Gulf Studies 1

Héla Miniaoui *Editor*

Economic Development in the Gulf Cooperation Council Countries

From Rentier States to Diversified Economies

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Introduction

The GCC Countries at a Glance

The Gulf Cooperation Council (GCC) is an economic and political alliance between six Middle Eastern countries, namely the Kingdom of Bahrain, the Kingdom of Saudi Arabia (KSA), the State of Kuwait, the State of Qatar, the Sultanate of Oman, and the United Arab Emirates (UAE). The Council was established in May 1981 in Riyadh. The main intention of the GCC was to attain unity among its members of similar cultural identity to enhance economic integration and political harmony.

To this end, the GCC members implemented a customs union in January 2003. The governments of these countries have also concluded a number of bilateral agreements such as the agreement with Singapore on 1 September 2013 and with the European Free Trade Association (EFTA) on 1 July 2014.

All the member states of the GCC are Arab Muslim monarchies, including three absolute monarchs, the KSA, State of Qatar, and Sultanate of Oman, whilst the Kingdom of Bahrain, Kuwait, and the UAE are considered mixed regimes. The oil-rich countries of the Gulf are mainly conceptualized as rentier economies characterized by a reliance on oil and natural gas as the main source of revenue. In fact, these natural resources continue to account for more than 60 per cent of GDP in almost every resource-based economy among the Middle Eastern countries.

Beginning during the oil boom of the 1970s, in order to achieve their economic development goals, the governments of these countries have preferred to import a foreign labour force on a large scale, mainly to develop infrastructure and services. Nationals of the Gulf countries rely primarily on the public sector for jobs. Public sector spending and employment have supported the rise in the standard of living of the nationals of these countries.

Towards Post-Energy Economies

Economic diversification is considered to be the process of shifting an economy away from a mono-source of income towards several differentiated sources of revenue from an expanding range of sectors and markets. This strategy remains a particular challenge for the GCC countries heavily dependent on the primary commodities of oil and natural gas. Indeed, economic diversification is thought of as a long and complex process that is inextricably linked to the structural reforms of their economies and the achievement of higher levels of productivity. Economic diversification's main objective is to improve nations' economic performance in order to achieve sustainable growth.

Applied as a long-term strategy, economic diversification is important for the economic development of these countries as it can reduce economic volatility, increase these nations' real economic activity, and enhance their economic growth.

The GCC states have launched "national vision" programmes, starting in 1996 and led by the Sultanate of Oman (2040) and then followed by Qatar (2030), Kuwait (2035), and Bahrain (2030) in 2008 and then the UAE (2021) in 2010 and lastly KSA (2030) in 2016. Although they differ in context depending on each country's own plans for development, these visions are mutually compatible in terms of facilitating economic diversification and a pivot away from oil- and gas-based economies.

These implemented strategies, including a set of pillars, such as economic development, human development, social development, and environmental development, aim to achieve common goals, particularly to cease relying on the single energy export sector, with highly volatile prices, as the revenue generator, and diversify these economies by creating viable sources of revenue, with the intention of building sustainable economies. As a result, and as objectives to achieve these visions, it is imperative for the GCC countries to become more resilient and to protect their people and national assets in the evolving geopolitical context. They are supposed to find new sources of sustainable economic growth, diversify exports, and shift employment to high-productivity sectors. They are as well expected to ensure the welfare of the Gulf people sustainably in food, water, health, and environment.

For the GCC countries, there is a dire need to diversify their economies. The "visions" represent transformational programmes for economic diversification in the GCC economies, with some variation across the countries. They intend to achieve thriving economies through augmenting private-sector job creation for nationals and pursuing knowledge-based development, based on high-quality education, and promoting sustainable development.

As a consequence, the GCC countries have started to revise their policies in terms of their economic development and are implementing long-term sustainable plans to preserve and capitalize on their present achievements for future generations. Indeed, a series of economic reforms have been implemented to address formidable challenges, starting with the regulatory and institutional levels in order

to create appropriate incentives and business environment for economic diversification, principally through Foreign Direct Investments (FDIs) and trade. Innovation and entrepreneurship, as well as the vehicles of Sovereign Wealth Funds (SWFs), are also considered real impetuses to diversify and develop these oil- and gas-based economies.

GCC Countries' Contemporary Issues and Prospects

From the developmental perspective, serious challenges to the GCC economies arise mainly from high population growth, rapid development, highly segmented labour markets, subsidies and a large public sector wage bill, combined with the adverse effects of climate change, leading these countries to take contingency measures to forestall all of these severe threats.

A meaningful diversification can only be achieved via structural transformation and through empowering the private sector, yet insufficient, to assume a fundamental role in accomplishing sustainable development.

On the other hand, the GCC countries are beset by emerging challenges emanating from certain global, regional and domestic political-economic changes sweeping the region. Indeed, within the GCC alliance, a diplomatic crisis took place on 5 June 2017, when a quartet of countries comprising the Kingdom of Bahrain, the KSA, the UAE, and Egypt, announced through their official news channels and Twitter accounts their intention to sever their economic and diplomatic relations with the State of Qatar. This land, sea, and air blockade has led the State of Qatar to reshape its geopolitical position in the region and reveals other challenges that have to be contended with.

Despite the strides made by the GCC countries in making their economies more diversified, they are still facing significant obstacles that they have to reckon with in order to achieve a comprehensive economic diversification requiring prominent changes in the economic system, mainly creating highly productive jobs in the non-oil and gas industries and outside the public sector, as well as in the social sphere, with a focus on health care and well-being and in regard to controlling pollution in the environmental area.

High oil prices for a prolonged period of time have endowed the GCC countries with generous revenues that have enabled them to create SWFs using these surpluses, domestically and abroad, in order to further promote and diversify their economies away from hydrocarbons and move towards investing in other sectors, including renewable energy. The GCC states should implement strategies and programmes to propel their economies towards diversified and sustained knowledge- and innovation-based development. Entrepreneurship and innovation policies must focus on small and medium enterprises (SMEs) in the GCC countries, considered to be the backbone of such economies. Thus, it is paramount to promote the creation of innovative and high-growth new ventures of SMEs, which are open to global markets, in the non-oil private sector.

Given low growth prospects, it is fundamental for the Gulf region to hasten the structural reforms agenda and articulate a growth model based on economic diversification which underscores the vital role of the private sector in economic development. Recent revenue measures include the introduction, in January 2018, of Value-Added Tax (VAT) in the KSA and the UAE. Other GCC countries are expected to introduce the VAT in the coming years to mobilize non-oil revenues. These fiscal reforms are more related to the problems of public budget equilibrium due to the fall in oil prices and the consequent decline of public revenues. Even if they can be used to boost diversification, in this case, they might generate an impact that could enhance the diversification of these economies and bolster government efforts towards achieving the "national visions", boosting a strong private sector and attracting foreign investments.

Nowadays, GCC policymakers should make key decisions to diversify their sources of income, which require trading off between economic development and environmental protection.

Book Outline

The principal objective of this volume is to provide an analytical review of the current economic diversification strategies of the GCC countries. The volume contributes to the theoretical literature by enriching the debate on the transition of the GCC countries from rentier states to diversified economies. The chapters that make up the volume deal with a variety of issues that are of great interest to scholars, policymakers, investors, and other stakeholders in the GCC region and beyond. In particular, all the chapters in this volume are dedicated to a variety of subjects that address economic diversification as the main topic; moreover, they focus on the GCC region, which represents a stimulating and unique experience for debating on this topic.

Targeting scholars and graduate students conducting research on various economic development issues related to the GCC countries, this is a practical handbook for understanding the transition of the Gulf states from rentier towards diversified economies, with an expansive comprehension of the contemporary challenges of the region as well as prospects for the future.

Chapter "Natural Resources Curse and Economic Diversification in GCC Countries" of this volume assesses the relevance of the natural resources curse theory for the GCC countries. The authors employ an empirical model to examine the impact of natural resources rents on the economic performance of the GCC countries. In particular, they consider the diversification process as a potential means to overcome any "curse" effect.

Chapter "Climate Agreements' Implementation Through Energy Transition and Economic Diversification in Kuwait" examines how Kuwait can head towards energy transition and a greater economic diversification following a structural transformation of its economy. Focusing on the relation between energy transition

and economic diversification, the authors summarize the facts and challenges confronting each area of Kuwait economy, followed by policy recommendations for successful implementation.

Chapter "Knowledge-Based Development and Economic Diversification: The Case of Qatar" highlights the top-down implementation of the transition towards the Knowledge-Based Economy (KBE) in Qatar, in order to diversify away from the overdependence on a single finite source of income and invest in non-energy sectors. The authors analyze the performance trends and identify the strengths, weaknesses and some of the challenges that Qatar is facing in turning into a KBE with reference to the related global indexes.

Chapter "Food Security in the GCC Countries: Towards a More Diversified and Sustainable Economic Development" examines the challenges and opportunities for food security in GCC countries. Th authors shed light on the strategies undertaken by the GCC countries to enhance their domestic food security. These include the measures taken after the 2008 world food crisis as well as the strategies announced by GCC ecountries to diversify the domestic agri-food sector as part of their long-term economic vision.

Chapter "Why Should Saudi Arabia Diversify Its Economy?" focuses on the energy transition and economic diversification of Saudi Arabia, which is suffering from the so-called "Dutch disease". The authors study the energy situation in Saudi Arabia and how the country can move from an economy based on fossil fuels to one with an increased role for renewable energy, through two sustainable projects as good examples of the economic diversification potential in Saudi Arabia.

Chapter "Corruption, Rentier States and Economic Growth Where Do the GCC Countries Stand?" discusses theoretically both the curse and the blessing effects of natural resources for the GCC rentier countries' economic outcomes. In addition, it explores at an empirical level the influence of corruption on economic growth within these countries. The authors underscore the importance for these countries to expend more effort to tackle the corruption problem whilst diversifying their economies.

Chapter "Oman's Shift to a Post-Oil Economy" discusses structural challenges and taps into the opportunities for Oman to achieve the goals of economic diversification and shifting towards a post-oil economy. The author discusses policy recommendations for the success of Vision 2040 that will largely depend on adopting a feasible implementable plan as a policy measurement tool to ensure achievement of the Vision objectives.

Chapter "The Journey of Bahrain to Economic Diversification" explores Bahrain's journey to diversification and the efforts made by the country to diversify its economy. The authors highlight the main governmental policies to diversify the economy and explore the achievements of economic diversification in the main sectors.

Chapter "Towards Changes of Macro-Economic Structures in Middle Eastern Countries. Empirical Evidence for 1970–2018" aims at unveiling general changes in macro-economic structures of the national economies of GCC countries through examining structural shifts among the main GDP contributors. The authors

demonstrate that "doing more business with less oil" may be the right direction in diversifying the Gulf oil economies.

Chapter "UAE Economic Diversification: A Medical Tourism Perspective" identifies how top medical tourism destinations position themselves. This will include uncovering the key attributes they mention as part of their branding strategy and identifying the emphasis they place on different aspects of the medical tourism experience, which is contributing to economic diversification in the United Arab Emirates.

Chapter "Why Gulf Rentier Economies Must Pursue Economic Diversification" elucidates the reasons for the Gulf rentier countries to pursue economic diversification. The authors discuss the consequences of counting on the petroleum sector by these countries, and their vulnerabilities associated with the fluctuations in global energy prices on their economies and analyze selective economic diversification strategies in the GCC countries in different sectors.

Contents

Natural Resources Curse and Economic Diversification in GCC Countries

Sami Ben Mim and Mohamed Sami Ben Ali

Abstract Numerous countries in the world enjoy huge natural resources but display relatively low economic development indicators. That is, their natural wealth is rather cursing and not blessing. This paper develop the natural resources curse theory in reference to the Gulf Cooperation Council countries. Results reveal that GCC countries have a persistent high share of resource-revenues in GDP. These high revenues allowed GCC countries to increase dramatically the life standards of their citizens and to reduce significantly their unemployment rates. However, reliance on natural resources contributed to deter investment in physical and human capital. Empirical results also reveal that the solution lies in a broader diversification of the production structure. Diversification should accelerate the investment in human and physical capital to boost the long-term growth and to meet the needs of the private sector. Moreover, upgrading the existent infrastructure is a necessary condition for the success of diversification strategies.

Keywords Natural resources curse · GCC · Cursing · Blessing · Diversification

1 Introduction

Numerous countries in the world are endowed with huge natural resources like forests, mines and mostly gas and oil. Despite enjoying high resource revenues, many of these countries exhibit relatively poor economic indicators especially in manufacturing, education and health. As a matter of fact, their natural wealth is often a curse rather than a blessing. Actually, most of the literature dealing with this dilemma detected a negative relationship between natural resources endowments and economic growth as a main driver of economic development. The natural resources

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curse has been developed by Sachs and Warner (1995) in a study revealing the existence of a negative relationship between the share of natural resources exports and economic growth during the 1970–1990 period. Consequently, a large number of studies explored the resources curse theory and highlighted the negative effects of natural resources on economic performance in many developing countries (Shao and Yang 2014; Sachs and Warner 2001, 1997).

The Gulf Cooperation Council (GCC) countries are among those enjoying the highest oil and gas rents. Several empirical studies investigated the impact of these revenues on the economic performance of this group of countries (Ben Ali et al. 2016; Hvidt 2013). While some studies pointed out the spectacular economic transformation and the important increase in living standards in the GCC countries (Callen et al. 2014), others considered that the current trend is unsustainable and argued that the lack of diversification will highly compromise future economic performance (Mishrif 2018; ESCWA 2001).

This paper aims to contribute to the empirical literature by examining the impact of natural resources rents on the economic performance of the GCC countries and by considering the diversification process as a potential mean to overcome any cursing effect. We stand apart from previous studies by considering a broad range of macroeconomic indicators and by using fixed effects models which assess more precisely the impact of natural resources on economic performance. We highlight that the reliance on natural resources deters investment in both physical and human capital and deteriorates the quality of institutions. We also show that diversification may spur physical and human capital accumulation and promote institutional development.

This chapter is organized as follows. Section 2 discusses the theoretical framework of the natural resources curse and emphasizes the importance of the diversification process. Section 3 develops the empirical framework and discuss the main results. The last section concludes and presents some policy implications.

2 Understanding the Cursing-Blessing Dilemma

When first suggested in 1994, the "resources curse" assumption stated that, in several cases, countries display low economic growth rates while they are highly endowed with natural resources. Although well established in the literature, there is no clear universal consensus on the natural resources curse. While there is a clear trend in some countries about the negative impact of natural resources endowments, oppositely some countries achieved relatively good economic performances.

The natural resources curse is usually explained by the "Dutch Disease" theory. The "Dutch Disease" was first introduced to account for the negative impact that the natural resources produced on the Netherlands economic performance. The real exchange rate appreciation that followed the exports of natural resources, as well as the associated capital inflows, produced a negative impact on the economic activity of the Netherlands. The most affected sectors were the non-tradable ones which were

somehow marginalized. As a result, the country's overall economic performance was negatively impacted.

The early literature dealing with the natural resources curse focused on their negative impact on countries' economic performance and mainly on economic growth. Recent literature, however, dealt with broader dimensions such as education, health and even institutional development. For example, natural resources dependence were suspected to hinderer social development as proxied by health and education (Carmignani and Avom 2010). In the same vein, De Soysa and Gizelis (2013) showed that depending on natural resources may be associated with a high spread of HIV/AIDS. Some studies dealt with other dimensions of economic development. Indeed, it has been shown that countries relying on natural resources could witness less school enrollment (Gylfason 2001). In a similar setting, Stijns (2006) showed the existence of an inverse relationship between measures of natural resources dependence and human capital accumulation. Similar results have been reported for a sample of Latin American countries by Blanco and Grier (2012), who showed that oil exports in these countries were negatively linked to human capital stocks. This human capital crowding out effect was more recently argued by Shao and Yang (2014) for a group of natural wealthy countries. The natural resources curse framework is mostly linked to the long run effects that dependence on resources can create. The rent seeking activity induced by the abundance of the natural resources is at the center of the resources curse theory. Because the abundance of natural resources can create a non-wage revenues, there is less incentives to invest in human capital accumulation (Atkinson and Hamilton 2003). More economic side effects can arise from reliance on natural resources when governments enjoy an easy access to these resources. Such a situation could create a certain financial security that can divert governments from saving (Atkinson and Hamilton 2003) to finance long run investments in both social capital (Papyrakis and Gerlagh 2004) and physical capital.

Another trend in the literature emphasized that the economic impact of resources endowments depends mainly on the country's institutional framework (Deacon and Rode 2015; Deacon 2011). When countries display a high quality of institutions, resources are blessing in the sense that they contribute to improve the overall economic performance. However, when institutions are weak, resources endowments turn to be cursing and can induce negative outcomes on countries economic development process. Accordingly, Shao and Yang (2014) argued that countries seeking to generate a positive outcome from their natural resources should ensure a high quality of education and a strong institutional framework. Obviously, the quality of institutions can obstruct or at least limit the rent seeking activity arising from the resources abundance. Indeed, a lower quality of institutions would favor and fuel the possibility to seize the benefits from these resources for private powerful groups own benefits (Lane and Tornell 1999). Not only will this encourage resources grabbing activities, but it will also deter entrepreneurs from engaging in other productive activities (Mehlum et al. 2006). Another effect which is intimately linked to the rent seeking behavior and the quality of institutions is the ability or disability of the country to converge towards a more diversified economy. In countries lacking sound institutions, governments are less likely to implement diversification policies. Powerful groups

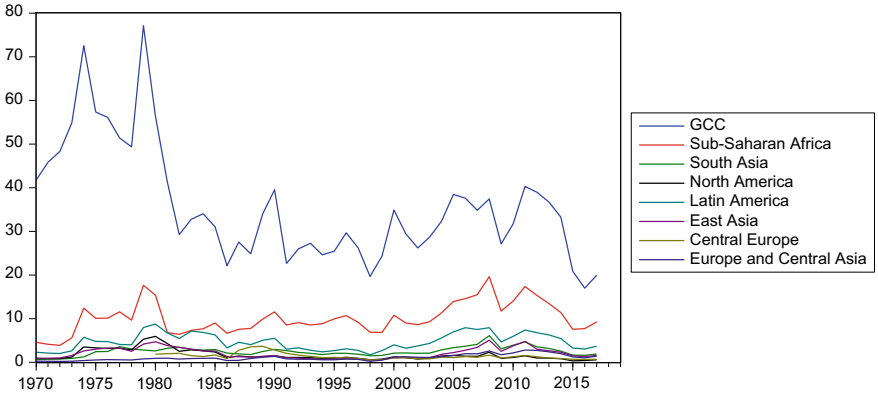
would obstruct any step favoring the diversification of the productive structure and would exert all forms of pressure to perpetuate dependence on natural resources. In the context of the African countries, Tiba and Frikha (2019) suggest that a good institutional framework can help these countries to overcome the negative effects of the natural resources curse. In a recent study for Adams et al. (2019) showed that the oil revenue management policies were insufficient to overcome the resource curse. In this respect, the authors argued that what is mostly important to avoid the curse is the institutional framework.

3 Natural Resources, Economic Development and Diversification in the GCC Countries

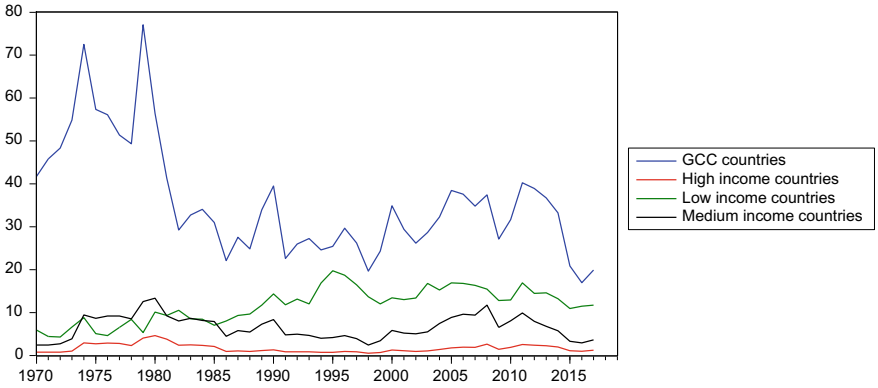
3.1 Natural Resources in the GCC Countries: Cursing or Blessing?

Data relative to natural resources and macroeconomic aggregates were collected from the World Bank's World Development Indicators database. Graphs 1 and 2 illustrate the share of natural resources in GDP for several groups of countries over the 1970–2018 period. The GCC countries have the highest natural resources rents compared to all other groups of countries. Their average annual rents reached 35.79% of GDP for the whole period, way a head of the African Sub-Saharan countries which rank second with 10.08%. For all the other groups of countries the average share of natural resources ranged between 1 and 5% of GDP.

A similar conclusion is obtained when countries are ranked according to their income level: GCC countries are endowed with the highest rents compared to other



Graph 1 Natural resources rents (% of GDP) by region, 1970–2018

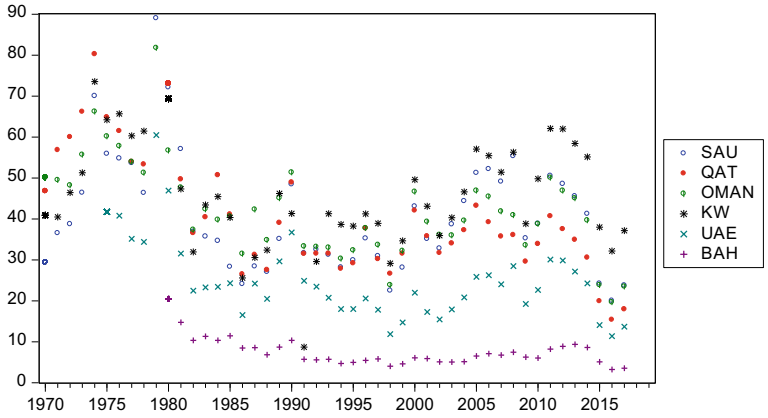


Graph 2 Natural resources rents (% of GDP) by income level, 1970–2018

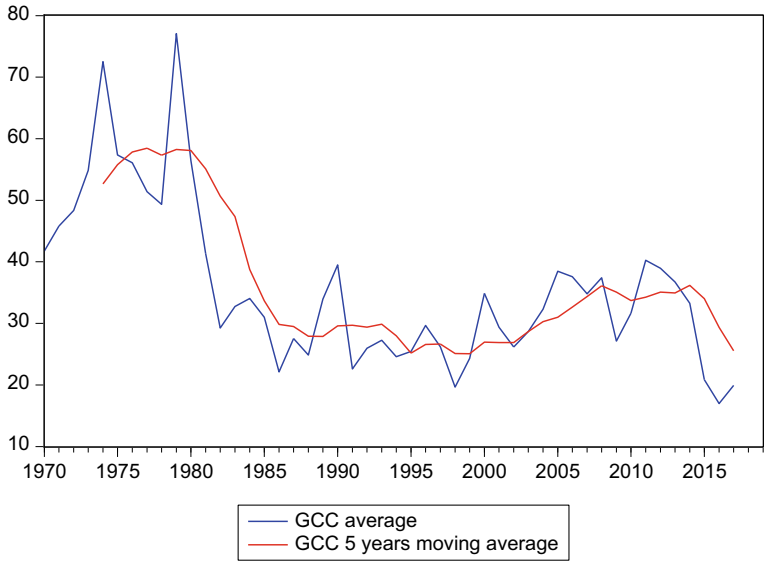
groups regardless of their income level. Graph 2 reveals also that high-income countries are the least dependent on revenues stemming from natural resources, unlike low-income countries. Such a finding suggests that high natural resources rents are associated with poor economic performance.

However, Graph 3 reveals that there are significant disparities within the GCC countries. While for Kuwait and Oman rents generated by natural resources represent a high share of GDP (respectively 45.26% and 42.23%), countries like the Emirates and Bahrain are less reliant on natural resources, which represent respectively 24.93% and 7.42% of GDP over the sample period.

An important objective of this study is to evaluate the persistence of the high natural resources rents. It would be interesting to check if these rents are exhibiting a decreasing trend. Such a trend would imply that GCC countries are implementing appropriate diversification policies in order to reduce their reliance on natural



Graph 3 Natural resources rents (% of GDP) by country, 1970–2018



Graph 4 Natural resources rents (% of GDP) long term dynamics, 1970–2018

Table 1 Unit root and trend breakpoint tests

	t-statistic	Prob.
Augmented Dickey-Fuller test	−4.1933	0.1179
Trend breakpoint test (break date: 1987)	2.8393	0.0069

resources. The five years moving average in Graph 4 illustrates that natural resources rents decreased significantly following the oil shocks in the 1970s, but this decreasing trend ended quickly by the beginning of the 1990s. To check for this significant change in the long term dynamics, we executed a unit root breakpoint test following the Vogelsang and Perron (1998) approach. Results reported in Table 1 show that natural resources rents are stationary, while a trend breakpoint is detected in 1987.

To confirm the robustness of these results we split the sample into two sub-periods (1970–1987 and 1988–2018) and estimate an autoregressive model including a trend for each sub-period:

$$NRR_{it} = \alpha_i + \beta_1 NRR_{it-1} + \beta_2 trend + \varepsilon_{it}$$

where NRR_{it} represents the natural resources rents of country i at period t, α_i are country fixed effects and ε_{it} is the error term. We use the Arellano and Bond (1991)

Table 2 Panel autoregressive model, dependent variable NRR

	Sub-period 1 (1970–1987)	Sub-period 2 (1989–2018)
NRR_{t-1}	0.640***	0.544***
TREND	−1.184***	−0.059
Nb. obs.	77	180
Sargan stat	4.250	5.067
Prob. Sargan	0.373	0.280

***denote significance at the 1% level

difference GMM estimator to control for endogeneity.[1] Estimation results for both sub-periods are summarized in Table 2. We can notice a significant decreasing trend during the first sub-period, whereas no significant trend is detected during the 1988–2018 period. The coefficient associated with the autoregressive term is highly significant for both sub-periods, which indicates that the high level of the natural resources rents is extremely persistent for the GCC countries.

3.2 Does the Lack of Diversification Hinder Economic Development in the GCC Countries?

Another important objective of this study is to assess the impact of rents stemming from natural resources on economic performance. It is important to check if such high revenues are used to finance sustainable economic development by promoting investment and human capital. To that end, we specified panel fixed effects models in order to evaluate the effect of natural resources rents on five macroeconomic aggregates. One of the main advantages of such models is that they allow for heterogeneity across the countries. In fact, time invariant characteristics of each country are captured through the individual fixed effects. On the other hand, period fixed effects control for the business cycle. The model can be written as follows:

$$X_{it} = \alpha_i + \mu_t + \beta NRR_{it} + \varepsilon_{it}$$

where X_{it} is a macroeconomic aggregate of country i in period t. α_i and μ_t represent respectively country and period fixed effects.[2] The retained macroeconomic variables are defined and commented in Table 3.

[1] The endogeneity problem stems from the correlation between the lagged dependent variable and the error term. The Arrelano and Bond estimator deals with this problem by estimating the model in first differences and by using the second and higher lags of the independent variables as instruments.

[2] We execute Fisher tests to verify the significance of country and period effects. The statistics associated to these tests are reported with the estimation results.

Table 3 Variables definitions

Variable (abbreviation)	Definition
Per Capita GDP (PCGDP)	Defined as the gross domestic product divided by midyear population This variable reflects the standards of living of the population
The unemployment rate (unemployment)	Measured as the share of the labor force that is without work but available for and seeking employment Low unemployment reflects a good economic performance and a higher level of welfare
The investment rate (investment)	Defined as gross capital formation reported to GDP High investment rates should lead to higher future growth rates
Health expenditure (health)	Defined as public expenditure on health from domestic sources as a share of GDP Health expenditure is used as a proxy for investment in human capital
School enrollment (school)	Measured by secondary school gross enrollment rate Scholl enrollment is another standard proxy for investment in human capital
Total natural resources rents (NRR)	Defined as the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents reported to GDP

Estimation results reported in Table 4 show that revenues stemming from natural resources enhance living standards in GCC countries as they produce a positive and significant effect on GDP per capita. Surprisingly, they contribute to accelerate the unemployment rate within these countries, and to deter investment in both physical and human capital. Their effect on gross capital formation, health expenditure and school enrollment are all negative and significant. These findings are in line with

Table 4 Natural resources rents and economic performance

Variable	GDPPC	Unemployment	Investment	Health	School
C	23,349.95*** (1679.550)	2.085*** (0.137)	38.125*** (5.889)	10.452**** (0.278)	85.090*** (6.395)
NRR	347.762*** (62.558)	0.019*** (0.004)	−0.355** (0.173)	−0.017* (0.008)	−0.304* (0.181)
R^2	0.79	0.919	0.439	0.702	0.769
Nb obs	218	162	222	102	189
FE stat.	155.152***	296.593***	20.238***	22.116***	36.294***
PE stat.	0.934	0.792	2.560***	4.030***	5.237***

Robust standard errors in parenthesis. *, ** and *** denote respectively significance at the 10%, 5% and 1% level. FE and PE Stat are individual and period fixed effects tests statistics

Elheddad (2016) which outlines the negative impact of oil rents on investment in GCC countries. Venables (2016) claims that there is high pressure to affect such resource revenues to current spending instead of productive investment assets.

As regards human capital, the International Monetary Fund (2011) emphasized that health and education spending in GCC countries are lower than those of countries with similar level of income. Moreover, recent statistics reveal that GCC countries are experiencing high infant mortality given their income level, while they show weak performance in internationally standardized mathematics tests.

Results relative to health and education are valid for all GCC countries, as shown in Graphs 1 and 2 in the appendix. We can clearly notice that all countries exhibit negative relationships between the share of natural resources in GDP in one side and health and schooling indicators on the other side. However, the intensity of these relationships differs from one country to another. The crowding out effects on health spending and education are respectively less important for the Emirates and Kuwait. Regarding the impact on investment, the differences across GCC countries are more important. Graph 3 in the appendix reveals that countries like Saudi Arabia, Bahrain and Oman are taking advantage from oil rents to accelerate the accumulation of physical assets, while these rents are hampering investment in the Emirates, Kuwait and Qatar.

In light of the empirical evidence, it seems that GCC countries did not succeed to translate wealth generated by natural resources into physical and human capital necessary to spur future growth and promote economic development. The weak unemployment rates in these countries, as well as the high per capita income, are likely to be attributed to government jobs and transfers. According to the World Bank (2018a, b) the GCC countries created 1.6 million public sector jobs during the 2000–2010 period. GCC citizens occupied 1.1 million of these jobs. Accordingly, the world Bank considers that "*wealth is distributed among citizens through generous transfers and subsidized public sector jobs, which generates harmful distortions in the economy*".

Results suggest that GCC countries suffer partly from the well-known " resources curse", a term introduced by Auty (1993) to refer to the disappointing economic performance of resource-rich countries. Venables (2016) stressed the incapacity of some developing countries to take advantage from revenues stemming from natural resources, and pointed out several factors explaining such a paradox. The lack of diversification is considered as one of the main factors perpetuating reliance on natural resources.

To assess the importance of diversifying the economic structure, we computed the Herfindahl-Hirschman Index (HHI) for the six GCC countries. The HHI is defined as the sum of the squared shares of agriculture, industry and services in GDP.[3] It ranges between 0 and 10,000. A higher value indicates a more concentrated, and thus a weekly diversified, economy.

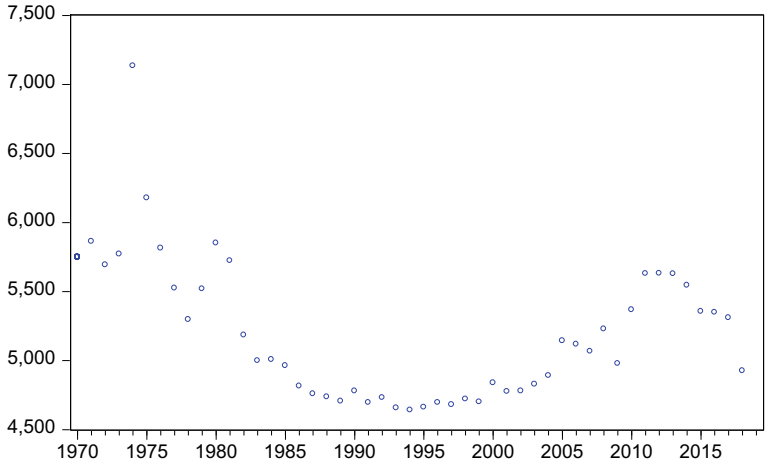
[3]The index was calculated for the years where data relative to the three sectors was available. We have considered a more detailed decomposition of GDP, but data unavailability led to a dramatic decrease in the number of observations.

Graph 5 shows that economic activity in GCC countries is still highly concentrated. We also notice that the HHI index follows a similar path to natural resources rents, which confirms that natural resources are shaping the economic structure in GCC countries. However, Graph 6 suggests that the sample countries are characterized by different levels of diversification. In particular, Kuwait, Qatar and Oman economies are much less diversified than the three remaining countries, mainly during the last two decades.

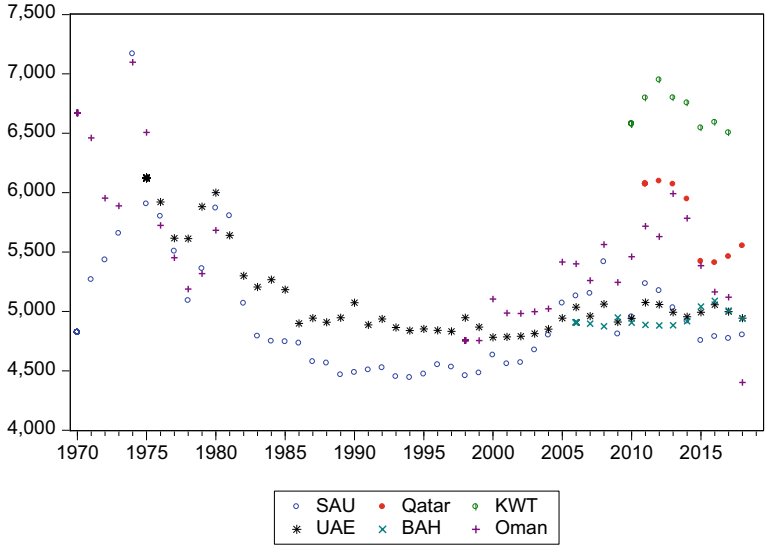
These results are in line with those of Beutel (2019) who pointed out the success of the diversification strategies implemented after the oil crisis. His results show also that the diversification process ended during the nineties following the recovery of oil prices. The breakpoint test we conducted in the previous paragraph led to a similar conclusion, and confirmed that the decreasing trend relative to oil rents ended on 1987.

In order to determine whether diversification helps to stimulate investment in physical and human capital, we estimated three fixed effects models where the HHI index is introduced as a control variable of gross capital formation, health expenditure and school enrollment respectively. The estimation results are presented in Table 5.

We notice that a higher concentration of economic activity affects negatively the investment rate, although this effect is not significant. Such a result suggest that diversification should contribute to spur investment. Results in the second and third columns reveal that a higher HHI index produces a negative and significant effect on both health expenditure and school enrollment. These outcomes indicate that diversifying the production structure helps to promote human capital in GCC countries. Such results suggest that diversification is a key solution to promote physical and human capital and to ensure a sustainable economic growth in GCC countries.



Graph 5 Average HHI for the GCC region, 1970–2018



Graph 6 HHI by country, 1970–2018

Table 5 Diversification, investment and human capital

Variable	Investment	Health	School
C	47.106*** (13,579)	7.669*** (1.717)	302.427*** (48.252
HHI	−0.003 (0.002)	−0.001*** (0.000)	−0.043*** (0.009)
R^2	0.491	0.774	0.465
Nb Obs	125	75	77
FE Stat.	6.771***	22.908***	22.908***
PE Stat.	1.661**	10.470***	16.276***

Robust standard errors in parenthesis. *, ** and *** denote respectively significance at the 10%, 5% and 1% level. FE and PE Stat are individual and period fixed effects tests statistics

In this respect, Mishrif (2018) highlighted the necessity to accelerate the diversification process and considered that diversification "*has become a necessity, not a policy option in the GCC countries*". His study provided a detailed review of the diversification strategies implemented by each of the six GCC countries.

In addition to investment in physical and human capital, a study conducted by ESCWA (2001) identified four different axes in which GCC countries are engaged to achieve economic diversification: the development of capital-intensive industries that utilize the region's comparative advantage in hydrocarbon resources (production of metals and petrochemicals); the development of other manufacturing industries (electrical products, textiles …); the development of other productive sectors and

Table 6 Control of corruption, natural resources and diversification

Variable	NNR	HHI
C	32.983*** (1.109)	5340.492*** (45.580)
C. Corruption	−4.927* (2.505)	−270.283** (114.511)
R^2	0.934	0.905
Nb Obs	114	88
FE Stat.	239.005***	117.139***
PE Stat.	19.815***	80.309***

Robust standard errors in parenthesis. *, ** and *** denote respectively significance at the 10%, 5% and 1% level. FE and PE Stat are individual and period fixed effects tests statistics

services (agriculture, financial services, tourism …); and finally the reduction of the direct role of the public sector. These strategies did not lead to the expected outcomes according to Hvidt (2013). He explains such a failure by the existence of important structural barriers to diversification, namely the growth scenarios for the world economy, the duplication of economic activities among the GCC states, and the substantial barriers to interregional trade. He also questions the willingness of political authorities to commit to the diversification plans under social pressure. In a similar vein, Callen et al. (2014) argue that the corroding effect of oil revenues on governance and institutions explains partly to failure of most of the diversification policies.

To highlight the impact of the institutional framework on the success of the diversification strategies, we estimated two-way fixed effects models where the share of natural resources in GDP (NNR) and the diversification index (HHI) are respectively explained by the control of corruption index (C. Corruption) developed by Kaufmann et al. (2010). A higher level of this index corresponds to a better control of corruption and reflects sounder institutions. Results in Table 6 show clearly that lower levels of corruption should lead to lower shares of natural resources in GDP and to highly diversified economic structures. These findings are in line with those of Lane and Tornell (1999), Mehlum et al. (2006) and Shao and Yang (2014) which emphasized the crucial role of sound institutions during the diversification process.

4 Conclusions and Policy Implications

The GCC countries are endowed with important natural resources. They have been benefiting for decades from important oil and gas rents. The "resources curse" theory suggests that rich-resources countries are generally underperforming economically. The main objective of this study is to assess the impact of natural resources rents on the economic performances of the GCC countries.

Results reveal that GCC countries have by far the highest share of resource-revenues in GDP compared to all other groups of countries. Moreover, this situation seems to be highly persistent and no negative trend has been detected during the last decades. These high revenues allowed GCC countries to increase dramatically the living standards of their citizens. However, reliance on natural resources contributed to accelerate unemployment and to deter investment in physical and human capital, which is an alarming fact for the future economic perspectives of these countries.

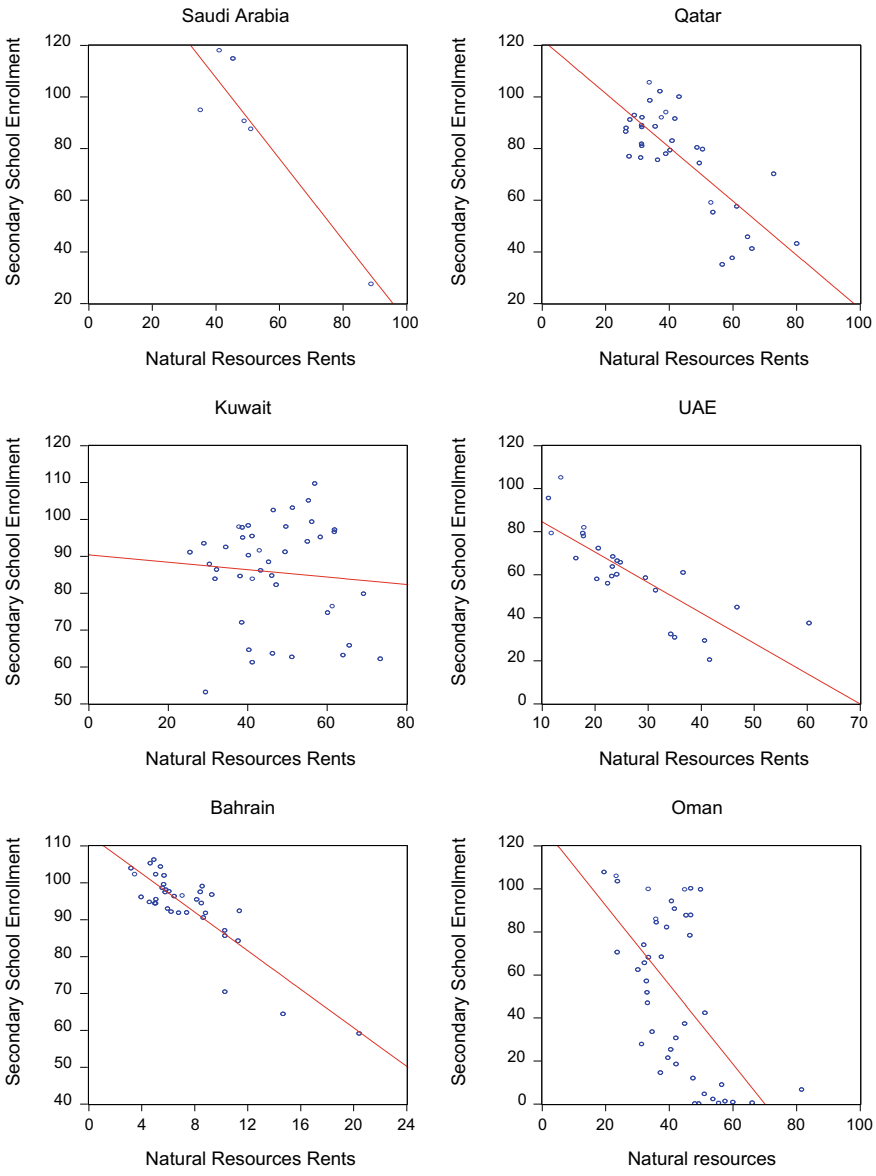
Estimation results reveal that the solution lies in a broader diversification of the production structure. Diversification should accelerate the investment in human and physical capital and boost the long term growth potential of the GCC economies. Higher investment in human capital should also help to meet the needs of the private sector. In this respect, tertiary education should be developed to provide skillful workers to the labor market. This should attract more firms specialized in medium and high technology.

However, the success of the diversification policies depends highly on the quality of the institutional framework. Building sound institutions should help GCC countries to overcome the natural resources curse and to achieve with success their diversification process.

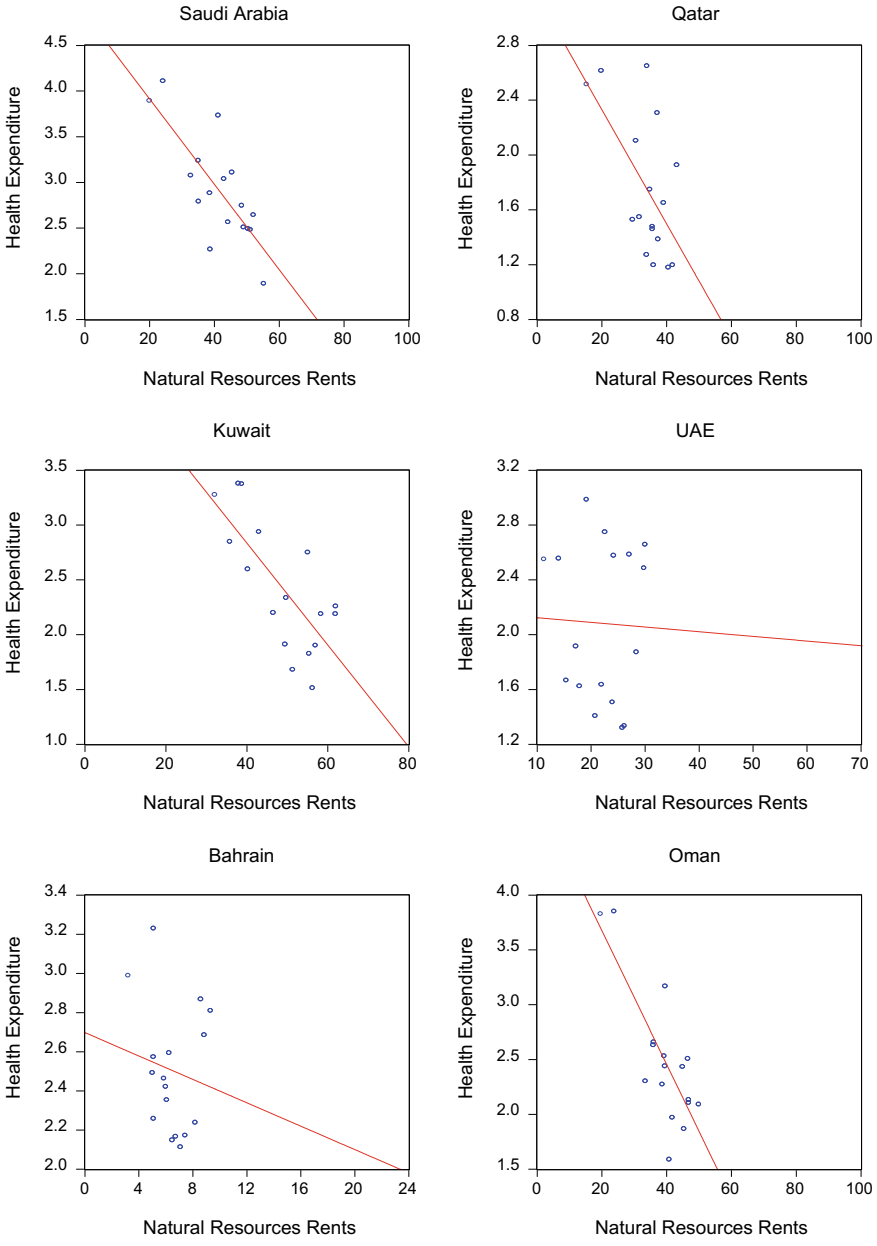
Finally, upgrading the existent infrastructure is a necessary condition for the success of diversification strategies. Transforming the economic structure begins by putting in place the appropriate infrastructure, the one that corresponds to the needs of the sectors to be developed or implemented.

