-energy hub. Its combination of ambitious net-zero goals, international partnerships, and domestic innovation capacity gives it a unique advantage. The DEWA strategy alone showcases how utility management, renewables, and smart grids can work together under a unified digital vision.

Saudi Arabia has the financial power and institutional structure to scale quickly, especially with government-owned champions like Aramco and Saudi Electricity Company. However, unless transparency and domestic AI innovation increase, it may remain second to the UAE in global positioning.

Qatar shows strong potential but lacks strategic coherence and sectoral visibility. Its AI efforts are currently fragmented across agencies and not yet integrated into a visible national clean energy

strategy. With more public information and coordination, Qatar could better leverage its wealth and research institutions.

Environmental Impact: AI for Sustainability or Efficiency Only?

Environmental impact varies across countries and sub-sectors. In oil and gas, the UAE provides some of the clearest examples of AI driving sustainability, with ADNOC deploying AI for real-time leak detection, carbon capture material discovery, and flare system monitoring. These directly target emissions and align with Net Zero goals.

In water utilities, both Saudi Arabia and the UAE apply AI in desalination—particularly for membrane fouling detection, site optimization, and energy integration—but again, the UAE (DEWA and EtihadWE) appears more advanced in customer-side management and reporting.

Saudi Arabia's AI initiatives in renewables, such as through NEOM and the Sakaka Solar Plant, are designed to integrate AI into clean energy forecasting, though most technical details remain confidential. This limits analysis of their actual environmental impact.

Qatar presents some promising directions—such as AI-assisted marine logistics (Serdal system) and remote monitoring at QatarEnergy's Real-Time Operations Center—but data is sparse. It's unclear how significantly these tools reduce emissions or environmental degradation in practice.

Challenges

Transparency: Uneven Reporting and Data Availability

The UAE leads in transparency, with detailed reports and press releases available from DEWA, Masdar, and ADNOC. These include performance metrics, pilot updates, and integration strategies. This visibility supports external evaluation and accountability.

Saudi Arabia shows moderate transparency. Aramco and GE Vernova share some project highlights, but detailed technical documentation or KPIs are limited. AI applications in renewable energy remain highly opaque, limiting public engagement or benchmarking.

Qatar faces the most significant information gap. While stakeholders like KAHRAMAA and QatarEnergy are mentioned in national reports, there's little accessible data on how AI is applied or how effective it is. This obscures both progress and potential areas for improvement.

Conclusion

AI adoption in the GCC energy sector is underway, but the level of maturity, transparency, and environmental ambition differs greatly by country and subsector. The UAE leads with a holistic, strategic, and transparent approach. Saudi Arabia is advancing rapidly but remains less open and more reliant on international support. Qatar is in the early phases of implementation, with scattered examples and limited public data.

This analysis - built on sector-specific tables from official sources and cross-referenced with national goals - shows that while AI is clearly a transformative tool, its integration depends on strategic clarity, governance openness, and long-term ecosystem investment.

5. Conclusion[44]

Category	Saudi Arabia	UAE	Qatar
BCG AI Maturity Matrix	"Rising Contender"	"Rising Contender"	"Gradual Practitioner"
Global AI Index[45]	14th	20th	54th
Research Output in AI	Limited; ranked 42nd in research (Global AI Index)	Ranked 12th	Mid-level (36th in research output)
Governance Structure	Centralized under SDAIA and Vision 2030 Strong top-down governance	First country with a Minister of AI Top-down but emphasizes public-private partnerships	AI embedded in digital transformation and sovereign investment strategy
General Approach	Projected to reap largest economic benefits Focus on national development	Working very intently Aspiration of becoming global AI hub	Does not want necessarily to compete at AI race level Leverages small size and large reach
Sectors[46]	Education: Moderate-Strong Healthcare: Moderate Energy: Strong	Education: Strong Healthcare: Strong Energy: Moderate	Education: Strong Healthcare: Weak Energy: Weak
Key Stakeholders[47]	1. State 2. Citizenry / Consumer Base 3. Industry / Non-education	1. State 2. Education 3. Industry	Difficult to categorise, perhaps: 1. Education (as part of state) 2. Industrial Application 3. Financial Industry[48]

