

A Comparative Analysis of Digital Economy Performance in GCC Countries During the Period 2018-2022

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Abstract:

The GCC's digital economy is progressing rapidly, as these countries seek to transform their economies into digitization to increase global competitiveness. This research paper seeks to provide a comprehensive comparative analysis of the reality of the GCC digital economy during the period 2018-2022. The study adopts a descriptive analytical approach employing data from Arab Digital Economy Index reports by analysing multiple dimensions of the index. Comparative analysis is used to assess the digital economy performance of GCC countries. The results of the study showed that all GCC

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countries recorded a marked improvement in the performance of their digital economy during the study period. The results also revealed significant differences in the performance of the GCC digital economy, with the UAE consistently leading in most indicators followed by Saudi Arabia, which showed good performance, while Kuwait lagged behind in most indicators.

Keywords: digital economy; digitization; performance; GCC countries.

Jel Classification Codes : O33, O53, O57

1. INTRODUCTION

The Gulf Cooperation Council (GCC) nations are actively pursuing the transformation of their economies and societies by embracing digital technologies. This digital shift is motivated by the region's commitment to economic diversification, boosting productivity, and elevating its standing in the global market. Through substantial investments in digital infrastructure, the expansion of e-government services, and the fostering of digital innovation, the GCC has made notable strides, steadily advancing towards a future that is increasingly centered around digital integration.

As the GCC economies navigate global shifts, digital technologies are emerging as critical catalysts for innovation, productivity, and economic expansion across the region. Each member state—UAE, Saudi Arabia, Qatar, Bahrain, Oman, and Kuwait—has introduced distinct digital initiatives and strategies aimed at fostering more sustainable economic growth and diversification. However, these countries are progressing at varied paces in their digital transformation journeys, reflecting their unique economic contexts and priorities.

Despite the significant advancements, the digital economy in GCC countries encounters several challenges that necessitate careful consideration. Key concerns include the uneven development across various sub-pillars of the digital economy, disparities in digital literacy and skills, and the need to bolster digital innovation capabilities. This study intends to offer a thorough comparative analysis of the digital economy across the GCC nations, highlighting their

strengths, pinpointing weaknesses, and uncovering opportunities for future growth and development.

The question of the study:

The Gulf Cooperation Council (GCC) countries are increasingly focusing on digital transformation as a pivotal strategy for achieving economic diversification and sustainable development. However, despite the ongoing efforts, a comprehensive understanding of the actual state of the digital economy across the region remains lacking. This gap underscores the need for an in-depth analysis of the digital economy within GCC countries, aiming to provide a clear and accurate assessment of its current status, identifying strengths, weaknesses, and potential areas for future growth. Such an understanding is essential for shaping effective digital strategies and enabling GCC nations to fully harness the opportunities offered by the digital economy. Accordingly, this study seeks to answer the following question: **What is the true state of the digital economy in GCC countries?**

Hypothesis: The study seeks to answer the following hypotheses:

- There are significant disparities in digital economy performance among GCC countries.
- The UAE leads the GCC in most aspects of digital economy development.
- All GCC countries have shown improvement in their digital economy performance from 2018 to 2022.

The Objectif of the study: The aims of the study are:

- To compare and analyze the digital economy performance of GCC countries across multiple dimensions.
- To identify trends and patterns in digital economy development in the GCC from 2018 to 2022.
- To highlight strengths and areas for improvement in each GCC country's digital economy.
- To provide recommendations for enhancing digital economy development in the GCC region.

The importance of the study:

This study delivers an in-depth comparative analysis of the digital economy in GCC countries, offering valuable insights for policymakers, businesses, and researchers alike. It serves as a critical tool for identifying best practices, pinpointing areas that need improvement, and uncovering opportunities for enhanced regional collaboration in the development of the digital economy. By providing a clear understanding of the current landscape, this analysis aids in guiding future strategies and fostering a more integrated and competitive digital ecosystem across the GCC region.

Methodology:

The study adopts a descriptive analytical approach, drawing on data from the Arab Digital Economy Index for the years 2018, 2020 and 2022. The performance of the GCC countries' digital economy is evaluated through comparative analysis of the various dimensions, pillars and sub-pillars of the index. By examining key dimensions, the study delivers a

detailed evaluation of the progress and challenges within the digital economies of GCC countries, presenting a nuanced perspective on their strengths as well as the aspects that need further development.

2. LITERATURE REVIEW

(Shkvarya et al, 2019); (Aidrous et al, 2021), emphasizes significant advancements in digital transformation and high-tech industries across GCC countries, pointing to substantial growth potential. (Melanyina et al, 2024); (Shu & Yu, 2022), reveal positive progress in digital transformation and high-tech industries in GCC countries, with potential for further growth.

(Bukht & Heeks, 2018); (Xia et al, 2024), offer broader insights into the digital economy, emphasizing its global growth potential, particularly in developing countries, while also acknowledging existing challenges. (Javaid et al, 2024), delve into the intersection of the digital economy and Industry 4.0, highlighting both opportunities and obstacles in its implementation. (Troubia, 2024), highlights the pivotal role the digital economy has played in alleviating the socio-economic effects of the pandemic.

Overall, these studies cover a spectrum of perspectives, from country-specific analyses to global trends, generally pointing to the growth potential of the digital economy, especially in developing regions, while also addressing areas for improvement and challenges that need to be overcome.

3. CONCEPTUAL FRAMEWORK

The digital economy marks a transformative shift in contemporary economic systems, defined by the widespread

integration of digital technologies across numerous sectors. This ongoing digital transformation is fueling innovation, altering market dynamics, and generating new avenues for economic growth and development worldwide.

3.1. Definition of digital economy

While defining the digital economy can be complex, there are established standards and guidelines that help in measuring its key components.

The OECD defines the digital economy as the segment of the economy that comprises marketplaces that rely on digital technologies and trade in goods (and services) are facilitated through e-commerce. It divides the digital economy into several parts and proposes certain characteristics and trends, such as network effects, two-sided markets, rapid innovation, and high investment rates (Sabayova & Cervena, 2023, p. 73).