Appendix

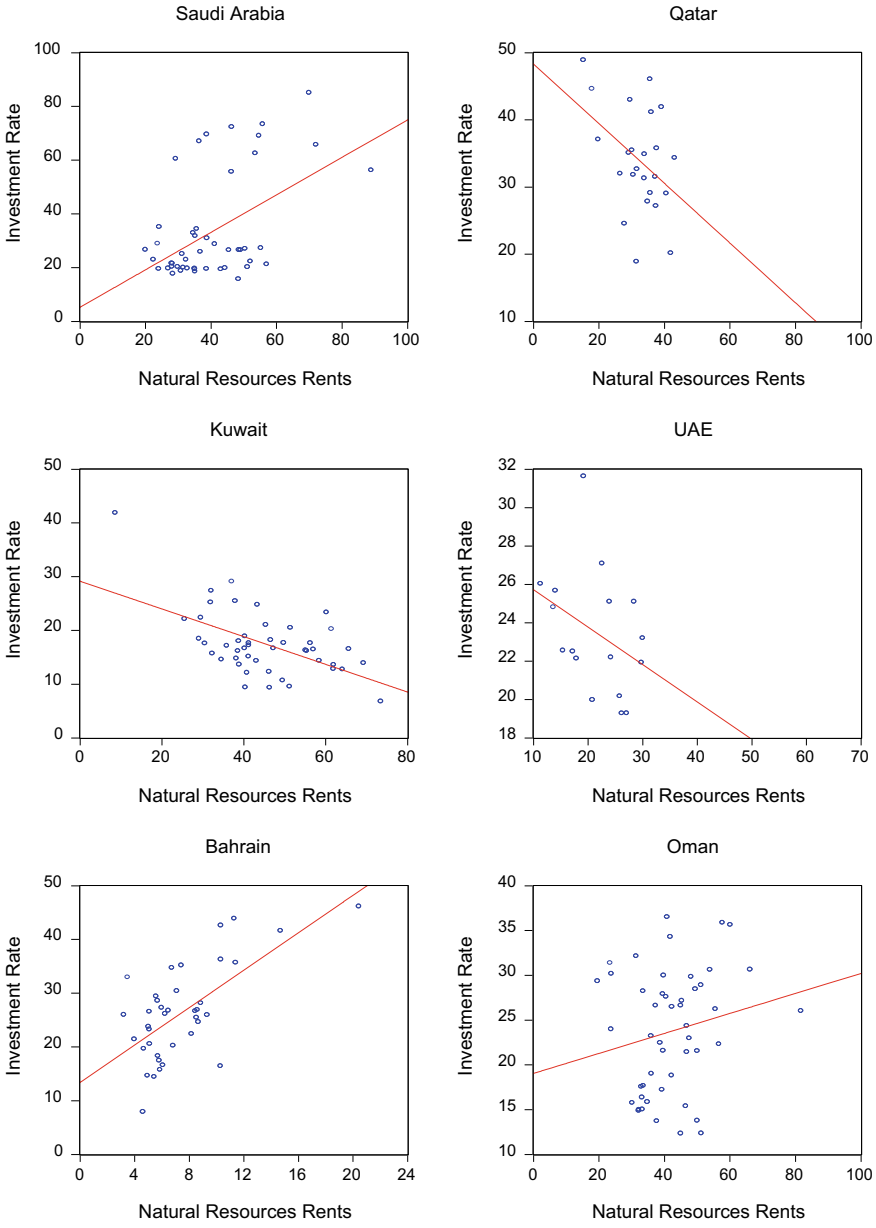
See Graphs 7, 8 and 9.



Graph 7 Natural resources rents (% of GDP) and secondary school enrollment by country



Graph 8 Natural resources rents and domestic general government health expenditure (% of GDP) by country



Graph 9 Natural resources rents and gross capital formation (% of GDP) by country

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Climate Agreements' Implementation Through Energy Transition and Economic Diversification in Kuwait

Nathalie Hilmi, Shekoofeh Farahmand, and Manal Shehabi

Abstract The Paris Agreement has identified climate change mitigation as a goal, aiming to hold "the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels" (Paris Agreement, art. 2.1). The Agreement also recognizes that the current need for adaptation necessary to achieve the said goal "is significant and that greater levels of mitigation can reduce the need for additional adaptation efforts, and that greater adaptation needs can involve greater adaptation costs" (UNFCCC in Sendai framework for disaster risk reduction, 2015 Art 7.4). Climate change mitigation and climate-resilient development require energy transition away from fossil fuels to clean and renewable energy sources. Energy transition is happening in most countries, with different motivations and objectives. Adaptation measures, by contrast, are those changes that need to be introduced in response to the global adoption of climate change mitigation. This chapter examines how Kuwait can head toward energy transition and a larger economic diversification following a structural transformation of its economy. The energy transition from fossil fuels to renewables is necessary in order to reduce CO2 emissions and to free up hydrocarbon resources for export. Economic sustainability entails securing alternative sources of revenue to substitute for that generated by oil rents, which would be a solution to the intrinsically unsustainable nature of oil rents and the lack of diversification. Efficiency-enhancing structural change is required to achieve productivity growth in non-energy sectors that are also export-oriented—thereby achieving meaningful diversification. Policy reforms include competition and private sector reform. Moreover, energy pricing reform and revising energy subsidization are required in order to rationalize energy consumption, achieve energy efficiency, and encourage a more diversified growth while reducing greenhouse-gas emissions.

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Keywords Kuwait · Climate change · Energy transition · Economic diversification · Mitigation

1 Introduction

The Paris Agreement has identified climate change mitigation as a goal, aiming to hold "the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels" (Paris Agreement, art. 2.1). The Agreement also recognizes that the current need for adaptation necessary to achieve the said goal "is significant and that greater levels of mitigation can reduce the need for additional adaptation efforts, and that greater adaptation needs can involve greater adaptation costs" (UNFCCC 2015 Art 7.4). Climate change mitigation and climate-resilient development require energy transition away from fossil fuels to clean and renewable energy sources. Energy transition is happening in most countries, with different motivations and objectives. Adaptation measures, by contrast, are those changes that need to be introduced in response to the global adoption of climate change mitigation. They include economic diversification, which according to the UNFCCC (2018), entails:

> shifting an economy away from a single income source toward multiple sources from a growing range of sectors and markets. In the context of climate change adaptation, it takes on a new relevance as a strategy to diversify away from vulnerable products, markets, and jobs toward income sources that are low-emission and more climate-resilient.

Another aspect of economic diversification involves a change toward increasing complexity and improving the quality of output (Beutel 2012). Achieving energy transition and economic diversification in Kuwait is, thus, necessary to achieve climate change mitigation goals and successful adaptation while also ensuring sustainable development. They are important if Kuwait intends to meet its commitments under international agreements, such as the Paris Agreement (UNFCCC 2015), The UN 2030 Agenda for Sustainable Development (UN 2015), the Sendai Framework for Disaster Risk Reduction 2015–2030 (Sendai Framework; UNISDR 2015).

Like most major oil exporters including members of the Gulf Cooperation Council (GCC), Kuwait, a "small" open oil exporter and a signatory to the Paris Agreement, faces imminent economic challenges resulting from high dependence on and consumption of fossil fuels as well as anticipated declines in oil export revenue owing to decreased global demand. The overdependence on oil exports entails economic performance that mirrors oil price movements, as shown in Fig. 1, which renders the economy susceptible to oil price movements and less resilient.

Kuwait's government adopted ambitious plans in its Vision 2035 to achieve energy transition and economic diversification. They aim at achieving a "New Kuwait" that is a knowledge-based economy with a transformed socio-economic landscape, new employment opportunities, shared knowledge among technology and science

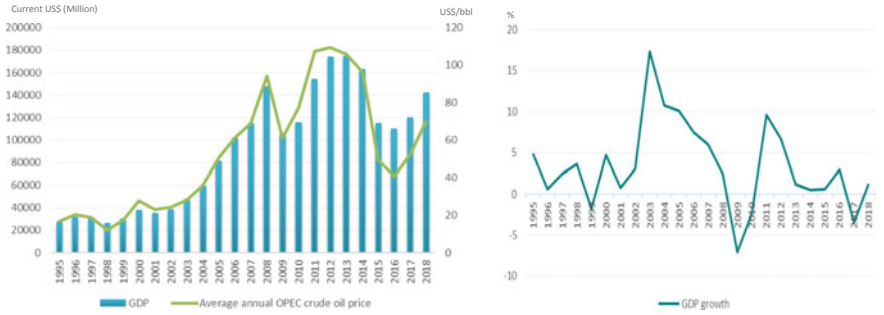

Fig. 1 GDP, GDP per capita and economic growth in Kuwait. *Source* WDI (2019), Statista (2019)

industries, a strong private sector, and sustainable energy (NewKuwait 2019; Al-Harami 2017; Vought 2017; Olver 2018).

This chapter examines how Kuwait can adopt energy transition and economic diversification as policy responses to achieve the aforementioned goals. Focusing on energy transition first and then economic diversification, the chapter summarizes the facts and challenges confronting each area, followed by policy recommendations for successful implementation.

2 Energy Transition in Kuwait

Energy transition is a fundamental structural change in a country's energy sector that steers its economy toward the greater use of renewable sources of energy, promotes energy efficiency, and gradually phases out fossil fuels (World Energy Council 2014). Historically, it has been achieved naturally or accidentally. Recently, however, many governments have adopted specific energy transition policies to achieve decarbonization and reduce air pollution and other negative effects (Fattouh et al. 2019). Energy transition is critical for Kuwait not only due to its high dependence on the energy sector but also to the continuously decreasing costs of renewable technologies as the world moves away from fossil fuels (Fattouh et al. 2019). The following summarizes the current production and consumption of different energy sources, followed by an outline of a future vision that includes renewable energy.

2.1 Fossil Fuels

2.1.1 Hydrocarbon Production and Resources

Kuwait's economy has depended on fossil fuels, especially oil, and it is among the ten largest oil producers and exporters (Malyshev et al. 2019). Kuwait holds the

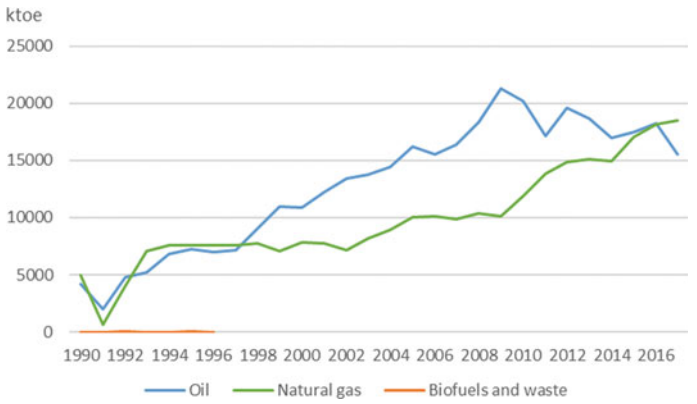

Fig. 2 Total primary energy supply (TPES) by source in Kuwait (1990–2017). *Source* IEA (2019)

sixth largest proven oil reserves, estimated at 101.5 billion barrels in 2019 (with a production-to-reserves ratio of 1%), approximately 6% of the world's supply. Natural gas reserves were estimated to be 1.7 trillion cubic meters at the end of 2017, estimated at 1% of global reserves (Malyshev et al. 2019). Oil and natural gas are the two main energy sources in Kuwait. Oil has dominated energy supply despite a reduced share, down from 74.5% in 1991 to 50% by 2009, reaching a low of 45.7% in 2017. As Fig. 2 shows, biofossils and waste supplied negligible amounts (between 2 and 8 kt of oil equivalent (ktoe) per year).

Although a major oil exporter, Kuwait imports liquefied natural gas (LNG). This is partly because its gas reserves are not well developed, and, more importantly, because its natural gas demand exceeds domestic supply, especially for electricity generation, water desalination, petrochemical production, and enhancing oil recovery techniques to improve oil production. The move toward replacing oil with natural gas in electricity generation was motivated by both reducing the impacts of climate change and freeing more oil for exportation. Consequently, the consumption of gas has been rapidly increasing, reaching 21.9 billion cubic meters (bcm) in 2017 (Malyshev et al. 2019). Importantly, energy consumption in Kuwait has also been very high due to its cost being heavily subsidized, with an estimated subsidization rate reaching more than 80%, using the shadow price of oil.[1]

2.1.2 Economic Dependence

Large hydrocarbon resources have long dominated the Kuwaiti economy, fueling the local economic development. Between 2007 and 2016, oil rents have contributed, on average, 50% of Kuwait's gross domestic product (GDP), the second-highest GDP share globally, exceeded only by Libya (IRENA 2019). High dependency on oil

[1] See Shehabi (2017) and El-Katiri et al. (2011) for details on energy subsidies and pricing.

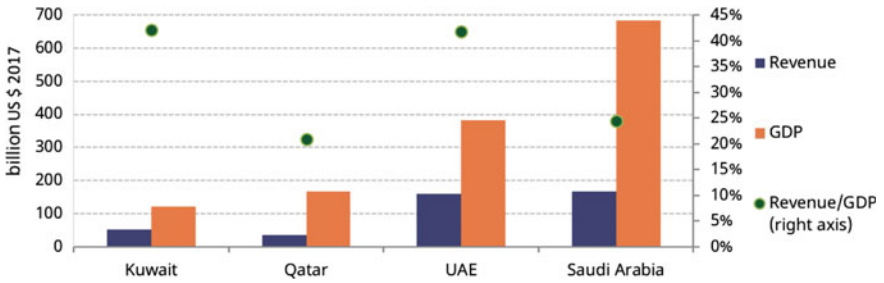

Fig. 3 Net oil-export revenue relative to GDP in selected GCC countries, 2017. *Source* Malyshev et al. (2019, p. 24)

exports has left the economy vulnerable to oil price fluctuations and declining oil demand, threatening its sustainability.

Crude oil and refined oil products contribute around 90% of the country's exports, and net oil-export revenues are approximately 40% of GDP (Fig. 3), reaching $46 billion in 2017. With its small population, per capita net oil-export revenues amounted to $11,303 in 2017 (Malyshev et al. 2019).

2.1.3 Electricity Consumption Per Capita

Kuwait derives most of its energy from oil products, natural gas, and electricity, respectively (IEA 2019). As with energy production, biofuels and waste have a negligible share in consumption. Electricity consumption has increased smoothly over time, from 823 kt of oil equivalent (kteo) in 1990 to 4171 kteo in 2017, with a 21.6% share in total final energy consumption (Fig. 4).

Per capita energy consumption in Kuwait has been consistently among the highest in the world, growing at an annual average of 5% between 2000 and 2015 (Malyshev

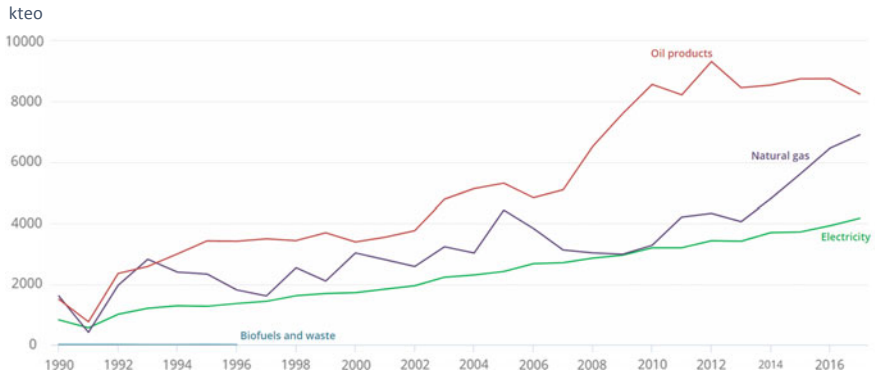

Fig. 4 Total final consumption (TFC) by source in Kuwait (1990–2017). *Source* IEA (2019)

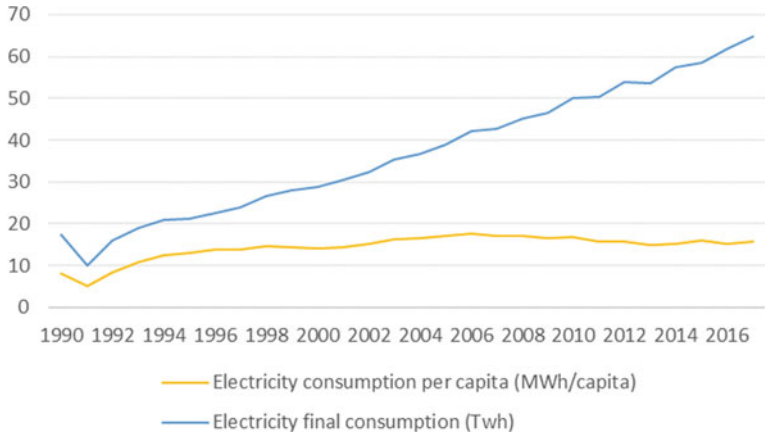

Fig. 5 Electricity consumption per capita and electricity final consumption in Kuwait. *Source* IEA (2019)

et al. 2019). This is due to loose energy-efficiency regulations, outdated codes, heavy subsidization of electricity and energy products, a hot climate requiring air-cooling for more than 8 months of the year, and very limited water resources, the solution for which has been electricity-dependent desalination.

As illustrated in Fig. 5, per capita electricity consumption increased by an annual average of 2.3%, from 8.20 megawatt hour (MWh) in 1990 to 15.68 MWh in 2017, compared to an average global consumption per capita of 3.15 MWh. In other words, Kuwaitis consume five times more electricity than any other people in the world. Because of factors such as declining oil prices and stricter enforcement of building codes and standards, Kuwait's per capita energy consumption started to decline in 2005, but it grew again by 2017 at a rate of 2.5%.

Final electricity consumption in the residential sector accounted for the largest share. It increased from 808 kteo in 1990 to 2789 kteo in 2017. The commercial and public services sectors consumed 1383 kteo in 2017, 33% of total final electricity consumption (Fig. 6).

2.1.4 Energy Intensity

The energy intensity level of primary energy, calculated as primary energy consumption per unit of GDP (Bhatia 2014), is a measure of an economy's energy inefficiency. It depends on factors like energy-intensive industrial activities (Malyshev et al. 2019), general standards of living, transportation systems, distances traveled, and weather conditions (Bhatia 2014). It is an important measure because it represents the principal source of greenhouse gas emissions produced in an economy; a declining intensity on this measure indicates reductions in the carbon intensity of the energy supply. As Fig. 7 demonstrates, the overall trend of energy intensity for most GCC states,

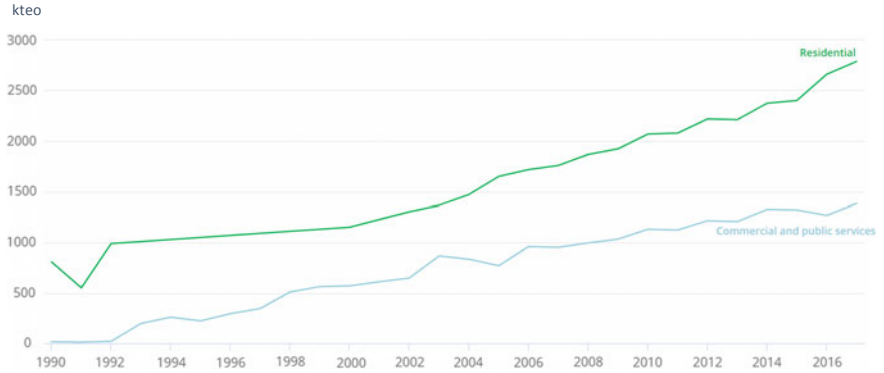

Fig. 6 Electricity final consumption by sector. *Source* IEA (2019)

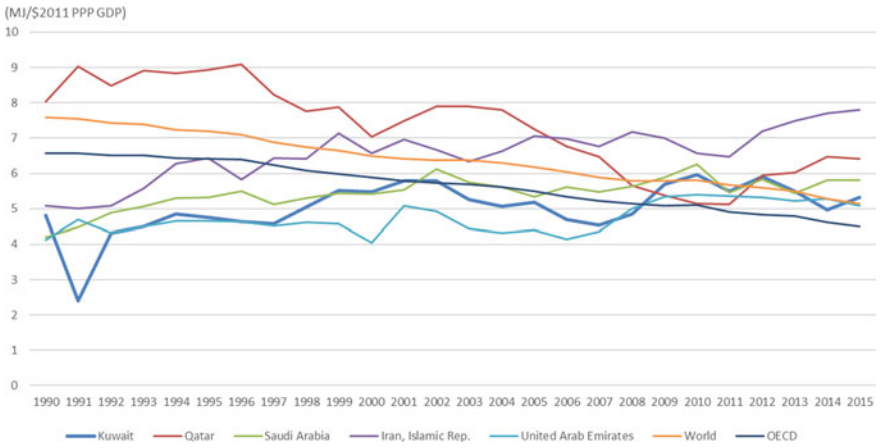

Fig. 7 Energy intensity (measured in megajoule (MJ)/$ dollar of 2011 purchase power parity GDP) in selected GCC countries, the Organization for Economic Co-operation and Development (OECD), and the World, 1990–2015. *Source* WDI (2019)

including Kuwait, has been increasing over the past 20 years, unlike major global trends.

2.1.5 Carbon Emissions

Correspondingly, Kuwait has one of the highest levels of energy and carbon intensity in the world owing to producing, exporting, and consuming hydrocarbons. In 2015, per capita CO_2 emissions reached 21.1 tons, and total emissions 104 million tons (Mt) in 2017, ranking 40th globally (Global Carbon Atlas 2019). It is estimated that greenhouse-gas emissions will increase from 83 Mt of CO_2-equivalent in 2015 to

103.4 Mt in 2035, growing annually by 1.1%, twice the rate of the world average (Malyshev et al. 2019).

2.2 Renewable Energy

Kuwait has an ambitious target of increasing the share of renewables in total energy demand to 15% by 2030, raising it from less than 1% in 2019. The potential role of renewable energy, mainly solar and wind, as a primary energy source in Kuwait is large. Although Kuwait was the first in the GCC block to start researching and demonstrating renewable energy projects, the share of such sources in its energy supply remains negligible (Malyshev et al. 2019), one of the lowest in the GCC.

2.2.1 Solar, Thermal, and Wind

Kuwait, like other states in the region, has one of the highest photovoltaic power potential capacities in the world. In the late 1970s and early 1980s, Kuwait led applied scientific and technological research in solar energy adaptations and applications in the region, especially for air-conditioning. The Kuwait Institute for Scientific Research (KISR) led efforts to construct a solar house, installed solar cooling in a school, and researched a solar absorption cooling system. They also created the Sulaibiya co-generation thermal power plant run on solar energy, along with a water pumping and distribution network (Malyshev et al. 2019). Despite such progressive efforts, Kuwait's solar PV output is just 2 GWh.

Large projects have been committed to increasing the share of solar and other renewable sources in energy production. Currently, commercially available large scale renewable solar energy technologies include solar photovoltaic (PV) and concentrated solar power (CSP). The latter relies on mirrors or lenses to concentrate a large amount of sunlight onto a small area for power generation and is attractive for large scale projects as it can be stored. As part of Phase I of the Shagaya Renewable Energy Park, a CSP plant was constructed and connected to the grid in 2018. It has a 70 MW pilot renewable energy project managed by KISR, including a 50 MW CSP plant and a 10 MW wind farm (Malyshev et al. 2019).

2.2.2 Electricity, Desalination, and Nuclear Infrastructure

In 2018, Kuwait had nine power plants with an electricity generation capacity of 18.8 GWh. Almost half of the total capacity is produced by steam, with another 40% produced by combined-cycle steam and gas plants. These plants use oil (crude and heavy fuel) as well as natural gas in production. The total power generated by renewables in Kuwait was just 80 MW. Kuwait plans to increase its electricity generating capacity to 32 GW by 2035 (Malyshev et al. 2019).

Desalinated water provides about 90% of Kuwait's water consumption. Despite its relatively small population, Kuwait is the third largest producer of desalinated water in the GCC, after Saudi Arabia and the United Arab Emirates. Eight desalination plants were producing 627 million imperial gallons per day (MIG/d) of desalinated water in 2018 and supplying 60% of water demand in the industry sector. In 2015, Kuwait desalinated water through three different desalination technology methods: 84% by multi-stage flash (MSF), 6% by multi-effect desalination (MED), and 10% by reverse osmosis (RO). By 2035, the government plans to increase water production capacity to 1039.5 mcm with a different combination of methods, for which the shares of MSF, MED, and RO will be 39%, 48%, and 13% respectively (Malyshev et al. 2019). The RO method, followed by the MED method, is more energy-efficient with fewer environmental impacts.

For some time, there was some interest in Kuwait in nuclear energy, with plans announced to construct four nuclear power plants with the help of the French Atomic Energy Commission (Energy Information Administration 2016). Yet the deployment of nuclear energy has been shelved and is likely to remain so for the foreseeable future.

2.3 Energy Projections

2.3.1 Demand Versus Supply

Energy demand is expected to increase at a fast pace in Kuwait, driven mostly by (a) increases in the population and, subsequently, their cooling, consumption, and residential needs, and (b) anticipated economic growth from committed projects in the petrochemical, industrial, and residential sectors. Nonetheless, it is worth noting that Kuwait's economic growth is highly unpredictable due to the inherently volatile nature of its oil exports (owing to volatile hydrocarbon prices and unpredictable demand), on which government budgets, welfare provision, and industries depend. Many of the committed industrial projects are government-funded and therefore depend on the availability of oil rents for financing. As such, future industrial oil demand remains unpredictable, depending on factors and scenarios that are not discussed further in this chapter.

The main focus herein concerning energy demand drivers is population growth and the associated increase in energy needs. The population increased from 1.61 million in 1995 to 4.14 million in 2017. Around 98% of Kuwait's residents live in developed cities and urban areas (World Population Review 2019). Transportation demands are high, with heavy use of cars due to poor public transportation infrastructure, limited alternative renewable options (such as cycling) due to the intense heat and the design of the road infrastructure, and established consumer behavior associated with multiple car ownership per Kuwait household. Kuwaiti citizens, who represent only around 30% of the population, consume two-thirds of total energy (Malyshev

et al. 2019). The government has committed to new development projects and residential cities to house the anticipated population growth, which will further increase pressures on energy sources in Kuwait.

If Kuwait's existing energy transition projects and new plans are actually realized, it is expected that total oil demand will grow by 0.5% per year by 2035 (Malyshev et al. 2019). It is also expected that the share of oil in total primary energy demand will decrease gradually and reach 42% by 2035, as a consequence of the government's plans to substitute oil with natural gas and solar energy in electricity generation. Natural gas demand is expected to grow by 2.2% annually between 2015 and 2035, to reach a total primary demand of 55% by 2035. The share of oil products used in electricity generation would decline to 25% by 2035, while the share of renewable energy capacity would reach 15%. Natural gas and renewables are both cleaner energy sources than oil, so greenhouse-gas emissions are likely to decrease through this transition. On the other hand, the transport sector is projected to consume 3% more oil annually and to account for nearly one-third of total energy consumption by 2035. Consequently, greenhouse-gas emissions from oil and oil product use are likely to increase. Per capita energy demand will increase from 8.8 toe in 2015 to 9.2 toe in 2035. Despite some progress in adding renewables to the energy mix, renewables would only make up 3% of the total primary energy demand by 2035 (Malyshev et al. 2019).

Electricity generation capacity is expected to grow by more than 13.2 GW by 2035, reaching 32 GW, a 70% increase from 2018 (Malyshev et al. 2019) (Fig. 8).

Besides, the nationally-owned Kuwait Oil Company (KOC)—which manages all hydrocarbon production and trade—has several upstream and downstream projects for oil and gas infrastructure and development. Crude oil production is estimated to grow, on average, by 1.5% per year, from 2.7 mb/d in 2017 to 3.5 mb/d in 2035.

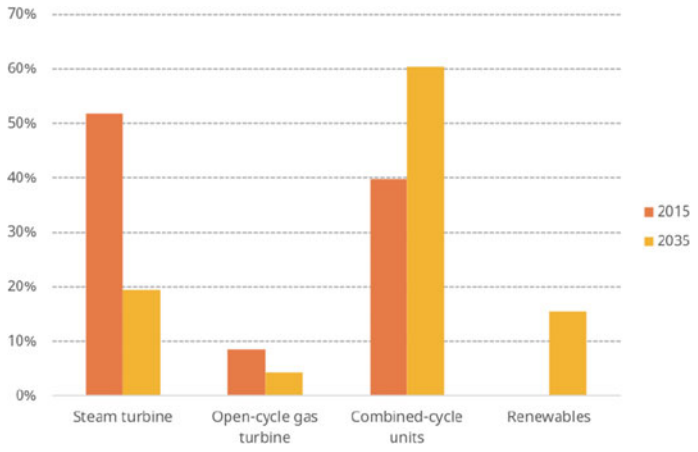

Fig. 8 Generation technology as a percentage of total installed capacity in 2035 versus 2015. *Source* Malyshev et al. (2019, p. 71)

Natural gas production would grow from 17.4 bcm in 2017 to 27.3 bcm in 2035, which is less than projected domestic demand. Thus, liquefied natural gas imports will likely continue to complement the national requirements. The overall goal for the Shagaya Renewable Energy Park is to provide an installed capacity of 4 GW by 2027, over four different phases of constructing CSP plants, solar PV farms, and a wind farm. The Shagaya Phase II, also known as the Al-Dibdibah Solar Project, was negotiated in 2019 between Kuwait National Petroleum Corporation and the Ministry of Electricity and Water, with participation from international companies. It is a US$1.9 billion plant with a planned production capacity of 1.5 GW, equivalent to at least 3150 GWh in the twenty-fifth year of operation, of PV panels that do not require storage (Malyshev et al. 2019).

If these projects are accomplished, total installed capacity could reach 5 GW in 2035 (Malyshev et al. 2019). Nonetheless, these plans are constrained by the slow development of renewable energy technologies, which is due to the lack of coordination between Kuwait's energy institutions and the weak participation of the private sector (Malyshev et al. 2019). Regarding water management, in 2016 the government restructured water tariffs and mandated water-saving fixtures as part of its water and conservation plans. An integrated water system is planned to be developed by the Public Authority for Housing Welfare for the new cities being designed in the southern part of the country (Malyshev et al. 2019).

Kuwait, like other oil-dependent economies, prefers to export oil and oil products instead of consuming them. Therefore, KPC is considering ways to expand crude oil production and related industries like petrochemicals.[2]

2.3.2 Policy Reforms

Although Kuwait has adopted ambitious plans and committed to projects to achieve energy transition, by substituting oil with natural gas and renewable energy sources in the power generation sector, we expect that a successful energy transition will not be possible if the existing energy and economic policies remain in effect.

First, as the previous sections have shown, Kuwait not only already has large energy demand but its demand is expected to grow, and meeting it relies mostly on oil and gas. Second, severe limitations are preventing the adoption of renewable technologies. Third, despite the establishment of the Higher Energy Committee as a national body to implement a coordinated energy strategy, different agencies (such as the Ministry of Electricity and Water (MEW), KPC, the Ministry of Finance, and the Parliament) have divergent objectives. Fourth, energy efficiency remains low and the regulatory framework is weak. For example, the energy conservation code is dated (established in 1983 and revised in 2010) and lacks effective monitoring, verification, and enforcement provisions. The 2014 revised version of the

[2]To this end, important strategic projects include the planned building of a polypropylene plant through a joint venture with a Canadian company, likely to be commissioned in 2023; and the Olefin project, likely to be started by 2025 (Malyshev et al. 2019).

code was developed with more rigorous standards for the energy-efficient design of new buildings, and the to-be-finalized version of the 2017 code is expected to set minimum requirements for power densities, material properties and the use of efficient air-conditioning systems in government and commercial buildings. Fifth, there is limited monitoring and application of energy-efficiency laws in Kuwait. For example, the minimum efficiency requirements of MEW for residential cooling in kilowatts per refrigeration ton (kW/RT) is set at 48 °C, while imported systems with lower levels continue to be sold.

Therefore, to achieve energy transition, reforms are necessary to increase energy efficiency, reduce energy consumption, and encourage investment in and technological adoption of renewable energy sources. To that end, we present the following as key areas for reform.

Regulatory Reform for Efficiency Improvements

Regulatory reform is required to achieve mandatory energy efficiency improvements on both supply and demand sides. Such reform should include strict requirements to be included as part of the updates of the 2017 building code. It should also enforce existing efficiency standards on local and imported energy systems. As the transport sector is a major source of energy inefficiency in Kuwait and given the cultural spread of car use, reform should address means to increase the use of electric cars or cleaner cars and, possibly, public transportation. Similarly, new measures must be imposed to ensure the identification and use of energy-efficient appliances, and energy-saving air-conditioning and temperature controls in buildings (including government buildings).

Energy Pricing Reform

Removing, or at least reducing, high subsidies on energy (oil, gas, water, and electricity) consumption is key in changing consumer behavior and rationalizing consumption in Kuwait. This is a very important reform due to the high per capita energy consumption and greenhouse-gas emissions. This is a politically difficult area as energy subsidies form part of the government's generous welfare system and so-called "social contract." A key obstacle to the government's previous attempts to reform energy prices has been strong local opposition and parliamentary obstruction. Therefore, this reform requires careful planning and implementation that address not only the political hurdles but also the socio-economic and welfare effects of energy pricing reform.

Educational Awareness and Institutional Coordination

Successful energy and pricing reforms cannot be achieved without open, educative engagement with the parliament, the public, schools, the business sector, and various institutions about the importance of fiscal and consumption rationalization.

Importantly, energy pricing reform goes hand in hand with the efficiency improvements. Therefore, a prerequisite for successful reform implementation is institutional and regulatory coordination in identifying and implementing a national energy strategy with specific measurable goals.

3 Economic Diversification in Kuwait

This section examines economic diversification as a complementary adaptation option to place the country on a climate-resilient and economically sustainable development path. In the context of an oil-dependent economy, economic diversification is crucial for achieving economic resilience and sustainable development in light of anticipated decline in oil demand owing to the global energy transition, with the advent of shale oil and the expansion of renewables and their increasing competitiveness due to greater efforts toward climate change mitigation. Diversification ensures the availability of other energy sources and productive capacity to generate income, employment, and long-run development. It reduces an economy's exposure to volatility in prices of oil,[3] which can be harmful through causing boom and bust cycles, real exchange rate volatility, and comparatively high investment risk (Ramey and Ramey 1995; Van der Ploeg and Poelhekke 2009).

Consequently, Kuwait has identified economic diversification as a key pillar and goal in its Kuwait Vision 2035. It aims to establish itself as a financial and tourist center and to diversify away from petroleum into sectors such as information and communications technology, healthcare, education, finance, and tourism. These goals have been part of development plans for decades, but have only been expedited since mid-2014 as a response measure to anticipated reduced oil export revenue without a matching reduction in fiscal commitments.

This section examines the state of economic diversification in Kuwait and then addresses how meaningful diversification can be achieved.

3.1 Diversified or not Diversified?

Although Kuwait is presented as an undiversified economy in the official and common policy discourse (by the Kuwaiti government and larger international organizations

[3] Oil has been shown to be one of the most volatile of all traded commodities (Plourde and Watkins 1998; Pindyck 2004; Regnier 2007).

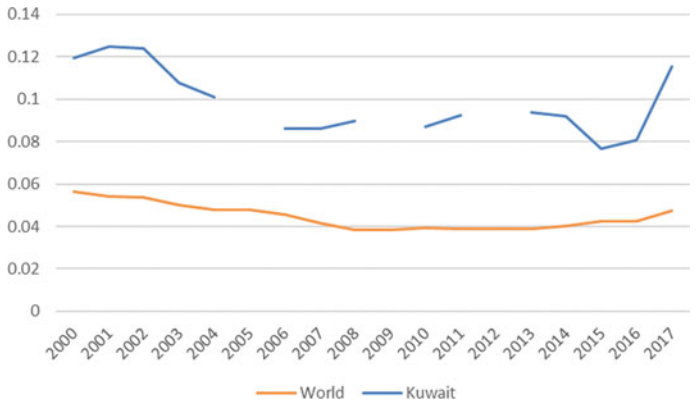

Fig. 9 HH Market Concentration Index in Kuwait and the World, 2000–2017. *Source* WITS (2019)

such as the IMF), there is evidence to disprove this view. For this assessment, we consider two dimensions: export and domestic production.

3.1.1 Two Dimensions: Export and Local Production

Importantly, there is no single definition or measure to define economic diversification, so relying on a given measure for assessment might be misleading. Diversification can be measured in terms of GDP, export, employment, or government budget. Existing measures are dominated by decades-old indices that broadly fall in two groups: (a) indices that measure an economy's absolute specialization, such as ogive, entropy, the widely-used Herfindahl-Hirschmann (HH) index of market concentration, or economic complexity indices; and (b) indices that measure an economy's structure in relation to a given industry (or group of industries), such as the Theil or relative Gini indices. The former group reflects the diversification of exports and trade, while the latter refers to domestic production.

Kuwait ranks rather low on export diversification, but the level changes with oil price changes. Kuwait's HH index [4] is higher compared to the world's median value in all years (Fig. 9), which shows more concentration in Kuwait.

Although the decrease in Kuwait's index value by −3.51% during this period implies increased trade diversification, it is not a considerable growth in diversification. Nevertheless, the index value jumps significantly in 2016 despite there being no corresponding changes in economic structure, reflecting the index's sensitivity to oil

[4]The HHI index is calculated as the sum of squared shares of the various industries in gross value added. When a country's trade is concentrated in very few markets, the value of this index is close to 1. Conversely, the index approaches zero when a country has a perfectly diversified trade portfolio (World Bank 2019a). The index effectively measures the dispersion of trade value across an exporter's partners. Within the GCC, the UAE appears the most diversified (HHI = 0.05) and Oman the most trade-concentrated (HHI = 0.30).

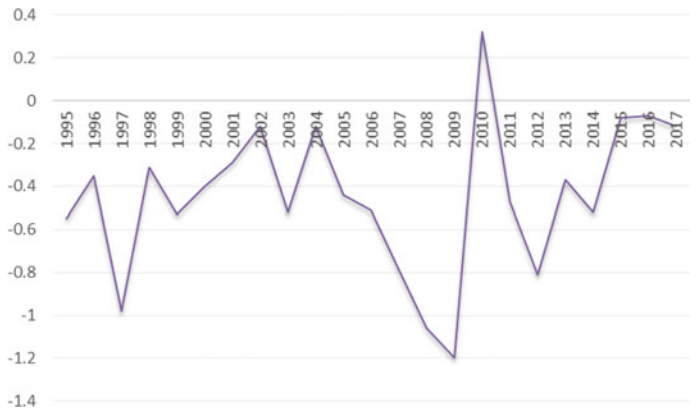

Fig. 10 Economic complexity index (ECI) for Kuwait 1995–2017. *Source* Atlas of Economic Complexity (2019)

price changes and, consequently, its unreliability. As such, this index value does not accurately inform us about the level of diversification. Similarly, in the "Economic Complexity Index" (ECI)[5] of Harvard's Center for International Development, Japan is placed first (ECI value = 2.28) while oil exporters show low economic complexity due to their high specialization. Within the GCC, Kuwait ranked lower than Saudi Arabia, UAE, and Bahrain. The ECI value for Kuwait shows low competitiveness and diversification for Kuwait's exports, as Fig. 10 illustrates.

Nevertheless, the associated overall ranking for Kuwait (70) is higher than those of the more export-diversified economies of Australia (93) and Iran (88), therefore erroneously suggesting a higher level of economic diversification or complexity than either economy.

By contrast, Kuwait's domestic production diversification is more promising. A strategic interconnected indicator is the intermediate consumption of goods and services. If its growth rate exceeds that of GDP, an economy is moving toward more complex participation in inter-industry production. During 1995–2011, the share of intermediates in Kuwait's total output increased by 5.4%, the third-highest rate in GCC states (Beutel 2019), entailing improved local diversification, albeit marginally.

Analyses based on input-output tables [6] confirm that Kuwait has expanded its economic diversification in terms of industrial contribution to GDP (local production), but not in export production (Beutel 2019; Shehabi 2019a).

As these index levels offer contradictory and unreliable information, a detailed examination of economic composition in Kuwait follows.

[5]Knowledge intensity is important when measuring ECI; the export of products shows the knowledge intensity of an economy (OEC 2019).

[6]An input-output table is a detailed presentation, often prepared by national statistical agencies, of "the process of production and the use of goods and services (products) and the income generated in that production" (OECD, n.d.) and the intermediates.

3.1.2 Income Diversification in Kuwait

We examine both dimensions as they reveal different but complementary pictures of Kuwaiti economic structure.

Table 1 details Kuwait's economic structural elements and dynamics pertinent to assessing diversification.

The share of the 'hydrocarbon and energy sectors' versus 'other sectors' reveals details of diversification. As argued by Shehabi (2019a), the data reveal that Kuwait indeed has a diversified base ('other sectors') in local production (representing 32% of GDP), predominantly dominated by the services industry followed by financial services—both of which are non-traded industry. Meanwhile, from the export perspective, other sectors contribute only 13% of exports (including re-exports). Both dominant diversified industries are mostly non-tradable. Meanwhile, chemicals and transport are both non-energy sectors that have an export capacity and have export competing industries.

Table 1 Economic structural elements (2013)

Sector/Percentage	Share of GDP^{FC}*	Share of total exports	Export share of output	Net exports over output	Share of Kuwaiti labor in value-added	Share of expatriate labor in value-added
Hydrocarbon and energy sectors						
Mining	1.4	0.0	0.0	0.0	42.6	4.7
Crude oil	48.9	42.1	50.5	50.3	14.1	0.7
Gas and petro-services	0.9	1.3	50.5	50.3	33.5	1.8
Oil refining	5.4	38.6	72.6	72.2	12	1.3
Electricity	0.6	0.0	0.0	0.0	12.5	1.3
Other network services	4.6	4.6	32.3	31.4	11.1	7.4
Other sectors					0	0
Agriculture	0.3	0.0	1.3	−63.3	0.9	8.1
Chemical	1.1	3.4	37.4	−1.7	8.2	15.1
Light manufacturing	0.8	0.4	4.1	−56.0	20	24.5
Heavy manufacturing	0.8	1.9	8.1	−72.0	21.4	26.1
Construction	2.2	0.0	0.0	0.0	13.6	54.3
Transport	3.4	5.7	38.9	14.1	14.1	32.9
Financial services	7.8	0.7	4.1	−1.3	27.6	41.3
Other services	21.7	1.2	1.8	− 15.6	16.6	66.4

*GDP^{FC} is GDP at factor cost, which is the sum of value added in each industry
Source Input-output table (Kuwait CSB 2015); Social accounting matrix for 2013 (Shehabi 2019a)

These details are support findings of Shehabi (2019a) who, using a computable general equilibrium (CGE) framework, argues that Kuwait's economy is already diversified through its non-oil sectors and its sovereign wealth funds (SWFs), but that this diversity does not improve export or fiscal sustainability due to structural factors and economic constraints (not due to the "Dutch disease"). These factors are: locking-up of capital in SWF and energy sectors, access to SWF savings, pervasive oligopolistic industrial structures especially in non-tradable services sectors, access to temporary expatriate labor, negligible taxation, concentration of Kuwaiti nationals in public sector employment, and a dominant public sector (Shehabi 2019a). These constraints prevent the expansion of non-oil exports (Shehabi 2019a, b). The strength of these constraints is evidenced in reality by the fact that Kuwait's economic structure has not changed despite policy implementation that has aimed at achieving diversification and private sector development. Industries display oligopolistic or monopolistic behavior (Shehabi 2019a, b) and rent-seeking behavior, rendering economic diversification policies less effective and inclusive in the long-run (Nosova 2018).

Kuwait's diversification level is insufficient for climate change mitigation and adaptation because it neither reduces local consumption of energy nor reduces dependence on unsustainable oil exports. What is needed, thus, is substantial and meaningful reforms that are economically and politically feasible to achieve the necessary diversification. The following section addresses this potential.

3.2 An Outlook Toward Diversification and Structural Change

Achieving structural change entails changing the relative share of the energy industries relative to other industries in the economy's value-added, employment, and exports.

Vision 2035 aims to transform Kuwait into a financial and tourist center. The government has passed reforms targeting minimal reduction of energy subsidies, nationalizing employment in the private sector, expanding private sector participation, and allowing foreigner investors access to the capital market and private sector. Kuwaiti energy policy aims to increase the share of oil in exports and to create new alternative and renewable energy sectors and technologies (Malyshev et al. 2019).

Despite major ambitious plans and policies, the outlook for a structural change in the economy remains poor. First, Kuwait ranks last in the region in factors vital for diversification (such as economic competition, legal framework, and effective governance regime) (Bandow 2017). Second, none of the non-oil industries have the potential to compete with the size and speed of oil export revenue. Third, achieving economic diversification requires reducing the aforementioned economic constraints and distortions (Shehabi 2019a). Existing government plans have faced parliamentary and private-sector opposition and have not achieved intended results (Nosova 2018; Shehabi 2018). Fifth, existing capital and other investments in the energy

sector cannot be readily transferred to other industries. Moreover, the energy sector continues to use fossil fuels for electricity and water desalination.

Successful implementation of structural change plans will depend on the country's ability to enhance and transform value-added industries in ways that not only expand the role of non-energy sectors but also achieve economic and environmental resilience. To that end, specific transformations should be achieved in numerous areas, of which the most important are: technological advancements in innovation, human capital development, reduction of public sector dominance, enhancement of the energy sector's role in energy transformation and green energy innovation, enhancement of industrial competition and productivity, business law reform, taxation reform, and reforming of industrial incentives to encourage expansion of industrial output into exports. The economy requires productive involvement of private firms in (energy and non-energy) export-oriented industries that can access capital, have incentives for technological advancement, and operate in competitive markets.

A necessary opportunity for structural change that also meets energy transition goals is transforming the energy sector—in which Kuwait has a comparative advantage—in ways that offers clean energy and energy solutions.