[44] Though we do not give concrete policy recommendations in this report, we envision that our findings and provided insights will be useful for Teneo, for example to be used as the basis for further research or an overview of relevant sub-sectors and sector-specific actors.
[45] White & Cesareo. 2024. For further reference: https://www.tortoisemedia.com/data/global-ai
[46] Based on our analysis and reading.
[47] Due to distinct political structures of these countries the state is the primary stakeholder across the board.
[48] Ms. Ahmed pointed out the relevance of the financial industry for Qatar due to its proximity to Bahrain and its financial influences.

Table 7: Concluding Comparison Table[49].

A review of two AI indices that look at the three selected GCC countries more in detail reveals certain divergences in their respective approach and positioning:

The UAE leads the region, ranking highest in both the Global AI Index by Tortoise (20th) and research output (12th). The country aspires to be a **global political leader in AI**, shown through its **Minister of AI**, leadership in **AI ethics**[50], and **significant investments** (e.g., G42). It emphasizes **public-private partnerships**. This is in line with its **entrepreneurial and cosmopolitan development approach to development** which focuses on attracting **top global talent** to lead innovation.
Saudi Arabia is also labeled as a "Rising Contender" in the BCG AI Maturity Index and ranks higher than the UAE in the Global AI Index (White & Cesareo, 2024). This higher ranking may be due to different factors relating to the AI index methodology.

The country ranks lower in research output (42nd), but shows strong centralized governance under SDAIA and other relevant government bodies that have integrated AI components. The key notion is that Saudi Arabia is embedding AI as part of a broader national development agenda.

Qatar appears more cautious, ranking as a "Gradual Practitioner" and 54th on the Global AI Index. Rather than competing directly, Qatar leverages its sovereign wealth fund investments and global diplomatic reach to still have a stake in the AI area, without heavily focusing on building domestic capacity. As put by Ms. Ahmed, Qatar is trying to "invest in future success stories" instead of local talent pipelines.

A common thread across all three countries is **strong state leadership and state-backed investments.**

In terms of **sectors**, we conclude the following based on our analysis, interviews, and sources:

- **Saudi Arabia** leads in energy due to scale, funding, and state-led strategy.

- The **UAE** is well-rounded and is especially strong in education and healthcare due to its emphasis on partnerships and its advanced use cases, mainly in healthcare.

[49] Note: Based mostly on interview insights from Ms. Ahmed and the researchers own conclusions from their research, reading, and analysis.
[50] The UAE has published an International Stance on Artificial Intelligence Policy. (Ministry of Cabinet Affairs. 2024.) Retrieved from: https://uaelegislation.gov.ae/en/policy/details/uae-s-international-stance-on-artificial-intelligence-policy#:~:text=UAE's%20Foreign%20Policy%20on%20Artificial%20Intelligence%3A&text=Supports%20the%20development%20of%20international,protecting%20personal%20data%20and%20privacy.

- **Qatar** lags comparatively, but nonetheless leverages investment and partnerships, particularly in education, albeit from a lower baseline.

What AI Needs To Thrive - Future Outlook

In conclusion, future AI development in Saudi Arabia, the UAE, and Qatar requires four main aspects:

- Sustained political will and funding
- Strong talent attraction and development programs
- Infrastructure expansion[51]
- A comprehensive AI ecosystem

While the region, and within it our respective case study countries, clearly has the funds and ambition to be a top-contender in the global AI race, fragmented talent development and attraction systems and the need for even more infrastructure expansion may slow their way to the top. As AI development hinges on reliable computing power, data, collection, and storage, the GCC countries must leverage their vast solar and oil resources even further as an advantage to attract investment and build sustainable infrastructure - efforts that are already well underway.

