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The Impact of Artificial Intelligence Applications in Non-Oil Sectors on Economic Diversification in the Gulf Cooperation Council Countries

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ABSTRACT

This study examines how government readiness for artificial intelligence adoption influences the growth of non-oil sectors in the Gulf Cooperation Council (GCC) countries, situating this relationship within the broader framework of economic diversification. Given the persistent vulnerability of GCC economies to oil price volatility and geopolitical uncertainty, the research investigates whether AI adoption functions as a structural driver of diversified, sustainable growth rather than a purely technological add-on. Using a balanced panel dataset covering the six GCC states (UAE, Saudi Arabia, Kuwait, Bahrain, Oman, and Qatar) over the 2020 to 2024 period, the study applies panel data estimation techniques, testing pooled OLS, fixed effects, and random effects specifications. Diagnostic procedures, including the Redundant Fixed Effects test, the Hausman test, and Pesaran's cross-sectional dependence test, were used to select the most appropriate model, with results favoring the Pooled OLS specification. Findings indicate a statistically significant positive relationship between the government AI readiness index and non-oil sector growth, alongside a strong positive effect of overall GDP growth on non-oil output. These results suggest that institutional AI readiness has moved beyond symbolic policy commitments to generate measurable economic returns, helping to offset the region's historical dependence on hydrocarbon revenues. The study contributes a region-specific, multi-country econometric framework that extends prior descriptive and single-country research, offering policymakers empirical grounds for prioritizing AI integration as a lever for sustainable economic diversification across rentier economies.

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Introduction

The Gulf Cooperation Council (GCC) countries share many common characteristics, most notably their heavy reliance on oil as a primary source of revenue and a key driver of economic growth. However, this excessive dependence on oil presents a complex challenge; it is a limited and depletable resource, and its prices are subject to sharp fluctuations, posing significant obstacles to achieving sustainable economic stability and a balanced growth future. This is especially true amid trade wars, protectionist policies, and geopolitical changes that have contributed to increased global economic uncertainty. All these challenges have been a vital factor prompting the GCC countries to intensify their efforts to achieve economic diversification, aiming to enhance economic resilience, ensure financial sustainability, and achieve comprehensive and sustainable development. To achieve this goal, these countries have paid great attention to innovation and the use of modern technologies by applying these technologies across various economic sectors. Artificial intelligence is considered one of the most prominent modern technological tools that the GCC countries have implemented to accelerate the pace of economic diversification. In light of this, the research problem arises in attempting to answer the following question: What is the impact of applying artificial intelligence technologies in the non-oil sector on enhancing economic diversification in the Gulf Cooperation Council countries? Based on that, the research aims to achieve the following objectives:

1- Analyze the concept of economic diversification and clarify its importance in strengthening the economies of oil-dependent countries.

2- Explain the role of artificial intelligence in supporting the process of economic diversification.

3- Evaluate the impact of applying artificial intelligence technologies on enhancing the non-oil sector in the Gulf Cooperation Council countries.

4- Highlight the main challenges and opportunities available for applying artificial intelligence technologies in the Gulf Cooperation Council countries, while providing recommendations aimed at maximizing the benefits of these technologies in light of the available opportunities and overcoming obstacles that may hinder their application.

Literature Review

1- The concept of economic diversification and its importance.

According to (Al-Than et al., 2023), economic diversification is defined as the process through which countries seek to reduce their dependence on a single source of income. The importance of this process lies in its pivotal role in supporting the green transition and achieving sustainable development goals. In light of climate challenges that have prompted many countries to adopt an economic model that promotes growth while focusing on environmental protection and improving individual well-being, sustainable transformation and economic diversification are considered two integrated and

interconnected strategic tools. Countries can benefit from these two approaches to achieve their developmental goals and ensure effective environmental sustainability.

Regarding strategies for implementing economic diversification among countries, (Sultanova & Naser, 2025; Arab Labor Organization, 2025), pointed out that their application is based on the economic and social characteristics of each country. Although most countries primarily rely on an export diversification strategy as a fundamental pillar to obtain the necessary resources that contribute to supporting the economic diversification process and achieving sustainable development goals. For example, in developed countries, this strategy focuses more on supporting sustainable industries and products, adopting modern technology and green techniques. In developing countries, exports often heavily depend on the use of primary natural resources, which results in environmental challenges such as increased carbon dioxide emissions and ecosystem degradation, especially in oil-producing countries. In these countries, the success of economic diversification and development financing heavily depends on oil revenues; these revenues are used to develop infrastructure and stimulate the growth of non-oil sectors to achieve economic growth. Hence, challenges arise for oil-producing and exporting countries, necessitating the adoption of policies that support sustainable transformation to ensure a balance between economic growth and environmental sustainability.