Structural change also requires enhancing value add, export, and employment contributions of non-energy industries. The existing non-energy industries employ a large number of expatriates, export a small portion of their output, are in part publicly-owned, receive subsidies, and pay little tax. The two largest non-energy sectors (financial services and non-tradable services like hotels and restaurants) are naturally non-tradable. The government's plan to make Kuwait a financial hub is difficult given the existence of a regional rivalry and the very successful financial services industry in the United Arab Emirates. It is also difficult given the large transaction and legal costs entailed in achieving this goal. Furthermore, while is it possible to create new vibrant industries such as tourism, the time and cost required to enact the necessary cultural, legal, educational, and economic reforms would be prohibitive, at least in the short run. As such, a more efficient investment should be in the industries that have existing capacities to export, such as transport, chemicals, and other network services. These industries need improved competitiveness and regulatory changes that reduce oligopolistic behavior, to increase their access to capital and technology, increase productivity, and increase incentives to export. Structural change requires new or stronger industries that are highly productive, capital-owning, privately-owned, export-oriented, tax-paying, and competitively-operating, and have access to required labor based on skill and free-market dynamics. The economy also needs additional sources of government revenue with reduced fiscal commitment, entailing a reduction in welfare and an increase in taxes. Needless to say, for these changes to occur, wide-spread economic reform is required, but politically it will be very difficult.

3.3 Policy Reform

To achieve economic transformation and structural change, substantial and meaningful reforms are required across the economy, mainly in taxation, employment, education, productivity, technology, investments, and other areas. While the scope for these reforms is large and merits detailed analysis, this section focuses briefly on policy reforms in three key areas: industrial competition, productivity, and foreign direct investments. We focus on these areas because we posit that these reform areas: (a) provide necessary steps for achieving other policies; (b) are potentially politically feasible relative to other reforms (such as the politically-contentious labor and taxation reforms); (c) expand across various industries and other reform areas; and (d) have potentially substantial benefits that extend economy-wide in the long run.

3.3.1 Competition Reform

Increasing competition across the economy has a substantial potential to provide benefits economy-wide. The pervasiveness of oligopolies across industries and their collusive behavior has been shown to capture large parts of the economy's efficiency and deter innovation as well as economic and non-energy export expansion (Shehabi 2019a). Stimulating competition reform that reduces collusion among oligopolistic firms reduces oligopolists' opportunities for markups and pure profits, and offers efficiency and scale benefits that extend economy-wide at the overall production, employment, fiscal, and welfare levels (Shehabi 2019a, b). Reducing the strength and dominance of oligopolistic industries will reduce their crowding out of private investments. It will also reduce incentives to concentrate output on the domestic, rather than the export, market (Shehabi 2019b). Competition reform goes hand in hand with attracting new technologies and governmental intervention to reduce subsidies and offer appropriate incentives to support technological innovation. In the naturally oligopolistic energy industry, incentives, as well as enforceable legal and regulatory measures, are required to encourage investments in new green energy technologies.

3.3.2 Productivity-Enhancing Reforms

As Kuwait ranks low in productivity, increasing the productivity of various economic sectors has a large potential for expanding Kuwait's economy. Beneficial productivity-enhancing reforms include raising educational standards and outputs to globally-competitive levels; support and incentives for technological innovation; technical training; capital investments; competitive labor market structures; and reallocation of resources toward new activities.

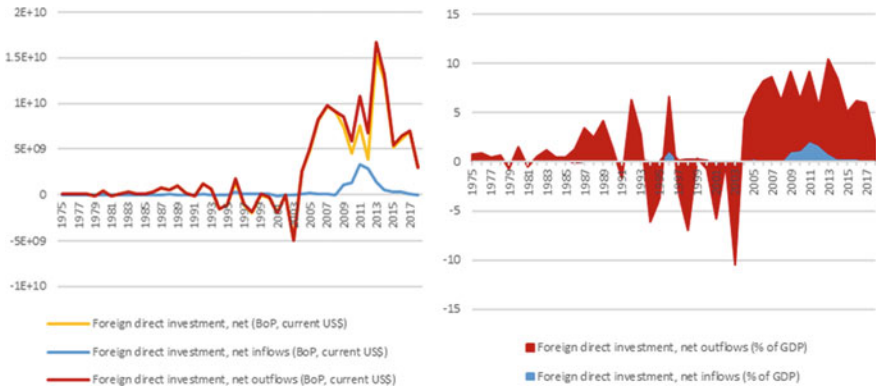

Fig. 11 FDI values and FDI as the percentage of GDP in Kuwait, 1975–2017. *Source* WDI (2019)

3.3.3 Foreign Direct Investments (FDI)

Kuwait attracts a relatively small amount of FDI, even when compared to the rest of the GCC states, and historically has had systematic and structural high outflows and low inflows. Between 2005 and 2007, outward FDI amounted to 45% of gross fixed capital (GFC) formation (reaching USD$7712 million), compared with inflows of less than 1% of GFC formation (USD$156 million) (UNCTAD 2019).[7] On the outflows side, these have been largely composed of its large contributions to its SWF, [8] which have been aided by high oil prices and are estimated at $592 billion (SWF Institute, n.d.). Figure 11 shows the considerable differences between inflow and outflow of FDI in Kuwait for 1975–2017, so that the net FDI curve relatively coincides with the curve of outflows.

Kuwait Vision 2035 set as a goal attracting FDI to support economic diversification and various steps have been implemented to that end.[9] The New Kuwait agenda adopted a new law allowing the previously-banned 100% foreign ownership in numerous sectors in return for a commitment to employ Kuwaiti nationals. The Kuwaiti Stock Market was also opened to non-Kuwaitis in 2018, the minimum

[7]Even upon the decline of the oil price in 2014, which slashed outflows into the SWFs dramatically, investments abroad were more than 10 times inward FDI. In 2018, outward FDI exceeded 11% of GFC (USD$3751 million), while inflows represented a meager 1% of GFC formation (USD$346 million) (UNCTAD 2019).

[8]Kuwait has two SWFs managed by the Kuwait Investment Authority (KIA) abroad. The KIA was set up to hold substantial wealth abroad in diversified assets and geographic locations. The government is required by law to contribute 10% (which became 25% between 2012 and 2014) of oil export revenue to the Future Generations Fund (FGF), and to invest any remaining fiscal surpluses in the other SWF, the General Reserve Fund (GRF).

[9]Laws were enacted as early as 2000 to attract FDI. In 2000, foreigner investors were allowed to buy shares in companies listed on the Kuwaiti Stock Exchange, and in 2008 they could own non-listed shareholding companies. The Companies Law No. 97 of 2013 eliminated some foreign ownership restrictions, permitting total ownership of shareholding companies.

paid-in capital requirement to start a business was eliminated (World Bank 2019b), and various tax incentives have also been proposed. FDIs are expected to increase, largely owing to agreements for developing the first project phase of the China-led Silk City project which is expected to generate $86 billion (UNCTAD 2019, p. 45).

Nevertheless, the outlook for FDI remains poor due to high barriers. Kuwait ranks low as a good business environment, ranking 45th out of 82 countries in the world for the period 2014–2018, coming last in the GCC [10] (The Economist Intelligence Unit 2019), and 97th out of 189 countries in the 2019 Doing Business Report of the World Bank (2019b). Further, there are various barriers to FDI, including policy design and structural factors, such as political tensions, a high degree of state intervention, the small size of the locally-crowded private sector, and the limited research and development output in the country. [11]

Reforms are thus needed to facilitate doing business in Kuwait and attract FDI. These include: reducing legal and procedural complexities (through streamlining processes, reducing processing times, and providing multi-lingual services); reducing transactional costs and time for doing business; reducing requirements for local participation, and strengthening legal institutions. The condition of hiring Kuwaiti labor in new foreign-owned sectors might be an obstacle with high tradeoffs: legal costs for non-compliance could be at the expense of competitive forces enabling companies to hire those they find the most suitable or productive for their business. Finally, attracting FDI also requires taxation reform, improvements in the productivity of labor, and reduced public sector dominance.

4 Conclusion and Policy Recommendations

This chapter has examined how Kuwait can head toward energy transition and a larger economic diversification following a structural transformation of its economy. The energy transition from fossil fuels to renewables is necessary in order to reduce CO_2 emissions and to free up hydrocarbon resources for export.

Oil price declines in mid-2014 and global energy transition saw oil exporters like Kuwait reduce energy subsidies and implement policies to reduce economic reliance on the oil sector and expand economic diversification. The economics of renewables in oil-exporting countries like Kuwait are affected by oil price volatility. Like Fattouh et al. (2019), we posit that renewable investment can increase the export revenue of oil-exporting countries, but only in the short run, and it can neither reduce global oil demand in the long run nor provide sufficient economic rents to satisfy the country's fiscal and budgetary needs. Therefore, the main solution for the long run is economic

[10] GCC states except for Oman, for which no data were available.

[11] Undoubtedly, some barriers to FDI include exogenous factors such as geopolitical and geographic risk (given the region's stability, or lack thereof) and possibly other endogenous variables such as cultural ones.

diversification, a strategy that helps to protect Kuwait and similarly oil-dependent economies from the effects of the global energy transition.

Economic sustainability entails securing alternative sources of revenue to substitute for that generated by oil rents, which would be a solution to the intrinsically unsustainable nature of oil rents and the lack of diversification. As measurements of diversification vary and can be misleading, more complex methods or indices should be constructed to measure meaningful diversification in oil-dependent economies. Efficiency-enhancing structural change is required to achieve productivity growth in non-energy sectors that are also export-oriented—thereby achieving meaningful diversification. Competition and private sector reform are also important to achieving economic diversification and sustainability in the Kuwaiti economy. Increasing the opportunities and role of the private sector, as in the Shagaya complex, across the energy and non-energy industries is also necessary. Further, energy pricing reform and revising energy subsidization are required in order to rationalize energy consumption, achieve energy efficiency, and encourage a more diversified growth while reducing greenhouse-gas emissions.

The policy reform areas proposed in this chapter can be substantiated by further research that measures the economy's progress toward achieving reform goals. Also necessary is further research that measures the effects of proposed reforms and explores how to plan, structure, and implement reform in ways that maximize socio-economic and environmental benefits while minimizing associated costs and disadvantages. Further, as this chapter addresses only two pillars of sustainable development—namely environment (energy transition) and economic (economic diversification)—there is scope for further research on the third pillar of social transformation, as well as the governance aspect and international environmental law.

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Knowledge-Based Development and Economic Diversification: The Case of Qatar

Ahmed Almoli and M. Evren Tok

Abstract Qatar is privileged to have massive natural gas reserves compared to a small population. This massive wealth in gas reserves coupled with the fact that Qatar has a small population, has led Qatar to be ranked among the countries with the highest per capita income in the world. However, continuing reliance on the hydrocarbon revenues will expose the nation to several risks, including overdependence and volatile energy prices, in addition to the "peak oil" risks. In view of this, economic diversification through investments in non-energy sectors becomes an essential element of future economic planning. Alternatively, knowledge is considered to be a key factor in constant economic growth and a knowledge-based economy (KBE) is a vital source of global economic growth that manages and facilitates the process of innovation which converts knowledge into wealth. This chapter highlights the top-down implementation of the transitions towards a KBE in Qatar in order to diversify away from the overdependence on a single finite source of income and invest in non-energy sectors. It illustrates the public policies related to KBE (QNV2030, QNDS 2011–2016 and QNR 2012) and highlights the alignment between them; it also emphasizes the national priorities in R&D in the Qatar entrepreneurship and innovation ecosystem. Furthermore, it provides an analysis of Qatar's performance and competitiveness worldwide and within the GCC countries that share similar social-economic factors. It also extracts the performance trends and identifies the strengths, weaknesses and challenges that Qatar is facing while transforming into a KBE with reference to the related global indexes; Global Competitiveness Index (GCI), Global Innovation Index (GII) and Global Entrepreneurship Index (GEI).

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Keywords Knowledge-based economy · Economic diversification · Innovation ecosystem · Qatar

List of Acronyms

GCI	Global Competitiveness Index
GEI	Global Entrepreneurship Index
GII	Global Innovation Index
GTL	Gas to Liquids
HBKU	Hamad Bin Khalifa University
ICT	Information and Communication Technology
KBE	Knowledge Based Economy
LNG	Liquefied Natural Gas
PRD	Product Research and Development
QBRI	Qatar Biomedical Research Institute
QCRC	Qatar Cardiovascular Research Center
QCRI	Qatar Computing Research Institute
QEERI	Qatar Environment and Energy Research Institute
QF	Qatar Foundation
QNDS\NDS	Qatar National Development Strategy
QNRS 2012	Qatar National Research Strategy 2012
QNV2030	Qatar National Vision 2030
QSTP	Qatar Science and Technology Park
R&D	Research and Development
SME	Small and Medium-sized Enterprises
STEM	Science, Technology, Engineering and Mathematics
STPs	Science and Technology Parks

1 Introduction[1]

Over the last 30 years Qatar has experienced remarkable social and economic development. Qatar's economic emergence started with Qatar's independence and the discovery of the North Field gas reservoir in 1971. Currently, Qatar is reliably serving global energy markets as the largest exporter of Liquefied Natural Gas (LNG) and Gas to Liquids (GTLs) in the world, with a supply chain that spans the globe.

[1]Parts of this book chapter were extracted and summarized from a masters thesis by the author Ahmed Almoli, supervised by Dr. M. EvrenTok. the thesis is titled "Towards a Knowledge-Based Economy: Qatar Science and Technology Park, Performance and Challenges" and was submitted in partial fulfillment of the requirements for the degree of Master of Arts-Public Policy, Hamad Bin Khalifa University in March 2018.

This massive wealth in gas reserves coupled with the fact that Qatar has a small population, led Qatar to be ranked among the countries with the highest per capita income in the world. "Qatar is privileged to have massive natural gas reserves compared to a small population" (AI-Sowaidi 2015).

However, continuing reliance on the hydrocarbon revenues will expose the nation to several risks, including overdependence on Oil and Gas and the price volatility in the market of energy, in addition to the "peak oil" risks. In view of this, economic diversification through investments in non-energy sectors becomes an essential element of future economic planning.

Alternatively, knowledge is considered to be a key factor in constant economic growth and a knowledge-based economy (KBE) is a vital source of global economic growth that manages and facilitates the process of innovation which converts knowledge into wealth.

1.1 Knowledge-Based Economy

The concept of a KBE focuses on the role of information, knowledge and technology in economic performance and growth. However, despite the widespread use of the term 'Knowledge-Based Economy', it has resisted precise and coherent definition. The World Bank and OECD define a KBE as "one that has an economic incentive and institutional regime that stimulates the acquisition, creation, dissemination and use of knowledge and information to improve its growth and welfare, as well as effective systems of education and skills, information and communication technology (ICT), research and development (R&D) and innovation" (ADB 2014). A Knowledge-Driven Economy is distinguished from a Resource-Driven Economy or Investment-Driven Economy by the fact that its key elements include a higher dependence on "intellectual capabilities than on physical inputs or natural resources." These conditions have contributed to the "increasing relative share of the gross domestic product that is attributable to intangible capital" (Powell and Snellman 2004).

The KBE framework suggests that to achieve a productive knowledge economy, economies should have four pillars in place: The Economic and Institutional Regime, Education, Innovation and Technology, and the ICT Infrastructure pillar. The purpose of the Economic and Institutional Regime pillar is to provide incentives for the creation, development, and efficient use of knowledge together with the thriving of entrepreneurship. The Education pillar is intended to produce an educated and skilled population able to create, share and use knowledge effectively. The Innovation and Technology pillar consists of, "development research centers, universities, consultants and other organizations to tap into the global knowledge". Additionally, this pillar forms an adoption system that can assist with the diffusion of technology, adapt it to society's needs and concerns, and create new technology (World-Bank 2007). The ICT Infrastructure pillar is a knowledge enabler and an integral part of education. It is a vital tool for knowledge access, usage, and processing.

On the other hand, other sources have argued that the KBE concept presents threats along with the opportunities created. A KBE may contribute to inequalities in wages and opportunities and increase the gap between those with a high intellectual capacity and those with low levels of qualifications, due to a decline in the well-paid but less skilled labor market. The other argument is that, despite the rise of high-tech industries, a KBE has limited requirements for the highest levels of qualifications. This will create disappointment among some highly educated people as only a limited number of jobs that require their qualifications will be available, which will in turn lead to a decrease in rates of productivity and economic growth. In addition causing the job market go through a period of secular stagnation (Pettinger 2017).

Hvidt (2014) points out that a knowledge economy is the latest evolution stage of a global capitalist economy which depends heavily on technological innovations and the global competitive need for innovation. Furthermore, he indicates that the "knowledge" is not the end, it is rather a concept that is intricately linked to the neoliberal economic paradigm competing for business and growth (Hvidt 2014).

Tadros (2015) suggests that Knowledge-based development requires a holistic approach that brings and connect scientists, researchers, entrepreneurs, and policy-makers. Further, he recommends that the R&D activities must cater to the needs of the market (local, regional, and international) and that the Gulf Cooperation Council (GCC) states should focus their R&D activities on areas of strategic importance to their countries and region. In addition, he focused on the importance of collaborating across disciplines and sectors while removing the barriers between organizations and individuals. Moreover, he emphasizes the need for a culture that takes risks, learns from failed experiences and celebrating success (Tadros 2015).

In the context of how the KBE can impact the job market, Brinkley and Lee (2007) reported that "knowledge-based sectors opened twice as many new jobs in the USA and four times as many in Europe as low-knowledge sectors did." Parcero and Ryan (2017) argue that GCC countries are turning onto the expatriate labor market and that they are using public employment as a part of the welfare state package for their national populations; this is taking into consideration that the capacity of the public sector has been largely exhausted. They suggested that GCC countries need to offer a relatively higher quality of life to skilled professionals in order to attract talented expatriates (Parcero and Ryan 2017).

1.2 Innovation Ecosystem

The Innovation Ecosystem refers to the inter-organizational, political, economic, environmental, and technological systems of innovation. It is widely argued that the most successful innovation ecosystems were built on a solid knowledge base, accumulating a network of developed innovation processes and advanced innovation resources. Viitanen stated that "the top ecosystems have managed to channel the accumulation of academic knowledge for joint innovation activities and combine the

related outcomes with the market-driven commercialization processes" (Viitanen 2016).

1.3 Knowledge-Based Economy Transition in Qatar

Qatar's leadership vision is concentrated on balancing the economy and directed to diversifying away from the overdependence on a single dominant source of income. With this view, Qatar has dedicated itself to evolving its economy towards a knowledge-based one, enriching its level of human capital and improving its competitiveness.

The Qatari government has developed a sustainable strategy that emphasizes the transformation towards a KBE that focuses on directing public and private investments into non-energy sectors (Qatar-Gov, P. 2007).

Qatar's strategies have focused on creating a national innovation system and envision Qatar's economy in 2030 as a KBE driving future economic growth through national innovation capabilities and knowledge assets. Qatar National Vision 2030 (QNV2030) rests on four pillars: human development, social development, economic development, and environmental development. The QNV2030 pillars emphasize the importance of developing the country's infrastructure and human capital and committing the required financial resources to reforming the education system in order to stimulate innovation (Nezameddin and Leyla 2014).

Furthermore, the recent collapse of oil prices has spurred new life into the diversification effort and highlights the necessity for Qatar to have a sustainable development strategy that does not depend on natural resources as the main driver for development, but rather stresses the transition to KBE. The concept of a knowledge-based economy goes beyond utilization of knowledge; it includes spillovers throughout the economy to build a dynamic knowledge society with a KBE mindset where economic competition and success are based on effectively employing intangible assets like skills, knowledge and innovative abilities, as the fundamental resource for competitive advantage. According to the World Bank, "the KBE is all about agility, networking, constant learning and reliability," (Nezameddin and Leyla 2014). "Knowledge is applied in innovation and entrepreneurship, research and development, product design and software and in how people use their education and skills" (Qatar-Gov, P. 2007).

Establishing an innovation ecosystem requires measures that improve performance in R&D, education, entrepreneurial activity, and knowledge flows, which when combined, allows an idea to be translated into an actual entrepreneurial venture.

1.4 Public Policies and National Strategies for KBE in Qatar

Qatar National Vision 2030

Qatar National Vision 2030 (QNV2030) was launched in October 2008 and has set a long-term direction toward 2030. It provides a clear strategy for the state's economic and social progress. The vision foresees Qatar becoming an advanced nation capable of sustaining its development and providing a high standard of living with world-class education, science, research, and health facilities for Qatar's next generations.

QNV2030 defines future trends and reflects the aspirations, objectives and culture of the Qatari people and outlines how Qatar will use the revenues from its substantial hydrocarbon resources to transform itself into a modern KBE.

QNV2030 assigned a critical and significant role to the Qatar Foundation (QF) to be the driving 'engine' for the development of Qatar's people, and it sets out desired outcomes founded on four developmental pillars: human, social, economic and environmental (Qatar Energy and Industry Sector Sustainability Report 2013).

National Development Strategy 2011–2016

The Qatar National Development Strategy (QNDS) was launched in March 2011 to be implemented between 2011 and 2016. It is founded on 14 sector strategies aligned with the QNV2030 four pillars, together with a fifth priority area for the development of modern public sector institutions. Each sector is responsible for implementing programs and practices that will contribute towards achieving these goals.

QF and QSTP, with other Qatari innovation eco-system institutions and the R&D community, are building a framework with measurable alignment and contribution to achieving the QNV and NDS goals (Qatar-Petroleum 2011).

Qatar National Research Strategy 2012

The Qatar National Research Strategy (QNRS 2012) aims to make Qatar a leading center for R&D and innovation. The mission of QNRS (2012) is based on inclusiveness and intellectual merit which develops the abilities of Qatar's people and institutions to build and maintain a competitive economy.

QNRS (2012) is designated to capture the mission logically in 23 goals and 76 objectives that address five priority themes, comprising enterprise-wide, energy and environment, computing and information technologies, health and social sciences, arts and humanities (Qatar-Gov 2007).

Alignments with Government Strategies and Policies

QNV2030 vision is aligned with the key pillars of the KBE (education and learning, innovation, and information technologies) and amplified by detailed plans to promote economic incentives and governance frameworks (Qatar-Gov 2007). Figure 1 shows the alignments of government strategies and policies.

National priorities are defined by the Qatar National Development Strategy (QNDS) 2011–2016 and they are aligned with QNV2030. Therefore, while

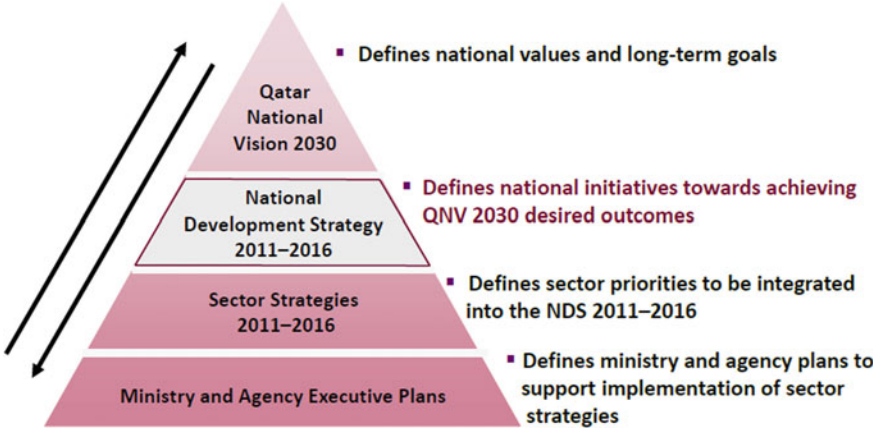

Fig. 1 Alignments of government strategies and policies. *Source* Qatar-Planning (2012)

QNV2030 defines values and articulates long-term national goals and development aspirations, QNDS defines initiatives and programs towards achieving QNV aspirations and desired outcomes (Qatar-Planning 2012).

1.5 Qatar Innovation and Entrepreneurship Ecosystems

As directed by QNV2030 and NDS 2011–2016, Qatar is creating a prolific innovation ecosystem, from existing elements as well as newly constructed elements, in addition to "participants and resources that are necessary for innovation. Such participants include entrepreneurs, investors, researchers, university faculty, as well as business development and other technical service providers" (Ibrahim and Harrigan 2012).

Figure 2 shows the associations between various organizations and entities in the Qatar entrepreneurship ecosystem map (Silatech 2013).

Likewise, Qatar's innovation ecosystem is similar to the Qatar's entrepreneurship ecosystem, with the addition of the newly established research institutes at Hamad Bin Khalifa University (HBKU).

These components interact with each other within the ecosystem and work with other stakeholders toward achieving the R&D vision. Moreover, while Qatar's various R&D entities conduct research, QNRF enables them and QF R&D facilitates to monitor and evaluate research activity across Qatar's R&D Community (QNRS 2012).

Moreover, the inputs to the Qatar innovation ecosystem are people, funds and infrastructure, while the outputs are R&D projects, collaboration, publications and direct products of activities, and the resulted outcomes can be citations, patents, and technology transfer.

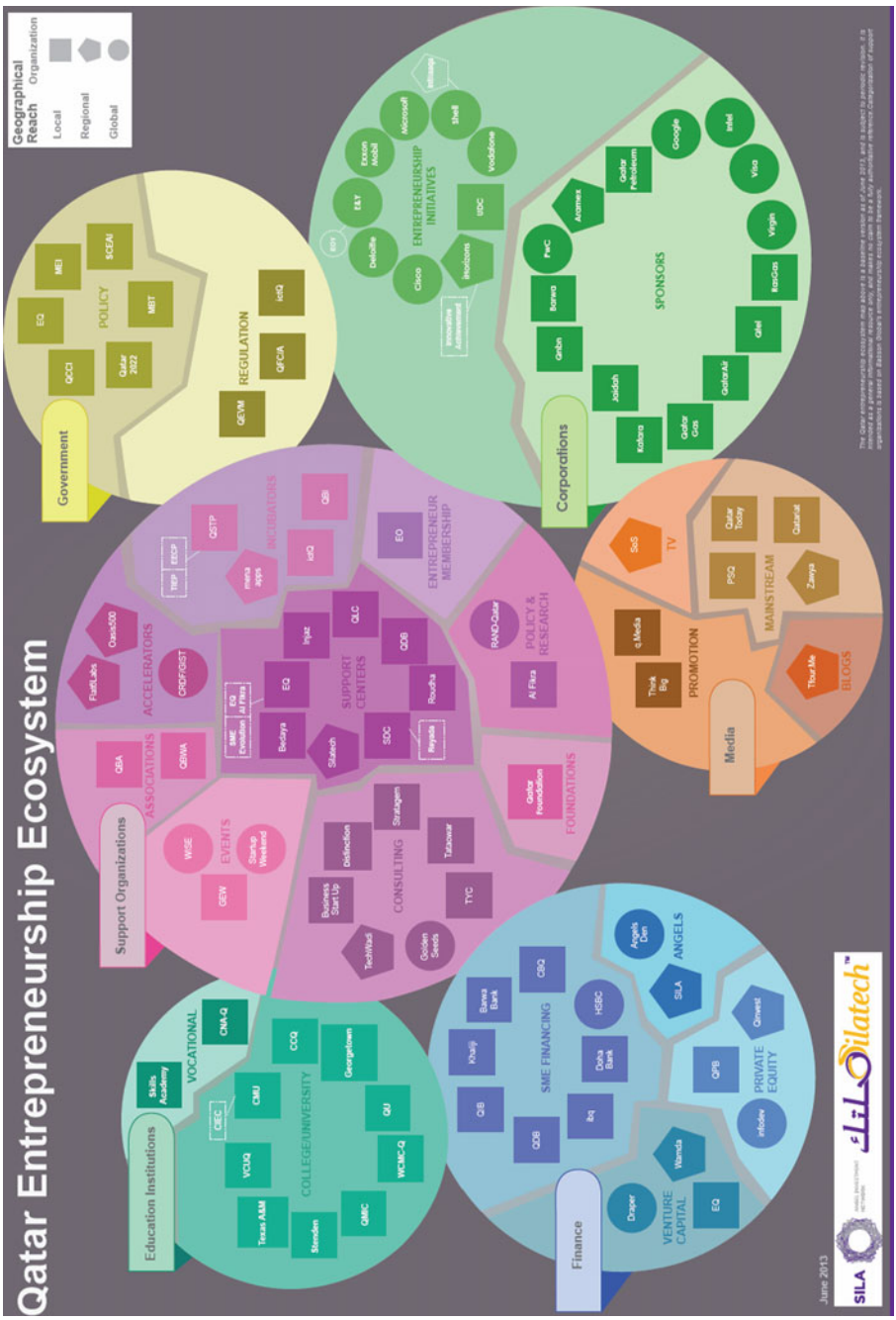

Fig. 2 Qatar Entrepreneurship Ecosystem map. *Source* Silatech (2013)

1.6 Qatari Public Policies and Ecosystems and KBE Alignment

The elements of Qatar innovation and entrepreneurship ecosystems along with the related public policies, are well structured and aligned to the framework of the KBE and Science and Technology Parks (STP), which provide a solid foundation for successful KBE transition projects. Figure 3 presents a mapping diagram and alignment between three main groups. First, the theoretical frameworks of KBE and STP; second, the related public policies in Qatar and the elements of QF concerning education, science and community development in QF and QSTP; and third, the related global indexes (GEI, GII and GCI) that were used to analyze Qatar's performance for the last ten years.

This chapter highlights the top-down implementation of the transitions towards a KBE in Qatar in order to diversify away from the overdependence on a single finite source of income and invest in non-energy sectors. It illustrates the public policies related to KBE (QNV2030, NDS 2011–2016 and QNR 2012) and highlights the alignment between them. It also emphasizes the national priorities in R&D in the Qatar entrepreneurship and innovation ecosystem.

Furthermore, it provides an analysis of Qatar's performance and competitiveness worldwide and within the GCC countries that share similar social-economic factors. Additionally it extracts the performance trends and identifies the strengths, weaknesses and challenges that Qatar is facing while transforming into a KBE with reference to the related global indexes; Global Competitiveness Index (GCI), Global Innovation Index (GII) and Global Entrepreneurship Index (GEI).

2 Economies' Development Stages

2.1 Global Competitiveness Index (GCI)

The Global Competitiveness Index (GCI) was developed by the World Economic Forum (WEF) to measure the overall performance of countries worldwide regarding economic growth, competitiveness, and knowledge of the economy (Tassey 2017). Economies' development stages are classified by GCI into the basic requirements (factor-driven) economy, the efficiency enhancers' (efficiency-driven) economy and the innovation and sophistication factors (innovation-driven) economy (Schwab 2016). GCI indicators (pillars) are organized into three sub-indexes and represented as the keys to the economic development stages (factor-driven, efficiency-driven and innovation-driven) as shown in Fig. 4.

The competitiveness according to GCI is defined as the set of institutions, policies and factors that determine the level of productivity of an economy and set the level of prosperity the country can achieve. Countries in the factor-driven stage compete based on low prices, benefiting from low-cost labor and availability of natural resources.

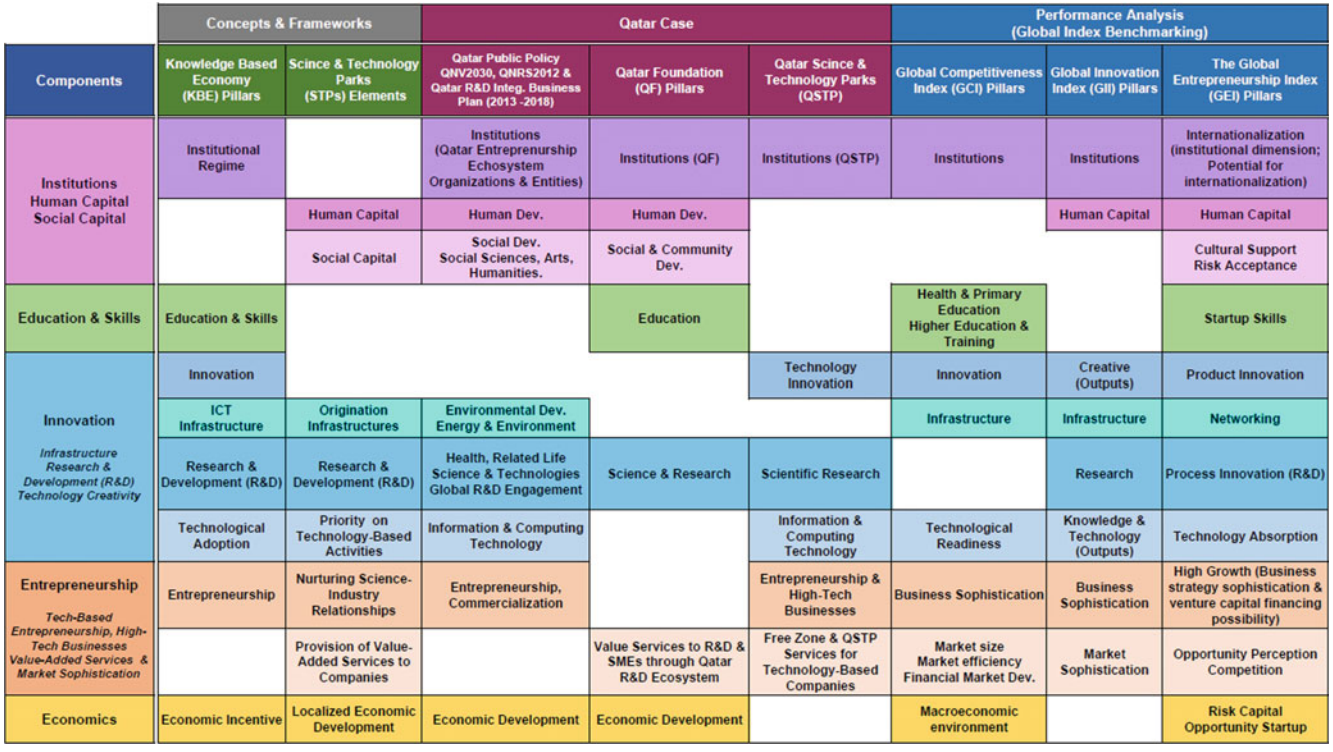

Fig. 3 Mapping between Qatar's public policies (QF and QSTP) and theoretical frameworks (KBE and STP). *Source* The author

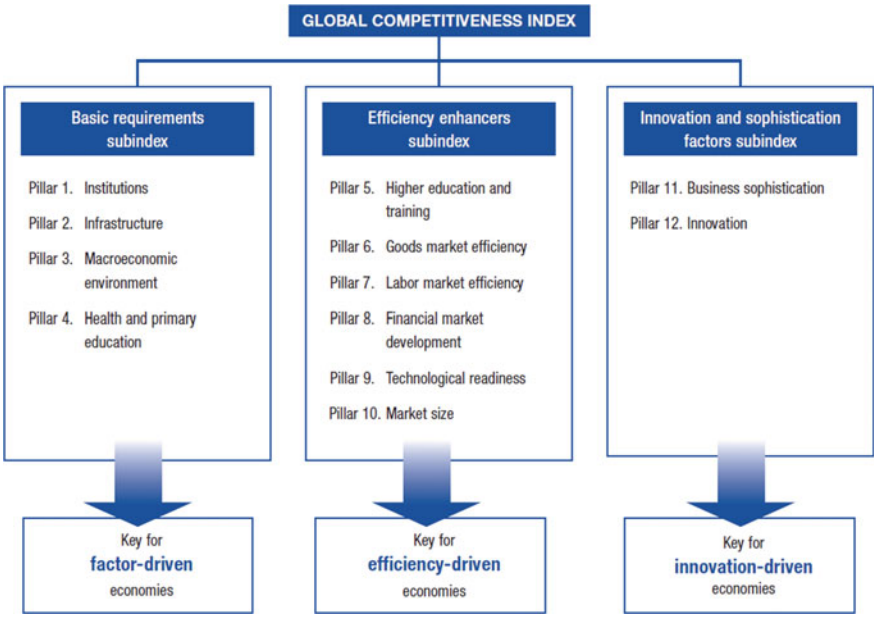

Fig. 4 GCI framework. *Source* Global Competitiveness Report 2016–2017

The key elements of competitiveness at this stage include strong institutions, adequate infrastructure, and a healthy workforce and a macroeconomic environment with satisfactory qualifications.

At the efficiency-driven stage, it is important to develop more efficient production practices. The quality of the products drives the competitiveness at this stage rather than low prices or natural resources. The main indicators of promoting efficient production practices comprise of higher quality education, financial markets and the use of the latest technologies. In the innovation-driven stage, countries must compete by creating sophisticated businesses through innovation (Schwab 2017).

Countries that are highly ranked (especially in the innovation sub-index) can be assumed to have a relatively high readiness for the Knowledge Economy, while good rankings on both the factor-driven and efficiency-driven indicators are strong indications of moving towards a KBE (Qatar-Gov 2007).

2.2 Qatar's Performance in Global Competitiveness Index (GCI)

Qatar has maintained robust competitiveness for the last ten years (2007–2017), with continuous improvement, whereby its global ranking has improved 13 ranking positions and 0.6 scoring points as indicated by GCI reports (Fig. 5).

Fig. 5 Qatar GCI ranks and scores 2007–2017. *Source* The author; data from GCI reports (2007–2017)

Qatar ranked 14th globally among 140 countries in the 2016–2017 GCI report, topping the GCC region with the first rank and advancing its global position with two ranking degrees and 5.23 scored points. However, between 2016 and 2017, Qatar's rank slipped four positions from the 14th rank to the 18th globally, out of 138 countries, and has become in the second place in the GCC region.

From 2007 to 2013, Qatar ranked the best among the GCC countries, with steady improvement, topping the GCC region in its efficiency in many areas, such as macroeconomic, environment, financial market development, innovation, health, and primary and higher education and training. Qatar and UAE occupied the first rank in the GCC alternately between 2014 and 2017. KSA has ranked third since 2014, while the rest of the GCC countries (Kuwait, Oman, and Bahrain) follow in the GCI ranking as shown in Fig. 6.

2.3 Qatar's Economy Development Stage

Qatar's performance in the basic requirements sub-index is the highest of the last ten years, with an improvement of 19 ranking positions on the GCI Index, whereas its performance on the other GCI sub-indexes, the 'efficiency enhancers' and the 'innovation and sophistication factors' sub-indexes, has improved significantly to 23 and 28 ranking positions respectively (Fig. 7).

Qatar's performance in the GCI sub-indexes has put it within the innovation-driven economies in the 2006 to 2007 GCI report and in the GCI reports from 2013 to 2014 until the most recent year, 2017 to 2018.

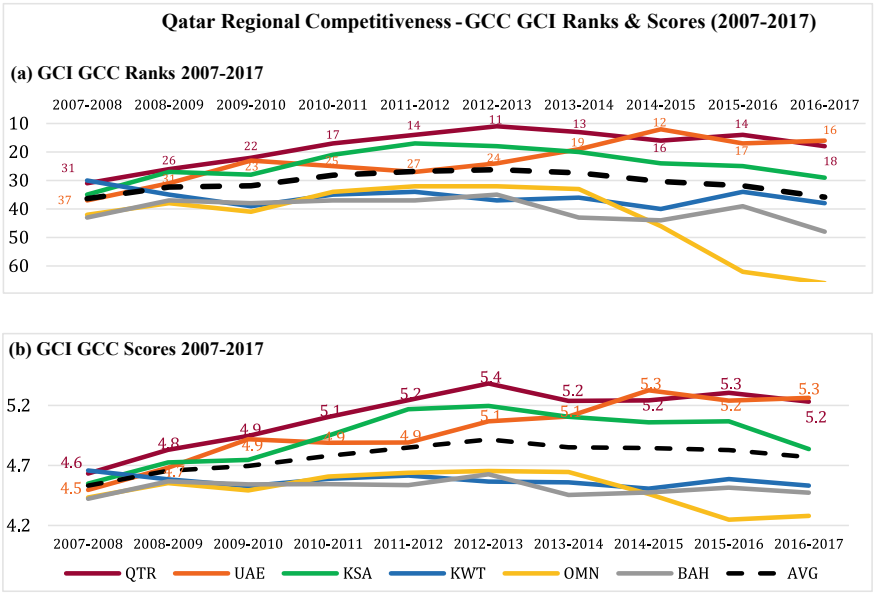

Fig. 6 Qatar regional competitiveness, GCI GCC ranks and scores 2007–2017. *Source* The author; data from GCI reports (2007–2017)

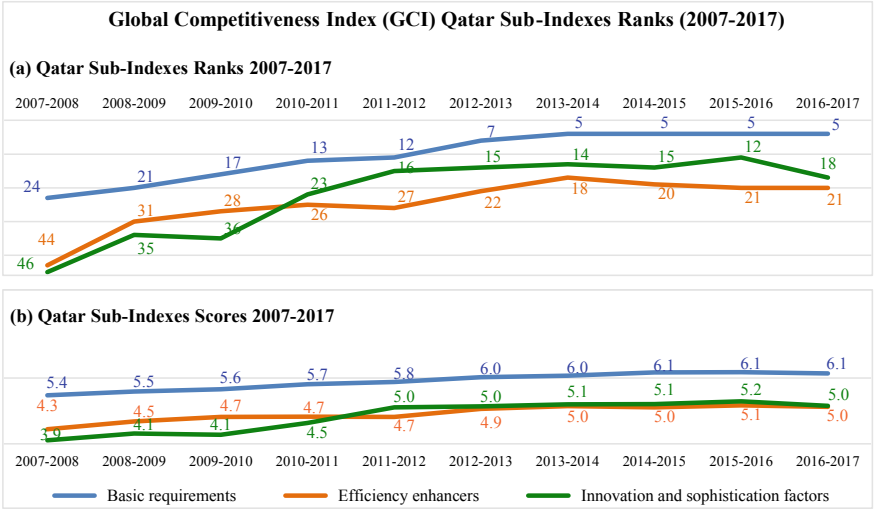

Fig. 7 Qatar GCI sub-indexes ranks and scores 2007–2017. *Source* The author; data from GCI reports (2007–2017)

Table 1 Countries classification by economies' development stages 2017–2018

Stage 1: Factor-driven (35 economies)	Transition from stage 1 to stage 2* (15 economies)	Stage 2: Efficiency driven (31 economies)	Transition from stage 2 to stage 3* (20 economies)	Stage 3: Innovation-driven (36 economies)
Bangladesh	Algeria (58.2, 36.4, 5.5)	Albania	Argentina (31.2, 50, 18.8)	Australia
Benin	Azerbaijan (54.5, 39.1, 6.4)	Armenia	Chile (28.6, 50, 21.4)	Austria
Burundi	Bhutan (46.5, 45.1, 8.4)	Bosnia and Herzegovina	Costa Rica (32.9, 50, 17.1)	Bahrain
Cambodia	Botswana (53.8, 39.7, 6.6)	Brazil	Croatia (32.3, 50, 17.7)	Belgium
Cameroon	Brunei Darussalam (50.2, 42.3, 7.4)	Bulgaria	Hungary (30.6, 50, 19.4)	Canada
Chad	Honduras (47.8, 44.1, 8)	Cape Verde	Latvia (27.3, 50, 22.7)	Cyprus
Congo, Democratic Rep.	Kazakhstan (43.4, 47.4, 9.1)	China	Lebanon (34.2, 50, 15.8)	Czech Republic
Ethiopia	Kuwait (49.9, 42.6, 7.5)	Colombia	Lithuania (25.3, 50, 24.7)	Denmark
Gambia, The	Mongolia (47.3, 44.5, 8.2)	Dominican Republic	Malaysia (29.1, 50, 10.9)	Estonia
Ghana	Nicaragua (57.6, 36.8, 5.6)	Ecuador	Mauritius (38.9, 50, 11.1)	Finland
Guinea	Nigeria (58.5, 36.1, 5.4)	Egypt	Oman (27.2, 50, 22.8)	France
Haiti	Philippines (41.5, 48.9, 9.6)	El Salvador	Panama (28.4, 50, 21.6)	Germany
India	Ukraine (58.1, 37.9, 6)	Georgia	Poland (31.7, 50, 18.3)	Greece
Kenya	Venezuela (55.5, 38.4, 6.1)	Guatemala	Romania (38.8, 50, 11.2)	Hong Kong SAR
Kyrgyz Republic	Vietnam (56.5, 37.6, 5.9)	Indonesia	Saudi Arabia (36.7, 50, 13.3)	Iceland
Lao PDR		Iran, Islamic Rep.	Seychelles (25.2, 50, 24.8)	Ireland
Lesotho		Jamaica	Slovak Republic (21.3, 50, 28.7)	Israel
Liberia		Jordan	Trinidad and Tobago (24.1, 50, 25.9)	Italy
Madagascar		Mexico	Turkey (35.6, 50, 14.4)	Japan
Malawi		Montenegro	Uruguay (23.3, 50, 26.7)	Korea, Rep.
Mali		Morocco		Luxembourg
Mauritania		Namibia		Malta
Moldova		Paraguay		Netherlands
Mozambique		Peru		New Zealand
Nepal		Russian Federation		Norway
Pakistan		Serbia		Portugal
Rwanda		South Africa		Qatar
Senegal		Sri Lanka		Singapore
Sierra Leone		Swaziland		Slovenia
Tajikistan		Thailand		Spain
Tanzania		Tunisia		Sweden
Uganda				Switzerland
Yemen				Taiwan, China
Zambia				United Arab Emirates
Zimbabwe				United Kingdom
				United States

Source GCI report 2017–2018

In addition to Qatar, Bahrain and UAE are also categorized as innovation-driven economies in the GCI 2017–2018 report, while Oman and Saudi Arabia are on the way towards being innovation-driven economies and Kuwait is in transition from the factor-driven to the efficiency-driven economy (Table 1).

GCI reports also show that Qatar was the only Arab country that was classified as an innovation-driven economy in the 2014 to 2015 period, whereas the UAE, Oman and Bahrain were among the countries that were in transition from the second stage to the third stage.

Qatar Competitiveness GCI Pillars

The scores of Qatar on the GCI pillars over the last ten years from 2007 to 2017 show significant improvement in most pillars, except for financial market development, which decreased by 0.3 points. The overall trends of Qatar's performance on the different GCI pillars over the last decade are shown in Fig. 8.