The digital economy refers to the economic and social activities in which individuals, businesses and governments produce and use digital technologies (Yassin, Mohamed, & Hussen, 2021, p. 10). It is also define as an economy, which functions primarily by means of digital technology, especially electronic transactions made using the Internet (Bukht & Heeks, 2018, p. 9).

The digital economy is the name for an internet-based economy or a network economy, i.e. an economy that deals with digital or digital information, digital customers, digital companies, digital technologies and digital products (Messiliti, Benzaama, & Benzidane, 2019, p. 41).

Current research advises developing a collection of digital indicators that offer a distinct perspective on how digitalization is affecting economic activity, rather than defining the "digital economy." Several nations have created experimental estimates of the digital activities, often known as satellite estimates, due to the policy implications of this data (Moulton, Tebrake, & Tovar, 2022, p. 4).

The digital economy forms a crucial pillar of today's economic framework, heavily reliant on digital technologies and the Internet. It covers the economic and social activities of individuals, businesses, and governments involved in the creation, use, and exchange of digital goods and services. This economy is characterized by network effects, two-sided markets, swift innovation, and significant investments in digital technologies. E-commerce and digital transactions are integral parts, significantly contributing to productivity improvements and transforming industrial relations. While pinpointing an exact definition of the digital economy is challenging, its measurement is based on a variety of digital indicators that reflect the influence of digitization across various aspects of economic activity.

3.2. Importance of digital economy

Productivity rises and socioeconomic growth are encouraged by the digital economy. To increase productivity and facilitate participation in global value chains, digital technologies are being introduced and employed in economic operations. Digitalization contributes to increased efficiency through network effects, economies of scale, and the removal of information asymmetry. These elements have made a large range of industries and services, more accessible thanks to the digital economy (Semyachkov, 2019, p. 102).

Since the active development of the digital economy contributes to both increased productivity and the transformation of industrial relations, the significance of the digital economy for the development of the economic system is determined in terms of developing industrial relations and productivity (Mottaeva et al, 2023, p. 3).

3.3. Principal components of digital economy

The various technological and economic facets of the digital economy can be divided into three main components: (UNCTAD, 2019, pp. 4-5):

- **Core aspects or foundational aspects of the digital economy**, which consist of core technology, supporting infrastructure, and fundamental innovation.
- **Digital and information technology (IT) sectors**, which generate essential goods and services that depend on fundamental digital technologies, such as mobile applications, digital platforms and payment systems.
- **A wider set of digitalizing sectors**, which covers those where the use of digital goods and services is growing (e.g. for e-commerce). This kind of digitalization is occurring in many economic sectors, even though the transformation is gradual.

3.4. Arab digital economy index components

The Arab Digital Economy Report comes out every two years, and is a tool that identifies strengths and areas of development and tracking Arab countries' progress towards the successful achievement of the digital economy in various fields and sectors. This index aims to understand the

multidimensional interaction of the digital economy and to increase tools that can help improve long-term economic and digital growth, and employment opportunities.

Table 1. Dimension and pillars of Arab Digital Economy Index

Dimensions	pillars
Digital Government	First Pillar: institutions Fourth Pillar: E-Government
Digital Foundations	Second Pillar: Infrastructure
Citizen digital readiness	Third Pillar: Workforce
Digital Innovation	Fifth Pillar: Innovation Sixth Pillar: Knowledge&Technology
Digital Business	Seventh Pillar: Market Force Eighth Pillar: Capial Market Growth
Sustainable Development	Ninth Pillar: SDGS

Source: (Arab Vision for the Digital Economy, 2022, p. 31)

According to the Arab Digital Economy Report for the year 2022, the evaluation in the indicator report is based on nine basic pillars parallel to the five strategic dimensions, and each pillar consists of three to eight indicators, with a total of 43 indicators, as shown in table 1. Each pillar contributes to the overall value of the index (out of 100 point) in each country. The total value of the index determines each country's ranking, position, and status in the Arab region (Arab Vision for the Digital Economy, 2022, pp. 28-29)

4. ANALYSIS OF DIGITAL ECONOMY INDICATORS

This section explores the key indicators that define the landscape of the Arab digital economy within the Gulf Cooperation Council (GCC) nations. By analyzing these metrics, we seek to gain a thorough understanding of the

progress in digital transformation and the future potential across the GCC countries.

4.1. The overall progress of Arab digital economy index in GCC countries

According to the Arab Digital Economy Report for the year 2022, the GCC countries were classified among the leading countries that are characterized with its attractiveness for international investment (GCC-STAT, 2022, p. 1).

Table 2. The Arab Digital Economy Index in GCC Countries, 2018-2022

GCC Countries	2018	2020	2022
Emirates	75.46 (1)	70.6 (1)	71.4 (1)
Saudi Arabia	63.49 (4)	59 (3)	66.1 (2)
Qatar	69.33 (2)	64 (2)	65.1 (3)
Bahrain	66.1 (3)	58 (4)	64.9 (4)
Oman	58.15 (5)	56.9 (5)	61.6 (5)
Kuwait	57.16 (6)	50.2 (6)	61.3 (6)

Source: (Arab Federation For Digital Economy, 2024)

Table 2 shows the Arab Digital Economy Index (ADEI), reflecting a dynamic trend of digital transformation within the GCC region. It can be noted that the United Arab Emirates, over the period from 2018 to 2022, took first place, although the score was always over 70. This reflects a strong, developed digital ecosystem fuelled by strong infrastructure, supportive government policies, plus a vibrant environment for innovative initiatives regarding digital technology. Saudi Arabia achieved notable improvements in the global ranking of digital economy performance for the last years. While it saw a slight decline in 2020 to 59, the Kingdom strongly rebounded by 2022 at 66.1 points. Its main driver is the ambitious Vision 2030 initiative of Saudi Arabia, where the core concept has placed digital transformation at the center of economic diversification and growth. Meanwhile, Qatar still leads the ranking, while Bahrain fell from third rank in 2018 to fourth rank in 2020 to maintain the same rank in 2022, but with an improvement in its score, which reflect the back of gradual improvement. Oman and Kuwait reflect a mixed performance, indicating the need for focused attention and investment in their respective digital economies. The Arab Digital Economy Index underlines the varied paths of digital transformation across GCC countries. However, drivers of these trends would have to be investigated, along with an analysis of the sub-indicators for further insight. This will provide evidence of strengths, challenges, and opportunities for further digital development across the region.