A functioning and fully-integrated AI ecosystem, however, needs alignment between education, industry, and government, and culture; bound together by concrete metrics and goals. Public-private partnerships, especially in the UAE, show this alignment. Saudi Arabia and Qatar have the potential and must seize the chance to benefit from this alignment by taking lessons learned and following with similar, country-adapted structural integration.

A deliberate strategic effort has been made towards enhancing operational efficiency, facilitating sustainable development and building human capital with the use of AI across the different sectors of healthcare, education and energy which is integrated keeping regional specifications in mind for each of the stakeholder countries. However, reaching the full potential of AI innovation would require adequate regulatory frameworks, continued and consistent investments and decisive actions towards ethical and social challenges.

[51] Improving data governance and integrating more Arabic-based LLMs remain critical regional priorities.

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Annex

List of Annexes

Annex I: Sub Sector Breakdown Tables

Annex II: Stakeholder Tables

Annex III: Interviewee List with Dates

Annex I: Sub Sector Breakdown Tables (extended versions)

Education Sector

Examples				
Sub-Sector	**Specific Application**	**Qatar**	**Saudi Arabia**	**UAE**

Primary + Secondary Education	• Lesson Planning
	• Rubric Creation (for grading) + Automated Grading
	• Parent Communication
	• Content Creation
	  ○ Creative Activities and Student Engagement
	• Personalized Learning
	• Intelligent Tutoring Systems (ITS)
	• Learning Analytics
	  ○ Dyslexia Detection
	  ○ Predictive Analytics
	• Curriculum Enhancement
	• Task Automation
	• Administrative Tasks
	• Proctoring
		• GAP?	• Madrasati
			• Noor System (i.e. registration)
			• Tatweer Educational Technologies
				• Intelligent Tutoring Systems: DreamBox Learning
				• Alef Education

Higher Education	• AI Competency Frameworks for Students and Teachers • Intelligent Tutoring Systems (ITS) • University Degrees in AI • Adaptive Learning Systems • Predictive Analytics • Emotional and Social Learning Support • Industry-Academia Collaboration • Faculty Expertise	• Qatar Computing Research Institute • Qatar University • Hamad bin Khalid University	• King Saud University - IBM Partnership • Al Baha University - IBM Partnership • KAUST (Saudi)	• Mohamed bin Zayed University of AI

Talent Development / Workforce Acquisition	• **Vocational & Technical Training** • AI Training Programmes / Skill Development Programs • AI Certificate Programs • Industry-integrated AI courses • Technical Skill Certifications • AI-enabled simulators (virtual reality / augmented reality) for technical training • Incubators • Accelerators • Sandboxes	• TASMU Accelerator and Innovation Lab • Qatar Digital Academy • Mada Academy Trainings (i.e. AI for Inclusive and Accessible Education) • Qatar Foundation (e.g. Fanar LLM)	• King Saud University - IBM Partnership • One Million Saudis in AI • Human Capability Development Program • KAUST Academy • Fuel Program ("train 100k citizens in digital jobs within the first year")	• Digital Dubai Initiative • Accenture + Commercial Bank of Dubai → Data and AI Training • ADNOC Technical Academy: Specialised professional training programs • UAE AI Summer Camp
Lifelong Learning + Adult Education	• Online Courses • Corporate Training • Public Programs (re-skilling, …)	• **GAP?**	• **GAP?**	• Dubai Future Academy (trainings on AI)
Policy + Governance	• National Education Policies • National Curricula • Accreditation & Quality Assurance • Public-Private Initiatives • Upskilling Policy Makers	• Qatar AI Committee	• Saudi "AI Skills Strategy" ○ One Million Saudis in AI • AI Scholarship Program (Saudi) • Information Technology Institute (Saudi) • SDAIA Academy (offering diff. bootcamps e.g.) • National Center for AI (NCAI) • Framework for AI in Digital Learning (national e-learning center)	• UAE AI Network (gather all experts) • UAE AI Tutor platform • National Program for AI (BRAIN) • CEO for AI • UAE AI Council • AI and Advanced Technology Council
Cross Border Academic Collaboration	• Exchange Programs (faculty, students) • International Partnerships GCC • Joint Research Centers	• Q-CAI - The Data Civilizer Project	• Saudi: AI Scholarship Program • NEOM Global Hub for Education, Research and Innovation	• MBZUAI and IIE (Institute of International Education • UAE Key Thinkers Programme University of Birmingham • AI Program in collaboration with
Education Technology	• AI Analytics • Smart Feedback Tools • Education Statistics	• **GAP?**	• Noon Academy (AI for real time feedback and tutorig help) • AlGooru Tatweer Educational Technologies Company	• Alef Education (tracks data points for content improvements)
Research & Development / Innovation	• Localized LLMs (Arabic) • Research Management Platforms	• Qatar Computing Research Institute (QCRI): AI tools for analysis of research trends, data analysis (multiple languages)	• NOOR LLM (KAUST & Google Cloud)	• UAE National Virtual AI Institute • UAE AI Library • Arabot • UAE AI and Robotics Award for Good