Financial markets need appropriate regulation to protect investors and other actors in the economy. The financial market development pillar is driven mostly by a stable and well-regulated banking sector.

Financial market development is the only pillar where Qatar's score has been decreasing over the last ten years, according to the GCI reports. Qatar's score on this GCI pillar was faltering during most of the period, scoring 5.1 in 2007, 5.3 in 2008, then dropping to 4.9 in 2010, followed by an improvement to 5.2 in 2014.

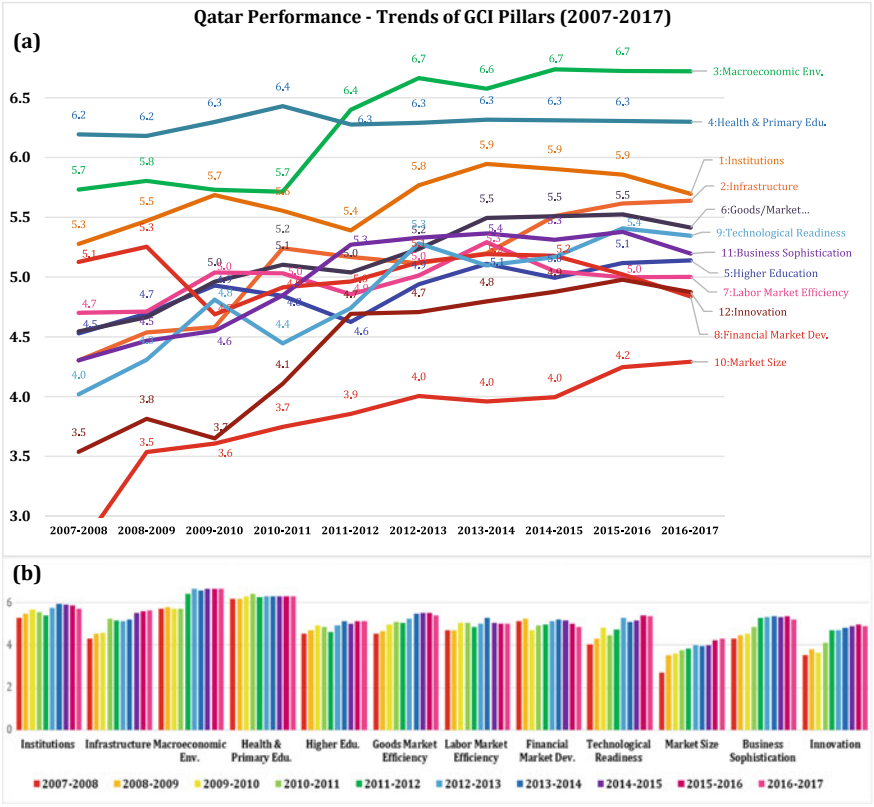

Fig. 8 Ten years trends in Qatar's performance, GCI pillars (2007–2017). *Source* The author; data from GCI reports (2007–2017)

Although Qatar's score dropped to 4.8 during 2016 to 2017, Qatar was ranked 21st out of 183 countries in that year.

On the regional dimension, it is clear that Qatar's performance is aligned with the GCI trend in the evolution of financial market development pillar, as indicated by the scores for the Middle East and North Africa from 2007 to 2017, shown in Fig. 9.

This may indicate that the drop in score is driven by issues that are impacting the global and regional performance. Nevertheless, Qatar's score of 4.8 on this pillar surpassed all of the GCC countries from 2016 to 2017. UAE was second with 4.7 and the GCC average score was 4.4, as shown in Fig. 10.

GCI reports from 2016 to 2017, shown in Fig. 10 also indicate that Qatar led the GCC countries with the first position and highest scores on 6 of the 12 GCI pillars, which include macroeconomic, environment, health, primary education, higher education and training, financial market development, business sophistication and innovation. However, Qatar came in the second position in 5 of the 12 pillars, including institutions, infrastructure, goods market efficiency, labor market

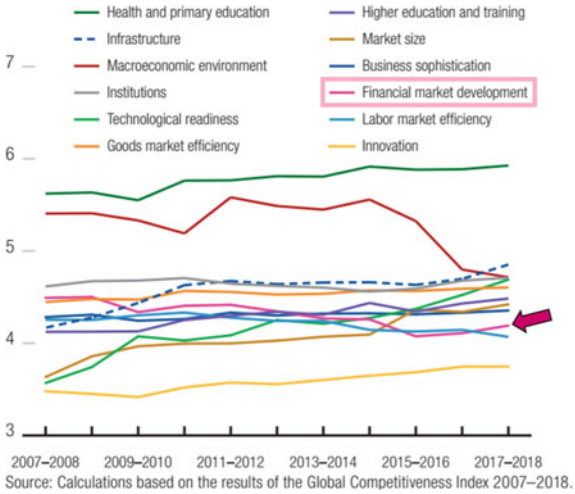

Fig. 9 GCI pillar scores in the MENA region (2007–2018). *Source* GCI report 2017–2018 GCI pillar scores in the MENA region (2007–2018)

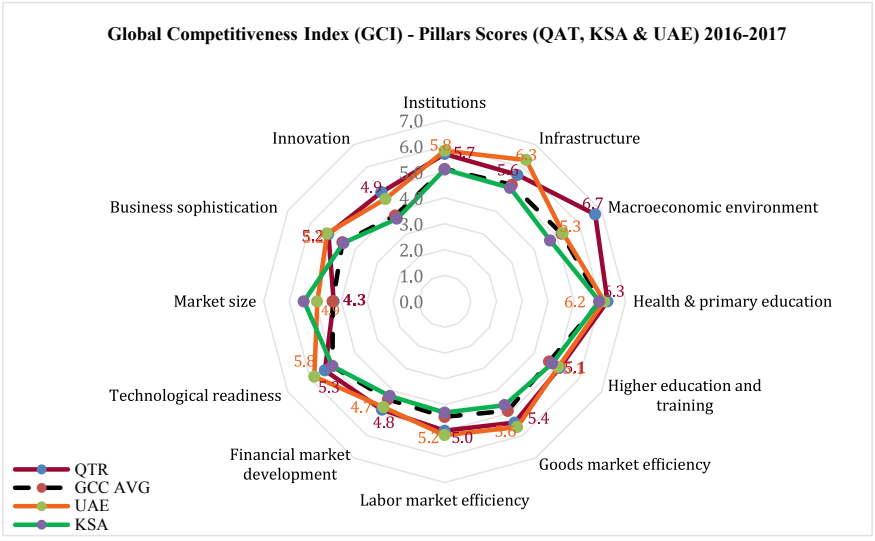

Fig. 10 GCI pillars scores (QAT, KSA and UAE)—2016–2017. *Source* The author, data from GCI 2016–2017

efficiency, and technological readiness. Lastly, Qatar is in third place on the market size pillar.

The Challenge of the Market Size

The size of the market is a significant competitive factor as it directly impacts economies of scale, the growth of production and business financial viability.

Economies of scale are a competitive advantage that large entities have over smaller entities, which reduce the average unit costs of production. The interactions between market size, pricing of the product, and the cost structures to develop the product all impact the growth of the business and its financial viability.

In conclusion, small size markets usually lack international competitiveness, whereas larger markets create positive externalities for the accumulation of human capital and transmission of knowledge (WEF 2016). The highest improvement among the GCI pillars that Qatar has made over the last decade was on the market size pillar, advancing by 1.6 score points (Fig. 8). However, with regards to the GCC region performance, Qatar was ranked third, and for the market size pillar, Qatar had the same GCI average score for the GCC (Fig. 10).

Traditionally the size of an economy is connected to its domestic market. However, in a globalized world, the global market has become more accessible than it has ever been and this has turned the international consumers into potential target market for entrepreneurs. This has re-defined the market size to be a combination of country size and foreign markets, therefore the size of a country's market may not always be limited to its own political or geographical borders (WEF 2016).

In the case of Qatar, the required objective is to increase the market size sufficiently to support business financial viability, considering the country's limited geographic area and political borders.

3 Innovation Capabilities

3.1 Global Innovation Index (GII)

The Global Innovation Index (GII) aims to capture the multi-dimensional facets of innovation, which can assist in developing policies that promote long-term output growth, improved productivity, and job growth.

> GII relies on two sub-indices (Fig. 11), the innovation input and the innovation output sub-indexes, where each is built around key pillars. Five input pillars capture elements of the national economy that enable innovative activities: institutions, human capital and research, infrastructure, market sophistication and business sophistication. Two output pillars capture actual evidence of innovation outputs: knowledge and technology outputs and creative outputs. (INSEAD 2017)

The GII Report consists of the ranking of the world economies' innovation capabilities and its results. Over the last ten years, the GII has established itself as a leading reference for innovation, recognizing its key role of innovation as a driver of economic growth and prosperity. More specifically, with an understanding of the essential role of the human aspects of innovation for the design of the policies that help promote economic development and richer innovation-prone environments locally (INSEAD 2017).

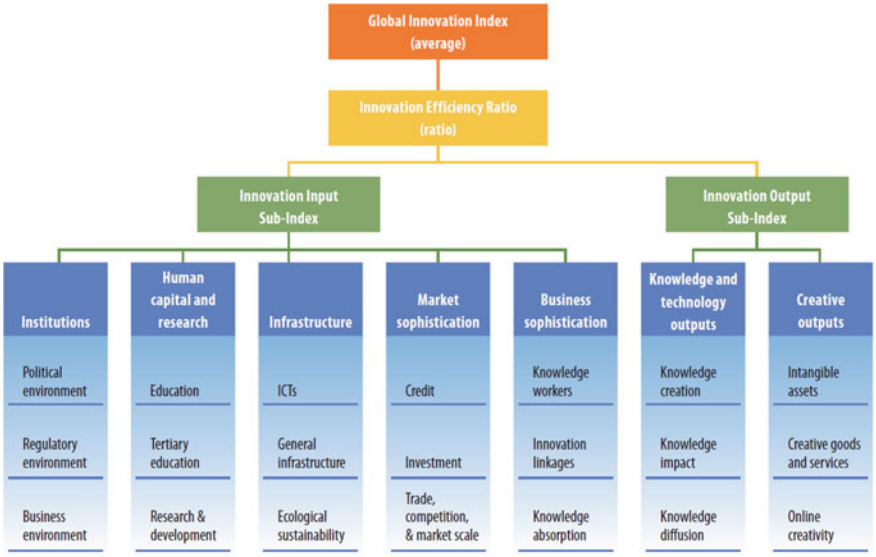

Fig. 11 GII framework. *Source* Global Innovation Report 2017

3.2 Qatar Performance in the Innovation Capabilities

Qatar is highly competitive among the GCC countries due to its significant wealth accumulation and innovation capabilities which are supported by its robust institutions and strong political leadership.

Benefiting from the enormous government support for the innovation policy development and implementation (INSEAD 2009), Qatar ranked 24th globally within the world's top 25 innovators during GII 2008–2009. It also ranked first in the GCC region and first within the Arab countries in the Middle Eastern region.

Qatar has dropped in the ranking compared to previous years, ranking 43rd in GII 2013 and 49th in GII 2017 (Fig. 12). Nevertheless, Qatar is still maintaining an advanced position within the GCC region, as it is ranked second among the GCC countries. The other GCC countries - Saudi Arabia, Kuwait, Bahrain, and Oman - were next in the regional rankings respectively (Fig. 13).

Qatar's performance in the seven GII pillars has been approximately within the same range for the last five years, with some changes in rankings and scores as indicated by the GII reports 2013–2017 (Fig. 14).

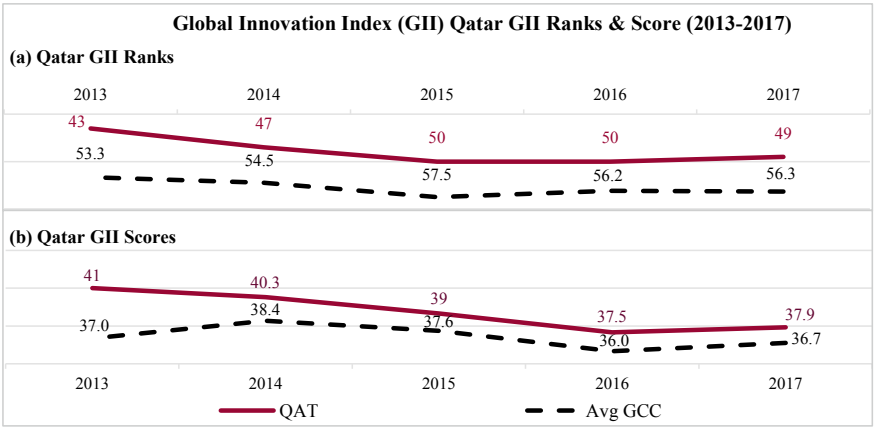

Fig. 12 Qatar GII ranks and scores 2013–2017. *Source* The author; data from GII reports (2013–2017)

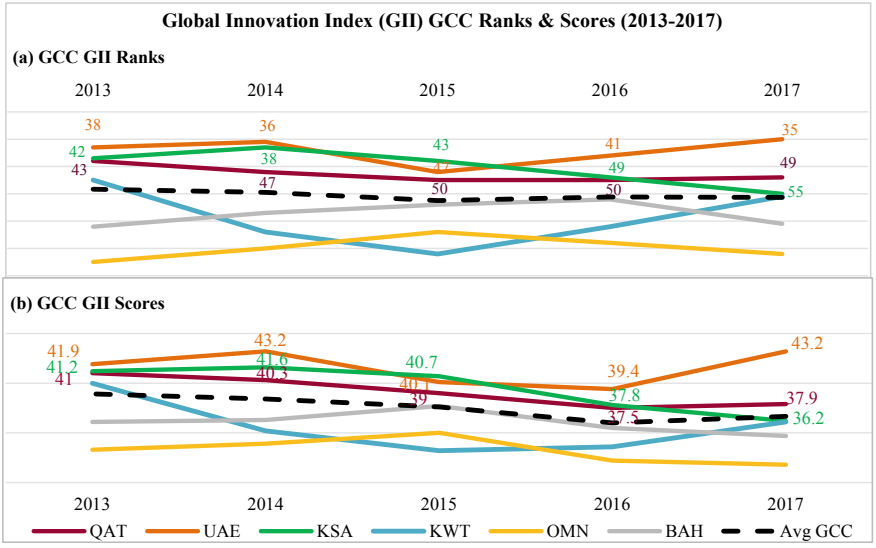

Fig. 13 GCC GII performance 2013–2017. *Source* The author; data from GII reports (2013–2017)

3.3 Strengths and Weaknesses in Qatar's Innovation Capabilities

Table 2 shows Qatar's performance on GII pillars over the last five years, highlighting the differences in the ranks and scores between 2013 and 2017 and the averages. The main improvements were in the institutions, human capital and research pillars and

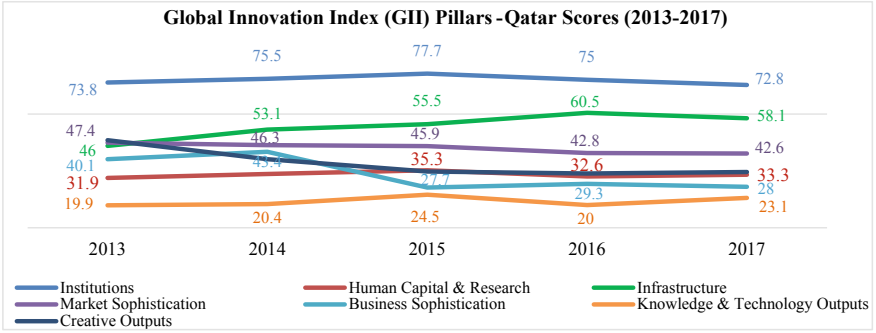

Fig. 14 Qatar GII pillars scores (2013–2017). *Source* The author; data from GII reports (2013–2017)

Table 2 Qatar's performance on GII pillars over the last five years (2013–2017)

GII pillars	Qatar GII performance 2013–2017			
*Delta is the difference between the values of (2017–2013)	Delta* rank	Avg. rank	Delta* score	Avg. score
1. Institutions	−1	34	−1	74.96
2. Human capital and research	9	57.6	1.4	33.34
3. Infrastructure	2	23	12.1	54.64
4. Market sophistication	−23	73.25	−4.8	45
5. Business sophistication	−45	76.75	−12.1	33.7
6. Knowledge and technology outputs	49	81.75	3.2	21.58
7. Creative outputs	−32	44.8	−14	38.32

Source The author; data from GII (2013–2017)

more significantly, in the knowledge and technology outputs pillar. Within the knowledge and technology output pillars, Qatar has moved up 49 ranking positions and advanced 3.2 scoring points. On the other hand, Qatar's performance has decreased on some other GII pillars including business sophistication, market sophistication and more significantly creative outputs, as it has moved down 32 ranking positions and lost 14 scoring points.

Table 3 highlights Qatar's innovation performance over the last five years (2013–2017), rankings and scores on the GII indicators and pillars. It also indicates the strengths and weaknesses on the main elements of the GII pillars as identified by GII data and reports.

Institutions

The institution pillar captures the institutional framework that provides the governance, protection and incentives which are essential aspects of innovation within a country. Qatar's average performance score is 75 points over the last five years.

Table 3 Qatar GII innovation performance analysis (2013–2017)

GII Indicators	Qatar Ranks					Qatar Scores					Strength (S) & Weakness (W)			
*Blanks: data are not available	2017	2016	2015	2014	2013	2017	2016	2015	2014	2013	2017	2016	2015	2013
GII-Global Innovation Index	49	50	50	47	43	37.9	37.5	39	40.3	41				
IER-Innovation Efficiency Ratio	68	97	110	114	97	0.6	0.6	0.6	0.6	0.7				
IIP-Innovation Input Sub-index	48	41	40	34	38	47	48.1	48.4	50.4	47.8				
IOP-Innovation Output Sub-index	54	58	62	69	52	28.8	26.9	29.6	30.2	34.2				
1.Institutions	37	34	30	33	36	72.8	75	77.7	75.5	73.8				
Political stability and absence of violence/terrorism	16		10	53	9	87.5		94.3		95.8	S		S	S
Ease of paying taxes	1	1	1	23	2	99.4	99.4	99.4		97.2	S	S	S	S
2.Human capital & Research	58	59	51	53	67	33.3	32.6	35.3	33.6	31.9				
Expenditure on education	95	98	120	27	107	8.2	7.8	18.5		5.9			W	W
Government expenditure on education per pupil, secondary	95	98	100	110	66	8.2	7.8	6.4		19.1	W	W	W	W
Assessment in reading, mathematics & science	60	60	60	41	2	33.1	18.5	18.5		99.3	W	W	W	S
Tertiary education	13	13	3			55.7	55.5	62.6			S	S	S	
Tertiary level inbound mobility	1	1	1			100	100	100			S	S	S	
Global R&D companies, average expenditure top 3	43	45				n/a	0				W	W		
3.Infrastructure	26	16	22	23	28	58.1	60.5	55.5	53.1	46		S		
General infrastructure	2	1	6		5	67.6	75.4	61.8		52.7	S	S	S	S
Electricity output	4	6	6		6	64.1	82	88		76.8	S	S	S	S
4.Market sophistication	85	68	78	84	62	42.6	42.8	45.9	46.3	47.4				
Ease of getting credit	108	106	113		11	30	30	30		78.9	W	W	W	S
Investment	113					30.1					W			
Intensity of local competition	16					79					S			
5.Business sophistication	84	78	106	27	39	28	29.3	27.7	43.4	40.1				
University/industry research collaboration	10	8	8		9	70.5	74	74		73.2	S	S	S	S
State of cluster development	9	8	10		2	70	71.4	70.2		69.9	S	S	S	S
High-tech imports	113	118	128		117	8.7	6.6	1.4		7.5	W	W	W	W
Foreign direct investment, net inflows	120	114	130			0.1	20.8	40			W	W	W	
6.Knowledge & Technology outputs	55	88	80	110	104	23.1	20	24.5	20.4	19.9	S			
Knowledge creation			128		124			2.8		4			W	W
Patent applications by origin		116	110		2		0.1	0.1		95.5		W	W	S
High-tech exports	112	121	129		140	1.9	0	n/a		1.5	W	W	W	W
Foreign direct investment, net outflows	11	16			123	79.5	54.8			0	S	S		W
7.Creative outputs	54	49	58	41	22	34.5	33.8	34.7	40.1	48.5	S			
Trademark application class count by origin	112	105	103		2	4.6	1.9	n/a		75		W	W	S
ICTs and business model creation	11	3	4		11	5.8	80.1	77.4		74.8		S	S	S
ICTs and organizational model creation	16	7	7		3	5.4	76.6	74.4		75.2		S	S	S
Creative goods exports	78	124	121		122	0.2	0	0.3		0.6		W	W	W

Source The author, data from GII reports (2013–2017)

GII identified the political stability in Qatar and the ease of paying taxes (as part of the political environment and business environment sub-pillars) as one of its economy's strongest areas. The political stability and the absence of violence and terrorism reflected the quality of the public and civil services, policy formulation and implementation.

Human Capital and Research

> The level and standard of education and research activity in a country are prime determinants of the innovation capacity of a nation. (INSEAD 2017)

Qatar's performance in building Human Capacity has improved by nine rankings and 1.4 scoring points over the last five years, with an average of 33.34 points. Mainly, areas of strength included tertiary education (tertiary enrolment) and the mobility of tertiary students, which plays a crucial role in the exchange of ideas and skills necessary for innovation. On the other hand, the weaknesses were in the expenditure on education and the average R&D expenditures, in addition to the assessments in reading, mathematics and science, in reference to the OECD Program for International Student Assessment (PISA).

The Challenge of Skilled Manpower Shortage

The central challenge facing the development of human capital in Qatar is building the required knowledge capability and capacity to achieve the QNV 2030 objectives, considering the low percentage of Qatari nationals in the resident population and the lack of a skilled workforce.

This challenge may arise directly or indirectly due to other issues, such as the smaller number of Qatari entrepreneurs, the lack of local capacity and experience in technology product development and investment, and the small local technology industry in general.

The idea of granting foreigners of "special competencies" with more secure permanent residency status in Qatar has been discussed for several years and suggested at QNDS 2011–2016; this is in order to retain high-quality expatriate talent (Khatri, "Qatar to offer permanent residence status for certain expats," 2017). The official Qatar National Development Strategy 2011–2016 concluded that the "turnover is substantial among high-skilled labor, especially in the health and education sectors, and that the rising proportion of expatriate workers in the past decade has created a considerable risk on the economy if expatriates are forced to leave" (Bukhari 2017). The QNDS 2011–2016 also suggested that "to satisfy the demand for skilled expatriate workers, Qatar needs to create incentives such as satisfactory working and living environments and the provision of appropriate schooling." This attracts, and retains a diverse set of skill set (Khatri, "Qatar to offer permanent residence status for certain expats," 2017). Moreover, QNDS 2011–2016 recommended "a recruitment and retention program of Qatar's sponsorship system" which would be reviewed and revised as part of the country's efforts to retain skilled expatriates (Toumi 2017).

On August 03, 2017, the Qatari cabinet approved the Draft Law on Permanent Residency for Non- Qataris. This applies to those who meet certain conditions, including those who have offered "valuable services" to the country and people with "special capacities" that the country needs. This permanent residency carries some privileges, including being entitled to the same treatment as Qataris at government run education and healthcare institutions and being given the next priority after Qataris in holding public sector, military and civil service jobs (Hukoomi 2017).

This law was described by the international media as a "game-changer" (Bukhari 2017) as it will attract and retain skilled expatriates, competent professionals, and top entrepreneurs as well as the investors. This, in turn, will help in launching business ventures and expedite the process of diversification of the economy, so that the

country can more rapidly achieve its targets of self-reliance and self-sufficiency. The recent law granting permanent residence for non-Qataris helps balance the population, tailored to the country's unique circumstances and requirements. It is also aligned with the human development pillar in QNV2030 and the QNDS implementation of the development of people's capacities, to enable them to sustain a prosperous society and meet the needs of a high-quality workforce.

Infrastructure

The infrastructure pillar is a key input pillar and it includes three sub-pillars: information and communication technologies (ICTs), general infrastructure, and ecological sustainability.

Qatar's performance on the GII infrastructure pillar has improved by two ranking positions and 12.1 scoring points over the last five years with an average of 54.64 points. The main strength areas were in the general infrastructure and electricity output.

Market Sophistication

The market sophistication pillar measures the (1) availability of credit and an environment that supports investment (2) access to the international market (3) competition and market scale (INSEAD 2017).

Qatar's average performance on the GII market sophistication pillar score has decreased by 4.8 points over the last five years as the ease of getting credit and investment sub-pillars were identified as weakness areas. The investment sub-pillar includes assessing whether market size is matched by market dynamism and provides a hard data metric on venture capital deals. On the other hand, the intensity of local competition was marked as a strength area for Qatar in 2017.

Business Sophistication

The business sophistication pillar refers to how adept companies are in developing and applying new technologies in their practices, products and services, and how responsive companies are to the market (INSEAD 2009). Qatar's average performance on the GII business sophistication pillar score has decreased by 12.1 points over the last five years.

Areas of strength were in university and industry research collaboration and in the state of cluster development, which are on the innovation linkages sub-pillar. On the other hand, the main weaknesses of the sub-pillars were high-tech imports and foreign direct investment net inflows.

Knowledge and Technology Outputs

Qatar's performance on this pillar has improved by 3.2 points over the last five years. Strengths lie in foreign direct investment net outflows. However, the weakness was on patent applications by origin and high-tech exports.

Creative Outputs

Creative outputs measure creativity as part of its innovation output with Qatar historically on average scoring 38.32 points over the last five years. Areas of strength were

the use of ICTs in business and organizational models. However, the weaknesses were the "trademark application class count by origin" and "creative goods exports".

4 Entrepreneurial Ecosystem

The Global Entrepreneurship Index (GEI) is a composite indicator of the health of the entrepreneurship ecosystem in a given country. The GEI measures both the quality of entrepreneurship and the extent and depth of the supporting entrepreneurial ecosystem. The main structure of the GEI framework is presented in Fig. 15.

GLOBAL ENTREPRENEURSHIP INDEX	Sub-indexes	Pillars	Variables (individual / institutional)
	ATTITUDES SUB-INDEX	OPPORTUNITY PERCEPTION	*OPPORTUNITY RECOGNITION*
			FREEDOM (ECONOMIC FREEDOM *PROPERTY RIGHTS)
		STARTUP SKILLS	*SKILL PERCEPTION*
			EDUCATION (TERTIARY EDUCATION*QUALITY OF EDUCATION)
		RISK ACCEPTANCE	*RISK PERCEPTION*
			COUNTRY RISK
		NETWORKING	*KNOW ENTREPRENEURS*
			AGGLOMERATION (URBANIZATION*INFRASTUCTURE)
		CULTURAL SUPPORT	*CAREER STATUS*
			CORRUPTION
	ABILITIES SUB-INDEX	OPPORTUNITY STARTUP	*OPPORTUNITY MOTIVATION*
			GOVERNANCE (TAXATION*GOOD GOVERNANCE)
		TECHNOLOGY ABSORPTION	*TECHNOLOGY LEVEL*
			TECHNOLOGY ABSORPTION
		HUMAN CAPITAL	*EDUCATIONAL LEVEL*
			LABOR MARKET (STAFF TRAINING*LABOUR FREEDOM)
		COMPETITION	*COMPETITORS*
			COMPETETIVNESS (MARKET DOMINANCE*REGULATION)
	ASPIRATION SUB-INDEX	PRODUCT INNOVATION	*NEW PRODUCT*
			TECH TRANSFER
		PROCESS INNOVATION	*NEW TECHLOLOGY*
			SCIENCE (GERD*(AVERAGEQUALITY OF SCIENTIFICAL INSTITUTIONS +AVAILABILITY OF SCIENTISTS AND ENGENEERS))
		HIGH GROWTH	*GAZELLE*
			FINANCE AND STRATEGY (VENTURE CAPITAL*BUSINESS SOPHISTICATION)
		INTERNATIONALIZATION	*EXPORT*
			ECONOMIC COMPLEXITY
		RISK CAPITAL	*INFORMAL INVESTMENT*
			DEPTH OF CAPITAL MARKET

Fig. 15 GEI framework. *Source* Global Entrepreneurship Report 2017

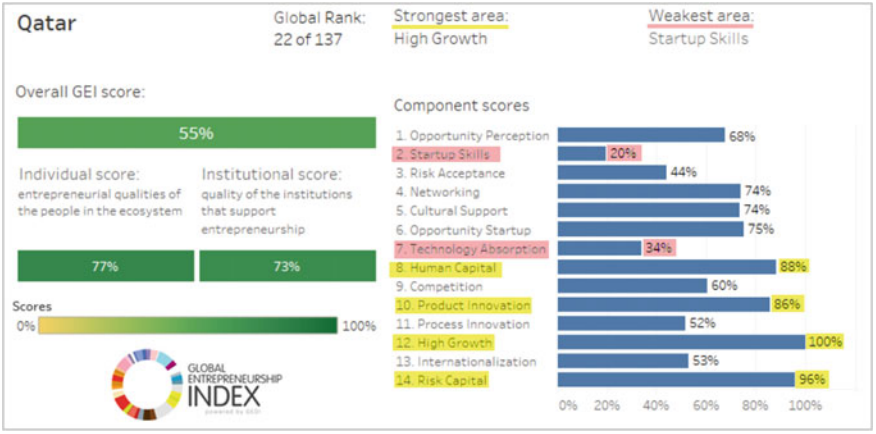

Fig. 16 Qatar GEI performance 2018. *Source* GEI report 2018 (Ács et al. 2017)

4.1 Global Entrepreneurship Index (GEI)

The GEI is composed of three sub-indexes: entrepreneurial attitudes, entrepreneurial abilities, and entrepreneurial aspirations. These three sub-indexes stand on 14 pillars, each of which contains an individual and an institutional variable that corresponds to the micro and the macro-level aspects of entrepreneurship (Ács et al. 2017).

4.2 Qatar Entrepreneurial Ecosystem Performance

With a 55% overall GEI score, Qatar has been ranked first in the GEI 2018 among the GCC countries, second in the Middle East and North Africa (MENA) region and 22nd out of 137 countries worldwide. In 2017, Qatar also had the top scores in process innovation and risk capital in the GEI (Fig. 16).

Qatar has maintained approximately its GEI performance over the last five years from 2014 to 2018, with the improvement of one ranking position and 2.4 scoring points (Fig. 17). Qatar also maintained an advanced GEI position among GCC countries over the last five years, as it ranked first in 2014 and 2018 (Fig. 18).

4.3 Qatar Entrepreneurial Ecosystem, Strengths and Weaknesses

The GEI indicated that the main area of strength for Qatar's performance in 2018 is in the high growth pillar and the main weakness is the startup skills pillar (Fig. 19).

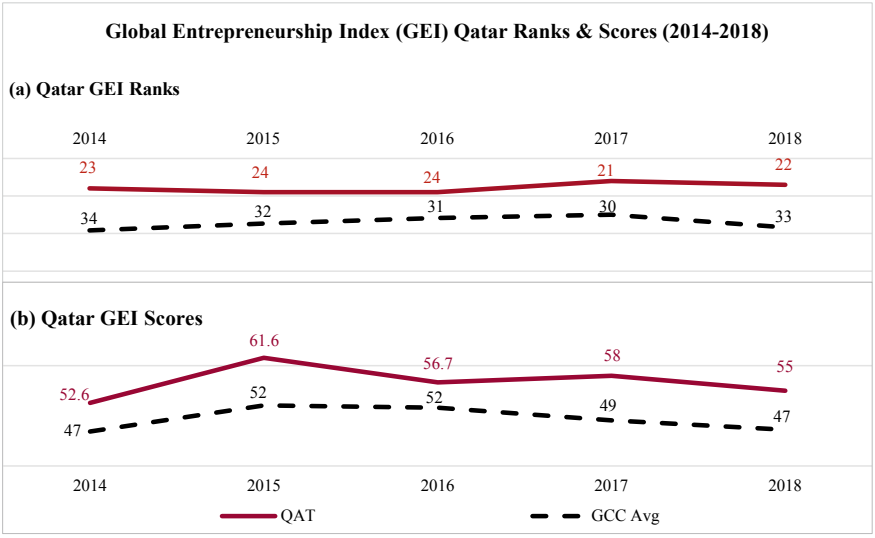

Fig. 17 Qatar GEI ranks and scores 2014–2018. *Source* The author; data from GEI reports (2014–2018)

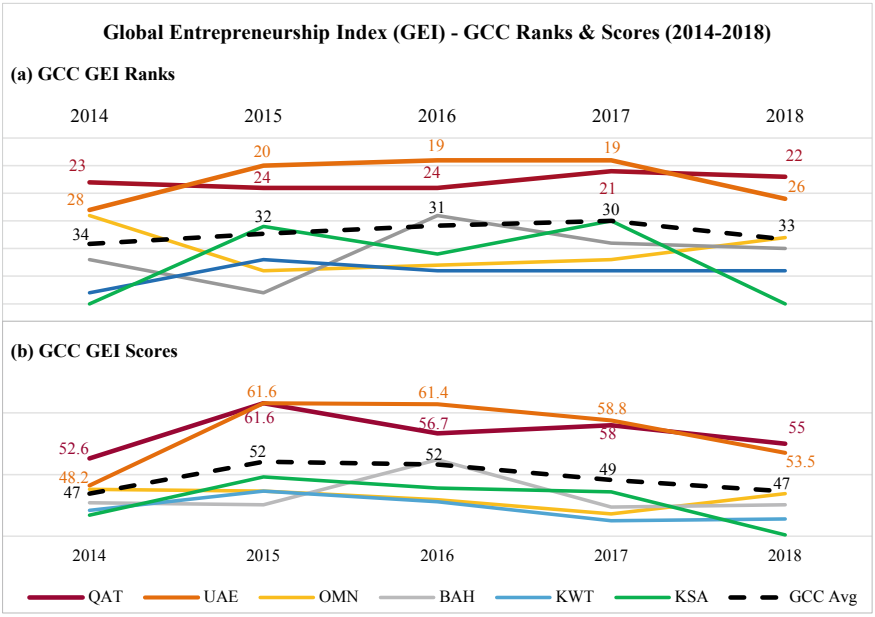

Fig. 18 GCC GEI ranks and scores 2014–2018. *Source* The author; data from GEI reports (2014–2018)

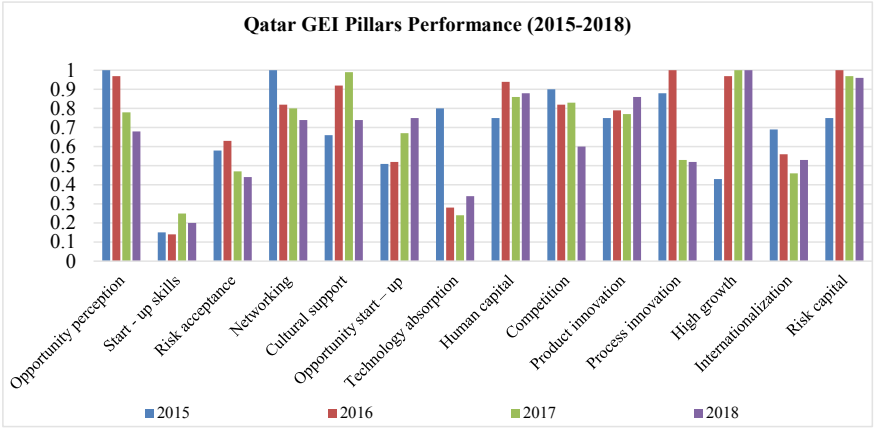

Fig. 19 Qatar GEI pillars performance 2015–2018. *Source* The author; data source GEI reports (2015–2018)

Additionally, the last four years of Qatar's performance from 2015 to 2018 highlighted some areas with high scores, including human capital, product innovation and risk capital pillars. However, the technology absorption pillar had a low score (Fig. 19).

On the other hand, the performance of the GCC countries in the GEI 2018 indicated that Qatar's score was the highest on the human capital and high growth pillars and below the GCC average on the startup skills and internationalization pillars (Fig. 20).

Figure 20 shows that the main areas of strength in Qatar's GEI performance were in high growth, human capital, product innovation and risk capital pillars. On the other hand, the weaknesses were in the startup skills, technology absorption and internationalization pillars. The following sections will investigate these pillars in more detail.

Startup Skills

Startup skills and internationalization are the only two GEI pillars where Qatar's scores are below GCC average score for the 2018 report. The startup skills pillar is focused on providing the population with the necessary skills to start a business.

QSTP is already running several programs to support the population in Qatar with the required startup skills, such as the accelerator programs.

Internationalization

The internationalization pillar is linked to the market size challenge that was discussed under the GCI analysis, where competing in the global market may provide a solution to break the local and regional market limitations. This pillar is also concerned with providing entrepreneurs with the ability to enter global markets and produce ideas that are valuable globally.

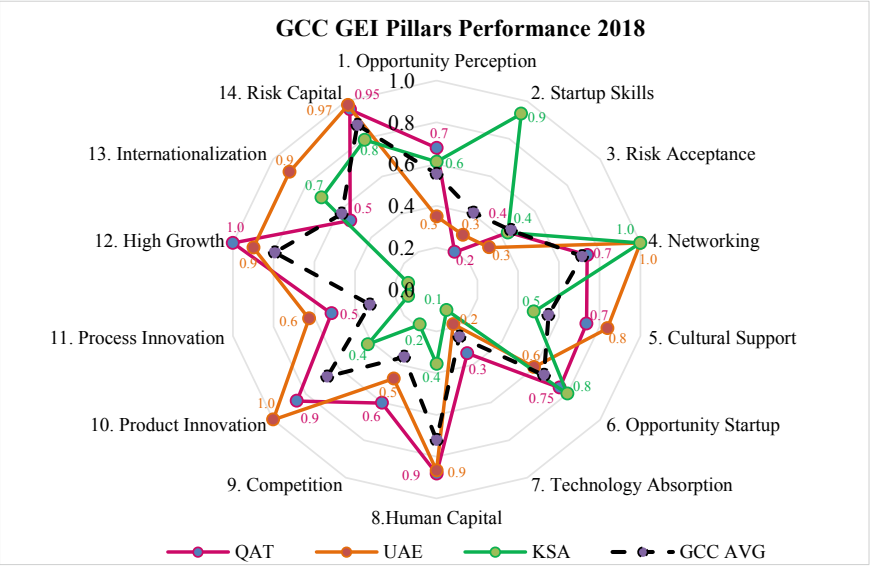

Fig. 20 GCC GEI pillars performance 2018. *Source* The author; data from GEI reports 2018

It is worth noting that QSTP's Innovation Mindset programs, such as the Summer Internship program, European Innovation Academy (EIA), Arab Innovation Academy (AIA), and the Student Innovation trips are all supporting the internationalization and startup skills pillar.

Technology Absorption

The technology absorption pillar measures if the technology sector is large enough that businesses can rapidly absorb new technology. Qatar's score in technology absorption is the second-lowest score in Qatar's performance in GEI 2018. However, it has improved since 2016 and it is the highest among GCC countries.

5 Conclusion and Recommendations

The new trends and challenges in the oil and gas industry, such as the current circumstances of the low oil prices in recent years and the increasing efforts to find renewable energy sources have added more pressure to move faster in transforming Qatar's economy into a KBE.

Qatar, with its strong ambitions for further long-term economic growth by diversification into non- energy sectors, has come a long way in a short time by using knowledge to drive economic development towards transforming itself into a knowledge economy. Therefore, Qatar innovation and entrepreneurship ecosystems are providing the infrastructure support and financial incentives required to facilitate the

knowledge transfer between R&D and local businesses, augmented with the strong alignment between the pillars of Qatar's public policies (QNV2030, NDS 2011–2016 and QNR 2012) and the pillars of the KBE. Qatar has been steadily becoming more globally and regionally (within the GCC countries) competitive, as measured by the global indexes such as the World Economic Forum's Global Competitiveness Index (GCI), Global Innovation Index (GII) and Global Entrepreneurship Index (GEI).

This analysis has identified the main areas of strength and areas for improvement. Multiple challenges are related to the nature and the size of Qatar's population. However, the Qatari government has been dynamic and flexible in response to the challenges, by issuing new laws, plans and programs to tackle these issues.

Based on the performance analysis of the KBE development in Qatar using various pillars and indicators of the GCI, GII and GEI global indexes, the following recommendations can be suggested to overcome some of the weaknesses and to speed up the transition toward the KBE:

The Challenge of the Market Size: Increase Qatar's potential market to overcome the constraints of its small domestic market size, as it is essential for Qatar to look beyond the local and regional GCC market by providing competitive products. with regards to the cost, quality and specialization in the global market.

Human Capital and Research: Promote research culture in the country especially among the nationals and drive the education in schools and universities to be more R&D focused to prepare more high-quality researcher required to move to the KBE.

Skilled Manpower: Promote and support the recent law of granting more secure permanent residency status to non-Qataris of "special competencies" to attract top quality researchers along and the highly talented specialists considering that talented professionals attracted by intrinsic motivators such as longer-term residency are likely to be more committed with the country than those who are driven by extrinsic motivators such as high wages.

Business and Market Sophistication: Promote investing in entrepreneurship and create an environment that supports entrepreneurs in receiving credit and various types of financing to encourage them to commercialize their products, processes, and services. As well as develop policies that tolerate taking risks and protecting them in case of failure.

Creative Outputs, and Knowledge and Technology Outputs: Establish export regulations on technology transfer and the patent registration process. Additionally, promote industry/university/government partnerships as well as the scientists/entrepreneurs/innovators interactions that enable the delivery of the innovative ideas and research output.

Startup Skills: Universities similarly can contribute by promoting post-graduate education, continuing education and online courses, with a focus on entrepreneurship skills. Moreover, startup skills can be included in collegiate recruitment programs at the pre-internship stage. Furthermore, high schools must have business education as a mandatory subject.

Companies and government also can support these skills by funding employees for this type of education and reimbursing childcare expenses after school for the working parent so that this training is attainable.

Companies can also sponsor skill-building events within local associations as part of their social responsibility.

Internationalization: QSTP can support entrepreneurs by helping to identify opportunities on the global market so their products can penetrate the new markets successfully. Furthermore, Allowing them to join global forums and technology associations for ideas and knowledge exchange. Additionally, QSTP can increase the volume of its Innovation Mindset programs and take them to the school level, where they can be offered as part of the curriculum.

Technology Absorption: Various initiatives on different levels can be used to assist in improving the performance of this pillar. On a corporation level, companies can capitalize on technologies that advance their business, especially that of local technology. They also may keep their employees updated with technological advancements and trends. Schools and colleges can also sponsor STEM programs and large companies can sponsor a leading technologist in the ecosystem.

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Food Security in the GCC Countries: Towards a More Diversified and Sustainable Economic Development

Khalil Yahya Al-Handhali and Héla Miniaoui

Abstract This chapter examines the challenges and opportunities for food security in GCC countries and shed lights on the strategies undertaken by these countries to enhance their domestic food security. These include the measures taken after the 2008 world food crisis as well as the strategies announced by the GCC countries to diversify the domestic agri-food sector as part of their long-term economic vision. In addition, this chapter provides some insights into the impact of the current Gulf crisis on Qatar's food security, to illustrate the role of geopolitics in food security in the Gulf.

Keywords Food security · GCC countries · Economic diversification · Sustainable development

1 Introduction

Driven by the fossil fuel boom of the 1960s and 1970s, the six states of the Gulf Cooperation Council (GCC) countries have, within a short span of time, transformed from remote Bedouin pastoral villages into global megacities that are the envy of many today. However, the high dependence on hydrocarbon revenue as the main source of national wealth has left the GCC countries seriously vulnerable to global market dynamics. The 2008 global financial crisis is a case in point. Faced with falling oil prices and potential economic contraction, GCC countries had to mobilize their sovereign reserves to prop up their economies against the deleterious effects of the crisis (Abdelbaki 2010). Based on this experience as well as the threat of the "Arab Spring" events three years later, the GCC member countries have increasingly realized the urgency of diversifying their economies away from exhaustible natural resources. In the meantime, the growing clamor by climate change activists for a

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global shift from fossil fuels to renewable sources of energy adds yet another layer of exposure to global political and social dynamics.

The vagaries of the global hydrocarbon price volatility are not the only risks that incessantly confront the GCC countries. Owing to their aridity, poor soils and desert conditions, their domestic food production potential is so limited that all the six countries rely almost exclusively on food imports to shore up their national food security. For example, Irungu (2017) reported that Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE) import about 92%, 91%, 89%, 97%, 80% and 89% respectively of their domestic food needs. Unfortunately, these global food markets are oftentimes unpredictable and are eminently exposed to supply chain challenges, especially those associated with domestic politics and with climate change (Cheeseman 2016). Indeed, Kaitibie et al. (2019) found that political instability in food source countries negatively influenced Qatar's food imports. Additionally, the GCC countries have learned lessons from the 2008–2011 global food price spike, when some food-exporting countries restricted food exports in order to stabilize their domestic food supply, thereby causing international food prices to more than double (Basher et al. 2013).

Against this background, this chapter examines the challenges and opportunities for food security in GCC countries and the strategies adopted to diversify the agri-food sector. The chapter attempts to answer the following question: To what extent are measures taken by GCC countries to secure their national food security sustainable? Related secondary questions include: what solutions do the long-term economic visions launched by each of the six GCC countries offer to achieving sustainable domestic food self-sufficiency, and, to what extent does the current Gulf crisis influence the food security particularly of Qatar? To answer these questions, the chapter is structured into three main sections. Section one presents some facts and information, partly in graphic form, about the food security situation in the GCC countries. The second section sheds light on the strategies undertaken by the GCC countries to enhance their domestic food security. These include the measures taken after the 2008 world food crisis as well as the strategies announced by GCC countries to enhance the domestic agri-food sector as part of their long-term economic vision. The last section provides some insights into the impact of the current Gulf crisis on Qatar's food security, to illustrate the role of geopolitics in food security in the Gulf.