4.2. Pillar indicators analysis

The GCC countries have implemented a range of digital initiatives and strategies aimed at achieving sustainable economic growth and diversification. These nations are at

different stages of their digital transformation journeys, with varying levels of maturity in digital governance.

4.2.1. Digital Government

This analysis evaluates the Digital Government performance of GCC countries from 2018 to 2022, focusing on the "Institutions" and "e-Government" pillars as outlined in the Arab Digital Economy Index (ADEI). By examining these specific components, the analysis provides insights into how well each country has developed its digital governance frameworks and e-government services during this period.

Table 3. Digital Government Performance in GCC Countries, 2018-2022

Years	Dimensions	Pillars	UAE	KSA	QR	BH	OM	KW
2018	Digital Government	- Institutions	75.83	55.72	68.30	58.97	68.30	52.22
		- e-government	82.92	78.04	71.34	81.19	68.48	73.88
2020		-Institutions	74.73	60.53	66.59	56.03	62.84	53.61
		- e-government	71.64	70.65	74.49	70.66	66.10	46.51
2022		- Institutions	85.69	65.40	71.92	74.14	66.45	62.51
		- e-government	85.55	80.24	71.73	82.13	77.49	79.13

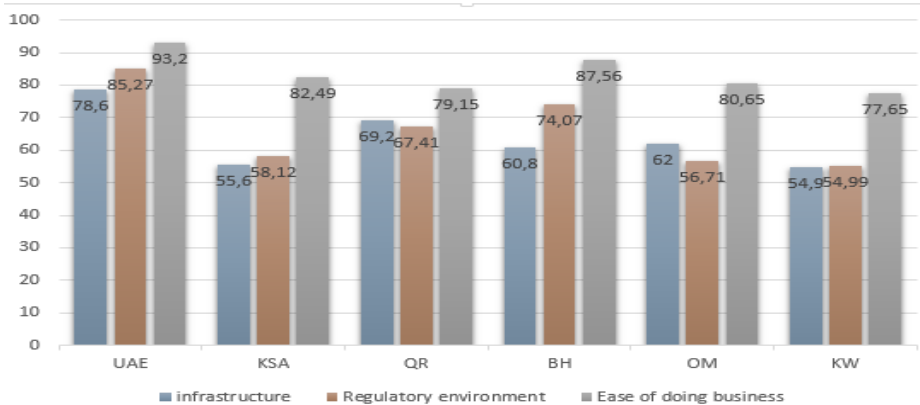
Source: (Arab Federation For Digital Economy, 2024)

The UAE has the top scores for Digital Government over all the observed years. It is in fact showing strong commitments on the path of digital transformation and infrastructural richness to cater to digital government service delivery in the nation. Saudi Arabia is clearly growing upwards both in 'Institutions' and 'e-Government' pillars. The Institutions score increased from 55.72 in 2018 to 60.53 in 2020 and further to 65.4 in 2022, reflecting the attention of the Kingdom toward digital transformation and modernization. Similarly, the e-Government score increased from 78.04 in 2018 to 70.65 in 2020 and then to 80.24 in

2022, showing that the strategy of Vision 2030 was going in the appropriate direction regarding digital government initiatives. Meanwhile, Qatar and Bahrain demonstrate rather stable performance; their ratings are interpreted as reflecting stable progress in their respective digital government efforts. Simultaneously, Oman reveals steady progress, although moderate over these years, while fluctuating trends in Kuwait note that more focused and consistent efforts in the digital transformation of government are called for.

The 2022 Arab Digital Economy Index (ADEI) Institutions Pillar data reveals a dynamic picture of digital transformation within the GCC region. This pillar reflects how each country is strengthening its institutional frameworks to support and sustain digital innovation, highlighting the progress and challenges faced by different GCC nations in their journey toward a more digitized governance structure.

Fig.1. Institutions pillar in GCC Countries in 2022



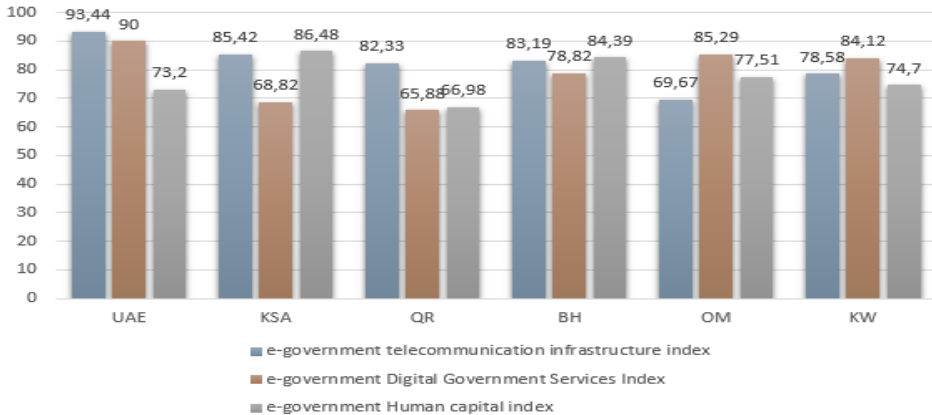
Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

The UAE always manages to top the Institutions Pillar, registering absolute highest scores across all its sub-pillars: Infrastructure at 78.60, Regulatory Environment at 85.27, and Ease of Doing Business at 93.20. These scores showcase the strong and stable environment for businesses and investments alike that the UAE has and contributes much to the nation's overall strong performance in the ADEI. Meanwhile, Saudi Arabia shows a really notable improvement compared to previous years. It scored 82.49 points in the Ease of Doing Business sub-pillar, a performance that could be attributed to the successful efforts made by the Kingdom in creating a more welcoming environment for both entrepreneurs and investors in keeping with its Vision 2030 digital transformation strategy.