Table 8: Education Sub-Sector Breakdown Table.

Healthcare Sector

Note: There is no other healthcare sub-sector table than the one in the text.

	Subsectors	Stakeholders	Example (Utilization of AI)
Saudi Arabia	Oil and Gas	Aramco (81% held by the government of Saudi Arabia) Government of Saudi Arabia	- **Aramco Digital + aramcoSAIL (The Saudi Accelerated Innovation Lab):** it drives digital transformation to meet energy demands, boost fuel efficiency, and cut CO_2 emissions. It uses predictive maintenance to optimize operations and implements carbon monitoring initiatives to support sustainability.
	Water Utilities	Saudi Water Authority (SWA) Artificial Intelligence Center for Energy (AICE) International collaborators (e.g. Siemens, IBM)	Most data is from the AI Applications in the Desalination Industry manual published by SWA - AI enhances desalination by predicting maintenance needs, optimizing operations, selecting sites and technologies, monitoring water quality, detecting membrane fouling, and integrating renewable energy for greater efficiency.
	Power Transmission and Distribution	GE Vernova Saudi Electricity Company (SEC) Saudi EXIM Bank	Smart grid (the advanced electricity network that uses digital technology and real-time data) integration has been the primary development target. It enables two-way communication between power providers and consumers, ensuring optimized energy distribution and minimizing wastage. - **GE Manufacturing Technology Center (GEMTEC)** drives grid automation and digitalization, modernizing Saudi Arabia's electrical network for greater efficiency, reliability, and sustainability. - **GE Saudi Advanced Turbines (GESAT)** supports local production of high-voltage switchgears. Expanding both projects boosts electricity capacity and speeds the shift to a smarter, interconnected grid. - **GE Vernova's cooperation with Saudi EXIM Bank**: expands exports of Saudi high-tech energy solutions and supports economic diversification beyond oil.
	Renewable Energy and Clean Tech	Neom (the smart city vision) ACWA Power Saudi Data and AI Authority (SDAIA) ALGihaz Holding Ministry of Energy (MoE) Renewable Energy Project Development Office (REPDO) National Renewable Energy Program (NREP)	All designed to achieve Saudi Arabia's 2030 goals for sustainable energy development. However, most information on how AI has been implemented remains confidential. - **ENOWA (launched by NEOM)** - **Smart grids** - **Sakaka Solar Plant (70% held by ACWA Power, 30% by ALGihaz Holding)** - **Sudair Solar PV Project (ACWA Power)** - **King Abdullah City for Atomic and Renewable Energy (KACARE, chaired by the Ministry of Energy)** However, AI has been applied to forecast energy demand and variations in renewable energy production based on weather patterns, allowing power plants to adapt their output as needed.