In the same context, recent literatures indicated that sustainable transformation represents a comprehensive and crucial development framework because it does not focus on developing a single economic sector in isolation; rather, it encompasses all economic sectors such as energy, agriculture, freshwater, fisheries, forests, industry, transportation, construction, and tourism, in addition to services, infrastructure, and technology. This sectoral diversity makes green development an integral part of the process of enhancing economic diversification, as sustainable transformation relies on countries' ability to reduce dependence on a single sector and transition towards a balanced and multifaceted economic structure (Al-Taai, 2021). From this standpoint, investing in natural and human capital, encouraging innovation and renewal, and expanding job opportunities in green fields are fundamental pillars to support the path of economic diversification and its development. To achieve this goal, it is necessary to reconsider the traditional relationship linking economic growth on one hand, and resource consumption and environmental pressures on the other.

2- The Role of Artificial Intelligence in Advancing Economic Diversification in Non-Oil Sectors: Strategies and Readiness of GCC Countries

According to (Al-Sahmah, 2025), artificial intelligence is a fundamental factor in bringing about radical changes in various fields of sustainable development, through automating processes, enhancing the quality of decision-making, and driving innovation. Artificial intelligence contributes to the development of advanced technical solutions and the creation of new technological innovations, as well as providing effective tools to support and preserve environmental sustainability. Therefore,

investing in research, development, and innovation in the field of artificial intelligence is an imperative necessity to strengthen the national economy. With the increasing reliance on artificial intelligence technologies recently, its vast potential has become capable of making a clear impact in various economic sectors, foremost among them the non-oil sectors.

Starting from the belief in the importance of artificial intelligence in supporting growth and achieving sustainability, (Albous et., all, 2025) affirmed that the Gulf Cooperation Council (GCC) countries give great attention to employing artificial intelligence technologies to enhance economic diversification and drive societal progress, especially in light of the rapid changes witnessed in the digital environment and their ambitious national strategies in the UAE, Saudi Arabia, Qatar, Oman, Bahrain, and Kuwait. Particularly with the strong capabilities they possess that contribute to adopting artificial intelligence, including substantial financial capacities and advanced levels of digitization, as they were pioneers in launching e-government initiatives, which enabled them to transition early towards effectively using these technologies. The GCC countries deal with artificial intelligence as a fundamental factor to drive economic growth, a means to improve the level of public services, and a tool to enhance their position in global competition. Therefore, each country has begun launching or updating its national AI strategies in line with its visions to achieve economic diversification and enhance competitiveness within the global economy.

This aligns with the global trend observed by (Enholm, et., all, 2022), who explained that the business value of artificial intelligence is realized only through integrating the technology into organizational and productive activities. This explains the Gulf countries' efforts to enhance their governmental readiness to ensure the flow of technological investments toward promising service and industrial sectors.

On the other hand, in the search for causes of non-oil growth, the study by (Abdelkawy, 2024) discussed the "resource curse" dilemma in the Gulf countries, confirming through empirical analysis that economic diversification requires structural policies that go beyond reliance on oil surpluses. Here, the importance of technological innovation emerges; the study by (Abid, 2025) provided practical evidence from the East Asia region, proving a strong positive relationship between innovation in artificial intelligence and improved macroeconomic performance. This supports the hypothesis that Gulf countries' investment in artificial intelligence and big data infrastructure will contribute to accelerating the pace of non-oil GDP growth and reducing sensitivity to energy market fluctuations.

In the context of sustainability and the transition towards a green economy as part of diversification, the study by (Zhao, et., all, 2023) indicated that the digital economy plays a fundamental role in supporting green development by improving resource use efficiency. This aligns with the visions of the Gulf countries (such as Saudi Vision 2030 and Oman 2040), which integrate digital transformation and environmental sustainability to diversify income sources. The literature overall concludes that the

success of the GCC countries in investing in artificial intelligence depends on balancing technological readiness, human capital development, and regulatory frameworks to ensure that these innovations translate into tangible and sustainable economic growth in non-hydrocarbon sectors.

According to (Asmyatullin & Glavinam 2025), digitization is considered the foundation on which the Gulf Cooperation Council (GCC) countries rely to adopt artificial intelligence technologies, contributing to enhancing their ability to achieve economic diversification. In this context, (Bazoobandi, 2025), revealed that the GCC countries are working on developing and implementing digital transformation strategies aimed at achieving three main objectives: reducing dependence on the hydrocarbon sector, strengthening their strategic position in the "post-oil era," and improving the level of digitization of public services. These efforts have resulted in rapid growth of the data center market in the region, as well as the continued development of government cloud computing platforms and systems valued at approximately 3 billion dollars. These investments represent a pivotal step towards establishing an advanced digital environment that enables the comprehensive and effective use of artificial intelligence technologies.

These transformations confirm that digitization in the GCC countries is not merely a technical upgrade, but a strategic path aimed at establishing a solid foundation for adopting artificial intelligence, supporting non-oil sectors, and enhancing competitiveness in the global economic arena (Janardhan, 2022).

3- The policies adopted by the Gulf Cooperation Council countries to support the process of economic diversification.

The Gulf Cooperation Council was established in 1981 as an economic and political alliance comprising six countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. These countries primarily rely on oil as the main source to support economic growth. With modern developmental trends aiming for sustainability and green development, alongside the fact that oil is a non-renewable resource and its prices are subject to significant fluctuations in global markets, the need has become urgent for the GCC countries to adopt strategies aimed at diversifying economic sources away from oil and gas. Considering that oil and gas revenues still represent 62% of the total government income according to 2023 statistics (Salaytah & Bristow, 2025).