Qatar and Bahrain have consistently been strong concerning the Institutions Pillar, reflecting the consistent progress they have made toward improving their respective regulatory environments in addition to developing a business-friendly atmosphere. Qatar retains strength in Infrastructure at 69.20 and also in Regulatory Environment, with 67.41. Bahrain's Ease of Doing Business score reaches 87.56 in 2022, reflecting certain significant amelioration and hence its efforts toward making the environment more conducive for business operations. Both Oman and Kuwait put up a mixed performance. In general, Oman is characterized by relatively similar scores across all sub-pillars of each index, reflecting steady but moderate progress in its journey toward digital transformation. While Kuwait has achieved impressive improvement in the aggregate Ease of Doing Business score at 77.65, there are laggings on Infrastructure at 54.90 and Regulatory Environment at 54.99. These components of lower scores indicate that infrastructure and regulatory frameworks should be taken seriously towards alignment with the massive leap of digital transformation by other GCC countries.

The overall performance of the GCC region in the Institutions Pillar reflects an utmost robust commitment to digital transformation. Consistent leading from the UAE, along with large jumps for the Kingdom of Saudi Arabia, underlines effectiveness in both strategic planning and targeted investment. These strong performances will be indicative of the GCC aspirations to attain regional and global leadership in digital innovation and investment. The different performances on various sub-pillars, however, demonstrate that more work remains to be done in order to overcome particular difficulties and make sure further improvement is continuously achieved. Such a balanced approach would be required for the region to actually realize its goals on digital transformation and to compete at the top. The high Infrastructure scores across the GCC region show an extremely strong basis for digital growth. In this respect, the relatively low result for Kuwait is the country's investment in developing digital infrastructure to keep it competitive. Despite the remarkable improvements concerning Ease of Doing Business made by the State of Saudi Arabia and Kuwait, both Oman and Kuwait more specifically need to work further on their respective regulatory environments. These areas, when strengthened, will contribute to creating a more predictable and attractive business environment—one that is essential for long-term economic growth and digital transformation in the region.

Fig.2. E-government pillar in GCC Countries in 2022



Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

The GCC performance during 2022 accounts for broad differences in each of the three important sub-pillars of e-Government. First, regarding telecommunication infrastructure, the UAE is on top with a score of 93.44, followed by Saudi Arabia at 85.42 and Bahrain at 83.19. Oman has the least score of 69.67. This asymmetry underlines the different levels of investment and development in digital infrastructure within the region and suggests that several countries might have to competitively speed up their efforts toward building a more robust digital foundation.

The Digital Government Services Index shows a bit of a mixed picture. The UAE is still leading the pack at 90.00, but Oman (85.29) and Kuwait (84.12) aren't too far behind. Meanwhile, Qatar's trailing at 65.88. These numbers highlight the varying success levels when it comes to rolling out digital government services across the GCC. On the

Human Capital Index, Saudi Arabia takes the top spot with 86.48, with Bahrain close on its heels at 84.39. But again, Qatar's falling behind with 66.98. These scores shed light on the differences in education, skills, and digital know-how across the region.

Overall, the UAE shines across all sub-pillars, while other GCC countries show strong points in specific areas. This opens up a big opportunity for knowledge-sharing and collaboration to boost e-government efforts across the region. By tapping into each country's unique strengths, the GCC could drive some serious regional improvements.

4.2.2. Digital Foundations

The performance of the Digital Foundation Index in the Gulf countries during the period 2018-2022 shows clear trends and differences in infrastructure development (see table 4).

Table.4 Digital Foundations Performance in GCC Countries, 2018-2022

Year	Dimension	Pillars	UAE	KSA	QR	BH	OM	KW
2018	Digital Foundations	Infrastructure	78.38	62.68	71.28	72.28	60.10	58.95
2020		Infrastructure	81.04	60.53	70.60	63.60	65.44	58.63
2022		Infrastructure	71.83	57.55	65.51	57.38	56.38	52.45

Source: (Arab Federation For Digital Economy, 2024)

The UAE has consistently performed well in Digital Foundations, especially in 2018 and 2020, which highlights their strong digital infrastructure supporting an advanced digital economy. However, their 2022 score of 71.83 shows a slight dip, hinting that they might need to keep up steady

investments in infrastructure development. Qatar holds on to second place, but its score also slides from 71.28 to 65.51 over the same period. Bahrain, though, takes the biggest hit, dropping from 72.28 in 2018 to just 57.38 in 2022. Saudi Arabia and Oman have stayed relatively stable, only showing small declines, while Kuwait consistently ranks the lowest, slipping from 58.95 to 52.45.

Interestingly, most countries saw slight improvements or stayed steady between 2018 and 2020, but there's a clearer downward trend from 2020 to 2022. This pattern suggests that while there was initial progress in digital infrastructure, some challenges or shifts in priorities due to global events like the COVID-19 pandemic have slowed things down. The overall decline across all GCC countries indicates the need to refocus and invest in digital infrastructure to keep their digital foundations strong and future-ready.

Fig.3. Infrastructure pillar in GCC Countries in 2022



Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

The 2022 infrastructure performance across GCC countries shows some noticeable differences in four key areas (see Fig.3). When it comes to access to IT services, everyone's doing pretty well, with the UAE out in front at 87.30, closely followed by Bahrain (83.40) and Saudi Arabia (81.50). In terms of use of technology services, the UAE leads again at 83.70, while Kuwait lags behind at 67.60. Regarding capital formation as a percentage of GDP, Qatar leads here by a large margin, scoring 43.85, while the rest of the countries received lower scores, ranging from 22.00 (Oman) to 33.60 (Bahrain).