2 Food Security in the GCC Countries: Challenges and Opportunities

Owing to their low and erratic rainfall, hyper-aridity and infertile soils, the GCC countries have negligible agricultural production, particularly juxtaposed against the need to feed their burgeoning population. For example, as shown in Fig. 1, the average monthly rainfall hardly exceeds 14 mm, which is too low to sustain meaningful agricultural production. At the same time, high ambient temperatures that often reach

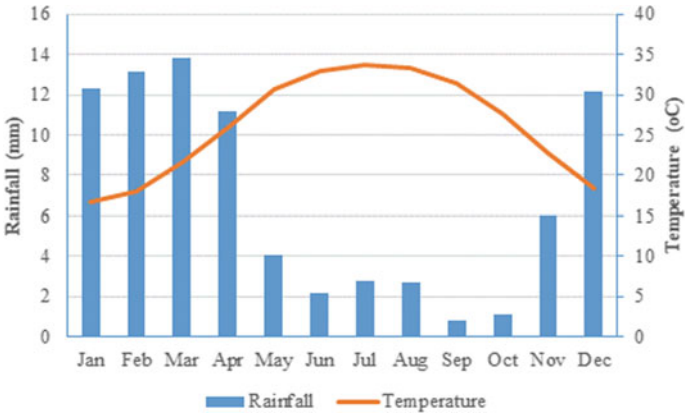

Fig. 1 Average monthly rainfall and temperature of GCC countries (1901–2015). *Source* World Bank data (2019)

50 °C during the summer months (June to September) accelerate evapotranspiration, leading to negligible soil moisture to sustain either crop or livestock production. In addition to the existing harsh climate, Shabbir (2013) indicates that the GCC countries will be seriously impacted by climate change through increases in temperature and variability of the already erratic rainfall.

Accordingly, out of the 2,572,910 km^2 of landmass occupied by the six GCC countries, only 1.4% is arable, and therefore suitable for agricultural production (Table 1) suggesting that the GCC region has insufficient arable land to meet the food demand of its population (Shabbir 2013). In addition, the soils are poorly developed, shallow and loaded with lime and gypsum, which makes them generally unsuitable

Table 1 Land size and volume of fresh water abstracted for agriculture in the GCC

Country	Total land (Km^2)	Arable land (% of total land)	Annual fresh water abstraction (Billion cubic meters)	Annual fresh water abstraction for agriculture (Billion cubic meters)
Bahrain	690	2.1	0.2387	0.1
Kuwait	17,820	0.4	0.415	0.2
Oman	309,500	0.2	1.186	1.0
Qatar	11,610	1.2	0.217	0.1
Saudi Arabia	2,149,690	1.6	22.64	19.9
United Arab Emirates	83,600	0.6	2.8	2.3
Total	2,572,910	1.4	27.4967	23.6

Source World Bank data (2019)

for both food and fodder production (De Pauw 2002). As Dawoud (2005) notes, salinity is a growing problem in all GCC countries, further compromising the already precarious food production potential of soils in the Gulf. According to Abdulrazzak (1994), salinity is high in the GCC, increasing as water moves to the east towards the Arabian Gulf, ranging from 3000 to 15,000 ppm, which is too saline for sustainable arable farming (Shahid et al. 2018).

Agricultural production in arable areas is only possible through irrigation. As shown in Table 1, the six GCC countries abstract a combined 27.5 billion cubic meters of water each year of which 86.4% is used in agriculture. With this level of water abstraction coupled with low recharge of underground aquifers, the GCC region has long surpassed the World Health Organization (WHO) water scarcity benchmark of having renewable water resources of less than 1000 cubic meters per year per capita (Dawoud 2005). In addition, existing underground freshwater aquifers have long been exhausted (Al-Ajmi 2014), with fossil groundwater withdrawals for irrigated agriculture in Bahrain, Kuwait, Qatar, and the UAE far exceeding the total recharge capacity (Odhiambo 2017). In fact, land deformation (development of sinkholes, fissures, differential settling) in the Arabian Peninsula has largely been associated with excessive extraction of groundwater from the fossil aquifers for agricultural use (Othman et al. 2018).

Given the above-mentioned constraints, the main opportunity to expand agricultural production in the GCC is to employ modern technology. For example, to overcome the water deficit problem, many GCC countries are increasingly investing in hydroponics and drip irrigation technologies for the production of vegetables and fruits. Others such as Qatar have resorted to using greenhouse technologies for dairy, fruit and vegetable production. Research at the International Center for Biosaline Agriculture (ICBA) in Dubai has produced many promising biosaline agricultural technologies that perform well in saline or brackish water, including salt-tolerant food crops and fodder species, aquaculture and salt-tolerant plant growth-promoting rhizobacteria (Shabbir 2013).

Other opportunities to assure food security in GCC countries include purchasing or leasing land in other countries for agricultural production. For example, Shahid and Ahmed (2014, p.14) report the following land use arrangements between certain GCC countries and host countries outside the region: Bahrain (Philippines – agroforestry; Turkey—agriculture), Kuwait (Cambodia—rice), Qatar (Kenya—fruits, vegetables; World—food and energy; Vietnam—agriculture), Saudi Arabia (Sudan—wheat, vegetables, animal feed; Indonesia—rice; Egypt—barley, wheat, livestock feed; World—agriculture projects), and UAE (Sudan—corn, alfalfa, wheat, potato, beans; Pakistan—agriculture; Ethiopia—tea). Proponents of these land deals argue that they result in a win-win outcome where the host country benefits from rent, technology transfer, food exports and job creation in exchange for its land. The opponents, on the other hand, view land leases or purchases for agricultural use by rich GCC countries as a land grab that entrenches poverty and food insecurity in host countries, particularly if those countries are net food importers or emergency food aid recipients (Shahid and Ahmed 2014).

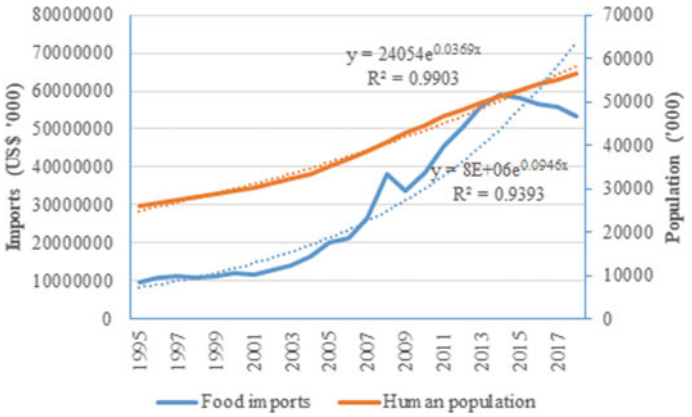

Fig. 2 Trend of food imports and human population in the six GCC countries (1995–2018). *Source* UN Comtrade (2019); World Bank data (2019)

Although the above-mentioned options offer viable opportunities for enhancing food security in the GCC countries, the scope for expanding agricultural production to achieve food self-sufficiency in the Gulf still remains considerably limited by the biophysical constraints inherent in the region in terms of water scarcity, salinity, poor soils, and hyper-aridity. In addition, the growing threat of climate change will exacerbate these constraints, thereby making the task of providing enough food for the burgeoning population even more challenging (Shahid and Ahmed 2014, p.13). It seems, therefore, that the most feasible and sustainable option for meeting the growing demand for food in the GCC for the foreseeable future will continue to be food importation.

As indicated earlier, all the six GCC countries import at least 80% of their domestic food requirements, with some commodities such as cereals, sugar, and meat being 100% imported. As shown in Fig. 2, the value of food imports in the GCC countries rose by a whopping 451.3% from US$ 9.68 billion in 1995 to US$ 53.37 billion in 2018, representing a six-fold increase with a growth rate of 9.46% per year. While this increase is a function of the high population growth rate in these countries (amounting to 3.69% per year between 1995 and 2018), it also reflects a decreased ability of Gulf countries to produce their own food to match the growing demand. Additionally, the adverse effects of global market dynamics are apparent from the graphs. Notably, there was a kink between 2008 and 2009 of −11.95%, reflecting the impact of the vagaries of the global financial crisis on GCC countries' food import demand.

Individual countries show wide variation in their food import demand, perhaps reflecting their production potential, purchasing power and internal socio-political dynamics (Fig. 3). For example, while Bahrain and Kuwait show an increasing linear trend, the trend for the other four countries is approximately exponential with Saudi Arabia's and the UAE's tapering off in 2013 and 2014 respectively. The effect of the 2008 financial crisis is also apparent in all the six countries, albeit with different

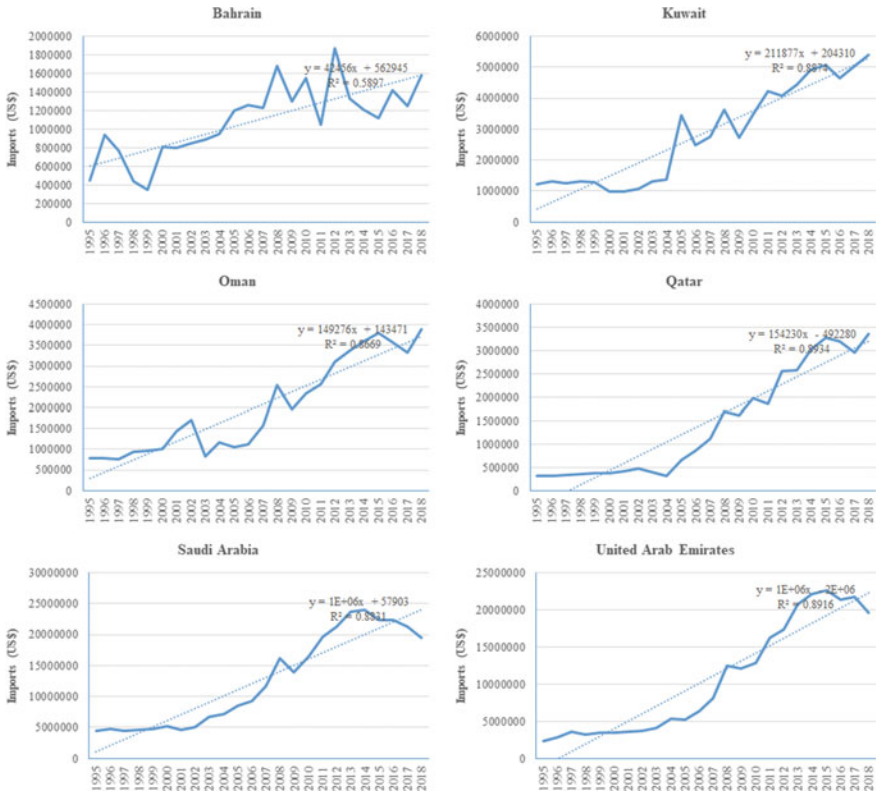

Fig. 3 Trend of food imports in individual GCC countries (1995–2018). *Source* UN Comtrade (2019)

magnitudes of −22.7%, −25.2%, −22.8%, −3.8%, −14.4% and −2.3% for Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE respectively. For inexplicable reasons, Qatar and the UAE were least affected by the crisis while Oman, Kuwait, and Bahrain were the hardest hit. The 2011 "Arab Spring" events seriously affected Bahrain, where food imports fell by 32.4% from their 2010 level, while in Qatar they fell by 6.4% over the same period.

Other opportunities relate to the "software" aspects of GCC countries, such as economic and political stability, strong trade relations with diversified partners, good infrastructure including their modern ports and logistics, stable currency, access to labor and highly-qualified human resources, low tariff and non-tariff barriers to trade, and a positive global standing (Fischbach 2018). Nevertheless, the long-term food security of GCC countries will have to come from domestic food self-sufficiency based on the utilization of desert lands for food production using innovative technologies.

3 What Strategies Do the GCC Countries' Development Visions Suggest for Food Security?

The foregoing constraints have obliged the GCC countries to introduce multiple strategies to ensure domestic food security. For example, following the 2008 global food price rise, all the six GCC countries introduced food-based social security measures to cushion their citizens against rising food prices. These included food subsidies, controlled food prices, an increase in wages and the provision of handouts. As a result, social spending in the GCC countries increased sharply during and after the 2008 crisis, as shown in Fig. 4 for Kuwait, which is the only country with data for that period. Yet, granting social subsidies to deal with an increase in food prices is not sustainable, as they are often poorly targeted and escalate government spending (Woertz 2013). The sustainable long-term food security of the GCC requires that governments contain untargeted social expenditure and pursue economic diversification and widening of their revenue base (Antonelli et al. 2017).

Along with their strategy to diversify their economies and increase the contribution of non-oil sectors to national wealth, all the GCC countries launched their long-term "national vision" programs with the principal aim of achieving economic diversification. Examination of these "visions" (Qatar 2030, Oman 2040, Kuwait 2035, Saudi Arabia 2030, UAE 2021 and Bahrain 2030) reveals an underlying thrust of pursuing food self-sufficiency as one of the key pillars of national security. For example, the Qatar National Food Security Program (QNFSP)—a component of Qatar's Vision 2030—aims to reduce Qatar's reliance on food imports through self-sufficiency, under a two-pronged approach. One strategy is to employ cutting-edge technology in food production while the other involves adding value to imported food commodities through local food processing. Saudi Arabia's "vision", on the other hand, proposes to build strategic food reserves to guard against food emergencies, promote aquaculture, lease foreign land for agricultural production, use available water more efficiently for domestic food production, and reduce resource wastage including food waste.

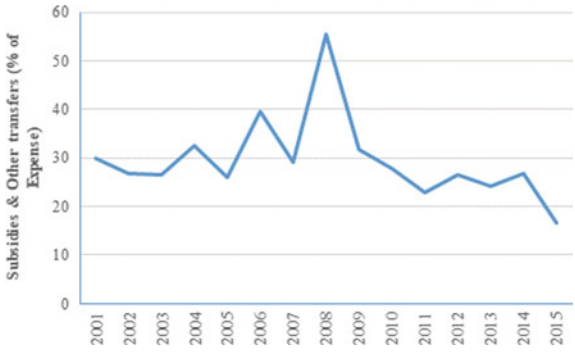

Fig. 4 Trend of subsidies and other transfers in Kuwait (2001–2015). *Source* World Bank data (2019)

It can be clearly seen that there is a consensus in all the six strategies with regard to the importance of diversifying food security programs and enhancing food self-sufficiency initiatives. It is important for the GCC countries to pursue a strategic plan to overcome any potential challenges in the future as their population grows by an anticipated 40% by 2030 (Cheeseman 2016). The large increase in population should be met with an ambitious strategy to meet higher food demand by that time. Thus, the main question for GCC countries is how to keep their people secure by meeting the rising demand for food.

Focusing on the future, investment in farmland in foreign countries seems to be a promising option to shore up food security in the GCC. To date, GCC countries have invested in farmland in Pakistan, India, Tanzania, Kenya, Egypt, Syria, Turkey, Sudan, and Australia. According to the International Food Policy Research Institute (IFPRI), between 2006 and 2009, GCC states bought a third of the almost 20 million ha of farmland which was globally available for sale (Nally 2015). Saudi Arabia, the UAE and Qatar are among the top ten investors in the world when it comes to establishing farms abroad. The UAE alone spent up to US$ 400 million to buy eight farm companies in Serbia and 400,000 ha in Sudan as well as 324,000 ha in Pakistan. Saudi Arabia, in turn, made a deal with Turkey and Pakistan to invest in their agricultural sectors and secure food supply, while Qatar purchased 40,000 ha in Kenya among other areas (Ismail 2015). These kinds of investments, however, slowed at some point due to the global financial crisis and a period when conflicts among local farmers made the supply of food grown overseas volatile, raising a question about the efficiency of investing abroad as a way of securing the food supply in the long term (D'Alessandro and Mohammed 2017). More than that, it at some point became problematic with the press, which framed it as neo-colonialism or a land grab (Nally 2015). There are some countries that enjoy a large agricultural capacity while lacking the necessary infrastructure to host huge investments, such as Tanzania, Ethiopia, and Sudan,. With all these considerations, and in order for the GCC countries to avoid any kind of disruptions or volatility that may occur in the countries of investment, they have broadened the investments to include other more stable countries, such as Canada and Australia, along with the Philippines (Ismail 2015).

Along with overseas investment, some GCC countries have adopted measures to secure their food supply through increasing their strategic reserves of essential foodstuffs. Oman, for instance, is at present working on a US$ 170 million agro-terminal handling and storage facility at Sohar port. The facility will handle 700,000 tonnes of grain and 1.5 million tonnes of sugar annually upon completion (Al-Busaidi et al. 2016). It is worth noting that one of the main pillars of Oman's Vision 2040 is to develop logistics processes, aiming to be among the top 10 countries in logistics by 2040. This will help the country to improve the food supply chain, make Oman one of the major hubs of logistic processes, and facilitate food distribution within the region. With regard to Bahrain, subsequent efforts have in large part been focused on improving the supply chain at home. Most private sector companies involved in food manufacturing in Bahrain, for instance, are looking to upscale their footprints in the region. Mondelez International, a United States food and beverage company,

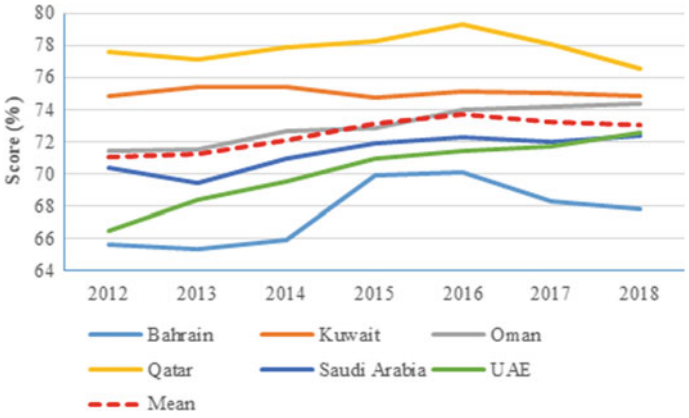

Fig. 5 Trend of food security scores for GCC countries (2012–2018). *Source* The Economist Intelligence Unit (2017)

announced that it would set up a US$ 90 million biscuits plant in Bahrain in 2014 (Woertz 2013). The efforts to build capacity for logistics and improve supply chains are becoming essential and increasingly common among the GCC member countries. For example, the QNFSP targets four main sectors to achieve self-sufficiency by 2023: food manufacturing, agriculture, water and renewable energy (QNFSP 2018).

The strategies adopted by GCC countries appear to be achieving some food security objectives. For example, Qatar, Kuwait, and Oman have been the most food-secure countries in the GCC based on the Global Food Security Index of the Economist Intelligence Unit, where they have consistently scored above the mean for the six countries since 2012 (Fig. 5). This score in part reflects the efforts exerted to overcome food security challenges (EIU 2017). The situation has largely been helped through the stockpiling of imported food.

Other future plans to spur food security in the Gulf include investing in large-scale cross-border infrastructure, such as expanding existing ports in the Red Sea, the Indian Ocean, and the Gulf (Wellesley et al. 2017), construction of a GCC railway network to diversify food supply routes, and investing heavily in research and development (R&D) to produce cutting-edge technologies and innovations in water use efficiency and recycling, energy (including renewables) and agriculture.

Of international importance is to reduce the GCC's carbon footprint and minimize the region's global contribution to climate change. Research shows that the GCC countries have some of the largest carbon footprints per capita due to their heavy reliance on fossil fuels. Investment is urgently needed in diversified energy sources, especially for water desalination to increase food production (Atalay et al. 2017). The use of greenhouse hydroponic technologies and water recycling in food production can overcome existing water challenges in the Gulf through increased water use efficiency (Woertz 2013). Fortunately, these issues are succinctly captured in the economic visions of GCC countries.

4 Geopolitics Matter: Impact of the Gulf Crisis on Qatar's Food Security

Despite the efforts described above by GCC countries to enhance cooperatively their mutual food self-sufficiency programs, the bloc is facing an unprecedented political conflict that may threaten its continuity. The following section sheds some light on the implications of this crisis for Qatar, as an example that best demonstrates how regional conflicts fuel food supply risk, including the measures taken by Qatar to overcome these challenges.

In order to understand the implications of political conflicts for food security, the current Gulf crisis is a good example. Before delving into the ongoing crisis, it is important to trace the geopolitical factors that led to the creation of the GCC. Despite the fact that security concerns, particularly the threat posed by the Iranian revolution, was the leading motive behind the establishment of the GCC in 1981, economic integration between the six states was an important consideration (Abdulqader 2014). The GCC leaders' vision of achieving economic integration among its members is captured in Article (4) of the GCC Charter, which states: "The member states must intensify coordination, integration, and interconnection between them in all fields in order to achieve unity" (Secretariat General of GCC 2016). Accordingly, several agreements have been signed to achieve the desired economic integration, including a free trade agreement in 1983, a customs union in 2003, and a common market in 2008 that guaranteed the free flow of capital, goods, services, and citizens between member states (Abdulqader 2014). Thus, it is obvious that the establishment of the GCC was intended to secure member states from surrounding threats and disruptions. However, even under such collective arrangements, a state may face internal challenges from its citizens and threats from global dynamics. The current Gulf crisis is a clear demonstration of this; all the mutual agreements and efforts toward developing the GCC in the past 30 years have been lost within one year.

On 5 June 2017, Qatar's neighbors, i.e. Saudi Arabia, Bahrain, and the UAE, along with Egypt, imposed a diplomatic blockade against Qatar. In the beginning, the blockade was hugely problematic to Qatar in terms of food supply disruption, given that up to 97% of Qatar's food is imported (see Irungu 2017). Before the blockade, Saudi Arabia and the UAE accounted for 27.4% of Qatar's total food imports by value, with over 40% of Qatar's food imports coming overland through Saudi Arabia (Miniaoui et al. 2018). As shown in Fig. 6, Saudi Arabia and the UAE were among the top 10 countries that accounted for two-thirds of Qatar's food imports before the embargo.

During the blockade, the value of Saudi Arabia's food exports to Qatar dropped by 20.2% in the second quarter (Q2) of 2017 and by 99.3% in Q3 (Miniaoui et al. 2018). Turkey emerged as the leading food source during the blockade with a 190.7% increase over its Q1 export value (Fig. 7). Kuwait and Lebanon made it to the list of top 10 source countries, at numbers 8 and 10 respectively, while the UAE dropped from position 2 in Q1 to position 9 in Q3 (Miniaoui et al. 2018).

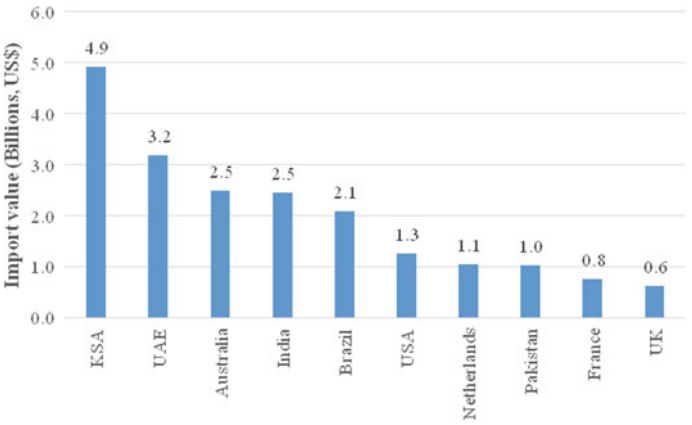

Fig. 6 Qatar's 10 leading food source countries (1998–2017). *Source* Miniaoui et al. (2018)

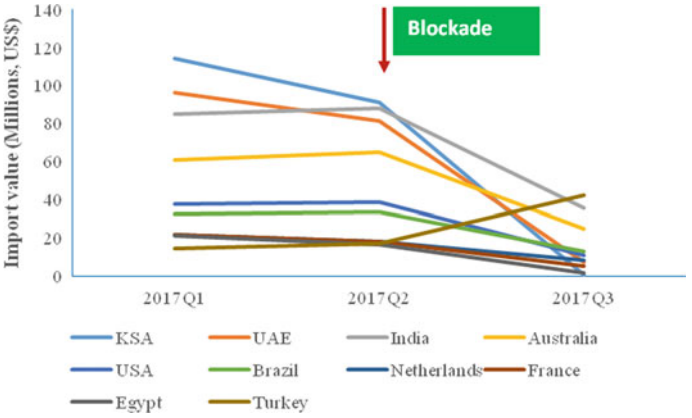

Fig. 7 Effect of the blockade on Qatar's food import value (Q1–Q3 2017). *Source* Miniaoui et al. (2018)

The impact of the interruption of the flow of people and goods, by land, air or sea, can generate severe repercussions, causing huge economic disruption and leading to social or political conflict. However, the Qataris believe that one good aspect of this blockade is that the crisis has exposed its heavy reliance on imports from its neighbors, even with regard to essential foodstuffs such as dairy products, whereby Saudi Arabia was the main supplier of such products. In the short term, Qatar was able to manage the problem and recover quickly by becoming reliant on air and sea freight, with suppliers already connected through Qatar Airways. Lebanon, Oman, Turkey, Morocco, and Iran have already attempted to address the shortages in milk, meat, sugar, and vegetable supplies through air freight (Atteridge and Canales 2017). The new Hamad International Port played a major role in connecting Qatar with

important food sources including the United States of America, Canada, Australia, and Europe. By all accounts Qatar has remained confident in its economic forecasts, and it has signed transportation agreements and bilateral deals with many countries, including Turkey, Oman, and Iran, to speed up the movement of food and also ease the economic pressure imposed by the blockading countries (Baabood 2017).

One year after the blockade, Qatar was able to diversify food imports by opening new supply channels to overcome any future disruptions in its food supply chain. Secondly, Qatar benefited from this blockade by launching a set of national initiatives to increase food storage capacity and domestic food production. In this regard, Qatar has achieved self-sufficiency in fresh chicken, dates and poultry products, at a rate of 98%, 86% and 82% respectively, and expects to be 70%, 90% and 100% self-sufficient in fresh vegetables, table eggs, and fish and shrimps, respectively, by 2020 (Miniaoui et al. 2018).

Overall, Qatar has ensured uninterrupted food supplies. However, despite its ability to do so, Qatar should not overlook its worrying vulnerability and the potentially negative implications of geopolitics for its food security (Baabood 2017). Therefore, in order for Qatar to enhance its food security, it could adopt the following strategies to complement what the government has done so far. First, there is a need to continue efforts to diversify sources of food imports rather than depending on only a few countries. Second, Qatar urgently needs to expand its strategic food reserve by being able to store food in large quantities. It can then add value to the stored food and become a net food exporter itself. Finally, there is a necessity to reduce food waste. Adema (2016) reports that an average Qatari citizen wastes 1.74 kg of food per day while an additional 14% is lost through spoilage even before it reaches the Qatari consumer due to problems with the cold chain. Opening of the food import supply chain to local and foreign competition could create opportunities for specialization and increase supply chain efficiency, which would reduce both consumer prices and food wastage (Kaitibie et al. 2019).

5 Conclusion

This chapter examined the state of food security in the GCC countries. It has found that GCC countries are food-deficient countries that must continue to import food owing to the constraints imposed on domestic production by water scarcity, hyper-aridity, poor soils, and climate change. Having examined the food security situation of the GCC countries, it emerges that a major constraint on their socio-economic development remains their ability to meet the food demands of their people. The issues of supply and price risk are among the key factors that act as obstacles to achieving sustainable food security. In addition, geopolitical, environmental and climate challenges facing the Arabian Gulf region will continue to hinder the economic development of GCC countries. For example, the ongoing conflict between Bahrain, Saudi Arabia and the UAE on the one hand and Qatar on the other has weakened the effectiveness of the bloc in collectively addressing and solving their food security challenges. Although the GCC states' long-term visions have raised the hope

of achieving sustainable economic development through enhancing the role of the private sector, with a focus on small and medium enterprises (SMEs), and promoting a knowledge-based economy, reforming government policies and business regulations still remains a challenge. Low educational standards, a poor attitude towards work and heavy reliance on expatriates and government subsidies among indigenous Gulf citizens will continue to limit the scope of sustainable socio-economic progress in the region. It is expected, however, that the economic vision programs that were launched with so much fanfare in all the six countries will inspire concrete efforts towards sustainable long-term solutions to the food security situation of the region. What remains uncertain is the ability of these countries, given their heavy dependence on expatriates and hydrocarbon wealth, to translate these visions into reality.

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Why Should Saudi Arabia Diversify Its Economy?

Nathalie Hilmi, Shekoofeh Farahmand, and Fateh Belaid

Abstract Climate change is a global issue. According to an IPCC special report (IPCC, Global warming of 1.5 °C. An IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. World Meteorological Organization, Geneva, Switzerland, 32 p, 2018), if global warming is 1.5 °C above pre-industrial levels, this will increase the threat of climate change, challenge sustainable development and increase poverty in the world. All countries must reduce their greenhouse gas (GHG) emissions. The attention paid to countries that produce fossil fuels and export them to the rest of the world is evident in this context. Like other oil-producing countries, KSA faces two challenges for the 2020s: the consequences of the world's low carbon energy transition and the changes associated with economic diversification and the growth of the low carbon economy at home. The country should diversify its economy and develop sustainable projects, like smart cities and sustainable tourism, in order to achieve the Agenda 30 aims and the UN Sustainable Development Goals.

Keywords KSA · Climate change · Sustainable development · Smart cities · Sustainable tourism

1 Introduction

Climate change is a global issue. According to an IPCC special report (IPCC 2018), if global warming is 1.5 °C above pre-industrial levels, this will increase the threat of

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climate change, challenge sustainable development and increase poverty in the world. All countries must reduce their greenhouse gas (GHG) emissions. The attention paid to countries that produce fossil fuels and export them to the rest of the world is evident in this context. Saudi Arabia's GHG emissions are predicted to increase from about 1.12 to 1.19 $GtCO_2e$ by 2030. Nationally Determined Contribution (NDC) would lead to a warming of more than 4 °C and is not compatible with the Paris Agreement (Climate Transparency 2018). Saudi Arabia's economy is over-reliant on the export of fossil fuels. In 2017, its total exports were USD 170 billion, and it ranked as the 26th largest exporter in the world. The largest share concerns crude petroleum—64.7% of the total exports, followed by refined petroleum—8.26%. As a whole, oil and gas account for 76% of total exports (Fig. 1), which demonstrates the dominance of this sector in Saudi Arabia's economy.

This chapter focuses on the energy transition and economic diversification of Saudi Arabia, which is suffering from the so-called "Dutch disease". In various studies, diversification is mostly explained in the context of the 'Dutch disease' literature [e.g. Corden and Neary 1982; Corden 1984; Venables and van der Ploeg 2010; Dobrynskaya and Turkisch 2010 (for Russia); and Gylfason and Nganou 2015 (for Uganda)]. The term "Dutch disease" describes an economic situation where one sector of the economy develops rapidly (particularly natural resources), leading to substantial currency appreciation, yet other sectors decline. Most studies on Dutch disease analyze the negative impacts of natural resource exports on non-resource tradable goods and services. Significant increases in nominal and real exchange rates (or inflation in countries with fixed-exchange-rate regimes) can result (e.g. Corden and Neary 1982; Corden 1984, 2012; Sachs and Warner 1995; Venables and van der Pleog 2010; Tyers and Walker 2016), and some studies have focused on the impact of natural resources on the concentration of non-resource export (Bahar and Santos

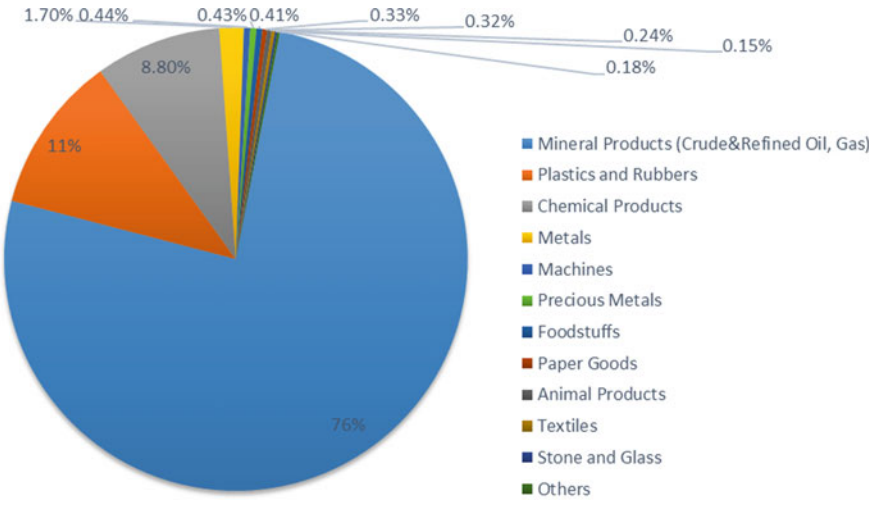

Fig. 1 Exports by product categories in Saudi Arabia, 2017. *Source* OEC online data, 2019

2018). In the first part of this chapter, we will study the energy situation in Saudi Arabia and how the country can move from an economy based on fossil fuels to one with an increased role for renewable energy. In the second part, we consider two sustainable projects encompassing the three pillars of sustainable development (economic, social and environmental) that represent good examples of the economic diversification potential in Saudi Arabia.

2 Part 1: Energy Transition and Economic Diversification

In the MENA region, policymakers face several choices for increasing renewable energy production and energy efficiency. There are, however, risks and obstacles, including technological and financial constraints. First, technologies that can supply renewable energy at a low cost should be prioritized. Second, appropriate policies should be designed and implemented to attract private investment in clean energy (Belaid et al. 2019; Belaid and Zrelli 2019).

The energy sector is facing rapid and profound changes. Cost reductions, innovation and new policies are driving unprecedented growth in renewable energy around the world. The imperative of combating climate change and the need for a new economic model further strengthen the dynamics of this energy transition. As a result, many countries are increasing their level of ambition to accelerate the transition process by relying on two main levers: (i) accelerate the deployment of renewable energy, and (ii) enhance energy efficiency.

Climate change poses threats to the economy of the Kingdom of Saudi Arabia (KSA). On the one hand, like other oil producers, KSA is adversely affected by mitigation policies, since the world's overall policy is reducing the consumption of fossil fuels. Muttitt et al. (2016) state that to have a likely (66%) chance of limiting global warming to below the 2 °C level, or a medium (50%) chance of achieving the 1.5 °C goal, respectively 68% or 85% of reserves must remain in the ground (Muttitt et al. 2016). In this context, if we consider the carbon budget for maintaining 2 and 1.5 °C limits (which are 800 and 350 Gigatons (Gt) of CO_2 respectively), fully extracting and burning Saudi reserves would lead to an estimated 112 Gt of CO_2, which is one-seventh and one-third of total global emissions in a 2 or 1.5 °C carbon budget, respectively (Muttitt and Mckinnon 2017). Global constraints on the use of fossil fuel resources could thus lead to direct economic losses in Saudi Arabia's export revenues (Al-Sarihi 2019), since fuels account for 78.9% of total exports. On the other hand, the physical results of climate change have direct effects on non-oil economic sectors in KSA, such as agriculture, fisheries, tourism, and infrastructure (Al-Sarihi 2019).

In the last decades, KSA has experienced remarkable energy demand growth. This steady increase has been driven by various factors, including high economic growth, a young and rising population, standards of living improvements, the development of energy-intensive industries, rough weather conditions, and a policy of keeping energy prices low, which encourages lavish consumption.

Economic diversification and clean environment goals create an urgent call for energy conservation and emission reduction. Nevertheless, up to now, there has existed a market failure, which makes it difficult for Saudi Arabia to achieve a holistic goal in the light of energy conservation and pollutant emissions reduction. Establishing an effective government policy and stringent constraint mechanism is conducive to solving this issue and facilitating the Saudi Arabian processes of enhancing energy efficiency and reducing carbon emissions.

This section aims to explore the perspectives and challenges of the energy transition in Saudi Arabia, as well as the role of renewable energy and energy efficiency in stimulating and accelerating the energy transition process.

Indeed, stimulating the energy transition is not based solely on a single driving force, but rather on a multiplicity of actors (organizations, institutions, companies, etc.) that are developing creative responses to the challenges and opportunities presented by a dynamic and changing environment.

3 From Fossil Fuels to Renewable Energy

This section will compile an inventory of Saudi Arabian policy on renewable energy and energy efficiency. The main purpose is to provide a comprehensive overview of energy policies in Saudi Arabia, renewable energy and energy efficiency objectives, the regulatory framework, the expected objectives, and prospects.

3.1 Energy Context in Saudi Arabia

Saudi Arabia has been classified as a rentier country and is the world's largest crude oil exporter (Bradshaw et al. 2019). Table 1 summarizes Saudi Arabia's growth and development trajectories.

The country's population has grown from about 10 million people in 1980 to 33.7 million in 2018 (which is about 0.5% of the world population). Although the population growth rate decreased during the period 1980–2018, it has been more than the world average. Most of the population lives in urban areas and KSA's urbanization rate increased from about 66 to 83.8% in this period. Moreover, almost a quarter of this urban population lives in the primary city (Riyadh).

Though Saudi Arabia's GDP almost doubled between 1980 and 2018, the highest economic growth occurred in 1970 when the economy benefited from the oil price shock. In 2018, although Saudi Arabia was ranked 41st in the world in population, it was ranked the 19th most powerful economy in the world. Thus, it is evident that it has a high income per capita. In 2018, Saudi Arabia's GDP per capita (in terms of PPP 2011 constant international dollar) was USD 48,995, which is three times the global average and the 14th highest in the world.

Table 1 The main statistics of Saudi Arabia

Indicators	1980	1990	2000	2010	2018
Demographics					
Population (Million)	9.69	16.23	20.66	27.42	33.70
Population growth rate (%)	5.9	3.6	2.3	2.9	1.8
Urban population (%)	65.9	76.6	79.9	82.1	83.8
Population in the largest city (% of urban population)	16.5	18.7	21.6	23.2	24.4
Economy					
GDP (constant 2010 Billion $)	355.71	293.93	379.22	528.21	700.12
GDP per capita PPP (constant 2011 international $)	..	42,700	43,280	45,428	48,995
GDP growth (average annual %)	11.21 (1971–80)	−1.11 (1981–90)	2.69 (1991–00)	3.28 (2000–10)	3.63 (2010–18)
Oil rents as % GDP	72.1	48.1	42.5	37.9	23.1[a]
Gas rents as % GDP	0.14	0.32	0.54	0.87	0.57[a]
Fuel exports as % merchandise export	99.2	91.7	92.2	87.5	74.5[b]
Agriculture, forestry, and fishing, value added (% of GDP)	1.0	5.7	4.9	2.6	2.2
Industry (including construction), value added (% of GDP)	71.5	49.2	54.2	58.4	49.7
Services, value added (% of GDP)	27.5	45.1	40.9	39.2	48.2
Energy and environment					
Oil production (ktoe)	..	319250	403,601	406,992	496,421[a]
Natural gas production	..	22,567	32,255	54,107	59,984
Energy use (kg of oil equivalent per capita)	3209.1	3573.1	4735.7	6764.4	6905.8[c]
Fossil fuel energy consumption (% of total)	99.99	99.98	99.99	99.99	99.99[c]
CO_2 emissions (Metric tons per capita)	17.5	11.5	14.4	18.9	19.4[c]
CO_2 emissions (kt)	169,404.4	185,803.2	296,935.3	518,491.8	601,047[c]

[a], [b] and [c] data are for 2017, 2016 and 2014, respectively
Sources WDI (2019), IEA (2019)

The share of oil in KSA's GDP has decreased greatly, from 72.1% in 1980 to 23.1% in 2018. Figure 2 presents the trends of GDP and oil and non-oil shares. After the fall in GDP in the early 1980s, it increased steadily until 2002 and escalated afterward. The share of non-oil sectors has increased considerably since 1980 and has shown a relatively smooth growth pathway in recent years.

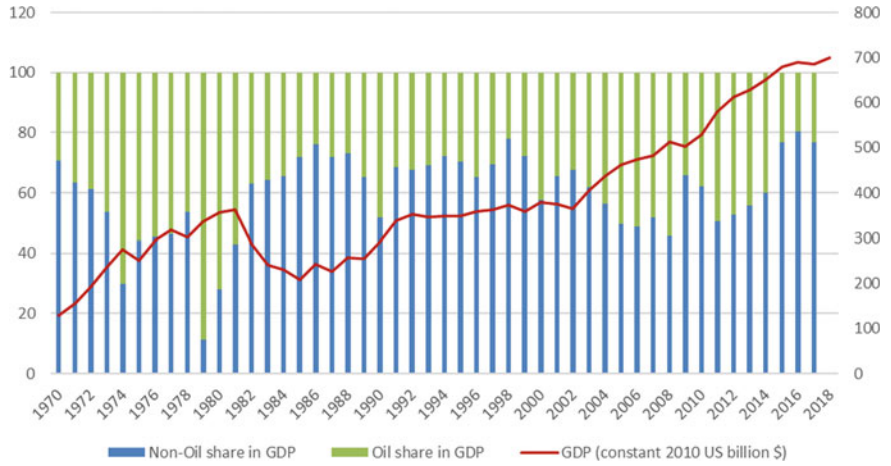

Fig. 2 GDP and the shares of the oil and non-oil sectors in GDP, 1970–2018. *Source* WDI (2019)

According to WDI data, in 2014-the last year for which data are available for KSA-per capita energy use in KSA was 3.5 times more than the average in the Arab world and 3.6 times higher than the world average.[1] In addition, per capita CO2 emissions in KSA are 3.9 times more than the world average, a consequence of high energy use in the country. Also, in 2014, according to the same dataset, Qatar had the world's highest per capita CO_2 emissions (34.9 tons) and KSA was ranked 9th in the world.

Holding about 20% of crude oil reserves and about 22% of world gas reserves, the Gulf Cooperation Council (GCC) countries represent the most important oil-producing region in the world. With reserves of about 266 billion barrels at the end of 2018, Saudi Arabia is the second-ranked oil producer after Venezuela. Saudi Arabia's advantage is its low average oil production cost, which is about USD 8–9 per barrel (Bradshaw et al. 2019). Furthermore, the proven reserves-to-production ratio for Saudi Arabia is more than 63 years, versus 8–10 years on average for international oil companies (Fattouh et al. 2019). Saudi Arabia holds the second-largest natural reserves in the GCC region, the sixth-largest in the world. The estimated proven gas reserves represent about 24.9 billion cubic meters.

However, a decline in oil prices has had a major impact on KSA's budget (see Fig. 3). Besides, during the last 25 years, KSA's oil and gas production rose by 74% while domestic energy consumption rose by 208% during the same period. Within that period, the domestic share of energy consumption grew from 21 to 37% (Groissböck and Pickl 2018).

After the oil price fell in 2014, Saudi Arabia adopted the 'pump-at-will' strategy. It did not agree to production cuts and in fact substantially increased its production to defend its market share and revenues. However, the Saudis decided to change the

[1]GCC states have high rankings in per capita energy use. In 2014, Qatar was ranked highest and KSA 11th.

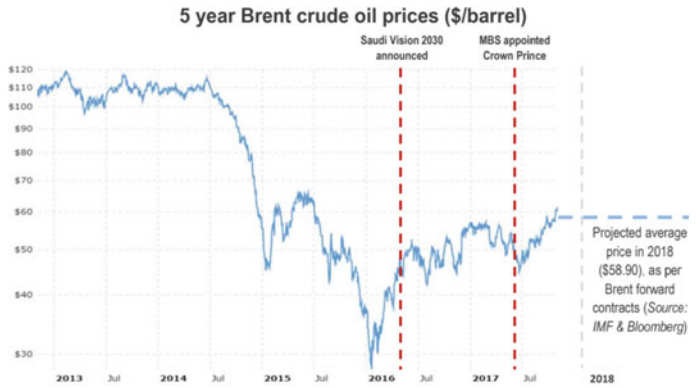

Fig. 3 Brent crude oil prices during the period 2013–2019

policy in 2016 and manage their oil production together with other OPEC members. As oil prices continued to stay low, they understood that it was important to reduce public spending, to increase the role of private initiative in the economy, and to enhance transparency (Bradshaw et al. 2019).

This context of falling oil prices is raising questions about KSA's economic model and its vulnerability to oil price changes. The fast-growing population and the economic growth realized in recent years have led to substantial increases in energy demand, especially concerning residential building construction. KSA's population has risen sharply during the last 20 years (Groissböck and Pickl 2018).

As we can see from Table 1, the building sector is one of the largest energy-consuming sectors in Saudi Arabia. The building sector represents about 40% of total energy consumption, and approximately half of the generated amount is consumed in the residential setting (Alshibani and Alshamrani 2017). Therefore, activities related to residential building consumption represent one of the largest sources of carbon emissions in KSA. The largest demand for oil in KSA comes from the electricity sector.

As illustrated in Fig. 4, industry and transport consume the most energy in KSA. In 2017 these two sectors consumed about 63% of the total energy in the country. At the same time, the share of the residential sector, and commercial and public services, were 10% and 6% respectively. It is worthwhile to note the growth of energy consumption in these sectors.

With roughly 6980 K (kWh)/capita, the per capita consumption rate is one of the highest in the world. According to the KSA Public Utilities reports (KSA PUR 2016), power generation consumes more than half a million barrels per day, and about one million barrels per day during the summer peak period. Today, Saudi Arabia experiences a steady growth of energy demand, with an annual increase of about 6%.