In this context, (Bala, 2025) believes that economic diversification should be a priority for the Gulf Cooperation Council countries, as their excessive reliance on oil revenues makes their economies vulnerable to significant fluctuations and long-term risks that threaten their sustainability. This approach is attributed to the close relationship between oil price fluctuations on one hand, and their impact on the effectiveness of fiscal policies and economic growth trends in these countries on the other hand.

Accordingly, (El Shazly & Lou, 2020) emphasized that it has become necessary for the Gulf Cooperation Council countries to implement comprehensive reforms

encompassing the financial and governmental sectors, as well as the tourism, services, and energy sectors, with a focus on policies that encourage foreign direct investment. Additionally, these countries need to carry out effective labor market reforms and update educational systems to create suitable opportunities for the youth, who are experiencing rapid population growth, especially since these countries are witnessing a boom in the number of young people in the 25-year-old age group, which constitutes about 50% of the total population, according to (Salaytah & Bristow, 2025).

Recognizing all these challenges as well as the available opportunities, the GCC countries have set ambitious national visions. The sharp fluctuations in oil prices revealed the fragility and lack of resilience of their economies, as well as the extent of the mutual relationship between their governments and oil revenues. (El Shazly & Lou, 2020) pointed out that despite the ongoing efforts of the GCC countries to diversify their economies over the past two decades, noticeable economic transformations only began to appear after 2014. This was confirmed by (Hvidt, 2013), who explained that the economic diversification efforts in the GCC countries are not recent but have roots extending back decades through the adoption of long-term visions and strategies aimed at reducing dependence on hydrocarbons and building diverse and sustainable economies. This highlights the GCC countries' efforts to adopt well-thought-out and early strategies for economic diversification, demonstrating a deep understanding of the importance of transitioning to a more resilient and sustainable economy away from oil market fluctuations.

(Salaytah & Bristow, 2025) see that the strategic initiatives adopted by the Gulf Cooperation Council countries, such as Saudi Arabia's Vision 2030, Qatar National Vision 2030, Kuwait Vision 2035, Oman Vision 2040, Bahrain Vision 2030, alongside the "Fifty Projects" initiative in the United Arab Emirates, represent a clear practical guide to the serious direction towards achieving economic diversification and enhancing sustainable growth. This approach is not limited to improving economic performance only but extends to making a comprehensive structural transformation in development models, through adopting integrated strategies based on clear goals and ambitions consistent with long-term future visions.

In the same context, (Callen et., all, 2014; Alomari & Bashayreh, 2020) confirm that the GCC countries have focused, over the past decades, on implementing a package of common policies supporting the process of economic diversification, represented in enhancing macroeconomic stability, improving the business environment, developing infrastructure and human capital, alongside supporting entrepreneurship and small and medium enterprises, as well as directing attention towards economic sectors with high growth potential, contributing to achieving more sustainable and balanced economic growth.

Research Gap

A review of recent literature on economic transformation in the Gulf Cooperation Council (GCC) countries highlights a noticeable gap in linking two pivotal tracks in

their national strategies: the transition to a post-oil economy and the expansion in the use of artificial intelligence and digital technologies. Although some studies focus on analyzing economic diversification efforts or artificial intelligence initiatives separately, they lack an analytical methodology that provides an accurate quantitative assessment of the impact of artificial intelligence in enhancing non-oil sectors in the region.

The review of recent economic literature revealed a significant disparity in addressing the relationship between digital transformation and economic diversification; while many studies concentrated on analyzing economic diversification policies in the GCC countries as an inevitable necessity to confront oil price volatility and ensure financial sustainability, other research paths tended to study artificial intelligence applications from a purely technical or managerial perspective.

It appears from the review of studies by (Al-Thani et al., 2023) and (Bala, 2025) that there is a consensus on the role of economic diversification and its importance in supporting the green transition. However, these studies have not sufficiently delved into how "government readiness for artificial intelligence" can be transformed into a quantitative driver of non-oil GDP growth. When comparing current research trends, we find that the study by (Albous et al., 2025) analyzed national AI strategies in the Gulf Cooperation Council countries but remained within the framework of descriptive analysis and strategic comparison without providing a standard model linking these strategies to sectoral growth indicators. Similarly, the study by (Bazoobandi, 2025) focused on digital infrastructure and data centers as a pillar for the post-oil era, while other studies such as (Abid, 2025) provided empirical evidence from the East Asia region on the positive relationship between AI innovation and macroeconomic performance. Nevertheless, there remains a clear methodological gap in both the Arabic and international literature, characterized by the scarcity of studies using panel data models to estimate the impact of artificial intelligence specifically at the Gulf region level as a single economic bloc.