Overall, while GCC countries generally do well in IT access and usage, there are big differences when it comes to capital investment and logistics. The UAE consistently leads in all areas, showing a balanced approach to infrastructure development. Meanwhile, other countries have strengths in specific areas, which suggests there's plenty of room for targeted improvements and collaboration across the region.

4.2.3. Citizen Digital Readiness

Table 5 illustrates significant variations and changes in the GCC nations' Citizen Digital Readiness metric during the period 2018-2022.

Table.5 Citizen Digital Readiness Performance in GCC Countries, 2018-2022

Years	Dimension	Pillars	UAE	KSA	QR	BH	OM	KW
2018	Citizen Digital Readiness	Education	79.04	66.01	85.93	71.90	56.04	58.73
2020		Education and skills	80.71	67.83	74.15	69.63	69.82	63.43
2022		Workforce	74.64	76.97	77.51	72.23	56.38	64.44

Source: (Arab Federation For Digital Economy, 2024)

The Citizen Digital Readiness dimension in GCC countries has seen some ups and downs from 2018 to 2022. Back in 2018, Qatar led the pack with a strong score of 85.93 in Education. But by 2020, they dropping to 74.15, before making a modest recovery to 77.51 in 2022. The UAE, on the other hand, kept things pretty steady, starting at 79.04 and ending up at 74.64 by 2022. Saudi Arabia's been on a consistent upward trajectory, going from 66.01 in 2018 to a solid 76.97 in 2022, even surpassing the UAE. Bahrain stayed stable, with a slight bump from 71.90 to 72.23 over the years. Oman had the most dramatic shift, jumping from 56.04 in 2018 to 69.82 in 2020, only to fall back down to 56.38 in 2022. Meanwhile, Kuwait made gradual but steady progress, climbing from 58.73 to 64.44. These trends highlight different strategies and success rates in boosting citizen digital readiness across the GCC, with Saudi Arabia standing out for its steady improvement across the board.

If we consider the performance of the Workforce Pillar in GCC countries for the year 2022 alone, different sub-pillars have held a range of strengths. Fig. 4 below shows leading scores for current workforce and skills in the UAE at 70.40 and 67.70, respectively, with Qatar in second place. For future workforce and skills, however, Qatar is ahead with 74.30 and 82.40 points, respectively, with Saudi Arabia and Oman performing well in both categories. The workforce diversity is very high in most countries, led by the UAE at 98.28, with Oman the closest behind at 96.55. Kuwait, with its low scores, has been consistently at the bottom across all sub-pillars but one: the future workforce skills.

Fig.4. Workforce pillar in GCC Countries in 2022



Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

The varied performance across sub-pillars suggests that while some countries excel in current workforce capabilities, others are better prepared for future workforce needs. This diversity in strengths presents opportunities for knowledge sharing and collaborative development among GCC countries to enhance overall workforce readiness in the region.

4.2.4. Digital Innovation

The Digital Innovation performance in GCC countries during the period 2018-2022 shows varying trends across GCC countries (see table 6).

Table 6. Digital Innovation Performance in GCC Countries, 2018-2022

Years	Dimension	Pillars	UAE	KSA	QR	BH	OM	KW
2018	Digital Innovation	-Innovation -Digital Readiness	65.26 82.65	49.31 69.70	66.90 79.41	47.63 77.00	42.42 62.04	37.78 60.44
2020		education and skills, Innovation & Knowledge and Technology	43.86	49.20	50.80	47.66	47.45	43.86
2022		-Innovation -Knowledge & Technology	63.94 28.35	61.37 20.85	61.21 23.67	49.33 28.05	48.58 19.48	45.81 33.00

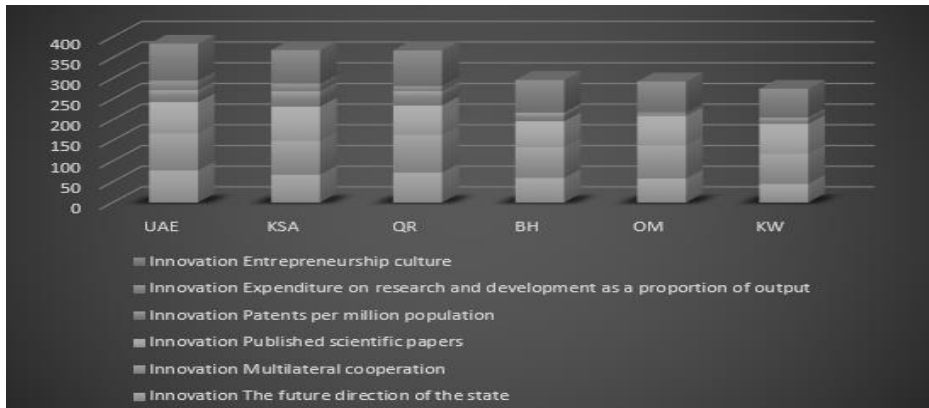
Source: (Arab Federation For Digital Economy, 2024)

The table 6 gives us a mixed snapshot of digital innovation in the GCC countries from 2018 to 2022. The UAE consistently leads the pack, especially when it comes to digital readiness (scoring an impressive 82.65 in 2018), though it struggles a bit in knowledge and technology. Qatar and Saudi Arabia usually follow in second and third place. Meanwhile, Bahrain, Oman, and Kuwait are making progress, but still trail behind the top performers. The 2022 data shows the gap between the top three is shrinking, signaling a rise in regional competition. But when it comes to the Knowledge and Technology pillar in 2022, scores dropped across the board, with Kuwait unexpectedly taking the lead at 33.00. This could mean there's been a shift in priorities or how this area is being measured.

Overall, the GCC countries are progressing at different speeds in digital innovation. To keep moving forward, they'll need to focus on boosting specific areas, especially knowledge and technology, if they want to ensure sustainable growth.

The Innovation Pillar performance in GCC countries for 2022 reveals diverse strengths across different sub-pillars (see Fig.5).