Energy Sector

	Subsectors	Stakeholders	Example (utilization of AI)
UAE	Oil and Gas	ADNOC (state-owned oil company)	**ADNOC** uses AI to drive decarbonization, emissions reduction, and operational efficiency

		Masdar (UAE's cleaning energy champion) Ministry of AI International collaboration (Microsoft, academic institutions, SDAIA, Siemens, NVIDIA)	- Integrated geospatial and sensor data for smarter environmental management. - Applied predictive maintenance to reduce downtime and improve sustainability. - Deployed AI for real-time methane leak detection. - Used AI to accelerate carbon capture material discovery and optimize storage. - Enhanced flare system efficiency with AI-driven combustion monitoring. For instance, ADNOC optimized its operations through AI at its Bu Hasa oilfield, resulting in a 3-5% increase in production
	Water Utilities	Dubai Electricity and Water Authority (DEWA) Dubai Government Dubai Digital Authority International collaboration (Microsoft, OpenAI, etc) UAE's National Emergency Crisis and Disaster Management Authority (NCEMA) Emirates Institution for Advanced Science and Technology (EIAST)	- **DEWA** is using GenAI to accelerate digital transformation and enhance customer services. It is also applying AI to optimize energy and water network management, using predictive analytics and maintenance and load management. - **EtihadWE**: leak detection technologies, smart meter rollout, and AI-powered services.
	Power Transmission and Distribution	The Abu Dhabi National Energy Company PJSC (TAQA) Masdar Emirates Water and Electricity Company (EWEC)	**TQTA** Transmission is building advanced power grid infrastructure to support AI-driven energy demand. <u>Smart grid modernization includes:</u> - Real-time data processing to monitor grid conditions instantly - Predictive analytics to forecast energy demand and potential issues - Autonomous decision-making to balance energy supply and demand dynamically The infrastructure supports 24/7 renewable energy dispatch and aligns with the UAE's AI strategy 2031 and Net Zero 2050 goals
	Renewable Energy and Clean Tech	ADNOC Masdar International collaboration (Microsoft) Dubai Electricity and Water Authority (DEWA) International collaboration	The UAE is actively integrating AI into its renewable energy and clean technology sectors, aiming to support the nation's Net Zero 2050 goals. - **Masdar's** AI-driven renewable energy initiatives - Using AI to optimize energy efficiency, managing complex energy systems, and reducing greenhouse gas emissions. - **DEWA (Dubai Electricity and Water Authority)** Implements generative AI (Microsoft Copilot) and autonomous energy systems through its Digital DEWA strategy . - **TAQA & EWEC** Developing AI-enabled power grid infrastructure and 24/7 renewable dispatch projects combining solar + battery storage. - **Etihad Water and Electricity (EtihadWE)** Uses AI for leak detection, predictive maintenance, and smart metering in water utilities.

			- **Masdar City & MBZUAI** A hub for AI research and smart infrastructure innovation supporting clean tech and sustainability.

	Subsectors	Stakeholders	Example (Utilization of AI)
Qatar (Qatar National Vision 2030)	Oil and Gas	Qatar's National Cyber Security Agency (NCSA) QatarEnergy QatarEnergy LNG Qatar Computing Research Institute (QCRI) The Ministry of Environment and Climate Change	Qatar is using AI to support sustainable growth. AI helps to predict when machines need maintenance, which saves time and reduces costly breakdowns. It also makes it easier to manage money and plan logistics more efficiently, leading to smarter and more sustainable operations. The strategic shift to predictive maintenance has also been taking place. However, most information cannot be found online besides very general ones.
	Water Utilities	The Qatar General Electricity and Water Corporation (KAHRAMAA) Qatar Electricity and Water Company (QEWC) International collaboration (Microsoft, KPMG, Siemens)	Qatar is revolutionising desalination operations and maintenance (O&M) by effectively using Artificial Intelligence (AI) to optimise operations and save energy. - Utilizes AI, machine learning, and big data analysis. - Supports real-time monitoring of consumption patterns. - Enables strategic planning for electricity and water distribution. - Enhances sustainability and reliability of services.
	Power Transmission and Distribution	The Qatar General Electricity and Water Corporation (KAHRAMAA) Siemens	**Kahramaa** is partnering with Siemens to implement Advanced Metering Infrastructure, representing the infrastructure of smart electricity and water meters. It will be deployed enabling electricity and water meters installation and its integration with the remote monitoring and reading platform. This system supports KAHRAMAA's efforts to reduce waste, and monitor consumption details accurately, momentarily at any time.
	Renewable Energy and Clean Tech	The Qatar General Electricity and Water Corporation (KAHRAMAA) QatarEnergy Qatar Fertiliser Company General Electric Government of Qatar	**QatarEnergy** launched a *Real-Time Operations Center* for upstream operations. This center uses remote monitoring and advanced data analytics (powered by AI) to: - Optimize drilling operations - Improve operational efficiency - Reduce emissions - Promote digitalization across operations. *Vessel Vetting with AI:* The in-house *Serdal* system for vessel vetting integrates artificial intelligence to enhance: - Accuracy and speed of risk assessments - Safety and compliance in marine logistics - Environmental and safety standards across the supply chain