One reason for high energy demand is high energy subsidies. Saudi Arabia's fossil fuel subsidies were USD 29.66 billion in 2016, approximately 3.8 times more than

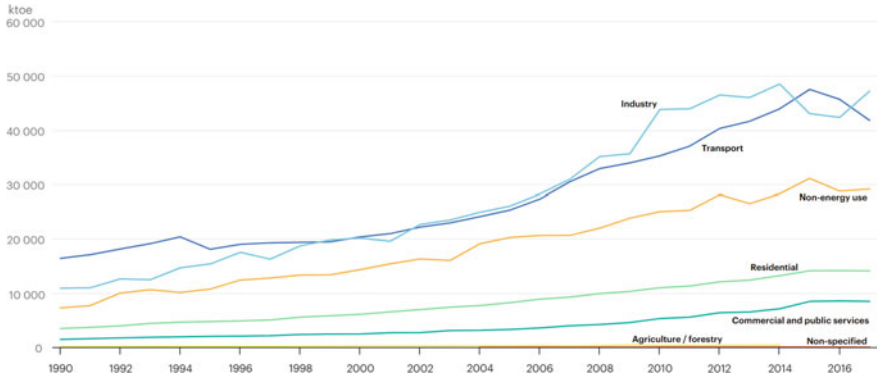

Fig. 4 Total final energy consumption by sector in Saudi Arabia, 1990–2017. *Source* IEA (2019)

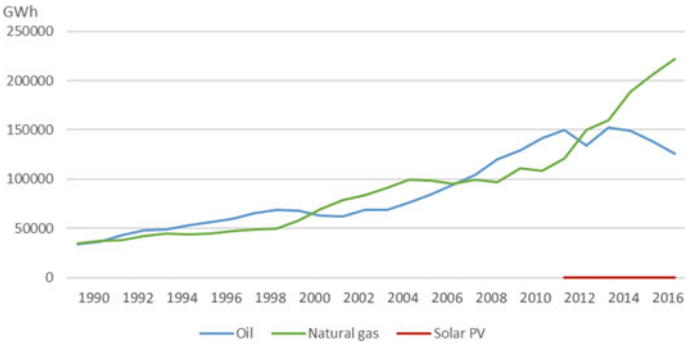

Fig. 5 Electricity generation by source in Saudi Arabia, 1990–2017. *Source* IEA (2019)

the average for G20 countries (Climate Transparency 2018), and USD 37 billion in 2017 (IEA 2018).

The expansion of the demand was mainly due to low domestic retail energy prices leading to a power generation mix based on fossil fuels only (Groissböck and Pickl 2018). In fact, starting at 5 Halalah/kWh the residential electricity prices are the lowest in the world, making renewable energy alternatives economically uncompetitive in KSA.

Per capita electricity demand in Saudi Arabia is one of the highest in the world. In 2017, per capita electricity demand was 9.6 MWh which is three times more than the world average. As can be seen in Fig. 5, almost all electricity is produced by fossil fuels and solar PV has a negligible share (0.5% of the total) in power generation. This has increased the CO2 emission intensity of power generation in KSA. The emissions intensity of the power sector in 2016 was 717 gCO_2/kWh, 1.5 times higher than the average of G20 countries (Climate Transparency 2018).

3.2 *Renewable Energy Potential in the Kingdom of Saudi Arabia: Key Challenges, Strategies, and Lessons Learned*

There is a consensus that new renewable energy sources will be an important component of future energy systems worldwide. Since the World Commission on Environment and Development (WCED) report published in 1987 (WCED 1987), developing economies have become conscious of the fragility of their growth model, which is largely based on the use of finite natural resources. In this regard, with the Johannesburg Plan of Implementation adopted at the World Summit on Sustainable Development in 2002, governments found a greater sense of urgency in taking steps towards sustainable development by significantly raising the share of renewable energy in their total energy mix. Such prioritization could significantly enhance economic growth, productivity, employment, health and education, reduce the social and environmental consequences of energy extraction, and reduce macroeconomic instability.

Currently, one of the major challenges is to stimulate energy transition using low carbon sources to achieve sustainability goals, including a cleaner and healthier environment, broader access to energy, and reduced inequalities.

The 2030 projections show that the demand for energy and especially electricity will grow dramatically in KSA. This is why it is crucial for KSA to develop renewable energy sources to address the security of the energy supply, CO_2 emissions, and climate change issues. Besides having enormous oil resources, the KSA enjoys by far the largest potential for renewable energy sources in the MENA region, notably solar energy.

Acknowledging the lack of a competitive renewable energy sector, despite the impressive potential of solar and wind power, the KSA government approved an ambitious strategy, planning to increase the share of renewable sources in the energy mix and reduce the dependency on fossil fuels. To achieve these ambitious goals, KSA authorities will invest massively in renewable energy sources to spur the deployment of solar and wind energy across the country in the next decades. The main goal of KSA's renewable energy program is to achieve a high energy mix from renewable sources. According to this objective, the KSA set an initial target to generate 9.5 GW of renewable energy (see Fig. 6). In the short term, the initial objective was revised to reach about 27.3 GW. In the medium term, KSA set a target to install 58.7 GW of renewable power sources by 2032, including 40 GW of solar PV, 16 GW of wind, and 2.7 GW of solar CSP.

To accelerate KSA's renewable energy program implementation, twelve pre-developed projects were tendered in 2019 with a total capacity of about 3.1 GW, as displayed in Fig. 7.

This was extremely ambitious given that there were no utility-scale renewable energy projects currently operational in KSA. Given this context, several measures should be taken to enhance renewable energy deployment in KSA, including:

- Design a national program for the development of renewable energy equipment manufacturing,

Fig. 6 Planned renewable energy capacity in KSA. *Sources* KSA Vision 2030, renewable energy program

Fig. 7 Renewable energy projects to be tendered in 2019. *Source* KSA Vision 2030, renewable energy program

- Use the available public funds to leverage and encourage firms to invest in R&D and cost-efficient renewable energy technologies,
- Develop an extensive regulatory framework for renewable power implementation,
- Simplify procedures to attract private and international investment,
- Enhance financial incentives and exemptions to increase industrial investment in rural areas,
- Improve research and development in renewable technologies to ensure local and regional competitiveness,
- Support education and training of a highly-skilled workforce,
- Enhance awareness about the benefits of renewable energy among the population,
- Redirect fuel subsidies to make cleaner energies competitive in the market.

4 Reorientation of Investments, Government Expenditures, and FDI: The Kingdom of Saudi Arabia 2030 Vision

Most sectors worldwide position the reduction of non-renewable energy consumption and greenhouse gases as a major objective. The Intergovernmental Panel on Climate Change (IPCC) designated the building sector, especially the residential sector, as having the biggest untapped energy-saving potential.[2] However, the success of energy transition in the residential sector largely depends on the good-will and capacity to act of millions of housing stock residents. Even if commitments relative to the reduction of energy consumption and the increase of energy efficiency are made on the national and international scale,[3] the challenge will be to modify energy consumption behaviors and to design policies capable of fostering energy efficiency investments.

Al-Sarihi (2019) reports that Saudi Arabia does not have a climate action plan with targets, strategies, and regulations to meet its mitigation and adaptation goals. The country has taken some steps in the direction of climate-based initiatives, including: the first National Energy Efficiency Program, which was a three-year program started in 2003; the Saudi Green Building Forum and establishing the Saudi Energy Efficiency Center in 2010; and the Saudi Energy Efficiency Program started in 2012. The main goal in all these endeavors is to improve energy efficiency, and by investing approximately $53 billion, the country had more than 300 green building projects underwayby the end of 2014. In addition, in 2015 the first CO2 enhanced oil recovery demonstration project—the Uthmaniyah project—was launched to compress and dehydrate CO_2 from the Hawiyah natural gas liquid recovery plant (Al-Sarihi 2019). In 2018 the Saudi government began to permit imports of electric vehicles (Climate Transparency 2018). The Renewable Energy Project Development Office was established to enhance the share of such energy sources in KSA's energy supply mix (Al-Sarihi 2019).

As a part of the Fiscal Balance Program in Vision 2030, the Saudi government introduced energy price reforms targeted at diversifying government revenue sources and improving fiscal stability. The first phase was implemented in 2016 by increasing the prices of gasoline, electricity, and water in different sectors. The second phase took the form of steady increases in prices in the period from 1997 to 2020 (Gelil et al. 2017).

According to the 2019 World Energy Trilemma Index,[4] although Saudi Arabia was placed among the top ten countries in terms of Energy Equity criteria, because

[2]International Panel for Climate Change: https://www.ipcc.ch/pdf/presentations/poznan-COP-14/diane-urge-vorsatz.pdf.

[3]See Energy Efficiency Directive and Energy Performance Building Directive revised in 2018: https://euroace.org/euroace-positions/energy-performance-buildings-directive-epbd/.

[4]The World Energy Trilemma Index has been designed by the World Energy Council with the idea that the success of energy transition depends on managing three core dimensions throughout the transition process: Energy Security, Energy Equity and Environmental Sustainability of Energy Systems. This index rates the national energy policy and performance of countries across these

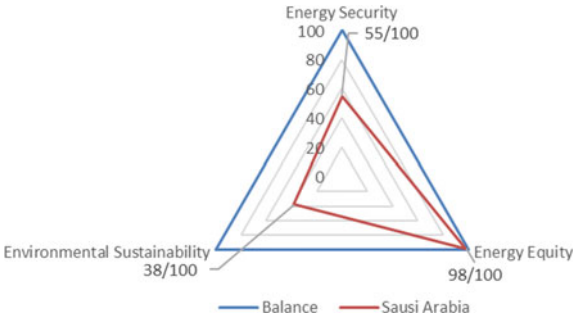

Fig. 8 Energy Trilemma Index for Saudi Arabia, 2019. *Source* World Energy Council (2019)

of universal access and very affordable prices, it scored 62.8 and ranked 87th in the overall index. KSA has a weak performance regarding Environmental Sustainability of Energy Systems (ranked 124 of 128 countries) which is mainly due to high GHG emissions, a restricted system regarding renewables, and high energy intensity. Among GCC countries, the United Arab Emirates has the best rank (52) and Bahrain has the worst (80) (World Energy Council and Wyman 2019) (Fig. 8).

Like other MENA countries, the KSA is richly endowed with renewable energy sources, particularly solar, wind, and biomass. There is a consensus that renewable energy sources represent a viable option for changing the current energy mix, which is still dominated by fossil fuels, as well as for improving environmental quality.

Acknowledging the important role that renewable energy sources and energy efficiency could play in addressing environmental and economic issues, Saudi Arabian authorities initiated a new long-term strategy called Saudi Vision 2030. This strategy includes a large number of economic reform programs, including privatization, aiming to avoid the resource abundance curse and join the path of significant economic growth. The first step toward Vision 2030 was the approval of the National Transformation Program (NTP) in June 2016, aiming to increase efficiency, diversify the economy, cut public spending, reduce subsidies, increase the role of the private sector, and privatize major public assets, as well as create jobs (Bradshaw et al. 2019).

The KSA's 2030 Vision is built around three main pillars: a vibrant society, a thriving economy, and an ambitious nation. The main objectives of the KSA Vision 2030, displayed in Fig. 9, are fourfold: (1) stimulate and encourage private investment participation; (2) reduce government spending; (3) spur and promote non-oil and gas-related industries; (4) improve the population's living standard.

Two years after the launch of Vision 2030, in May 2018, the IMF mentioned the progress of Saudi Arabia in implementing reforms (IMF 2018). The Public Investment Fund (PIF) of Saudi Arabia started to advance diversification plans by large investments in new technology projects, including ride-sharing (Uber), electric vehicles (Tesla), and solar energy (through an investment in the Softbank Vision Fund). The country also has plans to support small- and medium-sized enterprises inside Saudi Arabia (Bradshaw et al. 2019).

three Trilemma dimensions through tracking the pathways that countries have taken in advancing each of the dimensions over the past 20 years (World Energy Council, 2019).

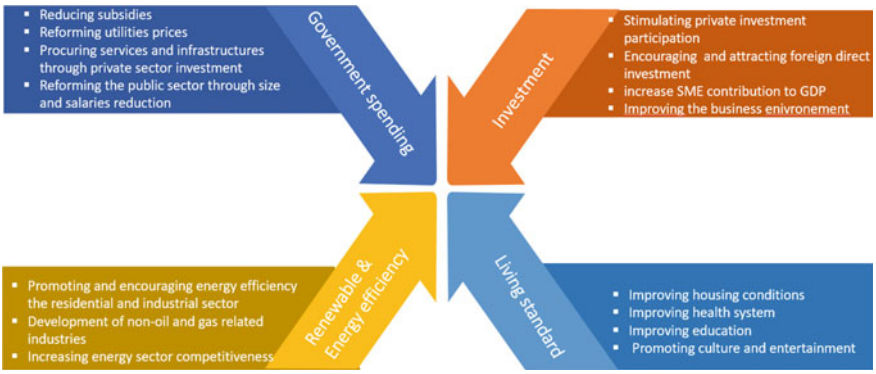

Fig. 9 Main goals of the KSA Vision 2030

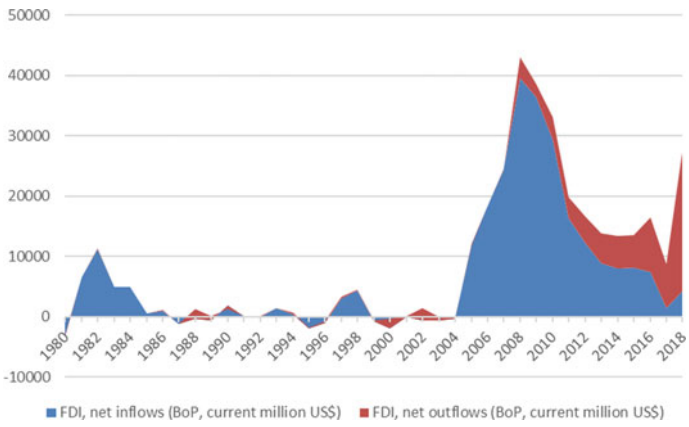

Fig. 10 FDI net inflows and outflows in Saudi Arabia, 1980–2018. *Source* WDI (2019)

In the KSA Nationally Determined Contribution, KSA proclaims its ambition to avoid up to 130 million tons of CO_2 equivalent by 2030 (IRENA 2019). To achieve this ambitious target, the key instrument is the diversification of the economy and investment in adaptation programs. Among the key policies are increasing investment in renewable energy and energy efficiency, promoting carbon capture and storage, and reducing gas flaring. Concerning the adaptation measures, the chief mechanisms include waste and water management, marine protection, urban planning, and measures to reduce and stop desertification. According to the World Development Indicators (WDI), inflows of Foreign Direct Investment (FDI) into Saudi Arabia dropped by more than 80%, from USD 7.5 billion in 2016 to USD 1.4 billion in 2017. In 2018, it increased to USD 4.3 billion (Fig. 10). The peak year for FDI was 2008, in which the net inflow of FDI was 9.3 times more than in 2018. In contrast, FDI outflows show an increasing trend in recent years. KSA's instability is a factor that negatively influenced the attraction of FDI. According to a political stability

index, KSA is classed as an unstable country. In 2017, its value in the index was −0.62 and it ranked 146 among 195 countries for which this index was calculated (Global Economy, 2019).

5 Part 2: Case Studies of Sustainable Projects

To diversify its economy, Saudi Arabia is investing in sustainable projects that have economic returns, social transformation potential, and positive environmental impacts. Saudi Arabia is promoting giga-projects that aim at attracting visitors and showing them the country's natural and cultural wonders, supporting local communities, protecting heritage and preserving the spectacular landscapes and seascapes for future generations. Consequently, the futuristic smart megacity Neom and several sustainable tourism projects have been launched, with the aim of creating a congenial and worry-free environment for visitors.

6 Smart Megacity: NEOM

City governments try to find ways to produce wealth and innovation but also health and sustainability. Making cities "smart" is an effective solution to a broad range of problems of modern cities (Meijer and Rodri 2016). Therefore, the development of smart cities, using ICT, has been considered worldwide as a way of dealing with rapid urbanization and the associated socioeconomic, environmental and governance challenges (Belanche et al. 2016).

The term "smart city" was first used to describe the new, efficient and self-governed cities of the American West in the mid-1800s (Yigitcanlar et al. 2018). Since the 1990s, the term has referred to sustainable urbanization using technology-based innovation in the planning, development, operation and management of cities (Yigitcanlar et al. 2018; Albino et al. 2015; Battarra et al. 2016). Smart cities are highly-developed, environment-friendly and innovative cities (Tahir and Malek 2016) which try to "address social, economic and environmental problems" (Townsend 2013; Wilhelm and Ruhlandt 2018) using new technologies (Batty et al. 2012; Wilhelm and Ruhlandt 2018). In fact, smart cities are cities with smart people as well as smart collaboration and governance, involving the use of smart technologies (Meijer and Rodri 2016). They are characterized by six aspects: smart people, smart government, smart economy, smart mobility, smart environment, and smart living (Giffinger et al. 2007).

The Project of NEOM,[5] the futuristic smart megacity, was first revealed at the conference on "Future Investment Initiative" held in Riyadh on 24 October 2017

[5]The name is a combination of the Greek prefix "neo" meaning "new" and the first letter of the Arabic word "Mostaqbal" meaning "future" (Farag, 2019).

by Crown Prince Mohammed bin Salman (Farag 2019). The PIF has plans to invest USD 500 billion to build this planned smart city on the Red Sea (Bradshaw et al. 2019). NEOM is located in northwestern Arabia, which spans three countries –Saudi Arabia, Egypt and Jordan- and covers an area of 26,500 km^2, 33 times bigger than New York. Its temperature is on average around 10 °C cooler than surrounding areas and the rest of the GCC because of cool winds from the Red Sea. On account of its strategic location, it is expected that NEOM will become a global hub for trade, innovation, and knowledge (NEOM 2019).

The target population of NEOM is two million with around five thousand permanent residents (Shahine et al., 2017). To cover all six dimensions of a smart city, 16 sectors have been designed for NEOM, including: energy; water; mobility; biotechnology; food; manufacturing; media; entertainment, culture and fashion; technology and digital; tourism; sport; design and construction; services; health and well-being; education; and livability (NEOM 2019).

Regarding energy and environment, NEOM plans to produce all of its energy through renewable resources, by using solar panels paired with wind turbines, and to develop a smart transmission and distribution network. NEOM's water will be 100% desalinated using renewable energy with totally smart technology to ensure zero CO_2 emissions and minimal wastewater. Smart infrastructure will be built in (NEOM 2019).

NEOM is planned to be the first city with more robots than the human population (Farag 2019). Concerning the smart economy, the focus is on services (financial services, etc.) as well as clean industries in the areas of nanotechnology, 3D printing, sensors, IoT devices, electric vehicles, robotics, and renewables, in addition to biotechnology and agritech innovations to increase the sustainability of food production (NEOM 2019). NEOM is rich in mineral resources, as well as in reserves of gas and oil, from which 200,000 barrels of oil could be extracted (Farag 2019).

Regarding smart mobility, this sector will concentrate on zero-carbon transportation via sea, air and land. The livability of urban environments will be ensured by designing them to encourage walking, cycling and using electric mobility devices. These will be accompanied by a reliable and wide public transport network (NEOM 2019).

NEOM will be an independent economic zone with its own laws, taxes and regulations, and no restrictions (Farag 2019). NEOM is seeking ways to enhance the relationship between people and nature (NEOM 2019) and will provide a highly-developed, technology-based lifestyle for people as well as a unique environment for businesses. The success of the project faces many challenges, including financing problems (Farag 2019), and it will be necessary to implement economic and social reforms.

7 Sustainable Tourism in Saudi Arabia

The definition of sustainable tourism is the concept of visiting a place as a tourist and trying to make a positive impact on the environment, society, and economy. For Alhaj (2017), "Sustainable tourism focuses on achieving the balance between the needs of the tourists, the environment, local people, and business". Religious tourism in Saudi Arabia is an example of sustainable tourism, as millions of pilgrims from all over the world gather annually in the holy city of Mecca and the management of resources satisfies all the visitors.

In Fig. 11, we can see that tourism is not really very developed in Saudi Arabia and that the tourist arrivals are very dependent on the image of the country globally. The annual growth rate of tourism is 5.25% and the share of KSA in world tourism in 2017 was 1.2%.

Saudi Arabia extends over more than 2.24 million km^2 and has 2500 linear kilometers of coast along the Red Sea and the Arabian Gulf (Al-Sulbi 2010). The variety of natural habitats and ecosystems encompasses deep seas, coastal plains, plateaus and deserts. The sixteen protected areas cover about 4.5% of the country. For Al-Sulbi (2010), to have a sustainable ecotourism in Saudi Arabia requires the integration of both biocentric (nature-centered) and anthropocentric (human-centered) perspectives. Saudi Arabia may be a latecomer to the international leisure tourism market but it is transforming quickly.

For decades, strict visa regulations discouraged sightseeing. Travel restrictions have now been removed and the regulations modified. The new eVisa available to citizens of 49 countries enables non-Muslim tourists to travel easily and inexpensively throughout the country for the first time, except for the two holy cities of Mecca and Medina, while Muslim visitors can now use the new visa to discover the whole

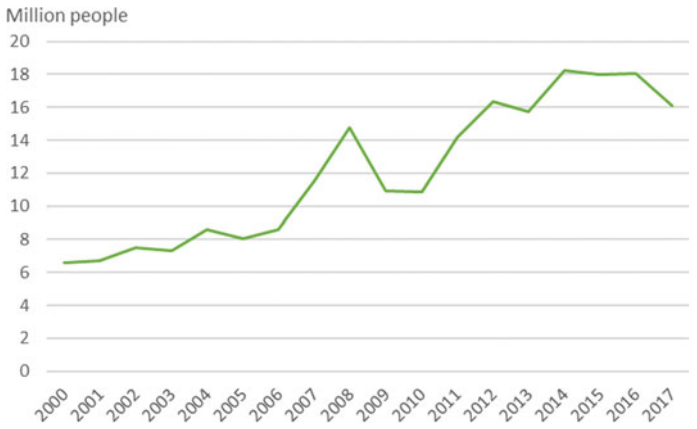

Fig. 11 International tourism, number of arrivals, Saudi Arabia, 2000–17. *Source* World Tourism Organization, Yearbook of Tourism Statistics, Retrieved from World Bank (2019) (https://data.worldbank.org/indicator/ST.INT.ARVL?end=2017&locations=SA&start=1995&view=chart)

country while performing the Umrah pilgrimage. The development of sustainable tourism to diversify the economy is in line with the Saudi Vision 2030. Currently, the tourism sector accounts for 9.4% of Saudi Arabia's total GDP. According to the World Travel and Tourism Council, the Saudi travel and tourism sector could contribute about $70.9 billion to the GDP in 2019 and the rate of international arrivals is predicted to increase by 5.6% annually.

Tourism is already an important source of revenue for Dubai, and so attracting tourists to Saudi Arabia is a difficult challenge as a newcomer in the Arab market. At several seminars and conferences recently organized by travel companies and foreign investors, it was remarked that Saudi Arabia has to adapt its hospitality sector to a kind of tourist different from pilgrims. Saudis know how to deal with religious tours and business conferences, they have to learn how to manage leisure tourism. New jobs are expected to be created thanks to the increase in the incoming foreign tourists, and domestic tourism may also develop, diverting some Saudis from traveling to the UAE. To attract the two million Saudis who visit the UAE annually, the country is positioning itself as a luxury destination with entertainment facilities as well.

One of the challenges for tourism in Saudi Arabia is to guarantee safety for tourists. Before the drone attacks on Saudi Aramco, Saudi Arabia was considered safe. But as a highly conservative country, Saudi Arabia has to soften its image to be considered as a travel destination for tourists. This is why the rules have been relaxed for hotel guests and foreigners may now adopt a less restrictive dress code. Also, the government has launched several musical, cultural and sports events and presented beaches and cultural heritage sites. But with the world now connected to social media, any negative incidents will be quickly shared and will damage international perception of the country.

Nevertheless, many sustainable projects have been developed recently. For example, Al-Ula, the southern hub of the ancient Nabatean civilization, has opened to tourism, revealing a place that connects humans, culture, and nature. Or the Wadi Al-Disah development project, located within the Prince Mohammed bin Salman Natural Reserve, which aims at developing sustainable tourism and creating new job opportunities while protecting the local environment and wildlife in the Kingdom's northwest, achieving sustainability in line with Vision 2030. The location, between NEOM, the Red Sea Development Project, Amaala and Al-Ula, offers an attractive investment opportunity for the private sector.

The Red Sea Project is an ultra-luxury destination for foreign travelers on the shores of the Red Sea, offering an exclusive experience of unparalleled diversity, covering untouched islands, dramatic desert landscapes, and stunning coral seas. The tourists can enjoy high-quality personalized accommodation and service in an amazing natural environment where an archipelago of more than 90 pristine islands is adjacent to the desert and mountains.

Al-Sheikh (2012) studied the deleterious contribution to environmental degradation of tourism in Jazan. If we consider the development of tourism on the Red Sea coast of Egypt, the impact on coral reefs is very harmful (Hilmi et al. 2012, 2018). But as corals are in better shape in Saudi Arabia (Fine et al. 2019), they should be preserved from the impact of tourists. To keep this tourism sustainable, visitors

will be involved in conserving and enhancing the region's natural beauty for future generations. In particular, the Red Sea Project aims at mitigating carbon dioxide emissions, waste production, and light and noise pollution.

8 Conclusion: Projections and Policy Recommendations

Like other oil-producing countries, KSA faces two challenges for the 2020s: the consequences of the world's low carbon energy transition and the changes associated with economic diversification and the growth of the low carbon economy at home. Oil revenues should be used to invest in economic diversification and decarbonization within the country, rather than flow to fossil fuel production and related infrastructures (Bradshaw et al. 2019).

One of the main challenges for KSA is the unavailability of and uncertainties in environmental and economic data and information (Al-Sarihi 2019). The country needs to establish a reference center for collecting, monitoring, and validating such data.

Although there is consensus on moving toward energy and economic diversification, and the country has the potential to expand renewable energy sources, the challenges must be investigated. For example, although Saudi Arabia has sufficient amounts of sun and solar energy could be an appropriate substitution for fossil fuels in power generation, solar panels are vulnerable to sand and humidity, and they are not efficient at very high temperatures (Mouritsen 2018). Hence, implementing such projects requires comprehensive and specialized studies.

The private sector has limited experience because of government controls (Mouritsen 2018). About 30% of the Saudi workforce are employed in the public sector, and almost one-fifth of the GDP is paid as wages by the public sector (Tagliapietra 2019). More space has to be made for the private sector, boosting investment and improving the business environment. In the World Bank rankings for the quality of the business environment, Saudi Arabia scored 71.6 of 100 and ranked 62nd (World Bank Group, 2019).

Considering the large share of energy demand represented by the industry sector, in planning for economic diversification the economy must shift structurally from energy-intensive industries to industries that use less energy and are environmentally friendly. Moreover, the country should diversify its economy and develop the sustainable projects, in order to achieve the Agenda 30 aims and the UN Sustainable Development Goals.

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Corruption, Rentier States and Economic Growth Where Do the GCC Countries Stand?

Nicholas Apergis and Mohamed Sami Ben Ali

Abstract Countries with vast natural resources usually display low economic outcomes and corruption is always considered as a main economic hinderer in this regard. We consider in this study the Gulf Cooperation Countries as endowed with huge natural resources while considering the potential role of corruption on their economic growth. We first theoretically discuss both the cursing and the blessing effect of natural resources on countries' economic outcomes. The empirical analysis employed the panel GMM approach to explore whether and how the investment channel and the political stability channel can contribute to explaining the link between corruption and economic growth. Estimation outcomes show that overall corruption negatively impacts economic growth. Given that usually corruption occurs through the interaction of the business with the public sector, regulatory authorities, as well as policymakers should spend their efforts to improve the transparency of communication between firms and public entities and officials. The result is expected to reduce their discretionary power, as well as the expected gains from corruption. Overall, these countries need to adopt certain institutional reforms, leading to higher accountability, the strength of property rights, and better bureaucratic quality.

Keywords Corruption · Rentier states · Economic growth · Economic diversification · GCC countries

1 Introduction

Economic development is at the center of interest of policymakers and academics worldwide. Policy reports and empirical studies show that many countries endowed with huge natural resources display weak economic development. Therefore, resources are in this case a curse and not a blessing for economic development.

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Many studies have confirmed this resources curse hypothesis for different regions of the world (Ben Ali et al. 2016; Davis 2013; Sachs and Warner 1995).

While many studies in the literature report the curse effect of natural resources, several resources-rich countries, on the contrary, show evidence of a blessing effect. The most cited example in the literature is the comparison between the United States and the United Kingdom. The United States outperformed the United Kingdom in the nineteenth century although endowed with huge natural resources, evidencing the blessing effect of these resources. Canada and Norway are also examples of countries where their natural resources greatly contributed to their economic prosperity.

It is worth noting that most of the initial literature on the curse-blessing effect deals specifically with the impact of the natural resources on economic growth (Brunnschweiler and Bulte 2008). However, other studies extend consideration of their impact to a broader set of economic development indicators such as education and health (Shao and Yang 2014; De Soysa and Gizelis 2013; Carmignani and Avom 2010; Cabrales and Hauk 2011), and income inequality (Goderis and Malone 2011).

While evidence for both effects of natural resources on countries' economic performance exists in the literature, the interference effect of the institutional framework seems to be blamed for the negative impact of these resources (Saha and Ben Ali 2017; Ben Ali and Saha 2016; Cabrales and Hauk 2011). The role of institutions in economic development is therefore crucial (Ben Ali and Krammer 2016). Specifically, a pervasive level of corruption in these countries is seen to be seriously to blame for the negative outcome on all economic development indicators.

The issue of corruption has recently become of greater concern for policymakers and academics worldwide because of its deleterious effect on all aspects of economic activity. As far as economic growth is concerned, the literature offers two strands of studies regarding the role of corruption in the process of economic growth. The first kind of studies, such as Kutan et al. (2009), among others, provide solid evidence that there exists a positive link between corruption and economic development across some Gulf countries. By contrast, in the second kind of studies, Hakimi and Hamdi (2015) explore the same link in the cases of fifteen MENA countries and their findings document that corruption hinders economic growth, through the channels of lower private investments and lower foreign direct investments.

The Gulf Cooperation Council (GCC) countries enjoy huge natural resources. Theoretical and empirical studies usually point to the curse effect of these resources on economic growth while other studies support their blessing effect. We shed light in this study on the corruption-economic growth nexus within the GCC countries. We explore whether natural resources in these countries are a blessing or a curse while considering the interference effect of corruption. Section 2 discusses the theoretical framework of the corruption-economic growth relationship and more broadly its effect on economic development. Section 3 presents empirical results on the impact of natural resources on economic growth for the GCC countries. Section 4 concludes and presents some policy implications.

2 Corruption, Growth and Economic Diversification

Two main strands of studies are documented in the literature, providing two contradictory points of view of the impact of corruption on economic growth. The first strand of literature lies within the context of the "*greasing the wheels of the economy*" theory and advocates that corruption may accelerate economic growth and impact positively economic development because it speeds up the administrative process and minimizes the cost (Lui 1985). The second strand of literature, namely the "*sand the wheel*" theory, supports the view that corruption has a negative effect on economic development as it is economically toxic and causes a transfer of resources to unproductive activities (Mauro 1998; Méon and Sekkat 2005).

Corruption can affect economic growth through different channels. Corruption can reduce government revenues which will in turn reduce health and education spending (Swaleheen et al. 2019; Ben Ali et al. 2016), increase financial stability (Ben Ali et al. 2020) and inflation as well (Ben Ali and Sassi 2016). Corruption can also undermine foreign direct investment (Wei 1997). As documented in Ben Ali and Mdhillat (2015), corruption can have negative effects on international trade flows. It is worth noting that the negative effects of corruption depend on whether corruption is organized or arbitrary and opportunistic (Myint 2000). When corruption is organized, it is possible to measure its amount and extent. However, when it is arbitrary, it is difficult to gauge it.

In a study dedicated to Latin America, Sub-Saharan Africa and in-transition economies, Asiedu and Freeman (2009) show that corruption negatively influences the investment level of firms. They also show that the negative impact differs from one region to another depending on the level of corruption. The indirect effect of corruption on economic growth can be channeled through the financial system. Ahmad and Ali (2010) show that corruption impedes financial development, which in turn decreases economic growth. The same study shows that, unlike the non-Asian countries, in Asian countries corruption and growth are negatively linked. In a more recent study of both low- and high-income countries, Ugur and Dasgupta (2011) show a significant direct effect of corruption on economic growth in the poor countries. Similar results have been reported in a recent study by Ajie and Wokekoro (2012) and Adenike (2013) for Nigeria. Similarly, Matthew and Idowu (2013) show that political corruption is suspected of hindering economic growth, causing poverty and unemployment, but also of decreasing taxes and private investment (Dissou and Yakautsava 2012).

When considering the deleterious impact of corruption, the general perception is that rich countries are less affected by corruption than poor countries with low per capita income. Graeff and Mehlkop (2003) argue that rich countries show less corruption than developing counterparts do. Empirical evidence shows also that corruption reacts differently to an increase in national income at different levels of economic development (Saha and Ben Ali 2017; Ben Ali and Saha 2016). Costs of corruption for countries' economic performance are therefore displayed differently. As documented in Saha and Ben Ali (2017), corruption and economic growth are correlated

in a nonlinear relationship. The nonlinear relationship indicates that at different economic development levels, public officials weigh the benefits of a corrupt act against the potential costs. The expectation is that in poor countries displaying a low level of income, the cost of corruption is relatively low compared to the cost of corruption in rich countries. Therefore, as natural resources economies achieve higher economic growth paths, they can attain lower corruption levels.

When considering the indirect effect of vast resources endowments, the literature supports the idea that resources cause a reduced public capital stock (Bhattacharyya and Collier 2013). The indirect effect of corruption on economic growth can also arise through its depressing channeling effects on investment, the stock of capital, political instability, and openness (Pelligrini and Gerlagh 2004; Mo 2001). Human capital accumulation is another factor where there may be a depressing effect on economic growth. Firms can also pay bribes to pursue rent practices or to avoid rents instead of spending on research and development and accumulating human capital. A depressing effect on human capital will therefore be channeled into lower economic growth (Pecorino 1992). In a similar setting, Ehrlich and Lui (1999) show that the growth inhibiting effect of corruption is more pronounced when countries' human capital stock is low. From a microeconomic perspective, corrupted managers will allocate more time to dealing with corrupted public officials instead of allocating it to productive activities (Kaufmann and Wei 2000).

The GCC countries are endowed with large oil and gas resources. Numerous studies and reports point to some deficiencies for these countries concerning the low level of economic growth compared to their vast wealth. Due to the income derived from these resources, governments in these countries usually do not collect tax from their citizens. Because of this, they are not required to display any accountability or transparency, and so could misuse these resources. Some resources-rich countries seem to witness a high level of corruption even with this natural wealth, which could have an undermining effect on their economic growth.

As far as corruption is concerned, corruption could obstruct or slow down the diversification of their economies. As evidenced by the theory of the natural resources curse, high endowment in natural resources can create a favorable environment for corruption, where the need for diversification is not urgent. It is therefore important for countries to expend more effort to tackle the corruption problem while diversifying their economies. Qatar is an example of a country that, although witnessing low levels of corruption, is looking forward to reducing the share of natural resources exports in its GDP and diversifying its economy, and is introducing many favorable anti-corruption laws and institutions, showing a clear awareness of the negative impact of corruption on economic diversification.

3 Does Corruption Affect Economic Growth in the GCC Countries?

Our study intends to discuss and assess the impact of corruption on economic growth in the GCC countries, considering, for the first time, potential channels of interference. We start with a descriptive analysis based on the correlation scatter plots for our countries of interest in the period 2000–2018. As displayed in Fig. 1, the corruption-economic growth nexus is most evident for Bahrain and Saudi Arabia, and we suspect that corruption hinders economic growth in these countries. However, for the remaining countries, the trend is not very evident. The further empirical analysis will shed light on this relationship for our sample countries. Therefore, in line with the literature, we consider the following panel equation:

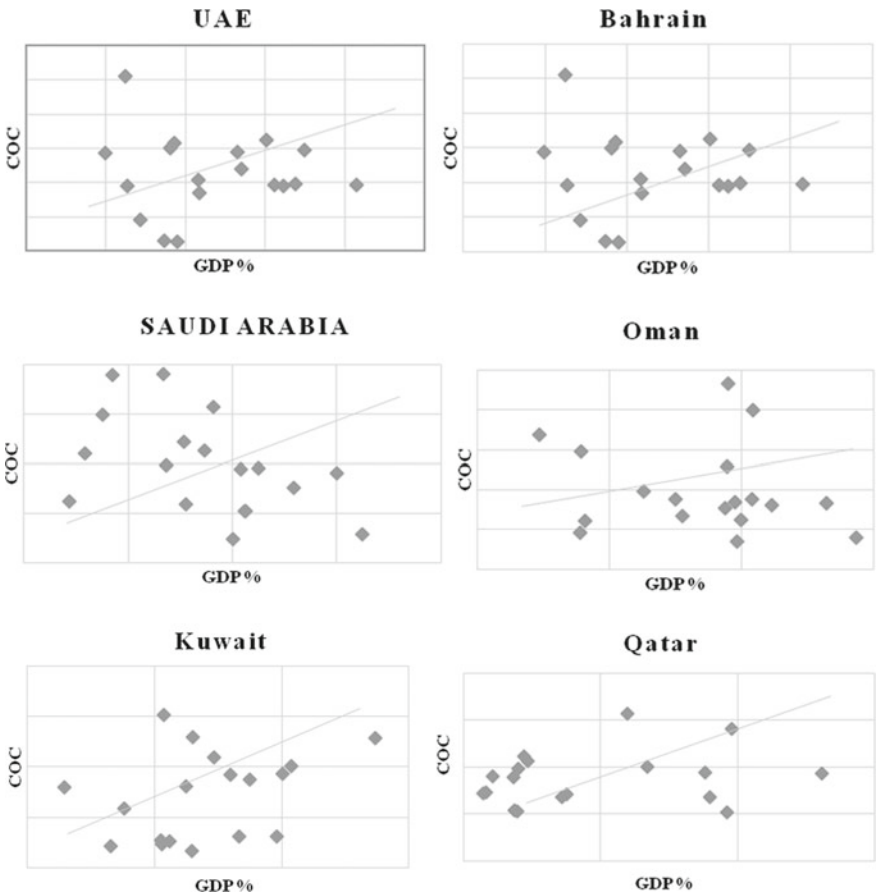

Fig. 1 Corruption and economic growth in the GCC countries

$$GDP_{it} = a_i + \beta 1\ FDI_{it} + \beta 2LABOR_{it} + \beta 3CPI_{it} + \beta 4GOV_{it} + \beta 5I_{it} + \beta 6TR_{it} + \beta 7G_{it} + e_{it}$$

where GDP is GDP per capita, FDI indicates FDI inflows, LABOR shows the labor force, CPI is the corruption index, GOV proxies government efficiency, I shows private investments, TR is trade openness, and G shows government expenditure, a_i defines fixed effects, while e is the error term. We use the panel General Method of Moments (GMM) approach and the Hansen test to check for the validity of instruments.

Annual data for all the GCC countries, i.e. Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates (UAE), spanning the period 2003–2018 were sourced in relation to the following variables: GDP per capita; labor force measured as the total number of workers aged between 15 and 64 years old; foreign direct investment measured as foreign direct investment inflows; government effectiveness, capturing the quality of public services, civil services, and policy implementation, as well as the credibility of governments in reference to this, with the value of the index ranging between −2.5 and 2.5, where higher values imply better outcomes; private investments measured as gross capital formation; government expenses in terms of percentages of GDP; and trade openness measured as the sum of imports and exports as a percentage of GDP. All data except government effectiveness come from the World Bank, with those on government effectiveness coming from the World Development Indicators database. Finally, corruption is measured through the Corruption Perceptions Index (CPI), provided by *Transparency International*. The index ranges from 0 (a country is perceived to be strongly corrupted) to 10 (a country is considered very little corrupted).

Our estimation methodology relies on different steps. First, we use the Pesaran (2004) cross-sectional dependence test. This test examines the validity of the null hypothesis of cross-sectional independence. The results are reported in Table 1 and they reject the null hypothesis. Next, the analysis makes use of two second-generation panel unit root tests. The first one is the Pesaran (2007) panel unit root test with the null hypothesis implying the presence of a unit root. The second one, recommended

Table 1 Cross-section dependence (CD) tests

GDP	16.77[0.00]***
FDI	19.42[0.00]***
LABOR	17.84[0.00]***
CPI	23.47[0.00]***
GOV	21.09[0.00]***
I	18.44[0.00]***
TR	19.65[0.00]***
G	24.58[0.00]***

Figures in brackets denote *p*-values. Significance level: ***: $p \leq 0.01$

Table 2 Panel unit root tests

Variable	Pesaran CIPS	Pesaran CIPS*	Smith et al. t-test	Smith et al. LM-test	Smith et al. max-test	Smith et al. min-test
GDP	−1.26	−1.39	−1.42	2.17	−1.14	1.25
ΔGDP	−5.28***	−5.49***	−5.44***	21.58***	−6.69***	6.94***
FDI	−1.17	−1.32	−1.28	2.48	−1.35	1.39
ΔFDI	−5.46***	−5.68***	−6.37***	21.42***	−7.14***	7.19***
LABOR	−1.32	−1.39	−1.35	2.64	−1.39	1.42
ΔLABOR	−5.49***	−5.64***	−6.35***	21.64***	−6.94***	7.18***
CPI	−1.29	−1.38	−1.35	2.75	−1.48	1.51
ΔCPI	−5.68***	−5.89***	−6.25***	21.46***	−6.59***	6.98***
GOV	−1.32	−1.39	−1.37	2.78	−1.42	1.47
ΔGOV	−5.56***	−5.81***	−5.65***	21.62***	−6.88***	−7.20***
I	−1.29	−1.38	−1.36	2.68	−1.39	1.49
ΔI	−5.85***	−6.12***	−5.99***	22.91***	−7.45***	7.62***
TR	−1.39	−1.48	−1.46	2.99	−1.49	1.58
ΔTR	−5.97***	−6.28***	−6.17***	23.51***	−6.19***	6.68***
G	−1.39	−1.52	−1.48	2.75	−1.49	1.52
ΔG	−5.68***	−5.89***	−5.75***	22.43***	−5.77***	5.98***

Δ denotes first differences. CIPS* = truncated CIPS test. Critical values for the Pesaran (2007) test are −2.40 at 1%, −2.22 at 5%, and −2.14 at 10%, respectively. For both tests the results are reported at lag = 4. ***: $p \leq 0.01$

by Smith et al. (2004), accounts for both time series and cross-sectional dependence. The null hypothesis associated with all four versions of the test shows the presence of a unit root. The results presented in Table 2 report that all variables of our model show the presence of a unit root in the levels.

The empirical results are provided in Table 3. Specification (1) describes only the bivariate results (economic growth and corruption variables), while specification (2) presents the multivariate case. With respect to the corruption variable, the findings clearly highlight that corruption worsens economic growth performance. These findings remain consistently similar across both specifications. For our control variables, our estimations show that private investments, government expenses, FDI inflows, trade openness and government efficiency lead to higher economic growth.

In terms of the diagnostics, reported in Table 3, our findings reject the test for second-order autocorrelation, AR (2). They also reject the null hypothesis of difference-in-Hansen tests of the exogeneity of instruments. In terms of the Hansen test, it clearly documents the validity of the instruments used.

The third step in our methodology explores whether and how certain transmission channels can contribute to explaining the link between corruption and economic growth by focusing on two main channels: the investment channel and the political stability channel.

Table 3 GMM estimates

Variables	(1)	(2)
ΔPCI	−0.088***	−0.085***
	[0.00]	[0.00]
ΔPCI(−1)	−0.049***	−0.042***
	[0.00]	[0.00]
ΔLABOR		0.075***
		[0.00]
ΔLABOR(−1)		0.050***
		[0.00]
ΔFDI		0.068***
		[0.00]
ΔFDI(−1)		0.041***
		[0.00]
ΔI		0.046***
		[0.00]
ΔI(−1)		0.027**
		[0.03]
ΔGOV		0.089***
		[0.00]
ΔGOV(−1)		0.051***
		[0.00]
ΔG		0.059***
		[0.00]
ΔG(−1)		0.031**
		[0.02]
ΔTR		0.078***
		[0.00]
ΔTR(−1)		0.046***
		[0.01]
Diagnostics		
R^2	0.58	0.69
AR(1)	[0.00]	[0.00]
AR(2)	[0.39]	[0.47]
Hansen test	[0.54]	[0.59]
Difference Hansen test	[0.78]	[0.85]
No. of observations	96	96

Notes Figures in parentheses denote *p*-values. ***: $p \leq 0.01$; **: $p \leq 0.05$

According to Mauro (1995), the investment channel offers such an explanation. In particular, corruption affects economic growth in a negative manner through fewer investment projects being undertaken. The literature also suggests a second channel through which corruption affects economic growth, which is the political stability channel. According to theoretical explanations, this channel shows a positive association between income inequality and instability in the society. More specifically, higher income inequality leads to the presence of stronger motivations for agents to engage in illegal activities, mainly for personal material benefits. As a result, property rights are greatly diminished, private investment projects are mitigated, and thus economic growth is reduced, while income inequality rises (Mo 2000).

Based on the above discussion, Eq. (1) changes into the following model:

$$\begin{aligned} GDP_{it} = {} & a_i + \beta_1 FDI_{it} + \beta_2 LABOR_{it} + \beta_3 CPI_{it} \\ & + \beta_4 GOV_{it} + \beta_5 I_{it} + \beta_6 TR_{it} + \beta_7 G_{it} + \beta_8 FDI_{it} \times CPI_{it} \\ & + \beta_9 GOV_{it} \times CPI_{it} + \beta_{10} I_{it} \times CPI_{it} + e_{it} \end{aligned} \quad (1)$$

where the interaction terms FDI × CPI and I × CPI show the transmission channel of investments, while the interaction term GOV × CPI displays the second transmission channel. The new findings are reported in Table 4. They show evidence that all channels exert a negative effect on economic growth.

In other words, the findings indicate that both the abovementioned channels are substantially important channels through which corruption exerts a detrimental impact on economic growth. The coefficients β_8 and β_{10} signify the joint indirect effect of corruption on economic growth through both the domestic investment and the foreign direct investment channels, while the coefficient β_9 displays the indirect impact of corruption on economic growth through the government effectiveness channel. Not only do all three coefficients carry the expected sign based on theoretical arguments, but also the estimated results are in line with the findings of the literature discussed above, albeit for other groups of countries, that have provided solid evidence of a positive relationship between economic growth and all the three variables under study that proxy the potential variables through which corruption can impact economic growth (Pellegrini and Gerlagh 2004; Pellegrini 2011; among others).