Fig.5. Innovation pillar in GCC Countries in 2022

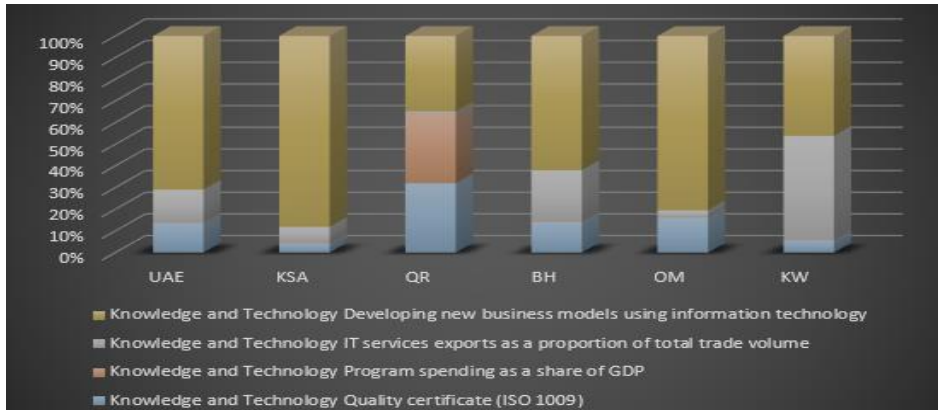


Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

The UAE leads in "future direction of the state" (77.60) and "entrepreneurship culture" (88.68), while Qatar excels in "multilateral cooperation" (90.94). Saudi Arabia shows strength in "published scientific papers" (83.20) and "patents per million population" (36.90). However, all countries show relatively low scores in "expenditure on research and development," with the UAE leading at just 23.26. This suggests a need for increased R&D investment across the region. Kuwait consistently ranks lowest in most sub-pillars, indicating potential areas for improvement. The varied performance across sub-pillars suggests that while some countries excel in certain aspects of innovation, there's room for improvement and knowledge sharing among GCC countries to enhance overall innovation capabilities.

The Knowledge and Technology Pillar performance in GCC countries for 2022 presents a mixed picture with significant variations across sub-pillars (see Fig.6).

Fig.6. Knowledge and Technology pillar in GCC Countries in 2022



Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

In "Quality certificate (ISO 1009)," Bahrain barely edges out the UAE, with scores of 15.88 and 15.60, respectively. Meanwhile, Qatar stand up in "Program spending as a share of GDP" with a score of 8.64—way ahead of the rest. Surprisingly, Kuwait dominates in "IT services exports" with a whopping 63.25, leaving Bahrain (26.50) and others far behind. The UAE also leads in "Developing new business models using information technology," leading with 80.41, followed by Saudi Arabia at 73.48.

These differences highlight how each GCC country is focusing on different aspects of knowledge and technology. Low scores in program spending and quality certification for most countries show there's room to step up in those areas. The huge gap in IT services exports points to varied economic structures and priorities, with some countries pushing ahead in tech exports while others focus on different strengths.

4.2.5. Digital Business

The goal of the digital business dimension is to maximize the benefits of digital transformation initiatives for the business sector. An overview of this indicator's evolution in the GCC countries from 2018 to 2022 is shown in table 7.

Table 7. Digital Business Performance in GCC Countries, 2018-2022

Years	Dimension	Pillars	UAE	KSA	QR	BH	OM	KW
2018	Digital Business	-Market Forces -Capital Market Growth	67.07 64.38	66.03 52.20	45.87 63.34	50.03 56.04	47.23 53.75	52.77 48.13
2020		-Business environment and digital readiness Growth of financing markets	68.71	59.02	62.26	62.55	58.39	59.95
2022		-Market Forces -Capital Market Growth	73.7 85.5	73.6 82.8	46.2 90.4	63.7 83.4	52.4 80.9	55.7 84.7

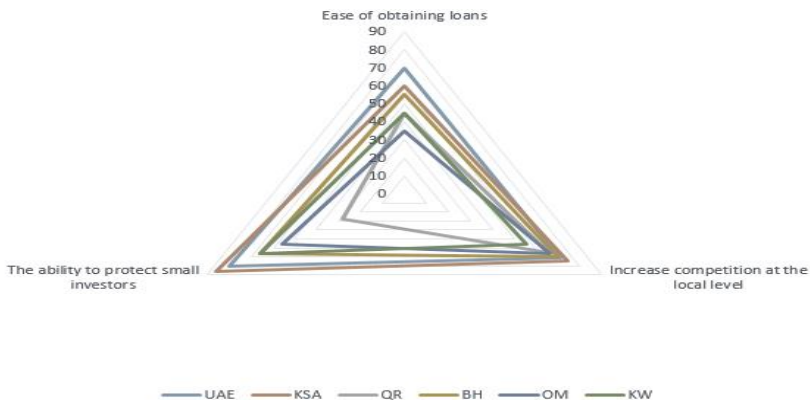
Source: (Arab Federation For Digital Economy, 2024)

From the table 7, we note that the United Arab Emirates (UAE) consistently outperformed other GCC nations across all measured pillars. In 2018, the UAE led in market forces (67.07) and capital market growth (64.38), while it excelled in Business environment (68.71) in 2020. By 2022, the UAE had further solidified its leading position, achieving the highest scores in both market forces (73.7) and capital market growth (85.5). Saudi Arabia demonstrated significant progress, particularly in capital market growth, rising from 52.20 in 2018 to 82.8 in 2022. Conversely, Kuwait consistently ranked lower in most categories, suggesting potential areas for digital business development. The data indicates a general upward trend in digital business performance across the GCC region, with particularly strong growth in capital market scores between 2020 and 2022,

possibly reflecting increased digital transformation efforts in response to global economic challenges.

The Market Force Pillar performance across GCC countries in 2022 reveals significant variations in three key sub-pillars (see Fig.7).