Table 9: Energy Sub-Sector Breakdown Table.

Annex II: Stakeholder Tables

Education Sector

Subsector	Stakeholder	Qatar	Saudi Arabia	UAE
Higher Education	**Government**	Ministry of Education and Higher Education	Ministry of Education SDAIA Education and Training Evaluation Commission National IT Academy	Ministry of Education Office for AI Advanced Technology Research Council (ATRC) Abu Dhabi Department of Education and Knowledge (ADEK) Knowledge and Human Development Authority (KHDA)
	Private Sector	Qatar Computing Research Institute (QCRI) Qatar Foundation (cross-sector)	Aramco (AI training programs) STC AI Labs King Abdulaziz City for Science and Technology (KACST) ADNOC	G42 Inception Institute of AI Mubadala MBZUAI (public-private)
	NGOs	Al-Fakhoora Education Program (**education access, not AI specific)** **otherwise gap**	Misk Foundation (education & youth development incl. digital / AI skill-building)	Dubai Cares (funds AI education globally) Emirates Foundation
Talent Development / Acquisition	**Government**	Qatar Research, Development and Innovation Council (QRDI)	SDAIA National Strategy for Data and AI Human Capability Development Program Technical and Vocational Training Corporation	Office for AI Ministry of Industry and Advanced Technology National Program for Coders
	Private Sector	Qatar Financial Centre (incentivizing tech talent through FDI)	NEOM Tech & Digital Company stc Group Aramco Digital	G42 ADQ Hub71 Amazon Web Services Microsoft UAE Dubai Future Foundation
	NGOs	Silatech (youth employment) Digital Qatar (community upskilling)	Misk Foundation (digital economy & AI-focused programs) **Very few *independent* NGOs in the education sector due to tight regulation and state-centric governance.**	Emirates Foundation AI4Good UAE Dubai AI Society

Table 10: Education Key Stakeholder Table

Healthcare Sector

Sub-sectors	Stakeholders	Conférences/Collaborations
Remote healthcare Automated Healthcare/Personalised Medicine	- Abu Dhabi Telemedicine Centre - Health Holding Company - **Ministry of Health (KSA)** - Care AI - Smart Nation Programme 2017 - **Ministry of Public Health (Qatar)** - **Qatar Science and Technology Park** - Hamad Medical Corporation - Primary Healthcare Corporation (Qatar) - Meddy (app) - Droobi Health - King Abdullah University of Science and Technology - Ministry of Investment of Saudi Arabia - Novo Nordisk - Vezeeta (Start-up) - Altibbi (Start-up)	- AI for Good Lab - Arab Health (Continuing Medical Education) - Health 2.0 Conference - Abu Dhabi Global Health Week - MoU- Saudi Arabia's investment Ministry and Janssen Pharmaceuticals - HealthTech Summit and Expo - SAHARA Conférence, Riyadh - Saudi International Medlab Expo - Global Health Exhibition Riyadh - ZIMAM Digital Health Award - Medtronic (treatment of Diabetes) - The Qatar National Health Strategy (2018-2022) - TASMU Accelerator Programme