The research gap becomes more evident in the lack of integration between the dimensions of "digital readiness" and the "tangible economic impact" in non-oil sectors such as industry and services; most of the available studies either address digital transformation from an institutional perspective (Enholm et al., 2022) or deal with economic diversification from the perspective of public fiscal policies (El Shazly & Lou, 2020). Hence, there is an urgent need for this study, which seeks to bridge this scientific gap by developing a benchmark model that explores the causal relationship between investment in artificial intelligence and the performance of the non-oil economy at the regional level, representing a qualitative addition to the literature that has long lacked linking these variables within a unified analytical framework that serves decision-makers in the Gulf Cooperation Council countries.

Stylized Facts

Within the framework of the Gulf Cooperation Council countries' diligent and ongoing efforts towards achieving economic diversification, sustainability policies emerge as one

of the fundamental pillars supporting this transformation. Therefore, sustainability policies, such as enhancing energy efficiency, reducing pollution, providing effective waste management, and increasing reliance on renewable energy sources, are essential elements within the economic diversification strategy (United Nations, 2020; World Global Green Economy Organization, 2020; International Labour Organization, 2022). This framework gains special importance in oil-producing countries, including the Gulf Cooperation Council states.

In this context, digital transformation represents the fundamental infrastructure supporting the employment of artificial intelligence applications in achieving this transformation. Confirming this, according to global digitization indicators, the Gulf Cooperation Council countries have witnessed tangible progress in this field. The United Arab Emirates was classified among the "leading countries" in the 2024 Global Digitization Index, scoring 61.4 points, while Saudi Arabia achieved 54.4 points within the "adopting countries" category. Bahrain, Kuwait, and the Sultanate of Oman recorded between 41.7 and 44.7 points, reflecting notable efforts in building a strong digital infrastructure that supports the economic transformation process (SAMENA, 2024).

In the same context, artificial intelligence readiness indicators reflect the extent to which these countries are prepared to adopt advanced technologies and employ them in supporting non-oil sectors. The Gulf Cooperation Council (GCC) countries have succeeded in achieving advanced positions in the artificial intelligence readiness index, according to the latest statistics for 2023. For example, the United Arab Emirates recorded 0.63, followed by Saudi Arabia with 0.58, then Oman and Qatar with 0.53 each, Bahrain with 0.52, and finally Kuwait with 0.46 (IMF, 2023). This digital and technological progress enhances the role of artificial intelligence as one of the main drivers of economic diversification in the region.

In light of this, the report (IAG, 2024) stated that the national vision documents of the GCC countries show a strategic shift towards reshaping growth models away from traditional dependence on oil, by diversifying their economies and strengthening their geopolitical priorities. At the same time, artificial intelligence has emerged as a fundamental element in the region's economic diversification path, with forecasts indicating that this sector will contribute $15.7 trillion to the global economy by 2030, including $320 billion for the Middle East and North Africa region. Saudi Arabia is expected to record the largest absolute contribution valued at $135.2 billion, while the United Arab Emirates is expected to achieve the highest relative impact, reaching 14% of its GDP during the same period.

According to estimates from the Digital Development Report in the Gulf Cooperation Council (GCC) countries, every dollar invested in generative artificial intelligence could yield a return of about 9.9 billion dollars, reflecting the significant potential of this transformation. These digital and technological shifts directly impact the performance of non-oil sectors, with the non-oil economy expected to grow by 4.5% in the United

Arab Emirates and 4.3% in Saudi Arabia during 2023, strongly supported by sectors such as trade, hospitality, manufacturing, and construction. Other Gulf countries like Bahrain, Kuwait, Qatar, and Oman also benefit from economic diversification efforts, albeit at varying paces. Projections indicate that non-oil economic growth in Kuwait could reach 5.2%, driven by increased private spending and expansionary fiscal policies.

In this context, the overall indicators of the Gulf economy reflect the actual outcomes of this transformation. According to the latest report on economic developments in the GCC countries, the region achieved a remarkable economic growth rate of 1.7% in 2024, compared to 0.3% in 2023. The non-oil sector continued to demonstrate its strength, recording growth of 3.7%. This positive performance is largely attributed to key factors, most notably smart spending focused on enhancing the application of artificial intelligence technology in investments, in addition to taking serious steps toward achieving effective structural reforms (World Bank, 2025).

Figure (1) highlights the rapid strategic development and high-level political commitment in the GCC countries to adopt artificial intelligence as a key driver for economic diversification.

Fig. 1. National AI in GCC Countries.

Figure (1) reveals that, since the United Arab Emirates launched its national artificial intelligence strategy in 2018, followed by Qatar in 2019, and Saudi Arabia in 2020, it has become clear that the countries of the region no longer view artificial intelligence merely as a technological option, but as a sovereign tool to decouple historically from oil and to enhance the growth of non-oil sectors. This strategic approach was further completed in 2023 and 2024 through executive programs in Oman and guidelines in Bahrain and Kuwait, confirming the formulation of an integrated regional framework aimed at increasing productivity efficiency in the fields of trade, industry, and services, and directly supporting efforts for sustainable economic diversification targeted within

national visions (such as Vision 2030 and 2040) to confront the volatility of global energy markets and the negative impacts of heavy reliance on oil.

Figure (2) illustrates the development of economic diversification indicators in the GCC countries in 2024. It measures the contribution ratio of non-oil sectors in three main areas: GDP, government revenues, and exports.