Fig.7. Market Force pillar in GCC Countries in 2022



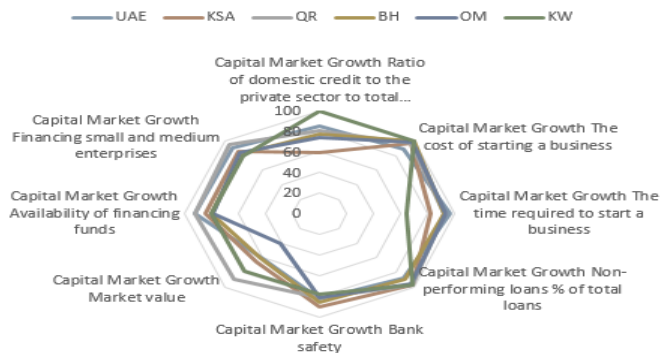
Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

In terms of ease of obtaining loans, the UAE leads with a score of 70.00, followed by Saudi Arabia at 60.00, while Oman lags considerably at 35.00. Saudi Arabia excels in protecting small investors with a score of 86.00, closely followed by the UAE at 80.00, while Qatar shows a markedly low score of 28.00. Regarding local competition, Saudi Arabia again leads with 74.80, followed closely by the UAE at 71.00, with Kuwait trailing at 56.00. These disparities suggest varying levels of financial accessibility, investor protection, and market competitiveness across the GCC region. The UAE and Saudi Arabia consistently perform well

across all sub-pillars, indicating robust market forces, while other countries show strengths in specific areas, pointing to potential for targeted improvements in their business environments.

The Capital Market Growth Pillar performance in GCC countries for 2022 presents a complex picture across various sub-pillars (see Fig.8).

Fig.8. Capital Market Growth pillar in GCC Countries in 2022



Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

The performance of the Capital Market Growth Pillar in the GCC countries for 2022 is pretty complex across various sub-pillars. Kuwait leads in domestic credit to the private sector with 100.00 and performs strongly in non-performing loans with 97.10, while Qatar leads in the financing of SMEs with 94.55 and in market value with 89.50. The UAE consistently shows very good results in most of the sub-indices, with particularly good results in availability of financing funds at 92.31 and time required to start a business at 96.50. Saudi Arabia leads the bank safety indicator with 89.55 and shows good marks in non-performing loans at

97.80. Bahrain and Oman mostly perform at the middle range but show several strong performance points, such as Bahrain's low cost of starting a business at 99.40. It follows that erratic strengths in capital market growth are considering that each GCC country seems to boast of different strengths, this speaks to a complementary regional financial ecosystem whereby countries could leverage each other's strengths for collective growth and development in capital markets.

4.2.6. Sustainable Development

Table 8 represents the performance of the GCC countries in the sustainable development dimension during the period 2018-2022, as it reveals interesting trends and transformations.

**Table8. Sustainable development Performance in GCC Countries,
2018-2022**

Years	UAE	KSA	QR	BH	OM	KW
2018	83.66	71.46	71.59	74.83	69.50	71.56
2020	74.32	60.51	70.95	72.37	72.21	65.20
2022	71.37	75.93	77.27	73.67	76.94	74.04

Source: (Arab Federation For Digital Economy, 2024)

In 2018, the United Arab Emirates was leading with a score of 83.66, far higher compared to its regional peers. By 2022, the landscape had changed dramatically, Qatar, scoring 77.27, is the best performer, followed by Oman, which scored 76.94, and Saudi Arabia at 75.93. While the rating of the UAE interestingly faced a sharp drop to 71.37 points in 2022, Kuwait showed the most linear growth—from 71.56 points in 2018 to 74.04 points in 2022. Bahrain generally performed

more or less consistently throughout the period. Incidentally, all but Oman posted a decline in 2020 due to the global pandemic but registered a strong rebound by 2022. This depicts resilience and adaptability in efforts toward sustainable development in most of the GCC countries. The converging scores in 2022 reflect how the gap in sustainable development performance among GCC countries has reduced and thus points toward more uniform regional progress in recent years.

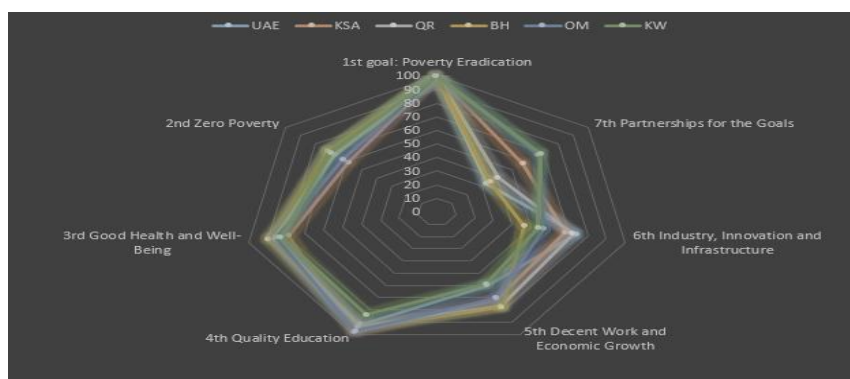
Figure 9 shows a detailed breakdown of the performance of Sustainable Development Pillars for GCC countries. In the first goal of Poverty Eradication, all countries have perfect scores, 100.00, which mean that GCC has made giant strides in eliminating extreme poverty within its territory perhaps due to robust social welfare systems and economic prosperity. The second goal, Zero Poverty: Qatar leads with 71.82, and Saudi Arabia lags way behind with a score of 58.55, showing that while extreme poverty may be removed, yet relative poverty and income inequality are still a concern of these nations.

In the third goal on Good Health and Well-being, Bahrain tops with 89.03, and Saudi Arabia again is at the bottom with 78.57. These high scores presumably indicate that GCC countries have created high-quality health systems and have developed effective public health policy. In Quality Education, Saudi Arabia ranks best with 98.24, while Kuwait ranks lowest at 83.91. That shows the strong commitment taken regionally toward education, where most countries are likely to invest in their respective educational infrastructures and systems. Bahrain leads in Decent Work and Economic Growth with 77.61, while Kuwait has the lowest with 59.08. This could also be indicative of the differences in policies

pursued for the labor market and the process of economic diversification, as well as the challenges associated with creating sustainable employment within oil-dependent economies.