In quantitative or economic terms, the sum of the first two coefficients turns out to be $(-0.058) + (-0.064) = -0.122$, implying that a 1% increase in corruption leads to 0.12% decrease in both domestic and foreign direct investments, and, therefore, to 0.12% lower growth outcomes, while the coefficient of government effectiveness (-0.077) highlights that a 1% increase in corruption reduces government effectiveness by 0.08%, which impacts negatively economic growth by 0.08%. It is apparent that the coefficient associated with the government's efficiency displays the strongest effect on growth against the individual roles of domestic and foreign direct investments. Overall, corruption seems to negatively impact certain economic sectors, such as investments and government effectiveness, inducing a negative impact on economic growth.

Table 4 GMM estimates-transmission channels

Variables	Coefficient	*P*-value
ΔPCI	−0.073***	[0.00]
ΔPCI(−1)	−0.040***	[0.00]
ΔLABOR	0.067***	[0.00]
ΔLABOR(−1)	0.042***	[0.01]
ΔFDI	0.059***	[0.00]
ΔFDI(−1)	0.038**	[0.02]
ΔI	0.041***	[0.01]
ΔI(−1)	0.022**	[0.05]
ΔGOV	0.069***	[0.00]
ΔGOV(−1)	0.037**	[0.02]
ΔG	0.053***	[0.00]
ΔG(−1)	0.025**	[0.04]
ΔTR	0.062***	[0.00]
ΔTR(−1)	0.039**	[0.02]
ΔFDI × ΔCPI	−0.058***	[0.00]
ΔI × ΔCPI	−0.064***	[0.00]
ΔGOV × ΔCPI	−0.077***	[0.00]
Diagnostics		
R^2	0.74	
AR(1)	[0.00]	
AR(2)	[0.48]	
Hansen test	[0.62]	
Difference Hansen test	[0.87]	
No. Of observations	96	

Notes Figures in parentheses denote *p*-values. ***: $p \leq 0.01$; **: $p \leq 0.05$

4 Conclusions and Policy Implications

Experience shows that countries with vast natural resources endowments display low economic growth trends. Actually, when considering countries' endowments in natural resources and the impact of this on their economic growth, two main strands of studies can be seen in the literature: the blessing strand and the curse strand. The first shows that huge endowment with natural resources induces a positive impact on economic growth. The second reports negative economic outcomes. The institutional framework, and more specifically corruption, has an interference effect in the natural resources-economic growth nexus, as found in numerous studies.

Gulf Cooperation Council countries are countries with large oil and gas resources. This study empirically explored the influence of corruption on economic growth in the

case of the GCC countries, over the period 2003–2018. We employed the panel GMM approach, where the results documented the negative correlation in the corruption-economic growth nexus. These findings are consistent with earlier studies about the negative role of corruption in economic growth in many countries.

Given that, usually, corruption occurs through the interaction of the public sector with business (i.e. firms), regulatory authorities, as well as policymakers, should expend efforts to improve the transparency of communication between firms and public entities and officials. The result is expected to reduce the discretionary power of public officials, as well as the expected gains from corruption, while it will definitely mitigate the role of bribery as a connecting link between business and public bodies. Overall, these countries need to adopt certain institutional reforms, leading to higher accountability, secure property rights, and stronger bureaucratic quality. Such reforms could include economic measures that protect property rights and contribute to better competition conditions, as well as judicial reforms, where laws and regulations are more rigorously enforced.

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Oman's Shift to a Post-Oil Economy

Aisha Al-Sarihi

Abstract Oman's economy has grown dramatically since 1970. Until recently, however, Oman's economic progress has been largely driven by the wealth generated from oil export revenues. Despite historical attempts to diversify the economy away from oil, the state budget has remained dominated by oil export revenues, accounting for 84.3% of total government revenue in 2014 and 68.2% in 2016. Without successful development of alternative sources of income and reduced dependence on oil, Oman's economy will remain highly vulnerable not only to the fall in oil prices but also to other challenges including increasing domestic demand for energy, as well as the effects of climate change on both oil and non-oil economic sectors. This chapter provides policy recommendations that can help overcoming structural challenges and tapping into the opportunities to achieve the goals of economic diversification and shifting towards a post-oil economy.

Keywords Oman · Economic diversification · Post-oil · Oil prices · Climate change

1 Introduction

Economic development in Oman started when Sultan Qaboos assumed power in 1970. The discovery of oil reserves in the 1960s and the revenues gained from their export have significantly contributed to Oman's economic development. Despite many attempts to diversify the economy away from high dependence on a single source of income, the dependence on oil export revenues as a main source of income has continued until recently, accounting for 84.3% of total government revenue in 2014 and 68.2% in 2016, due to a drop in oil prices post mid-2014 (World Bank 2019).

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Without successful development of alternative sources of income and reducing dependence on oil, Oman's economy will remain highly vulnerable not only to a fall in oil prices but also to challenges arising from increasing domestic demand for energy, as well as economic effects of global climate change mitigation measures. Rising domestic energy demands, if not met with new supplies, will divert natural gas allocated for exports to local use, lowering revenues from natural gas exports and necessitating costly import options. Global climate change mitigation measures, especially those associated with reducing fossil fuel consumption and enhancing energy efficiency and self-sufficiency, present an additional threat to Oman's economy similar to that of oil price shocks, and thus could impose direct economic losses (Al-Sarihi 2019).

The Omani government is not unaware of the aforementioned challenges, especially the economic vulnerability to oil prices and the domestic increase in energy demands. In fact, Oman was the first Gulf country to pursue long-term economic development plans for implementation on a 5-year cyclical basis, with the first 5-year plan implemented in 1976 through 1980 (Allen and Rigsbee 2000). The first 5-year plan focused mainly on building infrastructure, schools, hospitals and major governmental institutions. The impulse to diversify the economy away from solely depending on oil began in the 1990s due to the first incident of oil prices falling, which led to unprecedented deficits in the state budget. Therefore, the preparation of the fifth 5-year plan (1996–2000) was driven by governmental intent to broaden Oman's economic base through developing and diversifying non-oil sectors, enhancing the role of the private sector in economic development, and empowering the country's human capital. However, the rise of oil prices post-2002 slowed down such economic diversification efforts.

The fall in oil prices in 2014, along with accumulated issues of unemployment, has renewed the urgency to diversify the sources of income. Initiated in 2016, The National Program for Enhanced Economic Diversification (TANFEEDH) aims to accelerate the process of economic diversification through the implementation of the ninth 5-year plan (2016–2020) and achieve the goals set by Oman Vision 2020. Along with austerity measures such as removal of fossil fuel subsidies, the introduction of taxes and cutting employees' annual increments, the TANFEEDH program targeted the development of five economic sectors: manufacturing, logistics, tourism, finance and employment. To facilitate its implementation, the formulation of the TANFEEDH program involved inputs from different societal segments including the private sector and governmental entities as well as citizens.

Oman's economy has indeed improved drastically since 1970. However, it has been largely dependent on oil revenues. Despite governmental attempts to decouple the economic development from oil revenues between 1996 and 2020, the ambitious economic diversification objectives, including human resource empowerment, promoting the role of the private sector in the economy, as well as enhancing the growth of non-oil economic sectors, are yet to fully materialize. Given the rise of climate action ambitions, especially post-2020, continuous dependence on oil export revenues is no longer a safe pathway for Oman even if the oil prices rise again (Al-Sarihi 2019). This chapter concludes with policy recommendations that can help

overcoming structural challenges and tapping into the opportunities to achieve the goals of economic diversification and shifting towards a post-oil economy.

2 The Discovery of Oil and Gas and the Shaping of Oman's Economy

Like its neighboring countries of the Gulf Arab states, oil and gas wealth has played a significant role in Oman's economic development. The success of Oman's economy has been rooted to its petroleum and natural gas export revenues. The commercial production of oil in Oman has been key to funding state-sponsored developments, including basic infrastructure such as the building of transportation infrastructure, schools, hospitals and telecommunication systems, and the introduction of electricity services in the country. This activity fostered steady economic growth and greatly improved the standard of living (MOG 2013).

Commercial production of oil started in 1962 when, after 37 years of intensive oil exploration activities, the Petroleum Development Company discovered commercially-viable oil reserves in the Yibal field; this find was followed by discoveries in the Natih and Fahud fields in 1963 and 1964, respectively (van Scherpenzeel 2000), which were followed by several more oil discoveries. The first oil cargo was exported in 1967 and this was followed by the discovery of natural gas in 1978, which shifted attention to increasing investment in the gas sector. This, in turn, shifted the local energy sector away from oil to meet increasing local demand for power generation, water desalination and export contract commitments (MOG 2013).

Oman's crude oil production grew steadily from 283,000 barrels per day in 1980 to 955,000 barrels per day in 2000, albeit with some periods of shrinking production. For instance, after peaking at 955,000 barrels per day, production in the following years fell, to 710,000 barrels a day in 2007, which was nearly the number in 1990. In 2011, Oman produced 884,900 barrels per day, which accounted for a more than 24% increase over the previous four years from the 2007 minimum (NCSI 2015) (Fig. 1).

This increase in oil production and export was accompanied by an expansion of the gross domestic product (GDP) per capita by an average of 9.7% between 1966 and 1990 (World Bank 2015). Since then, Oman's economy has been heavily reliant on oil and gas export revenues, which contributed 81.1% of the country's gross export revenues in 2012 and a significant part of its GDP, increasing from 41.9% of GDP in 1991 to more than 50% in 2011, and still just under 50% in 2014 (NCSI 2012). Meanwhile, non-oil revenues contributed 48% of the GDP in 2011 and 60% in 2014 (NCSI 2015) (Fig. 2).

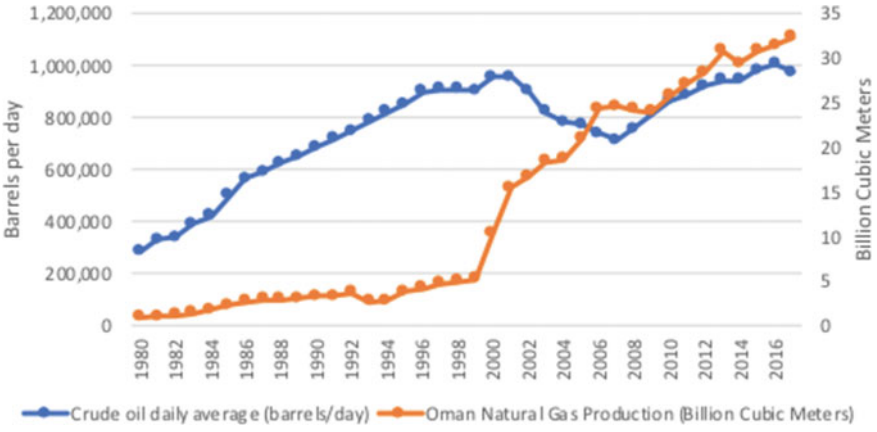

Fig. 1 Oil and gas production in Oman (1980–2017). *Source* NCSI (2012) and BP (2018)

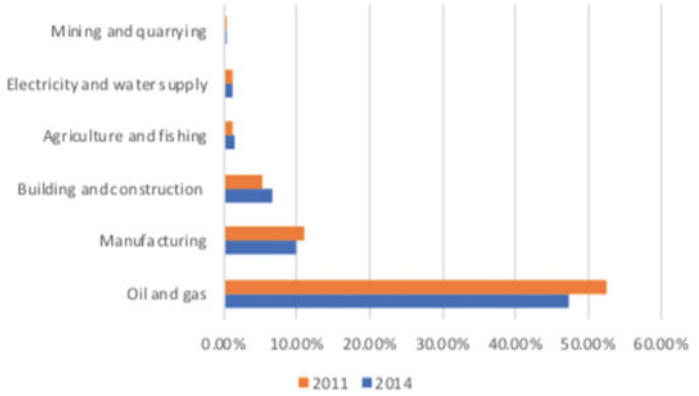

Fig. 2 Share of economic sectors in Oman's GDP in 2011 and 2014. *Source* NCSI (2015)

3 The Need to Shift Towards a Post-oil Economy

Being highly reliant on oil, Oman's economy will remain highly vulnerable not only to a fall in oil prices but also to challenges associated with limited oil and gas reserves, increasing domestic energy demand, as well as the potential economic effects of climate change.

3.1 Limited Oil and Natural Gas Resources

In comparison to its neighboring countries, Oman hosts the smallest hydrocarbon reserves, export stocks and revenues in the GCC.

Oman had total proven reserves of 5.4 thousand million barrels of oil as at the end of 2016, and 24.9 trillion cubic feet of natural gas as at the end of 2016 (BP 2018). Oman's 5.4 billion barrels of proven oil reserves rank 7th in the Middle East and 23rd in the world. Iran holds the largest natural gas reserves in the Middle East region, with 1183 trillion cubic feet, followed by Qatar with 858.1 trillion cubic feet, as at the end of 2016. The reserves in Saudi Arabia, United Arab Emirates, Iraq, Kuwait, Oman, Yemen, and Bahrain are far less than those in Iran and Qatar; the three smallest reserves are those of Oman, at just 24.9 trillion cubic feet, followed by Yemen and Bahrain, at 9.4 and 5.8 trillion cubic feet, respectively (ibid). On the other hand, Saudi Arabia holds the largest oil reserves in the region, with 266.5 billion barrels, followed by Iran, Iraq, Kuwait, and UAE, each with over 97 billion barrels as at the end of 2016. Qatar, Oman, and Yemen have the smallest oil reserves in the region, standing at 25.2, 5.4, and 3 billion barrels, respectively (BP 2018). Accordingly, Oman has very small oil and gas reserves compared with other countries in the region, which creates inevitable uncertainties with regards to Oman's future energy supplies and revenues.

Oman's crude oil reserve to production ratio (R/P ratio) is equal to 14 years and its natural gas R/P ratio is equal to 27 years (IRENA 2016). In fact, Oman has already started to import natural gas from Qatar via the Dolphin pipeline system, beginning in 2008 (EIA 2013).

3.2 Oil Price Shocks

Uncertainties associated with small oil and gas reserves go hand in hand with oil price shocks. Like other Gulf Arab states, Oman has a narrow export profile: in 2015, oil and natural gas accounted for 50% of total exports in Bahrain, 89% in Kuwait, 62% in Oman, 82% in Qatar and 78% in Saudi Arabia (World Bank 2015). Oil and gas export revenues have continued to generate significant economic wealth in Oman, accounting for 56% of GDP in Oman in 2014 (EIA 2013b). This heavy economic reliance on hydrocarbons export revenues makes Oman's economy highly vulnerable to changes in oil prices.

The impact of oil price shocks can be exemplified by the slump in oil prices in mid- 2014. This resulted in a direct reduction in oil contribution to the total GDP by around 50% for the UAE, 80% for Bahrain, 30% for Kuwait, 40% for Oman, 75% for Qatar and 40% for Saudi Arabia between 2013 and 2015 (World Bank 2015). It had also a significant adverse impact on Oman's state budget. The budget deficit grew dramatically (by 32%) between 2015 (2500 million Omani Rial) and 2016 (3300

million Omani Rial) due to the prolonged period of falling oil prices that began in mid-2014 (PWC 2016).

3.3 Climate Change

While not a major contributor to global total greenhouse gas (GHG) emissions, Oman is ranked among the highest in the world in per capita carbon emissions (World Bank 2013b), ranked 13 among the top world carbon emitters on a per capita basis.

Consumption of hydrocarbon resources to meet increasing domestic energy needs has contributed significantly to Oman's total carbon emissions. Oman's electricity consumption, like other neighboring Gulf countries, has exceeded the world average (3104 kWh per capita) but also surpassed the level of some major industrial countries such as the UK (5407 kWh per capita), and that of other developing countries such as India (765 kWh per capita) and China (3762 kWh per capita) (Hertog and Luciani 2009). In 2013, the per capita electricity consumption exceeded 10,000 kWh per capita for all Gulf Arab states and while Oman and Saudi Arabia showed lower levels of energy consumption compared to their neighbors, they still exceeded the world's average, accounting for 5981 kWh per capita and 8741 kWh per capita, respectively. Oman's total CO_2 emissions have increased by a factor of 5, from a total of 11.9695084 $MtCO_2$ in 1990 to 65.1766135 $MtCO_2$ in 2014 (World Resource Institute 2014).

Moreover, being highly reliant on oil export revenues, Oman's economy is exposed to the outcomes of climate change mitigation measures aiming to keep the rise in global temperature at a (relatively) safe level of no more than 2 °C higher than pre-industrial levels. Global action to cut greenhouse gas emissions, 56.6% of which were made-up of CO_2 from fossil fuel use (Barker et al. 2007: p. 28), through policies aiming to reduce fossil fuel consumption could impose direct economic losses on Oman (Manley et al. 2017; IEA 2018). Reduced demand for oil exports due to advanced climate action creates an additional economic challenge for Oman, which is already vulnerable to the physical impacts of climate change associated with increases in average surface temperature, reductions in annual precipitation, extreme weather events, and sea-level rise (Al-Sarihi 2018).

4 Early Stages of the Oil Era 1970–1995

4.1 Preparatory Stage 1970–1975

In July 1970, Sultan Qaboos assumed power in Oman. This was nearly eight years after Oman's oil production became commercial for the first time, before which Oman lacked nearly all features of modern development. Before Sultan Qaboos came to

power, Oman had only three schools and a few miles of paved roads, presenting a huge economic and development challenge to the new ruler. Yet, oil export revenues, which at that time provided nearly 100% of the government income, offered a huge opportunity for the new Sultan to shape the country's political and economic structures. Given the size of the challenge, a formal phase of development did not start until 1976 and the period between 1970 and 1976 was a preparatory stage with no formal implementation or development. The main focus of this period was on improving oil production, as the early years of Qaboos' reign were difficult ones in terms of Oman's oil production. Only five years after first exporting oil, Oman's oil exports declined to below 300,000 barrels per day. Most efforts thus were concentrated towards enhancing oil production as well as governance. For instance, in 1967, Petroleum Development Oman (PDO) was founded, and in 1973–74, in the wake of the oil boycott and nationalization of oil companies, Oman managed to acquire 60% of the PDO company ownership, with Shell owning 34%, Total 4% and Partex 2%. While efforts to improve and increase oil production have continued throughout Oman's economic development journey, 1976 was the first year for formal development and implementation (Allen and Rigsbee 2000).

4.2 Initiation and Implementation of 5-Year Plans 1976–1995

Starting from 1976, the Omani government commenced formal implementation of development programs through the use of 5-year plans. The first 5-year plan was implemented in 1976 and covered the period through 1980.

Benefiting from oil revenues, the initial phase of development between 1976 and 1996 focused mainly on developing infrastructure for transportation, health care, human resources, water and electricity, financial institutions and banks, and governmental institutions. The first public university, Sultan Qaboos University, was opened in 1986, starting with only 500 students but growing to enrolling over 10,000 students in later years. Industrial development barely existed before 1976. In 1975, only ten industrial units existed in Oman. The initiation of a Ministry of Commerce in 1974 and the promulgation of an Industry Organization and Encouragement Law in 1978 helped to tackle many impediments that challenged the development of the private sector including the shortage of capital and the general lack of expertise. The opening of the Oman Development Bank in 1977 helped to address the shortage of capital, although it initially focused on supporting large-scale industrial projects, with secondary interests in medium-sized agriculture, fishery and manufacturing projects (Allen and Rigsbee 2000). Examples of government-sponsored industrial estates included Rusail (formally opened in 1984), Sohar (oppened in 1992), Raisut (oppened in 1994) and Nizwa (oppened in 1994).

In 1978, a new Ministry for Water and Electricity Regulation was established to extend the construction of power stations to areas beyond the capital city, including building a 250 MW station to serve the Rusail industrial estate, the 26.5 MW Wadi Al Jizzi station serving the residential sector, and a 53 MW station serving a copper

refinery and Sohar. Another 22 locations outside the capital city were also supplied with about 27 MW by diesel-powered generation plants (Allen and Rigsbee 2000). A national grid was developed in the 1990s connecting the capital city with other distributed generation plants.

Such accelerating development was slowed down in the fourth 5-year plan (1991–1995). The government delayed the implementation of some projects as it was unable to finance developments because of the slump in oil prices in the late 1990s. Accordingly, the government decided to take a different approach to financing developments in the fifth 5-year plan (1996–2000).

5 The Rise of Economic Diversification Ambitions and Vision 2020 (1996–2020)

The fifth 5-year plan (1996–2000) was motivated by the wish not only to sustain the economic growth and improve the living standards of Omani citizens but also to diversify the sources of income and reduce the dependence on oil as a main source of income. The fifth 5-year plan was the first to articulate the economic diversification ambitions through Vision 2020.

In 1996, Oman Vision 2020 was approved by Sultan Qaboos via a royal decree for implementation by the Supreme Council for Planning. Oman Vision 2020 was formulated around three pillars: reducing dependence on oil export revenues through economic diversification, enhancing the role of the private sector in economic development and developing human capital (SCP 1996). Vision 2020 aimed to continue building upon the previous 5-year plan but also to overcome the challenges that emerged as a result of oil price fluctuations, population growth and the increasing number of job seekers.

6 Successes and Failures of Vision 2020

The agenda of Vision 2020 was promising and timely, to move from an oil-dependent economy towards a knowledge-based economy. This section explores the question: to what extent has Oman managed to achieve its Vision 2020? To do so, progress in achieving each of the three Vision 2020 pillars, i.e. human resources development, economic diversification, and private sector development, is analyzed within the timeframe 1996–2020.

6.1 Human Resources Development

Oil wealth has enabled state spending on public sector jobs but has not promoted productivity or made use of national labor force resources, which has created mounting pressure and saturation in public sector employment. State spending on public sector jobs has been highly focused on education, health, administrative jobs in the ministries and governmental authorities, and the oil and gas sectors, with an allocation of around 3.6% of GDP to public wage bills. Public spending in the public sector, however, has weakened the growth and diversity of the private sector because an economy reliant on oil has no need to create other industries or a manufacturing tradition, and instead jobs are limited to the tertiary sector (services). Such service jobs are extremely low-level (lower wages and longer working hours) compared to the public sector jobs and therefore not desirable to the local population. Such conditions led to importing lower-wage expatriate labor to fill service sector jobs, creating little incentive to diversify the private sector, and therefore few opportunities and an unattractive working environment for the increasing numbers of graduates who specialize in, for example, natural science, arts, social science, agricultural science and economics.

Vision 2020 aimed to increase employment in both private and public sectors. Although the national unemployment rate was recorded at just 1.8% in 2018, the figure was 5.4% for people between the ages of 15 and 24, with women in this age bracket experiencing an unemployment rate of 13.8% (NCSI 2019).

The number of Omani employees in the private sector rose by 138% between 2003 and 2010. However, much of the progress was reversed by the policies undertaken post-2011. The announcement of 35,000 new public sector jobs in the spring of 2011 reportedly led 30,000 Omanis to resign from private sector employment that year (Ulrichsen 2016).

Also, post-2011, as a result of government pressure to build up local talent, oil and gas companies across Oman have ramped up the In-Country Value (ICV) Blueprint Strategy to generate job and training opportunities, develop a robust and skilled local supply chain, and invest in the growth of Omani small and medium-sized enterprises (SMEs). The approach is in line with the 2012 ICV initiative launched by the MOG to promote the employment and training of Omanis, as well as investments in fixed assets and locally sourced goods and services. Petroleum Development Oman (PDO), in particular, has played a prominent role in the generation of job and training opportunities in Oman (Oxford Business Group 2019).

The above overview of Oman's labor market shows that the creation of jobs in the country remains unsustainable and highly linked to the fluctuation of oil prices, which does not only lead to put pressure over state budget at times of low oil prices but also trigger social unrest. The latter is especially reinforced by the lack of strategic reforms of labor market and training measures, which have been associated either with unprecedented domestic social unrest or based on ad hoc basis.

6.2 Diversification of Revenue Sources

Vision 2020 aimed to reduce the oil sector's share of Omani GDP from 41% in 1996 to 9% in 2020 while raising the share of gas and the contribution of non-oil sectors from under 1 to 10% and from 65 to 81%, respectively. In 2018, the oil sector contribution to Oman's GDP remained nearly the same as it was in 1996, accounting for 40.8%. Also, by 2018, the share of the non-oil sectors in GDP increased only slightly compared to 1995, accounting for 66.6% (NCSI 2019).

Most of the progress in Oman's economic diversification, although largely related to oil prices recovery, has been associated with expansion of downstream oil industries, investments in ports, industrial estates and free industrial zones, as well as some tourism mega-projects.

6.2.1 Ports and Petrochemical Industries

Oman's oldest refinery, at Mina Al Fahal near Muscat, was followed by the launch of Sohar refinery in 2006 in Sohar, which recently underwent a multibillion-dollar refurbishment and expansion in order to be equipped to process 198,000 bpd of crude, providing a 70% boost to output, with capacity for more than 13 m tonnes per year of finished products (Oxford Business Group 2018), and to add a slate of new refined oil and petrochemicals products at Sohar, including motor fuels and refined petroleum products. A new steam cracker and petrochemicals project in Sohar, the Liwa Plastics Industry Complex, has also been developed to enable Oman to produce polyethylene for the first time. Further, in 2017, Oman's existing refineries at Sohar and Mina Al Fahal were linked by the 280-km-long Muscat Sohar Product Pipeline Project which began commercial operations as a two-way multi-product pipeline in October 2017, to ultimately supply more than 50% of the sultanate's fuel through a new oil product storage and distribution terminal in Al Jefnain. The pipeline is the first of its kind to be constructed in Oman and meets several strategic needs, including increased safety and efficiency of fuel distribution, removing the need for shipping refined products. The pipeline also provides a higher supply capacity of aviation fuel via direct pipeline to Muscat International Airport.

In addition to the two existing refineries at Mina Al Fahal and Sohar, in April 2017, a joint-venture deal signed between Oman Oil Company and Kuwait Petroleum International to develop the country's third 230,000-bpd refinery at Duqm, 600 km south of Muscat in the Al Wusta region. The new refinery is expected to commence commercial operations in 2021. In addition to its investment in Duqm, Oman Oil Company is also enhancing existing and future downstream industries in the Governorate of Dhofar by investing in Oman's first liquefied petroleum gas (LPG) extraction plant in the Salalah Free Zone, expected to commence operations in 2020. Once the Salalah LPG plant is operational, LPG will be shipped to markets primarily in the Indian subcontinent from a dedicated export jetty at the Port of Salalah. Revenues from the

export of the plant's 300,000-tonne LPG output are projected at $200 m per year (Oxford Business Group 2019).

6.2.2 Renewable Energy

Furthermore, the decline in oil revenues in recent years as well as the growing demand for energy at the domestic level have inspired a new logic for reform in Oman's oil and gas sector, and increased support for alternative solutions, such as the uptake of renewable energy sources. Oman's official objective for renewable energy as laid out in Oman Vision 2020 was to source 10% of consumed energy from renewables by 2020. Oman's total installed renewable electricity capacity has increased from 1 MW in 2014 to 8 MW in 2018 (IRENA 2019). Apart from renewable energy investments in the electricity sector, the PDO has made steady progress in adopting large-scale renewable energy projects, such the 7-MW Miraah project and the 1021-MW solar thermal facility, in order to produce 6000 tonnes of steam for enhanced oil recovery purposes, saving 5.6 trn British thermal units of natural gas each year, which is equivalent to the amount of gas needed to provide electricity to 209,000 Oman residents. That is along with other online projects such as the development of a large solar panel project in Duqm to manufacture panels for power plants and residential buildings to generate around 1000 MW of energy per annum and boost the economy via export sales revenue, with 400 MW of installed capacity in the first phase of its operations.

6.2.3 Private Sector

Vision 2020 seeked to enhance the role of the private sector in Oman's economy by developing small and medium-sized enterprises, public-private partnerships (PPPs) and improved investment conditions. However, most of the expansion of the private sector, inspired by the 2014 fall in oil prices, has been translated into merging some state units and public offerings of state energy assets in electricity and oil and gas sectors. In 2019, Oman Oil Company (OOC) and Oman Oil Refineries and Petroleum Industries Company (ORPIC) were merged, integrating nine core businesses under a new brand identity called 'OQ' (Times of Oman 2019). Further, in December 2019, the Omani government's holding company for electricity sector entities, Nama, sold a 49% stake in the Oman Electricity Transmission Company to China's State Grid for $1 billion. Nama controls a number of other electricity providers within Oman, many also slated for partial privatizations, including an expected sale of Muscat Electricity Distribution Company in 2020. Oman's oil minister has also announced the intention for an initial public offering of 20–25% of shares in the state-owned Oman Oil Company (Karen 2019). Future plans include seeking to open prominent state-owned enterprises such as the Oman Tourism Development Company, Oman Food Investment Holding Company, Electricity Holding Company, Oman Global

Logistics Group and Oman Oil Company to private sector investment (Oxford Business Group 2019). This approach is consistent with the 2019 privatization (Decree No. 51/2019) and public-private partnership law (Decree No. 52/2019).

7 Vision 2040: Handovers and Lessons from Vision 2020

While Vision 2020 succeeded in improving the GDP on a per capita basis as well as improving the overall economic growth compared to 1995, there remain many avenues that require further improvement in order to fully achieve its main objectives, especially enhancing the role of the private sector in economic development and job creation, as well as decoupling the state expenditure from oil prices.

In 2015, through the engagement of relevant stakeholders such as government, private enterprise and public services, the Omani government initiated a process to put forward an economic vision for 2040. In implementing the Vision 2040, Oman's main priority is to continue diversifying its economic activities and establish an economic environment where dependence on hydrocarbon products is kept at a very limited level. Oman Vision 2040 was formulated around four main themes: 'a society of creative individuals', 'competitive economy', 'governance and institutional performance', and 'environmental and natural resources' (Oman Vision 2040, 2019). Aiming to adopt an economic development model along these lines, Oman aims to stand out in fields such as production, industry, tourism, trade, mining and port management. However, Oman will not succeed in achieving its Vision 2040 targets if structural challenges accumulated from previous development stages are not well addressed. These include:

Support Vision 2040 with an implementation plan. No vision will translate into a reality without a feasible and implementable plan or concrete strategy. The lack of an implementation plan to support Vision 2020 objectives was one reason behind the slowdown in achieving those objectives. A follow-up system that ensures the achievement of Vision objectives is key.

Continue human resource development. As the focus is on transforming the economy from a hydrocarbon-based one to a low-carbon, knowledge-based economy, with greater expansion of the private sector, it is important to equip citizens with suitable training and skills. Investment in human capital should not be limited to post-school levels, rather new knowledge and an entrepreneurial mentality and skills need to be integrated into the educational system at all levels. Importantly, educational curricula, if needed, should be updated and aligned with the new economy's requirements and realities.

Remove barriers to the private sector. Economic diversification will not be fully achieved through government intervention alone. Further engagement of the private sector and small and medium enterprises is key. The oil era has weakened the private sector by reinforcing the many institutional barriers that confront start-ups

and entrepreneurs. Despite efforts to empower the private sector, the public sector has dwarfed the contribution of the private sector in Oman's economic growth. The introduction of the 2019 privatization law (Decree No. 51/2019) and public-private partnership law (Decree No. 52/2019) is critical to boosting the role of the private sector in Oman.

Factor climate risks and opportunities into economic planning and development. Oman has been one of the first Gulf states to introduce environmental legislation to ensure that its economic development is not at the expense of its environment and natural ecosystems. Since the impacts of climate change go beyond the physical impacts in oil-producing countries like Oman, climate mitigation and adaptation efforts need to be taken a step further by ensuring that climate risks and opportunities are factored into development of all sectors, including the financial sector.

Encourage further involvement of women in the economy. It has become evident that enhancing gender diversity in the workplace can bring different skills and perspectives to the workplace and improve the economic[1] performance of the state or corporation. In 2018, unemployment rate of women between the ages of 15 and 24 was 13.8%. While Oman is one of the Gulf countries to adopt gender-sensitive policies, training and awareness programs as well as enabling flexible working arrangements can encourage further participation of women in the labor market.

8 Conclusion

Oman's economy has grown dramatically since 1970. Until recently, however, Oman's economic progress has been largely driven by the wealth generated from oil export revenues. Aware of economic vulnerability to oil price shocks, governmental efforts to broaden Oman's economic base and minimize the dependence on oil have been put in place since 1996 through Oman Vision 2020. While the government has succeeded in broadening the economic base through the expansion of oil downstream industries, development of ports, and logistics, many of these developments have largely relied on state investment, which in turn has continued to rely on oil export revenues. The role of the private sector in Oman's economic development has remained modest and unemployment rates have remained high. The latter challenges have been inherited by Oman's newly released Vision 2040. The success of Vision 2040 will largely depend on serious consideration of lessons learned from Vision 2020 and on adopting a feasible implementable plan, with a clear system of measurement, reporting and verification as a policy measurement tool to ensure achievement of the Vision objectives. Importantly, Oman will not succeed in broadening its economic base if structural challenges accumulated from previous development stages are not well addressed. This chapter suggests addressing those structural challenges systematically from three angles:

- **Address external economic shocks**. Given decades of high economic reliance on oil export revenues, Oman's economy is highly vulnerable to oil price shocks and changes in global oil demand. Diversifying revenue sources away from oil would require deep consideration of the challenges facing domestic and foreign investment environments. Also, the country can tap in its potential to establishing new areas of economic activities such as renewables. Importantly, diversifying revenue sources should not be at the expense of environment and should factor external risks such as the effects of international policy efforts to address climate change and global public perceptions of fossil fuels and their derivatives.
- **Introduce reforms to existing economic regime structure**. The economic structure conducive to diversifying revenue sources has been in place for decades. However, the over-reliance on oil revenues, especially at times of high oil prices, have weakened efforts towards empowering non-oil sectors and have shifted attention away from structural challenges such as those associated with efficiency in public expenditure and unemployment. Structural reforms are a necessity across all economic sectors including fossil fuel subsidies, labor-market, education system, and financial sector framework and investments. Pursuing such structural reforms should take into consideration the intersections between challenges facing different economic sectors such as the skills gap between education system graduated and labor market needs.
- **Support national innovation system**. To create economic competitiveness beyond oil markets, it is essential for a country to support innovations at the national level. Like its neighboring GCC states, Oman's R&D investment averages 0.3% of the GDP, compared with 2–3% in industrialized countries. Most large Omani firms do not have in-house R&D and new technologies are mainly introduced through joint-ventures with international partners. Oman should tap into its local talent and incentivizes national innovation across its firms, R&D entities, and academia, while making sure to define channels and networks that enable scaling up and transformation of innovations into commercial products.

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The Journey of Bahrain to Economic Diversification

Anis Khayati and Jaffar Al-Sayegh

Abstract The Kingdom of Bahrain is the smallest and the most vulnerable economy among the GCC countries, due to relatively low energy resources and limited market and savings. Therefore, the issue of diversification is crucial to the national economy. Bahrain came to realize this fact. The country adopted many measures and incentives to develop productive non-oil sectors such as finance, tourism and manufacturing. The overall non-oil economy has performed well and witnessed a remarkable development. However, oil and gas remain the main sources of national income and revenues. Accordingly, Bahrain needs to raise its level of economic diversification through exploring new industries, fostering the role of the private sector and enhance regional cooperation. The country has all the ingredients to achieve more sustained and reliable diversification.

Keywords Economic diversification · Oil industry · Non-oil sectors · Manufacturing · Finance · Tourism · Bahrain

1 Introduction

Although there is no specific definition of economic diversification, it generally refers to the diversification of income sources or the reduction of dependency on primary goods exports (Osakwe et al. 2018). Diversification has been related to different economic theories such as duality, exhaustible resources, liquidity preference, infant industries and immiserizing growth (Mania and Rieber 2019).

Economic diversification can be achieved either horizontally by creating new commodity opportunities within the same sector, or vertically by adding more stages of processing to the commodities themselves. Horizontal diversification helps to provide a greater number of products to meet the desires of consumers (Felipe et al. 2012). Vertical diversification encourages and strengthens the economic ties between the activities of different sectors (Koopman et al. 2014).

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Economic diversification is vital for long-term economic growth, as dynamic economies usually generate a large share of GDP in manufacturing and service sectors. Inversely, when the economy relies heavily on income from a specific sector; maintaining economic growth for a long-term period becomes a challenge due to fluctuations in commodity prices, inefficient allocation and crowding out of the industrial sector. In the long run, this can affect macroeconomic stability (Papageorgiou and Spatafora 2012).

Therefore, economic diversification can create an environment conducive to productive investment; it can generate stability of profits in the short term, an expansion of revenues and an increase in the added value of local goods and services (Cadot et al. 2013).

Economic diversification is even more important in the case of oil-rich Gulf Cooperation Council (GCC) countries (Mahroum and Al-Saleh 2016; Albassam 2015). This is because the oil market is characterized by instability and uncertainty, since it depends on a number of factors such as the world economic situation and the availability of alternative energy resources. Therefore, those countries have been actively trying to diversify their economies for decades. A number of studies have tried to evaluate the results. An IMF study (2016) concluded that the non-oil private sector is still relatively small, and therefore cannot be considered an important source of growth and employment in these countries. The cost of capital is still high due to poor financing policies. The lack of a sound financial policy has resulted in an aversion of foreign investors, which generates losses in employment and resource development.

Al-Bakr (2015) examined the problem of countries attempting to diversify the production base in the presence of specific natural resources. The study took the Kingdom of Saudi Arabia as a case study. The author concluded that the acceleration and the simplification of procedures in support of non-oil sectors could be achieved through strengthening direct links between the government and private companies (including multinationals). This represents an efficient way to diversify the production base and to achieve a qualitative leap in technology and product development.

Callen et al. (2014) studied the continuous efforts of the GCC countries to increase their level of economic diversification. The authors found that the most important obstacles that hinder diversification in these countries are related to macroeconomic fluctuations. The authors stressed the necessity of adding improvements to the financial policy, in order to improve macroeconomic stability and to provide adequate support to small and medium companies through financing and reduction of administrative restrictions.

In his study, Devaux (2013) concluded that there has been notable progress in the economic diversification in GCC countries since 2000. However, it is still largely dependent on the public sector. Despite their remarkable growth, non-oil sectors are still limited in their impact, while most improvements in diversification occurred in sectors directly or indirectly related to the oil industry. The author also concluded that the higher education programs, and the encouragement of academic research and cooperation with international universities, have led to an improvement in human

capital, the development of experience, and the encouragement of innovation in value-added activities outside the oil sector.

In his empirical analysis, Hvidt (2013) studied past experiences and the efforts made for economic diversification in the GCC countries. The author considers that diversification can be reached more efficiently and effectively through political reforms that aim to reduce government control over economic activities.

This chapter is related to one of the GCC countries, namely the Kingdom of Bahrain. The chapter explores the country's journey to diversification and the efforts made by Bahrain to diversify its economy. Section 2 shows the changes in the economic structure of the country. Section 3 highlights the main governmental policies to diversify the economy. Section 4 shows the achievements of economic diversification in the main sectors. Finally, the summary and conclusions are presented in Sect. 5.

2 Changes in Bahrain's Economic Structure

Prior to independence in 1971, economic development in Bahrain evolved over two successive phases. In the first phase, the pearling industry and some trade activities determined the economic structure of the economy. The collapse of the pearling sector caused a depression in the economy. In the second phase (1932–71), the oil industry replaced the pearling industry, rescuing the country from economic disaster. Thereafter, the oil sector has constituted the main determinant of domestic industrial and economic activities. However, the increase in government revenues did not deeply influence economic development or diffuse high revenues within the Bahraini society. The economy remained undeveloped and shaky. This is because oil extraction and refining were foreign-owned and controlled. For many decades, oil revenues had been captured by foreign oil concession holders.

Following independence in 1971, revenues from oil extraction increased remarkably. In 1972, total net production was greater than consumption, resulting in a BD 97.8 million payment surplus. The largest contribution was from the oil sector (81.6%). Other sectors, especially the manufacturing sector, consumed more than they produced, resulting in a BD 86.5 million deficit (Table 1). This was partly due

Table 1 The Bahraini economic structure in 1972 (BD million)

Sector	Production	Net exports	Consumption
Oil	202.7	196	6.7
Manufacturing	14.3	−86.5	100.8
Financial	22.3	–	22.3
Agriculture and other	9.1	−11.7	20.8
Total	248.4	97.8	150.6

Source Ministry of finance

to a high domestic demand for foreign goods. The net production of the oil sector, which was 30 times more than consumption, played a great role in the economy.

The oil boom of 1973 generated higher oil prices. In 1975, the net production increased by 108%. Net production largely exceeded consumption, resulting in a BD 23.5 million surplus in the trade balance. Still, consumption in the manufacturing sector remained higher than net production despite a 558% growth rate. This indicates that the country continued to depend on foreign goods, as a large percentage of domestic consumption was met by imports. As a consequence of an inflow of expatriate labor, work remittances increased remarkably from just under BD 3 million to 9 million.

Table 2 shows the difference in the value-added between the pre-boom economy of 1972 and the post-boom economy of 1975. The total net production increased by 120.8% or BD 300.3 million. This was mainly due to high oil prices in 1974. With the exception of the services sector (in which the worker remittances played a great part in reducing the effect of the boom), all other sectors experienced higher value-added.

Table 3 shows that oil prices in 1980 resulted in higher oil export revenues, and increased the net production of other sectors. Total net production was higher than consumption, resulting in a BD 46.4 million surplus in the trade balance. Although manufacturing production increased by 176.7%, its net production was still less than consumption, reflecting the country's continuous dependence on foreign goods (notably capital and machinery as well as consumer products).

Table 4 shows that during the period 1975–83, the total volume added increased

Table 2 The economic structure in 1975 (BD million)

Sector	Production	Net exports	Consumption
Oil	421.8	391.8	30
Manufacturing	94.1	−341.3	435.4
Financial	21.5	–	21.5
Agriculture and other	11.3	−27	38.3
Total	548.7	23.5	525.2

Source Ministry of finance

Table 3 The economic structure in 1983 (BD million)

Sector	Production	Net exports	Consumption
Oil	1030.1	972	58.1
Manufacturing	260.4	−849.2	1109.6
Financial	100.2	–	100.2
Agriculture and other	16.5	−76.4	92.9
Total	1407.3	46.4	1360.8

Source Ministry of finance

Table 4 The changes in economic structure (1972–1983) (BD million)

Sector	1972	1975	% Change	1983	% Change 75–83
Oil	202.7	421.8	108	1030.1	244
Manufacturing	14.3	94.1	558	260.4	276.7
Financial	22.3	21.5	−3.6	100.2	466
Agriculture and other	9.1	11.3	24.2	16.5	146
Total	248.4	548.7	120.8	1407.3	256

Source Ministry of finance

by 256%, mainly due to the oil sector, which formed 73.2% of total production, while the manufacturing sector increased by 276.7%.

It is evident from the above that the development of the oil sector had an impressive impact on the economic structure in Bahrain and on the growth rate of the economy. Due to higher oil revenues, imports increased in order to promote and expand social projects, and to form the industrial base of the country's economy.

3 Diversification and Government Policies

In order to reduce dependency on oil exports as a major source of income and foreign exchange earnings, development plans in Bahrain since the 1970s have focused on economic diversification as a strategy that aims to increase the production of non-oil sectors. The important oil revenues facilitated the conduct of sustainable development planning. Accordingly, the government provided a set of procedures and incentives.

3.1 Provision of Infrastructure

Infrastructural development is a direct way of influencing the extent of diversification. In effect, power supplies, roads, transport, communication, water and sewerage cannot be provided efficiently by individual initiative. Without these facilities, it is extremely difficult to improve productivity, profitability and competitiveness of domestic products in local and foreign markets (Joshi and Lambert 2011).

Development efforts in Bahrain during the 1970s and 1980s concentrated on building an advanced infrastructure. Between 1982 and 1989, infrastructure projects amounted to more than BD 1 billion (almost 70% of total investments). Transport networks, power and water supply, and an industrial estate have been the main priorities among the infrastructure projects.

Notably, priority was given to the development of the transport sector. In effect, the economic boom in the 1970s induced higher demand for imports that singled out the delay in unloading at the main port (Mina Salman Port) as a major transport

Table 5 Industrial zones in Bahrain

Zones	Date	Type of industries
Mina Salman	1961	Export-oriented light and medium industries
North Sitra	1982	Aluminum downstream, power, chemicals, and other industries
Ma'amir	1974	Block factories, aluminum assembly, asphalt plants, prefabricated building and furniture
North Refinery	1974	Block factories, aluminum assembly, asphalt plants, prefabricated building and furniture
Arad	1975	Carpenters and welders
Sitra Roundabout	1975	Warehousing
Al-Hafira	1975	Rock-crushing
South of Hidd	1988	Cement and steel
Kassarat	1980	Light and medium industries

Source Ministry of development

problem. There was considerable pressure on the port facilities, which led to serious congestion of traffic and cargo. It was necessary to expand and develop the facilities of the port to cope with this congestion. In 1979, there was a series of major extension programs to increase the number of berths, cranes and storage areas in the port. Thus, many improvements of the port have been realized since the 1970s.

Meanwhile, power and water supplies were adequately provided in Bahrain by the 1980s. The establishment of industrial areas facilitated the provision of an adequate infrastructure, in particular power and water at reasonable prices. Actually, the government's efforts to develop industrial zones date back to the early 1960s. However, with increasing population and limited land, most industrial activities were confined to the capital Manama, Muharraq and Sitra. In subsequent years, a plan was made to contain most industries within prescribed areas and well away from residential areas. Most of these zones were reserved on the coast or on reclaimed lands for general industries, and were adjacent to facilities in order to simplify transactions.

The government established free zones to stimulate the private sector. Manufacturers are exempt from customs duties on raw materials and machinery. By1989, there were many industrial zones scattered all over Bahrain (Table 5). The major areas included Mina Salman Industrial zone (70 ha of reclaimed land) and North Sitra Industrial zone (191 ha).

3.2 Provision of Skilled Labor

The development of skilled labor leads to self-reliance. Therefore, it can even be more important than the expansion of physical capital (Neffke and Henning 2013). In developing countries, there is a shortage of skilled labor in both management and supervision of production. Specifically, in the Gulf region, a shortage of skilled labor

is one of the principal impediments to economic growth. The GCC states rely heavily on foreign labor mainly from Europe and South East Asia.