The data show a noticeable variation between countries; while Bahrain recorded the highest contribution ratio of the non-oil sector to GDP at 85.1%, followed by the UAE at 77.8%, the UAE significantly leads in non-oil exports with a ratio reaching 85%.

Regarding non-oil government revenues, the ratios are close in the UAE (43.1%), Saudi Arabia (39.9%), and Bahrain (36.3%), reflecting intensive efforts to reduce direct dependence on hydrocarbon revenues to cover public budgets.

Overall, these ratios and figures support the strategic transformation efforts in the GCC countries towards a "post-oil" economy characterized by diversity and sustainability, a trend increasingly relying on digitization and technological innovation to enhance the efficiency of these emerging sectors.

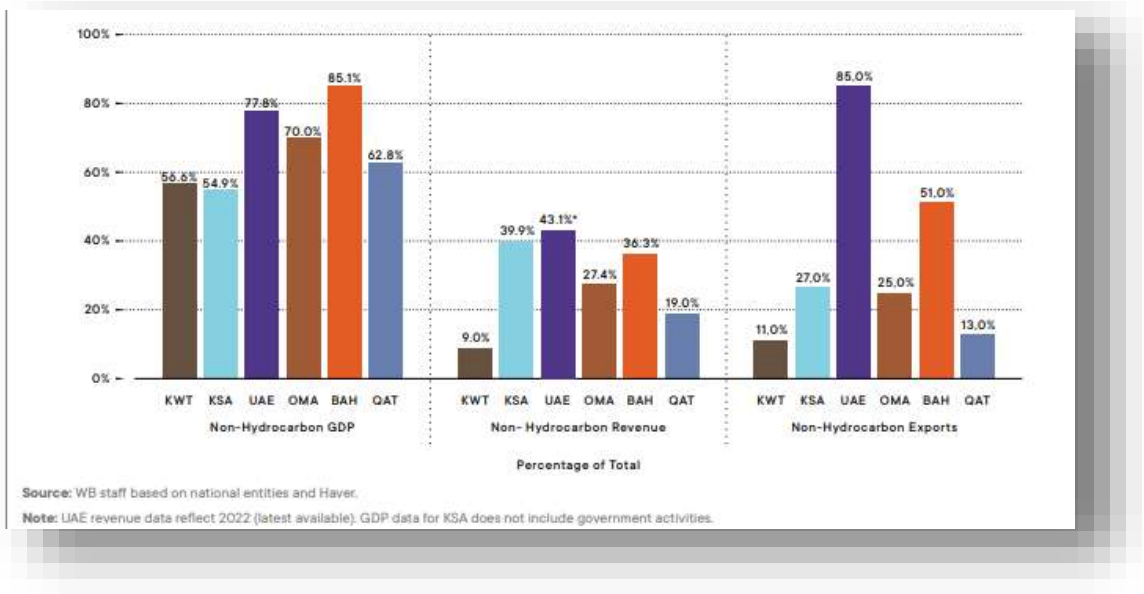

Fig.2. A snapshot of diversification indicators across the GCC: GDP, revenue and export diversification (2024)

Source: The Gulf's Digital Transformation: A Powerful Engine for Economic Diversification Report. (World Bank. 2025).

Conceptual Framework

To clarify the relationships between the main variables of the study, a conceptual framework was developed, through which the role of modern transformation factors and drivers, represented by artificial intelligence, the digital economy, and the green economy, in influencing economic outputs can be illustrated. In addition, this framework can clarify the mediating role of important enabling factors such as human

capital, policies, and legislation in enhancing the growth of non-oil sectors and achieving sustainable economic diversification.