Industry, Innovation, and Infrastructure, the UAE stands far ahead of Bahrain's 46.64. This gap could reflect a variation of growth in investment rate in a range of different R&D-related activities, innovation ecosystems, and infrastructure modernization processes across the region. Curiously enough, the standing for Partnerships for the Goals, Kuwait leads with 68.90, followed by Oman with 67.33, while the UAE has considerably the lowest rank of 33.00, being narrowly outcompeted by Bahrain at 35.51.

Fig.9. Sustainable development pillar in GCC Countries in 2022



Source: Prepared by Author based on (Arab Federation For Digital Economy, 2024)

These varied performances across different pillars suggest that each GCC country has distinct strengths and areas for improvement in sustainable development, with no single country consistently outperforming across all dimensions.

5. RESULTS DISCUSSION

The comparative analysis of the digital economy in GCC countries shows that advancement and disparities exist across different dimensions.

- **Digital Government:** The UAE demonstrates a consistent strong performance in digital government, reflecting its robust infrastructure and commitment to digital transformation. This aligns with research highlighting the UAE's commitment to digital government initiatives (Shkvarya et al., 2019). Saudi Arabia exhibits a clear upward trend, demonstrating the impact of their Vision 2030 strategy (Shu & Yu, 2022). Qatar and Bahrain show consistent progress, while Oman displays moderate performance. Kuwait, however, requires focused attention on improving digital government services (Troubia, 2024). These findings suggest that the UAE and Saudi Arabia are leading the way in digital governance, while other countries need to implement targeted strategies to improve their performance.

- **Digital Foundations:** The study found significant disparities in infrastructure development, with the UAE consistently leading. However, its score in 2022 indicates a need for continued investment to maintain its lead (Shkvarya et al., 2019). Qatar maintains the second position, but its score has also declined, suggesting a need to prioritize infrastructure investments (Melanyina et al., 2024). Bahrain's significant decline highlights the importance of

addressing specific challenges for sustainable growth (Aidrous et al., 2021). Overall, the study suggests a need for sustained investment in digital infrastructure across GCC countries to achieve their full potential for digital transformation.

- **Citizen Digital Readiness:** While the UAE consistently demonstrates strong performance, disparities exist in the skills and knowledge of the workforce across GCC countries (Javaid et al., 2024). Saudi Arabia has shown significant improvement, while Bahrain and Oman have shown steady progress. However, Kuwait's score consistently ranks lower, highlighting the need for specific initiatives to address educational and skills development gaps (Bukht & Heeks, 2018).
- **Digital Innovation:** The study reveals significant variations in digital innovation across GCC countries. The UAE consistently ranks highest in innovation, but its performance in knowledge and technology lags behind (Xia et al., 2024). Qatar and Saudi Arabia demonstrate strong performance, while other countries show progress. The study suggests that the UAE and Saudi Arabia are leading the way in innovation, while other countries require targeted strategies to enhance their capabilities in specific areas (Aidrous et al., 2021).
- **Digital Business:** The study suggests that the UAE consistently outperforms other GCC countries in Digital Business, specifically in market forces and capital market growth (Messiliti et al., 2019). Saudi Arabia shows significant progress, while Kuwait consistently ranks lower, demonstrating the need for focused initiatives to improve its business environment (Bukht & Heeks, 2018).

- **Sustainable Development:** The study indicates that GCC countries have made significant progress in eradicating poverty but face challenges in addressing income inequality (Mottaeva et al., 2023). While GCC countries have made strides in healthcare and education, disparities exist in decent work and economic growth (Yassin et al., 2021). This suggests a need for targeted efforts to address specific challenges and ensure a more equitable and sustainable future.

6. CONCLUSION

The comparative review of the standing of the digital economy in GCC countries follows a generally chequered pattern with significant progress combined with persisting disparities along many dimensions. It brings out that over time, the UAE has emerged as a consistent leader in most of the indicators, reflecting a high commitment to digital transformation. At the same time, it indicates that other GCC countries like Saudi Arabia, Qatar, and Bahrain are making strides in some areas, reflecting a growing commitment towards bridging the gap. Yet, this is not devoid of inequalities, and all countries have some areas for improvement to achieve the ambitions of sustainable and inclusive digital development. These are through investment in digital infrastructure, building needs for digital literacy and skills, promotion of innovation, and enhancement of sustainable actions. The key findings are:

- The UAE has constantly been at the lead in most areas of digital economy development, notably in digital government services and also innovation.
- Saudi Arabia improved substantially, especially in the area of digital business and innovation-related indicators partly reflecting its Vision 2030 strategy.
- For Qatar, the performance has been generally strong across many factors; however, specific successes in sustainable development and partial indicators of digital innovation can thus be identified.
- Bahrain and Oman have mixed performances in the several important areas, each being strong in some while weak in others.
- Kuwait shows poor performance on nearly every aspect of digital economy development.

The key findings of this study contain confirmation of the following hypotheses:

- First hypothesis—the presence of a significant difference in the performance of the GCC countries' digital economy performance. This is very obvious across all pillars and sub-pillars, with the UAE leading for as long as one can remember, Saudi Arabia second, and Qatar a close third.
- Evidence for the second hypothesis: That the UAE leads GCC in most aspects of digital economy development. The performance of the UAE has outperformed other GCC countries along all the dimensions, indicating its strong digital infrastructure and the will towards transformation to the digital economy.
- Third hypothesis: All GCC countries performed better in their digital performance of the economy from

2018 to 2022. Also, while the leading position remains consistent with the United Arab Emirates, other countries such as the Kingdom of Saudi Arabia, Bahrain, and Qatar had considerable improvements.

The study suggests the following:

- Invest in digital infrastructure to realize their full potential for digital transformation.
- Come up with improved digital government services to enhance their digital governance.
- Gaps in skills are addressed to ensure a future-ready labor force.
- Knowledge and technology drive innovation at the core.
- A solid business environment draws investments and results in job creation.
- Investment in the eradication of income inequality, decent work, and economic growth for an equitable and sustainable future.

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