Smart Hospital	- Cleveland Clinic Abu Dhabi - Fakeeh University Hospital - Emirates Speciality Hospital - Moorsfield Eye Hospital Dubai - King Faisal Specialist Hospital and Research Centre - Dubai Health Authority	
Genomics/Biotech	- Qatar Genome Project - Qatar Biobank - Qatar Biomedical Research Institute - Saudi Genome Programme - The Emerati Genome Project - Hayat Biotech - Cell Save - Mohamed Bin Zayed University of Artificial Intelligence - Dubai Science Park - The Centre for Genomic Discovery - Abu Dhabi Centre for Genomics and Systems Biology	- National Biotechnology Strategy (KSA) - Precision Medicine and Functional Genomics 2024 - Firmenich- Swiss company with a Creation and Development Centre at Dubai Science Park)
Predictive Analysis/Precision Medicine	- GE Healthcare - Philips Middle East - Mubadala Health's National Reference Laboratory - Orion Health	- Qatar Cancer Plan 2023-2026 - National Cancer Programme - Gulf Laboratory & Radiology - Precision MED - Personalised Precision Medicine Programme for oncology.
Overall Stakeholders- Gulf Health Council, Cerner Middle East, GE Healthcare and Philips Healthcare		

Table 11 : *Healthcare Key Stakeholder Table.*

Energy Sector

Subsector	Stakeholder	Qatar	Saudi Arabia	UAE
Oil and Gas	**Government**	Qatar's National Cyber Security Agency (NCSA) QatarEnergy QatarEnergy LNG Qatar Computing Research Institute (QCRI) The Ministry of Environment and Climate Change	Aramco (81% held by the government of Saudi Arabia) Government of Saudi Arabia	Ministry of AI ADNOC
	Private Sector			Masdar
	International			Microsoft Academic institutions SDAIA Siemens NVIDIA
Water Utilities	**Government**	The Qatar General Electricity and Water Corporation (KAHRAMAA) Qatar Electricity and Water Company (QEWC)	Saudi Water Authority (SWA) Artificial Intelligence Center for Energy (AICE)	UAE's National Emergency Crisis and Disaster Management Authority (NCEMA) Emirates Institution for Advanced Science and Technology (EIAST) Dubai Electricity and Water Authority (DEWA) Dubai Government Dubai Digital Authority
	Private Sector			
	International	Microsoft KPMG Siemens	IBM Siemens	microsoft OpenAI
Power Transmission and Distribution	**Government**	The Qatar General Electricity and Water Corporation (KAHRAMAA)	Saudi Electricity Company (SEC) Saudi EXIM Bank	The Abu Dhabi National Energy Company PJSC (TAQA) Emirates Water and Electricity Company (EWEC)
	Private Sector			Masdar
	International	Siemens	GE Vernova	
Renewable Energy and Clean Tech	**Government**	The Qatar General Electricity and Water Corporation (KAHRAMAA) QatarEnergy Qatar Fertiliser Company General Electric Government of Qatar	Ministry of Energy (MoE) Neom (the smart city vision) Renewable Energy Project Development Office (REPDO) National Renewable Energy Program (NREP)	ADNOC Dubai Electricity and Water Authority (DEWA)
	Private Sector		ALGihaz Holding ACWA Power	Masdar
	International			Microsoft

Table 12: Energy Key Stakeholder Table

Annex III: Interviewee List with Dates

Interviewee[52]	**Date of Interview**
Policy Officer at Austrian Federal Chancellery	14 April 2025
Person pursuing a PhD in education	14 April 2025
Manail Anis Ahmed, AI Expert	06 May 2025
Professor at the Geneva Graduate Institute, specialising in AI Law & Policy	07 May 2025
Regional GCC Head at a private AI company	08 May 2025[53]

Table 13: Interviewee Documentation Table

[52] De-identified unless explicitly given consent to be named and cited by name.
[53] Date of submission of written answers.