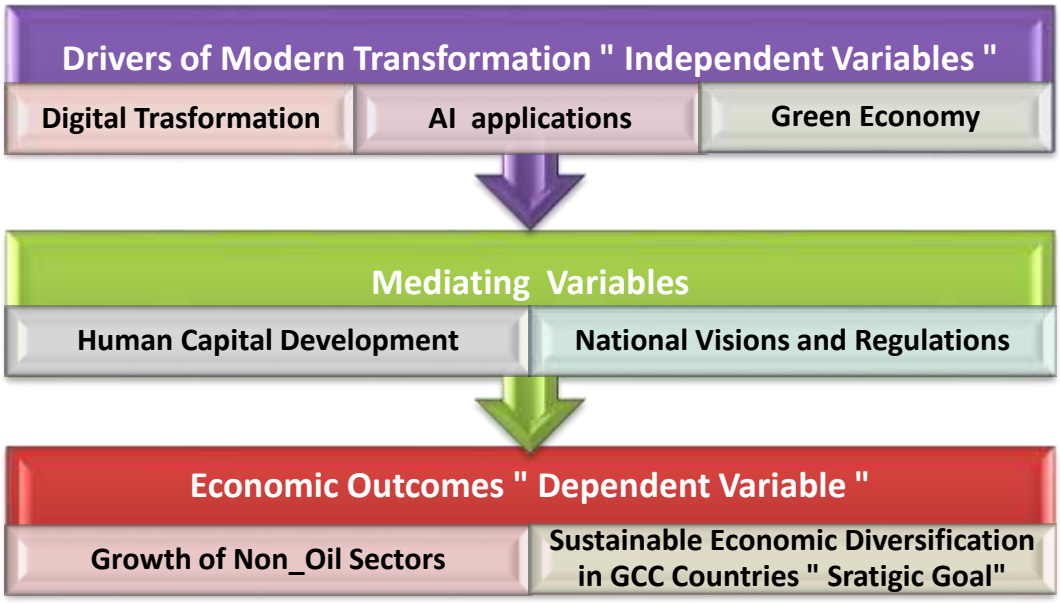

Fig.1. A Conceptual Framework for Sustainable Economic Diversification in the GCC Countries

In Figure (1), a positive relationship is shown between artificial intelligence and sustainable economic growth, through the vital cycle in supporting and enhancing the growth of the non-oil sector, by automating processes and tasks and stimulating innovation. In this context, digital transformation is considered the fundamental pillar upon which the employment of artificial intelligence technologies is based, while the integration of the green economy and sustainable transformation ensures directing this growth towards a sustainable path that aligns with international environmental standards. In light of this, the development of human capital emerges as a crucial element in this framework, especially given the high proportion of youth, which necessitates the development of educational systems and the qualification of cadres in line with the requirements of technological transformation to enhance the effectiveness of this integration.

Methodology

According to (Judson & Owen, 1996), this study focuses on the use of Panel Data Models as a distinctive analytical framework to study the economic links that integrate the temporal and cross-sectional dimensions comprehensively. These models hold a prominent position in macroeconomic research due to their ability to handle unobserved effects specific to each cross-sectional unit, which reduces the likelihood of biased results caused by omitting certain variables. Panel data models also allow for the

analysis of dynamic relationships that include lagged values of economic variables, making them a more efficient tool for studying long-term economic growth issues.

Panel data models used in empirical studies are divided into three main types. The first type is the Pooled Regression Model, which assumes homogeneity of cross-sectional units and no fixed differences between them, and is usually used as an initial benchmark model to test the suitability of panel data. The second type is the Fixed Effects Model, which takes into account the unobserved and distinctive characteristics of each cross-sectional unit that remain constant over time, and is particularly relied upon when these characteristics are likely correlated with the explanatory variables. The third type is the Random Effects Model, which assumes that the unobserved individual differences are random and not correlated with the independent variables, making it a suitable choice when this assumption holds, as it helps improve estimation efficiency.

Accordingly, the standard estimation methodology is chosen in the study in line with the nature of the data and its statistical characteristics to ensure accurate and reliable results.

These four equations constitute the foundation upon which the analysis of panel data models is built. They highlight the different methods of integrating the time dimension (t) with the cross-sectional dimension (i) within the model.

$$\gamma i,t = \beta 0 + \beta 1xi,t + \beta 2zi,t + \varepsilon i,t \qquad (1)$$

Assuming that all countries (i) and times (t) are completely homogeneous. That is, the intercept ($\beta 0$) and slope ($\beta 1, \beta 2$) are identical for all countries.

$$\gamma i,t = \beta 0 + \beta 1xi,t + \beta 2zi,t + ei + \varepsilon i,t \qquad (2)$$

Assuming that the unobservable differences (ei) between countries are a random component independent of the explanatory variables (x,z)

$$\gamma i,t = \beta 0,i + \beta 1xi,t + \beta 2zi,t + ei + \varepsilon i,t \qquad (3)$$

Assuming that the differences between countries are reflected in the constant ($\beta 0,i$) for each country, and these differences remain constant over time.

$$\gamma i,t = \beta 0,i,t + \beta 1xi,t + \beta 2zi,t + \varepsilon i,t \qquad (4)$$

Assuming the existence of a constant that changes with the change of the country (i) and the change of time (t).

The study relied in its panel data analysis on a methodology that combines both cross-sectional and time dimensions, allowing for a more comprehensive and accurate analysis. The panel structure used consists of six countries belonging to the Gulf Cooperation Council: the UAE, Saudi Arabia, Kuwait, Bahrain, Oman, and Qatar, each considered an independent cross-sectional entity. The study covers a time period of five years, from 2020 to 2024, making the total number of observations used in the analysis (30).

This specific time period was chosen due to constraints related to the availability of data for the main independent variable, which is the Government Artificial Intelligence Readiness Index. The necessary data for this index, comprehensively for each of the six GCC countries, was only available starting from 2020. Data on non-oil GDP growth for the State of Qatar was also not available on the website of the Qatar Central Bank, which is considered one of the most prominent official national sources, except for the period from 2020 to 2024. Therefore, the period 2020-2024 was the most suitable choice to ensure sample comprehensiveness and to maintain balance in the panel data analysis while avoiding loss of observations.

To ensure the accuracy of standard results and avoid bias in estimates, especially in the context of the highly specific nature of the GCC economies, a set of advanced diagnostic tests was conducted. First, the presence of cross-sectional dependence was verified using (Pesaran, 2021) test, which is essential in GCC studies due to the economic interconnection among these countries and their significant susceptibility to fluctuations in oil prices, regional crises, and geopolitical changes. The model assumptions and its suitability for use with panel and time series data were also verified based on the methodology developed by (Baltagi, et., all, 2021) to ensure the absence of specification errors or residual distribution issues, thereby providing high reliability to the regression coefficients related to the impact of artificial intelligence.

Table (1) Summary of Variable Definitions

Ref.	Variable	Mode
Central Bank of UAE. (2024). Saudi Central Bank. (2024. Central Bank of Kuwait. (2024). Ministry of Finance and National Economy. (2024). Central Bank of Oman. (2024). Qatar Central Bank. (2024).	(Annual%) Non-Oil Growth NON_OIL_?	Dependent Variable
Oxford Insights (2024).	Government AI Readiness Index AI_GOV_?	Independent Variable
World Bank. (2024).	GDP per capita growth (Annual %) GDP_?	

Source: Author's own elaboration based on the above-mentioned References.

1- **Descriptive Statistics of the Model**: The results, as shown in Table (2), indicate that the average growth of the non-oil sector in the Gulf Cooperation Council countries reached approximately 2.73% during the study period, reflecting positive growth that signifies a phase of economic recovery following the COVID-19 pandemic. The relatively high standard deviation of the non-oil sector (4.59) compared to the average indicates a significant disparity in performance across different countries and over time, underscoring the importance of relying on panel models to address this variation more accurately.

As for the explanatory variables, the average government readiness index for adopting artificial intelligence reached 60.38 points, ranging between a maximum of 75.66 and a minimum of 47.68. To ensure the credibility of the results, the Jarque-Bera test showed that all variables follow a normal distribution, based on the probability values for the non-oil sector (0.22), artificial intelligence (0.37), and GDP (0.89), all exceeding the significance level of 0.05. These results reflect the quality of the data.

Table (2): Descriptive Statistics

	NON_OIL_?	AI_GOV_?	GDP_?
Mean	2.730333	60.38100	1.953333
Median	3.650000	58.38500	2.200000
Maximum	11.80000	75.66000	12.00000
Minimum	-10.00000	47.68000	-5.900000
Std. Dev.	4.591305	8.068023	4.336909
Skewness	-0.683523	0.306175	-0.017120
Kurtosis	3.739747	1.908904	2.582403
Jarque-Bera	3.020052	1.956829	0.219450
Probability	0.220904	0.375907	0.896081
Sum	81.91000	1811.430	58.60000
Sum Sq.Dev.	611.3225	1887.697	545.4547
Observations	30	30	30
Cross sections	6	6	6

Source: Data compiled and calculated by the researchers using EViews 13.

2- Model selection

Table (3) presents the results of the analysis of the relationship between non-oil output growth and explanatory variables through the application of three panel data models: the pooled regression model, the fixed effects model, and the random effects model. This analysis aims to compare the models to identify the most suitable one. While Table (4), present the results of diagnostic tests and panel data model selection tests used in the econometric analysis.

Table (3): Results of Panel Data Model Estimation

Variables	Pooled OLS (1)	Fixed Effect (2)	Random Effect (3)
c	-	-8.504 (0.439)	-4.855 (0.300)
AI_GOV	0.022 (0.045) *	0.163 (0.372)	0.102 (0.193)
GDP	0.755 (0.000) *	0.719 (0.000)	0.737 (0.000)
Observations	30	30	30
Cross sections	6	6	6
R^2	0.543	0.619	0.562
Adjusted R^2	0.526	0.498	0.530
Durbin-Watson stat	2.04	2.38	2.09

Source: Data compiled and calculated by the researchers using EViews 13.

Note: Values outside the parentheses represent the estimated regression coefficients, while values inside the parentheses represent the p-values. An asterisk (*) indicates statistical significance at the 5% significance level.

Table (4): Model selection tests

Test	Test Statistic	p-value	Inference
Redundant FE Test	0.656	0.660	Fail to reject H_0.
Hausman Test	0.583	0.747	Prefer Pooled OLS

Source: Data compiled and calculated by the researchers using EViews 13.

Results

Initially, the Pooled Ordinary Least Squares (Pooled OLS) regression model was estimated as a benchmark model, assuming homogeneity of cross-sectional units and the absence of unobserved individual fixed effects among the countries under study. To test the suitability of the fixed effects model compared to the pooled model, the Redundant Fixed Effects Test was conducted, and its results showed the insignificance of cross-sectional effects, as the p-values exceeded the accepted statistical significance level, indicating the absence of substantial individual fixed differences among the cross-sectional units.

When comparing the fixed effects model with the random effects model, the Hausman Test was used to verify the correlation between unobserved individual effects and explanatory variables. The test results showed no significant correlation between them, theoretically supporting the use of the random effects model. However, the random variance estimates were found to be approximately zero, reflecting the absence of any substantial random differences among the cross-sectional units. This apparent contradiction between the FE and RE results is attributed to natural methodological limitations of the data; the time period used in the study (T=5) is limited, and this small number of years affects the power of statistical tests and limits their ability to detect subtle individual variations.

The Pedroni cointegration test was conducted as a supportive examination, where the results showed partial and inconsistent evidence of the existence of a long-term equilibrium relationship among the variables. This aligns with the lack of appropriate

statistical conditions for cointegration tests in panel data. The literature indicates that such tests require a longer time dimension to ensure the robustness of the results. Therefore, the focus was placed on estimating economic relationships within the framework of a panel data model suitable for the nature of the data available in this study. Consequently, the results of the Pedroni test were not relied upon in building the standard model.

Based on the above, the Pooled OLS regression model was adopted as the final model to estimate the relationship under study, due to the lack of any tangible efficiency gains from using either the random effects or fixed effects models. Table (3) presents the results of the diagnostic tests used to support this decision. Accordingly, the standard equation of the model used is as follows:

$$NON - OILit = \beta 0 + \beta 1AI - GOV\ it + \beta 2GDPit + \varepsilon it.$$

Discussion

The results of this study show that the applications of artificial intelligence in the non-oil sectors of the Gulf Cooperation Council countries are no longer merely the adoption of modern technologies and a technological luxury, but have become a structural driver reshaping economic growth trends towards diversification and sustainability. Through comparison with previous studies, we find that the current study's results agree with those of (Albous, et., all, 2025) and (Asmyatullin & Glavinam, 2025) in their affirmation that the national AI strategies in the Gulf have created a favorable environment for digital transformation. However, this study goes beyond the descriptive analysis presented by (Albous, et., al, 2025), proving through econometric models that there is a statistically significant positive relationship between the level of governmental AI readiness and the increased contribution of non-oil sectors to the GDP.

When comparing these results with the "resource curse" hypothesis discussed by (Abdelkawy, 2024), it becomes clear that artificial intelligence acts as a tool to "neutralize" the impact of over-reliance on oil; smart technologies contribute to enhancing the efficiency of sectors such as manufacturing and logistics services, thereby reducing the Gulf economy's sensitivity to energy price fluctuations. While the study by (Sultanova & Naser, 2025) indicated that export diversification is affected by the environmental footprint, the current study's results add a new dimension, namely that artificial intelligence facilitates green and sustainable diversification processes through improved resource management, which supports the vision of (Al-Thani et al., 2023) regarding the role of technology in sustainable economic transition.

Based on the above, the added value of this research compared to previous literature is clarified in several fundamental aspects; while the study by (Abid, 2025) focused on innovation in East Asia as a reference model, our current research presents a specific model for the GCC countries that takes into account the structural characteristics of rentier economies. Moreover, this research goes beyond the limitations of studies that

dealt with single case studies by providing a comparative and comprehensive analysis - Panel Data- covering all GCC countries, thus offering policymakers a unified regional framework to assess the impact of digital investments.

Thus, this research bridges the gap between "technical theories" and "economic reality," where discussions about artificial intelligence are no longer limited to administrative efficiency as mentioned in (Enholm, et., al, 2022), but have, thanks to this study, evolved into a decisive variable in the equation of overall economic growth and value-added generation in vital economic sectors distant from oil.

Conclusion

This study focused on analyzing the impact of government readiness to adopt artificial intelligence and its correlation with economic growth and its effect on the development of the non-oil sector in the Gulf Cooperation Council (GCC) countries. The Pooled Ordinary Least Squares (Pooled OLS) model was used as the optimal tool to analyze the available data during the study period. The main results of the adopted model showed the following:

1- The coefficient of the government readiness index for adopting artificial intelligence reached 0.022, which is statistically significant at the 5% level. This indicates that an increase of one point in the artificial intelligence readiness index contributes to raising the growth rate of the non-oil sector by about 0.022 percentage points, assuming other influencing factors remain constant. This result reflects the positive aspects associated with adopting artificial intelligence at the government policy level, as it helps drive the growth of non-oil sectors and enhances economic diversification efforts in the GCC countries. The importance of these results comes amid the Gulf countries' focus on digital transformation strategies and employing artificial intelligence as one of the fundamental pillars to support non-oil growth, confirming that institutional readiness in the field of artificial intelligence has begun to bear fruit economically.

2- The results also showed that the coefficient of GDP was 0.755 and was highly statistically significant, indicating that a 1% increase in GDP growth rate leads to an increase in the growth of the non-oil sector by approximately 0.755 percentage points. This result highlights the importance of overall economic growth as the main driver for the development of non-oil sectors in the GCC countries.

Based on these findings, the study recommends the following:

- The need to accelerate the integration of artificial intelligence applications in non-oil productive sectors, focusing on more than just improving institutional readiness indicators, to ensure achieving a tangible economic impact that reflects digital readiness.
- To continue supporting inclusive economic growth policies, considering them the primary means to drive the growth of the non-oil sector, directing this

growth towards achieving economic diversification goals and ensuring sustainability.

– Enhancing the linkage between readiness and legislation by transforming AI readiness into a system of binding laws and regulations that ensure the integration of AI applications in production and export operations within non-oil sectors, to guarantee a measurable positive impact at the economic and statistical levels.

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