In Bahrain, efforts have been made to improve the skills of domestic labor. The Council for Vocational Training was established in 1975 by Amiri Decree No. 20, to create training opportunities for school leavers, and to upgrade and develop the skills of existing workers. The council made it compulsory for all employers to establish in-house training and up-grading programs for Bahraini workers. A BD 5 million vocational training center was established in 1979 for 360 trainees. The council also initiated in-plant training schemes and unified national training and achievement standards. The council identified some occupations considered critical for the national economy.

Besides, various other schemes have been introduced for training. For example, the "Ten Thousand Training Plan" was launched in 1980 in order to provide appropriate education and training to Bahraini nationals who have successfully completed secondary education. The Continuing Education Management Program, initiated in 1983, coordinated by the Gulf Polytechnic in Bahrain and the American University of Beirut, prepared for the establishment of the Directorate of Manpower Development and the Civil Service Bureau. The aim was to provide a range of supervision and management skills. In addition, the Bankers' Training Centre, which was established in 1981, aimed to provide skills in both the banking industry and insurance companies.

In accordance with government regulations, enterprises with more than 200 employees were required to have their own training programs, while smaller companies must contribute financially to the operation of training institutions. The contribution amounted to 2.5% and 4% of total salaries, paid to Bahraini nationals and expatriates, respectively.

Despite these efforts to improve the quality of domestic labor, the shortage in the supply of skilled labor is still regarded as a major constraint. The main types of occupations that have been specified as difficult to obtain include technicians, engineering, management and supervision.

3.3 Investment Incentives

There are many financial incentives that have been provided to different economic sectors in Bahrain. These incentives include government procurement policy, direct support (such as subsidies) and exemption from taxes on profits and imports of raw materials.

The first law aimed at encouraging investment in Bahrain was the National Industry Protection and Support Law No. 11 in 1985. According to this law, imports of industrial machinery equipment, raw materials and other inputs for approved projects were exempted from custom duties, in the case that the firm was located in an industrial area. For other companies, reduction in custom duties ranged between 10 and 50%.

The public sector in Bahrain is allowed to give special preference in its purchasing to domestic goods, even when prices exceed those of their imported counterparts by up to a maximum of 10%, provided they meet standard specifications related to quality. Indeed, many firms grew because of the demand created by government purchases. However, many of these firms have remained dependent on public purchases and their growth has been related to government interference.

The government also afforded technical assistance in the pre-investment plans to many Bahraini companies. This measure represents another important incentive.

3.4 Government and Foreign Participation in Equity Stock

The capital requirement in some sectors can be so large that the private sector is unable to finance them. Therefore, unless the government intervenes, firms are unlikely to be established. In such cases, the government's contribution to the equity capital may be as important as the provision of other basic requirements such as infrastructure and skilled labor. In fact, this may be the only practicable way of achieving diversification in countries with such a small domestic market as Bahrain.

The government participated in the equity capital of almost all large industries such as petrochemicals and aluminum. While the government had total ownership of a number of big companies such as BALEXCO and Iron Steel, it held the largest share in ALBA (57.9%) and Bahrain Atomizers International (51%), and an important share in other large firms such as GARAMCO, GPIC and ASRY.

Other major participants in the equity stock of manufacturing firms are foreign investors. Foreign countries (mainly from GCC countries) own a substantial share in the domestic industries. Indeed, direct foreign investment has been attracted by liberal government policies such as free convertibility of currency, freedom to repatriate profits and fees, and the relative simplicity of the tax system.

4 Diversification in Non-oil Sectors

Since the early 1970s, Bahrain has embarked upon the development of non-oil production. Industrialization has been the principal mean for establishing a broad productive base for the post-oil era, and for diversifying sources of income.

In analyzing the role of non-oil sectors, we focus on three important sectors; namely, manufacturing, finance and tourism.

4.1 The Manufacturing Sector

Bahrain aimed at building a new modern industrial sector and the growth of manufacturing firms was remarkable. The number of manufacturing firms increased from around 145 in 1970 to 2890 in 1987, of which 92% were small workshops, food and dairy firms, jewelers, and beverage producers. With the dominance of small firms, the large productive industrial sector consisted of 328 established manufacturers (Table 6), of which 90 produce glass and building materials, 65 produce chemicals, while 47 produce aluminum products. As the number of entrants increased notably, and large firms were established, the contribution of manufacturing industry to GDP has increased from 2.5% in 1970 to 13.6% in 1987.

Since the 1970s, the aluminum industry has been established as an important sector. It includes Aluminum Bahrain (ALBA). ALBA is the nucleus of downstream industrial activities through different related companies such as the Gulf Aluminum Rolling Mill Company (GARMCO), the Bahrain Aluminum Extrusion Company (BALEXICO), Middle East Aluminum Cables Ltd. (MIDAL), and Bahrain Atomisers International (BAI). In 1988, aluminum sales accounted for around 60% of total manufactured sales in the country. In addition to aluminum-related industries, Bahrain's diversification strategy has included heavy industries such as the Arab Shipbuilding and Repair Yard (ASRY), petrochemical plants (GPIC), and factories for iron and steel fabrication (AISCO). This was a result of the industrial policy that initially aimed at promoting the development of energy-intensive industries and creating large-scale projects through direct government participation.

The growth of the manufacturing industry in Bahrain, however, has not resulted in the optimal structural change. For instance, manufacturing provided only 17,022 employment opportunities (about 20% of total employment opportunities) in 1987, while the construction sector provided 30,278 opportunities or 35.2% of employment during the same year.

Table 6 Number of large manufacturing firms in Bahrain, 1987

Type of activity	Number
Food processing	54
Leather and spinning	5
Wood fabrication	39
Paper printing	15
Chemical (soap, drugs, plastics, etc.)	65
Glass and building materials	90
Iron and steel	9
Metals, aluminum, machinery, fabrication	47
Others	4
Total	328

Source Ministry of development

4.2 Financial Sector

The accelerated economic growth in the region, following the 1973–74 oil price rise, created the need for an active financial and banking service, since local banks lacked the experience to manage the enlarged scale of economic activities, and to recycle the so-called petro-dollars derived from oil sales.

Thus, with a substantial financial surplus in the region, efficient utilization of savings became a prime policy goal as local investment opportunities increased rapidly. A sophisticated banking service would encourage the private sector to participate in domestic development, facilitate the channeling of financial resources into productive investment, enlarge the pool of investable resources and attract a larger part of private savings from abroad. Such a market appeared, therefore, a *sine qua non* of development and diversification in the country.

Therefore, consistent with the domestic development plan which aims at diversifying the oil-based national income, Bahrain seriously considered the financial industry to be one of the most important sectors to be developed with relatively small capital expenditure.

In September 1975, Bahrain announced its plan to develop a center for dealing in international liquidity. It invited foreign banks to open branches in the island and operate as offshore banking units (OBUs).

The response of the major international banks to Bahrain's invitation was enthusiastic. Within 4 months, 32 applications had been approved. By the end of 1978, 48 banks had been licensed, and in 1988 the number had reached 68 (Table 7).

A number of factors have worked in favor of the rapid increase of foreign banking in the island. First, the outbreak of Lebanon's civil war encouraged foreign banks to search for safety and establish a base in Bahrain. Second, the two richest states in the region, Saudi Arabia and Kuwait, did not allow foreign banks to open branches in their lands. Although other Gulf states attracted foreign banks, their banking sectors

Table 7 Financial Institutions in Bahrain in 1988

Incorporated in	OBUs	C.B.	SP.	R.B.	I.B.	I.C.	M.B.	Total
Bahrain	16	5	2	–	13	3	6	45
Gulf states	3	1	–	–	–	–	–	4
Arab states	2	3	–	–	–	1	–	6
Japan	1	–	–	22	1	1	–	25
Other Asians	14	4	–	5	1	2	–	26
W. Europe	20	3	–	21	1	7	–	52
USA	8	3	–	7	2	2	–	22
Canada	–	–	–	1	–	–	–	1
S. America	4	–	–	1	–	–	–	5
Total	68	19	2	57	18	16	6	186

Source Central Bank of Bahrain (CBB)

were still in their infancy. Bahrain therefore, seemed the only center that could provide adequate financial and banking services as well as good transportation and communication facilities, and a comparatively good supply of skilled labor.

The international banks were given regulatory and fiscal incentives. There was no restriction on any type of transactions, no taxes on income, sales or capital earned salaries and dividends. Therefore, the island is regarded as a tax haven in which the government allows foreign companies to send abroad profits and income earned abroad. Moreover, banks were exempted from the obligations to maintain reserves with the central bank, and to observe formal liquidity ratios. It should be noted that Bahrain's tax treatment of banks was more generous than that applicable in Singapore, where banks pay tax at the rate of 10% on their net income from foreign currency lending abroad.

The island also appeared to be attractive in terms of cost. In addition, it has excellent airline and telecommunication links both worldwide and within the Gulf region. Also, Bahrain's time-zone is another favorable cost factor.

By the end of 1988, in addition to the 68 OBUs, the banking sector in the country was structured as follows: 21 commercial banks (including two specialized banks), 57 representative offices of foreign banks and financial companies, 18 investment banks, 6 money brokers, and 18 insurance companies; 186 institutions in all (Table 7).

As shown in Table 8, the growth of the OBUs' assets and numbers was quite spectacular. Total assets have grown from $6214 million in 1976 to $68,124 million in 1988, while their numbers grew to 68 as compared with 26 in 1976.

Table 8 Assets of OBUs, 1976–88 (US$ million)

Year	No.	Loans to non-banks in Bahrain	Inter-banks funds		Outside Bahrain	Other assets	Total
			Comm. banks	Other OBUs			
1976	26	1734	136	510	3780	54	6214
1977	–	3706	162	2.012	9303	518	15,201
1978	48	6166	204	2.792	13,409	870	23,441
1979	–	6688	200	4.490	15,271	1115	27,764
1980	58	8493	204	6.707	19,886	2176	37,446
1981	65	11,242	144	8.771	26,225	4352	50,734
1982	72	14,316	270	9.847	29,441	5133	59,007
1983	75	15,977	384	8.996	32,052	5332	62,741
1984	76	18,392	310	8.521	32,803	2666	62,692
1985	74	15,873	270	7.387	30,819	2456	56,805
1986	68	13,862	232	6.379	32,445	2762	55,68
1987	67	13,097	423	5.180	41,178	3604	63,482
1988	68	12,206	267	4.915	47,319	3417	68,124

Source Central Bank of Bahrain (CBB)

Table 9 Financial sector's contribution to gross domestic product, 1980–86

Sector	1980	1981	1982	1983	1984	1985	1986
Total: banks and ins.	141.8	211.5	289.5	281.9	277.3	227.8	207.0
Domestic banks	41.8	46.3	67.2	64.8	73.9	66.4	59.2
OBUs	88.9	151.0	206.5	201.1	192.0	146.7	129.5
Insurance	11.1	14.1	15.8	16.0	11.4	14.7	18.3
Total GDP	1426.3	1541.5	1686.3	1711.0	1734.0	1602.9	1383.0

Source Central Bank of Bahrain (CBB)

The growth of the OBUs has ensured the island's future as a financial center and made this sector an important element in the diversification plans of the government. Their contribution to the GDP increased from BD 88.9 million (62.7% of the contribution of the financial sector as a whole) in 1980 to BD 146.7 million (64.4%) in 1985 (Table 9).

Offshore banking has created a variety of employment opportunities in the island, especially for Bahraini nationals. It has attracted the elite of multinational banks, provided various important financial services to the area, and became a source of income for the public sector. Also, the presence of foreign banks helped to encourage the establishment of the Banking Training Centre in 1981. The prime objective of this center was to provide highly professional training in all aspects of finance.

4.3 Tourism Sector

The development of the tourism sector came at a relatively late stage, after 25 years of independence. While the number of tourists did not exceed 64,000 in the year 1985, the opening of King Fahd Causeway between Bahrain and Saudi Arabia, which came at the end of 1986, enabled a large increase in the number of tourists, and the figure reached 1,170,000 during the year 1988. This number continued to rise gradually until it reached more than 3 million by the year 2003. Most tourists are overland visitors from Saudi Arabia arriving from the King Fahd Causeway (79.1% of the total number of tourists in 2012). Therefore, this sector has still large prospects of growth and development.

Table 10 shows the evolution during the period 2000–2013 of the number of hotels, rooms, suites, and beds.

The figures show that there has been a significant increase in all components. The number of hotels increased from just 79 hotels with a capacity of 9002 beds in 2000 to 106 hotels with a capacity of 15,501 beds in 2013. Therefore, the number of hotels in Bahrain grew by 34.1% between 2000 and 2013 and the number of beds grew by 72.1%.

Table 11 shows a general upward trend in international tourist arrivals, the number of occupants and nights spent in hotels.

Table 10 Hotels, hotel rooms, suites, and beds

Year	Hotels	Rooms	Suites	Beds
2000	79	5876	890	9002
2001	83	6344	1024	10,314
2002	83	6344	1024	10,314
2003	90	6788	1092	10,759
2004	92	6788	1210	5692
2005	99	4797	958	n.a
2006	95	6308	1118	10,348
2007	100	n.a	n.a	n.a
2008	101	6895	1564	n.a
2009	97	6817	1550	n.a
2010	100	6817	1564	n.a
2011	101	8364	2330	13,315
2012	104	9578	2270	14,298
2013	106	10,530	2339	15,501

Source Central Informatics Organization (CIO)

Table 11 Tourism demand indicators

Year	No. of occupants	Number of arrivals	No. of tourism nights	Average stay per person
2001	786,688	4,388,000	1,570,656	1.20
2002	686,262	4,831,000	1,385,598	2.02
2003	695,027	4,844,000	1,290,413	1.86
2004	1,131,609	5,677,000	2,290,081	2.02
2005	1,236,613	6,313,000	2,224,450	1.80
2006	1,284,135	7,289,000	2,475,360	1.93
2007	1,319,799	7,833,000	2,494,122	1.88
2008	1,153,692	8,631,000	2,368,527	2.05
2009	1,069,350	8,861,000	2,069,449	1.90
2010	995,061	11,952,000	1,898,823	1.91
2011	831,757	6,732,000	1,503,652	1.81
2012	1,028,551	8,062,000	1,858,979	1.81
2013	1,069,068	9,163,000	1,990,256	1.86

Source Central Informatics Organization (CIO)

Table 12 Tourism revenue, GDP and percentage of tourism revenue to GDP

Year	Tourism revenue (in million US dollars)	GDP (in million US dollars)	Tourism revenue as % of GDP
2000	854	9063	9.42
2001	886	8976	9.87
2002	985	9632	10.22
2003	1206	11,075	10.88
2004	1504	13,150	11.43
2005	1603	15,968	10.03
2006	1786	18,505	9.65
2007	1854	21,730	8.53
2008	1927	25,710	7.49
2009	1873	22,938	8.16
2010	2163	25,713	8.41
2011	1766	29,044	6.08
2012	1742	30,756	5.66
2013	1865	32,897	5.67
2014	1915	31,125	6.15

Source Calculated based on World Bank indicators

In addition, Table 12 shows that tourism revenue represents on average about 8.67% of GDP during the period 2000–2014. Meanwhile, during this period, there was an increase in tourism revenues and in employment opportunities related to this sector.

5 Conclusion

Due to increasing depletion and market instability in the oil industry, Bahrain came to realize the vital role of diversifying the country's economic base. Many sectors have experienced considerable growth since the 1970s. Notably, manufacturing and services have been the driving force for this growth. Shares of non-oil GDP increased from 68% in 1990 to about 80% in 2018. Non-oil production increased notably after the establishment of the Bahrain Economic Development Board (EDB) in the year 2000, and the elaboration of the Bahrain 2030 economic vision in the year 2008. However, this success in diversification was accompanied by an increase in the share of the oil sector in government revenue. This share has stabilized at around 85% during the last few years. In effect, the small domestic market, the lack of skilled labor, and the lack of an effective marketing system are among the major problems hindering diversification in the country.

Also, the examination of the diversification policies showed that government incentives, in general, were biased in favor of large-scale and public industries. In addition, protection has not been effectively used. Effective tariff rates of protection were not high enough to protect local industries from highly competitive foreign products, and the exchange rate has not been used effectively to encourage manufacturing exports and to solve the problems of the balance of payments.

In order to attain the desired diversification level, the country must be highly competitive and innovative. Specifically, more efforts should be made in the following aspects:

- Expand the number of skilled workers, particularly in the engineering and management disciplines. This would help the development of promising sectors such as artificial intelligence.
- Enhance the incentive system to improve the viability of the private sector. In particular, the following measures should be given priority: (i) increase the number of industrial banks in order to facilitate long-term credit to the productive industries (ii) reduce rents and taxes in industrial estates (iii) lower prices of energy, water and government services to the different productive sectors (iv) improve marketing facilities for domestic products (v) provide better pre-investment incentives and detailed market studies, and (vi) implement various industrial surveys and feasibility studies.
- Encourage the public and private sectors to invest in the production of capital goods. In effect, the high cost of imported intermediate equipment raises the average cost of production and renders local products less competitive. Production of such goods locally can serve different industries and foster the growth of manufacturing exports.
- Promote a greater degree of vertical integration of firms. The development of downstream projects requires less capital and energy and would lower production costs and assure long term viability notably in manufacturing sectors.
- Reinforce regional cooperation. This point is particularly important. Since the manufacturing industries are export-oriented, joint marketing efforts among the GCC countries can overcome some of the difficulties foreseen for entry into the world market. The GCC countries have similarities in economic, social and political characteristics. This encourages Gulf states to adopt a comprehensive strategy for economic development in order to harmonize their policies, direct the scarce natural resources, and thus improve development prospects. Demand for petrochemical and aluminum products, for example, will only be further expanded through such cooperation. Demand will expand further if such cooperation includes other Arab and Islamic nations. Domestic firms would increase their viability if they were able to penetrate the market of neighboring populated nations such as Egypt, Iran and Pakistan.

The adequate implementation of the aforementioned measures would allow Bahrain to improve the level of economic diversification and to drive sustainable growth in the country. Bahrain's economy is open, dynamic and growing. These characteristics are ideal to make the country able to achieve its goals.

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Towards Changes of Macro-Economic Structures in Middle Eastern Countries. Empirical Evidence for 1970–2018

Ewa Lechman and Radosław Slosarski

Abstract Middle East countries share a wide bundle of specific structural economic features and one of the latest is a high dependency of these economies on fossil fuels, which is quantitatively demonstrated through the share of oil and gas revenues in total export, but also in gross domestic product composition. This high economic dependency on natural resources on one hand has recently generated a material wealth of Middle Eastern countries which is demonstrated in a gross domestic product, but—on the other hand, contemporary global challenges such as price shocks on international commodity markets are calling for urgent diversification of national economies. This research aims to review key structural features of the economies of the six-member states of the Gulf Cooperation Council and changes in their macroeconomic structures between 1970-2018. It shows country-wise evidence, with respect to diversification of gross domestic product composition, identifying structural shifts between industry, service and agricultural sector. To provide more specific insight into the structure of national economies it examines time changes in oil rents (as a share of GDP), natural gas rents (as a share of GDP), fuel exports (share of merchandise exports). Finally, to verify the hypothesis that shifts in economic structure and GDP composition are accompanied by changes in sources of electricity production. Hence we additionally rely on data regarding sources of electricity production like coal, natural gas, oil, hydroelectric power plants (hydropower) and renewable sources (excluding hydroelectric but including geothermal, solar, tides, wind, biomass, and biofuels). Our methodological settings combine elementary descriptive statistics, time trends analysis, locally weighted polynomial smoothers for visual inspection of pair-wise correlations and panel regression models to capture statistical relationships between data examined. All macroeconomic data used in this research are exclusively extracted from World Development Indicators 2019.

Keywords Gulf Cooperation Council · Middle Eastern countries · GDP · GDP composition · Oil rents

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1 Introduction

It is widely acknowledged that the Middle Eastern countries Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain, and Oman share a wide range of specific structural, economic and political features, and this led those countries to establish the Gulf Cooperation Council (GCC). Its main purpose is to strengthen the economic and political position of its members through joint cooperation. Together GCC members hold more than 30% of all the world's known oil reserves (BP 2019). One of their common features is the high dependency of their economies on fossil fuels, which is quantitatively demonstrated through the share of oil and gas revenues in total exports, but also in gross domestic product composition. This high economic dependency on natural resources, on the one hand has recently generated material wealth for these Middle Eastern countries, which is demonstrated in gross domestic product, but on the other hand, contemporary global challenges such as price shocks on international commodity markets are calling for urgent diversification of their national economies. To prevent negative price shocks and as an outcome of government surpluses, GCC countries have been increasing their financial reserves, the growth of which has averaged 13% per annum between 2010 and 2014. These reserves have had to be used as a result of significant falls in oil prices. Between 2015 and 2017 GCC countries had to spend on average 10% per annum of their financial reserves to cover government expenditures (World Bank 2019a, b). This phenomenon represents a huge risk exposure of GCC countries to oil price fluctuations and indicates the need for a change in the structure of their economies. Surprisingly little empirical evidence exists that investigates structural changes in GCC economies in relation to changing rents and macroeconomic tendencies. The world trend to switch energy sources to renewables creates real dangers for the pace of further development in GCC countries, as world demand for hydrocarbons will decline in the next few decades.

The economic model of GCC countries, based on revenue obtained from oil exports, has resulted in an average 3% GDP growth between 1970 and 2018 (World Bank 2019a, b). Oil revenues have been reinvested by GCC members. For example, Dubai invested first in infrastructure such as glass skylines, estates, marinas, golf courses, shopping malls, and then, to attract foreign firms and individual investors, in office spaces, financial institutions, free zones, airports, harbours, then in tourism, and finally in other "new" economic sectors, mainly focusing on knowledge and new technologies (Hvidt 2011). This economic growth has resulted in an increase in demand for energy. Until recent years the GCC countries focused mostly on energy produced with fossil-fuels [mainly oil and recently natural gas). However, because of an increase in oil prices, in order to decrease CO_2 emissions (as the region contributes 2.4% to global emissions of greenhouse gases with only 0.6% of the world's population (Reiche 2010)], and to follow world trends, GCC members started to diversify their energy mix and decrease energy demand, which is reflected in changes in their economies. To achieve this GCC members have included in their energy mix natural gas, which is a by-product of the oil extraction process, and

recently have decided to employ renewable sources of energy (mainly derived from photovoltaics).

The purpose of this research is to demonstrate changes in the economic structure of the GCC member states through examining structural shifts among the main GDP contributors, and to verify the hypothesis that shifts in economic structure and GDP composition are correlated with changes in source of energy. To test the hypothesis a locally weighted polynomial smoother has been applied and to test statistical cointegration of variables regression analysis has been run.

This chapter encompasses five logically structured sections. Section 1 is the introduction and presents the general background of the study, as well as setting out its major aims and scopes. Section 2 presents the broad context of the research. It provides the reader with extensive discussion on the economies of the countries concerned and their gross domestic product composition, stressing the changing role of oil rents and the share of oils and natural gas in the total exports of these economies. It also presents a broad literature review of research that has been undertaken to date in the field to be analyzed. Section 3 presents the methodology and data rationale. Section 4 presents and interprets the results of empirical analysis. Finally, Sect. 5 discusses the results and concludes.

2 GCC Member Economies

The GCC economic model is based on revenue obtained from oil as the main export. As the government is the main force in these economies, it receives all revenues generated by state-owned enterprises (SOE's) and is responsible for distributing them to the citizens. This model has proven to be effective and has helped those countries to achieve rapid economic development. As has been previously mentioned, the GCC as a whole had an average GDP growth of 3% between 1970 and 2018, while Qatar's GDP has grown between 2001 and 2018 by an average of 9.45% each year (World Bank 2019a, b). However, as oil revenues between 2000 and 2017 were almost 80% of all government revenues, and oil exports reached 65% of total exports, this exposed GCC members to huge risk concerning fluctuations in global prices of fossil fuels. To diversify this risk, GCC members have individually started to make an effort to move from a rentier state classification (Luciani 1990) to that of a production state (Hvidt 2011), through various policy reforms. The major reforms have been made in key sectors of infrastructure. Leading examples that may be presented are the increase of air traffic capacity (which resulted in 135.49% increase in passengers carried by air transport in Qatar, 112.54% in the United Arab Emirates and 69.19% in Saudi Arabia), education [which has resulted in a literacy rate of 90% or higher throughout the GCC (World Bank 2019a, b)], and strengthening the business environment [which has resulted in improving the "ease of doing business" rankings to the following places in 2019: United Arab Emirates 16, Bahrain 43, Saudi Arabia 62%, Oman 68, Qatar 77, Kuwait 83 (World Bank 2019a, b)].

Losing revenue from changing prices of oil on world financial markets is not the only risk arising from relying solely on oil. Increasing prices of fuels forced GCC governments to implement subsidies for energy and fuel for their own citizens, which became a burden on their finances. As a result, GCC countries decided to diversify their energy mix. The first step was to take advantage of natural gas, which in the past was regarded by GCC authorities as a by-product without significant economic value. Natural gas, because of lower and more stable prices, requires much less subsidy by government (Peel and Blas 2011) and what is more, substantial investment in this sector [especially by Qatar, which after years of investment in the liquified natural gas sector has become the third greatest source of LNG in the world (Anderson 1987)] created an additional source of export revenue (AMF 2011).

The second step in energy diversification was to introduce renewables into GCC member states' energy mix (Al-Maamary et al. 2017). Until recent years renewables were not significant contributors to the energy mix, and so GCC countries have made significant change in their policies. The most ambitious ones, made by Qatar, assume the achievement of 20% energy production from renewables (at least 1.8 GW of energy sourced from PV) by 2030 (Wogan et al. 2017). This effort to diversify and develop the economy can also be observed in the shift from industry and agriculture towards services as leading contributors to GDP, which has been a known phenomenon in developed countries for many years. Maddison (1989) analyzed 16 developed countries over the period from 1970 to 1987 and reported a decrease in the share of agriculture in GDP from 29 to 4%, an increase in the share of industry from 26 to 39%, and almost a doubling of the share of services in GDP, from 35 to 60%. As this has been a proven phenomenon for developed countries, it is also applicable to the world average, which has shifted between 1970 and 2018 from 43.05 to 54.23% in the case of services, from 27.23 to 27.41% in the case of industry (although industry's average contribution as a percentage of GDP reached its highest value in 1975, since when it has dropped 4.05p.p.) and from 26.30 to 9.40% in the case of agriculture. This same phenomenon can be observed for the GCC countries, where the average contribution of services to GDP has increased by 19.57p.p., the average industry contribution to GDP has decreased by 16.34p.p. and the average agricultural contribution to GDP has decreased by 8.87p.p. This shows that GCC countries are following world trends by trying to diversify their GDP structure, to rely less on their natural resources and to decrease the influence of fluctuation in international financial markets on their economies (World Bank 2019a, b).

To understand how much GCC countries are exposed to risk concerning fluctuations in prices of fossil fuels it is crucial to investigate the correlation between GDP and oil prices. These two variables over the years were moving in tandem with a correlation coefficient of 98% (Nusair 2016). This correlation had a significant effect in the past on GCC countries' economies. For example, between 1997 and 2002 low oil prices resulted in an average income of USD146 billion for each GCC member state and 3.2% of GDP growth, while between the years 2003–2007 those numbers were USD327 billion and 7.1% (Momani 2008). This revenue stream resulted in huge investments and economic growth which was followed by increasing demands on

energy. This demand resulted in investments in the infrastructure of energy production which allowed GCC countries to obtain self-sufficiency (World Bank 2019a, b).

In order to understand how increases in energy production or consumption correlate with economic growth, the majority of studies focus on the correlation between energy consumption and economic growth (measured by GDP). Even though there are hundreds of articles on this subject, there is no consensus on the causality of this relationship. Payne (2010) provided an overview of the literature by examining 101 articles published between 1978 and 2008, and yet found no clear consensus on the causal relationship between energy consumption and economic growth. The literature has focused on the relationship between a particular energy source and GDP rather than on that between change in a country's energy mix and its economic growth.

A smaller number of articles has been written on the subject of the potential relationship between energy sourced from renewables and economic growth. Empirical evidence for this relationship is ambiguous. Some studies find a bidirectional relationship between economic growth and consumption of renewable energy (Apergis and Payne 2010a, 2011, 2012; Apergis et al. 2010). No evidence for a short-run relationship between real GDP and renewable energy consumption was reported by Sadorsky (2009), although he has provided evidence for the existence of a long-run relationship. In research examining 27 European countries, Menegaki (2011) fails to find any relationship at all. As countries are focusing on sourcing energy from renewables to different extents, it seems to be important to examine individual sources in the energy mix. Not many articles have researched the relationship between individual sources of renewable energy and economic growth. Payne has found in his research a positive unidirectional relationship between energy produced from biomass and GDP. Ohler and Fetters (2014) examined the relationship between certain renewable sources and GDP growth in 20 OECD countries between 1990 and 2008. They found a short-run bidirectional relationship between GDP, hydroelectricity use and waste energy. In the long run, their research found evidence for a cointegrating relationship between all analyzed sources of renewable energy and GDP.

Similarly to renewables, there is no consensus on a causal relationship between non-renewable sources of energy (fossil fuels) and economic growth. As aggregated data may not show the whole picture of the relationship many articles have focused on analyzing particular fuel sources, and even in the analysis of a single source of energy for a single country results may vary depending on the time period examined. Sari et al. find a causal relationship between coal consumption and economic growth for the United States of America in the period between 2001 and 2005 (Yu and Choi 1985), while Jinke et al. (2008) were unable to find a long-run relationship for the period from 1980 to 2005. Payne (2011a, b) detected for the USA a causal relationship between GDP and natural gas consumption and GDP and oil consumption from 1949 to 2006. However, he was not able to detect such a relationship between coal consumption and economic growth in the same period of time. The least controversial results are obtained for a causal relationship between economic growth and nuclear energy consumption. This relationship has been found in many countries (Apergis

and Payne 2010b; Aslan and Çam 2013; Wolde-Rufael 2010; Yoo and Jung 2005; Heo et al. 2011; Al-Mulali 2014) in different periods. The only difference was whether it was bidirectional or unidirectional.

3 Materials and Empirical Settings

3.1 Data Explanation

This study is designed to demonstrate changes in the economic structure of six member states of the Gulf Cooperation Council, namely: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. To meet the main aims of this research, by convention, we concentrate on key structural features of these economies and changes in their macroeconomic structures. First, we examine structural shifts among the industry, service and agricultural sectors' contribution to gross domestic product. To provide more specific insights into structures of national economies it examines—time changes in oil rents (as a share of GDP), natural gas rents (as a share of GDP), fuel exports (as a share of merchandise exports). Finally, it seeks to verify the hypothesis that shifts in economic structure and GDP composition are accompanied by changes in sources of electricity production. Hence we additionally rely on data regarding sources of electricity production, such as coal, natural gas, oil, hydroelectric power plants (hydropower) and renewable sources (excluding hydroelectric, but including geothermal, solar, tides, wind, biomass, and biofuels). Gross domestic product per capita (in constant 2010 US$) is also used to assess the overall condition of the countries examined. In the empirical part, we demonstrate country-wise evidence with respect to diversification of gross domestic product composition and other selected variables. The period of analysis covers the years 1970 to 2018. All statistical data are exclusively extracted from the World Development Indicators 2019 database.

3.2 Methods Applied

In this study, our empirical strategy combines different analytical techniques that allow seminal features of the variables examined to be revealed together with the relationships among them. In addition to standard descriptive statistics, our methodological framework combines time trends, graphical non-parametric analysis and panel regression techniques.

To reveal the statistical relationships between consecutive pairs of variables, we adopt a locally weighted polynomial smoother, which is a statistical nonparametric approach that is often applied to detect graphically the interdependencies between consecutive pairs of examined variables. This method is relatively simple, and allows

for preliminary general conclusions on the nature of the relationships between variables, and it relaxes rigid assumptions on the form of the relationships that parametric methods require. Additionally, unlike parametric methods, the use of the nonparametric graphical approach is outlier-resistant and hence the full empirical sample may be considered in the calculations.

Following Cleveland (1979), we use a general functional form like

$$f(.), \tag{1}$$

assuming that all the errors e_i in the model are identical to zero. Once the x_i is set as one of the covariates we can estimate $f(.)$ by adopting a polynomial functional form which may be multivariate function. We next extrapolate x_i using

$$y_i = f\left(x_i^*\right), \tag{2}$$

if $i = 1, \ldots k$, in the k-nearest neighborhood of x^*, with the assumption that f is a locally smooth function.

Next, to check for the relationship between economic growth that is approximated by gross domestic product per capita and other variables included in the research, we adopt panel regression analysis.

Henceforth we construct a panel where gross per capita income is denoted as a response variable, and all other variables are defined as predictors. By using panel regression analysis we aim to uncover if there is an impact of examined variables on per capita income in the countries within the scope of this analysis and if so how strong it is.

Relying on a random effects model, where—as assumed—cross-country variations are uncorrelated with explanatory variables, we estimate:

$$\boldsymbol{Y}_{\boldsymbol{i},\boldsymbol{y}} = \boldsymbol{\beta}_0 + \boldsymbol{\beta}(\boldsymbol{x}'_{\boldsymbol{i},\boldsymbol{y}}) + \boldsymbol{\alpha}_{\boldsymbol{i}} + \boldsymbol{\varepsilon}_{\boldsymbol{iy}}, \tag{3}$$

where $\boldsymbol{Y}_{\boldsymbol{i},\boldsymbol{y}}$ denotes GDP per capita; $\boldsymbol{\beta}$ is the $\boldsymbol{L} \times 1$; and $\boldsymbol{x}'_{\boldsymbol{i},\boldsymbol{y}}$ stands for the $\boldsymbol{iy}$ th observation on $\boldsymbol{L}$ explanatory variables (Baltagi 2008). The subscripts $\boldsymbol{i}$ and $\boldsymbol{y}$ stand for country and time accordingly.

4 Empirical Results

In what follows we support by empirical evidence our preliminary conceptual considerations on changing structures of the economies of GCC countries. The time span of this evidence ranges between 1970 and 2018. We examine fundamental shifts in economic structures by tracing the substitution patterns between gross value-added generated in the agricultural, industry and services sectors. Moreover, bearing in mind the fact that GCC countries are highly oil- and gas-dependent economies, we additionally trace changes in oil rents (% of GDP), natural gas rents (% of GDP)

and fuel exports (% of merchandise exports), to verify general tendencies in this regard. Finally, we rely on data on electricity production from natural gas sources and, separately, from oil sources (% of total). These changes are correlated with gross domestic production per capita (in constant 2010 US$).

Figures 1, 2 and 3 represent graphically the changes under consideration, while Table 2 in Appendix summarizes changes in discussed values between 1970 (or the earliest year when data was available) and 2018. Next, Fig. 4 displays the statistical relationship between GDP per capita and the remaining variables examined, and Table 1 shows panel regression results with GDP per capita as a dependent variable.

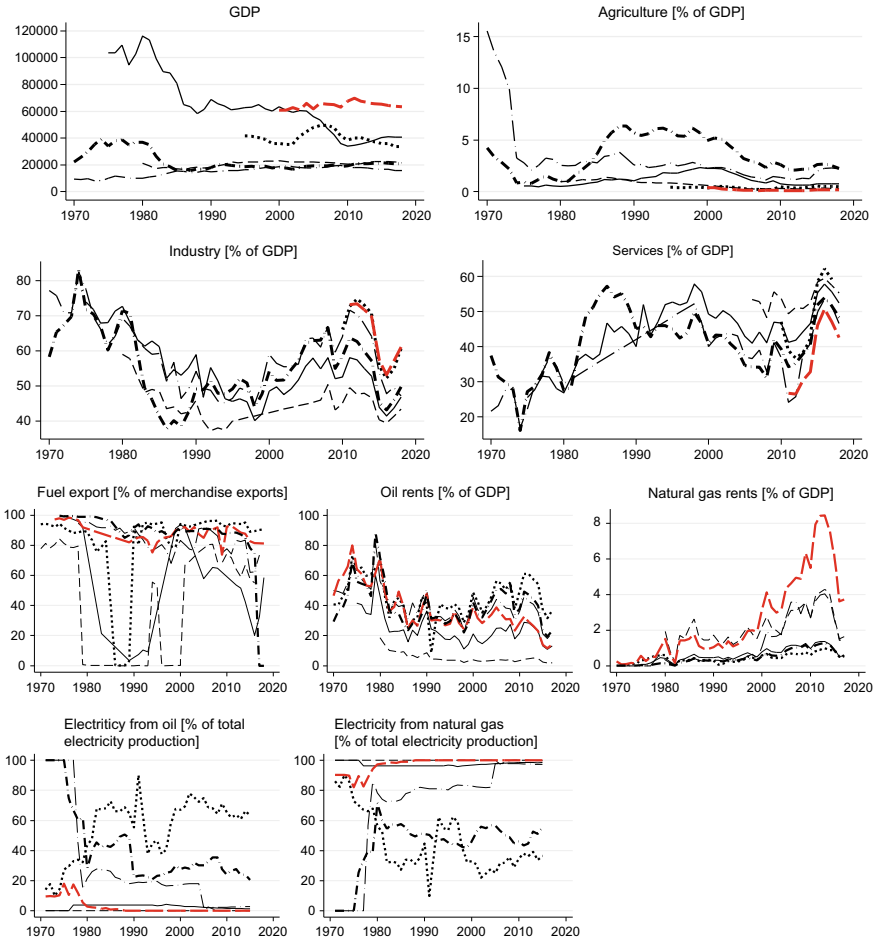

Fig. 1 Changes in basic macroeconomic indicators. Time trends representations. Period 1970–2018. *Source* Authors' elaboration. *Note* Solid line—United Arab Emirates; very short dash line (thick)—Kuwait; long dash (red)—Qatar; dash—Bahrain; long dash dot—Oman; dash dot (thick)—Saudi Arabia; GDP stands for Gross Domestic Product per capita (in constant 2010 US$)

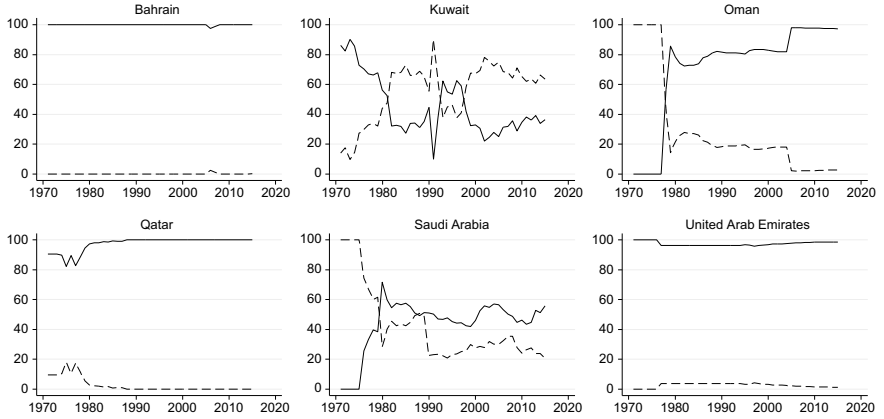

Fig. 2 Substitution between electricity production from oil and natural gas. Country-specific patterns. Period 1970–2018. *Source* Authors' elaboration. *Note* On Y-axis—share of total values; solid line—electricity production from natural gas sources; dash line—electricity production from oil sources

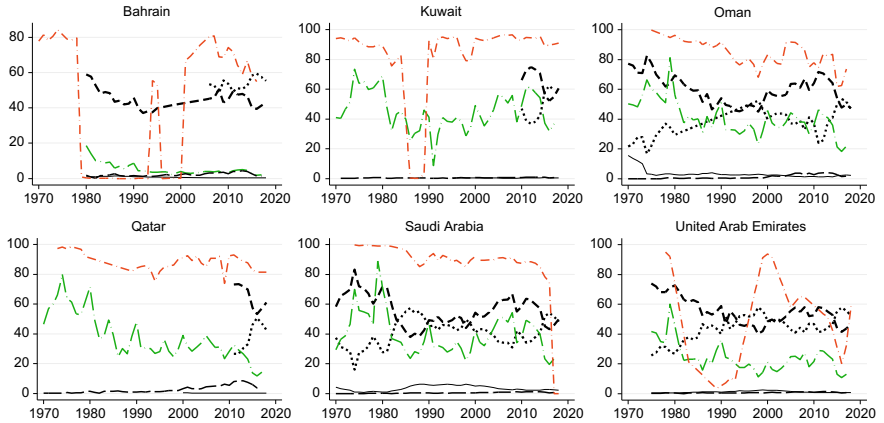

Fig. 3 Changes in economic structures. Country-specific patterns. Period 1970–2018. *Source* Authors' elaboration. *Note* On Y-axis—share of total values; solid line—agriculture (% of total GPD); very short dash line (thick)—services (% of total GDP); dash line (thick)—industry (% of total GDP); long dash line—natural gas rents (% of total GDP); long dash dot line (green)—oil rents (% of total GDP); dash dot line (orange red)—fuel exports (% of total merchandise exports)

Respective time trends regarding consecutive macroeconomic variables (see Fig. 1) demonstrate how pervasive changes are observed in these countries between 1970 and 2018. As for gross domestic product per capita, we note radical drops in the United Arab Emirates, but also in Kuwait. In Oman just the converse trend is observed (fast GDP per capita shifts), while the remaining economies seem to be relatively stagnant during the period analyzed. When looking at gross domestic product formation we

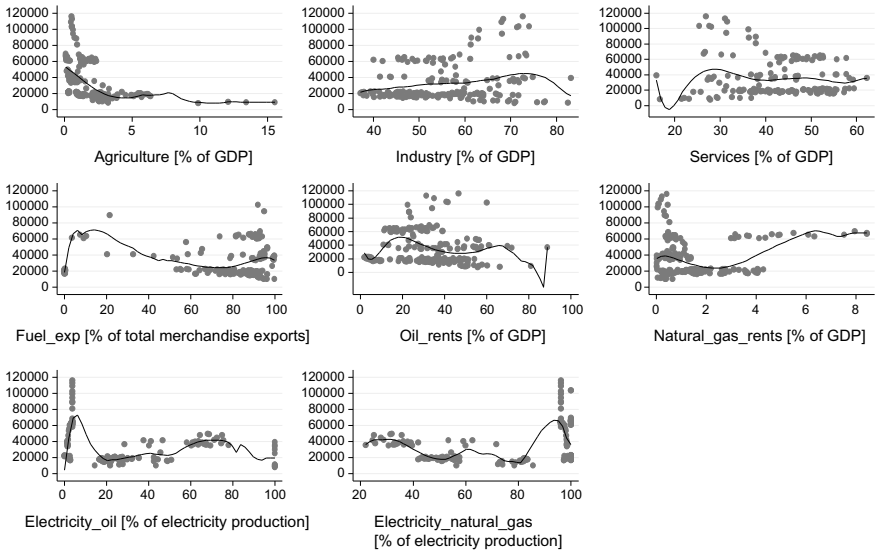

Fig. 4 Statistical relationship between gross domestic product and other variables. Period 1970–2018. *Source* Authors' elaboration. *Note* On Y-axis—GDP per capita; locally weighted polynomial smoother applied; kernel = epanechnikov; degree of polynomial—adjusted; bandwidth set as default

see that despite the fact that country-specific trends in respect to given variables are homogenous, the period between 1970 and 2018 was marked by several ups and downs.

In regard to the agricultural sector's contribution to GDP, we see that, for instance, in Oman it fell radically (from 15.5% in 1970 to 2.2% in 2018) while in the remaining economies the contribution to GDP of the agricultural sector remained negligible during the examined years. As for the industry and services sectors and their share in GDP composition, we observe relatively unstable patterns. First, between 1970 and the late 1990s the role of the industrial sector in GDP creation was falling and compensated for by a growing role of services. However, since the early 2000s the reverse trends are observed, a growing role of industry while that of services is falling. Finally, since 2010 again we observe switching from the industry to the service sector. In total, between 1970 and 2018 the share of GDP generated by the service sector grew substantially across GCC countries, with the sole exception of Bahrain where it remained stable.[1] A growing role of services in contribution to GDP is hence accompanied by a relatively diminishing role of the industrial sector.

When looking at the time trends (see also Fig. 1) regarding oil rents (% of GDP), natural gas rents (% of GDP) and fuel exports (% of merchandise exports), we note how fast and pervasively shifts are happening in these sectors. Across all economies, between 1970 and 2018 we see a fast diminishing role of oil rents in GDP creation; for instance in Oman it drops from 50.1 to 21.8%, in Qatar from 46.5 to 14.2%, and

[1] Please also note that available data for Bahrain go back only to 2006.

Table 1 Panel regression estimates

$LnGDPper\_capita_{i,y}$	RE(1)	RE(2)	RE(3)	RE(4)	RE(5)	RE(6)	RE(7)	RE(8)
$LnAgric_{i,y}$	−0.25 [0.03]							
$LnInd_{i,y}$		0.46 [0.14]						
$LnServ_{i,y}$			−0.34 [0.09]					
$LnOilRents_{i,y}$				*0.07 [0.04]*				
$LnNatGasRents_{i,y}$					−0.07 [0.08]			
$LnFuelExp_{i,y}$						*0.01 [0.006]*		
$LnElecGas_{i,y}$							*−0.04 [0.12]*	
$LnElecOil_{i,y}$								*−0.21* [*0.02*]
#obs	214	188	154	*218*	210	*172*	*192*	*156*
r-sq (overall)	0.39	0.01	0.002	*0.001*	0.00	*0.02*	*0.01*	*0.08*
Wald χ^2 (Prob > χ^2)	90.9 [0.00]	16.4 [0.00]	14.02 [0.00]	*2.71 [0.09]*	25.2 [0.00]	*2.87 [0.09]*	*0.15 [0.69]*	*0.8 [0.37]*
rho	0.85	0.86	0.86	*0.89*	0.89	*0.91*	*0.91*	*0.85*

Random effect. Period 1970–2018

Source Authors' estimates: *Note* Panel—balanced; below coefficients—standard errors; random-effects GLS regression applied; all values are logged; statistical significance at 5%; in italics—results statistically insignificant

in Saudi Arabia from 29.5 to 0.57%. On the other hand, shifts in natural gas rents' contribution to GDP are easily traceable. The most pervasive growths are visible for Qatar, from 0.2 to 3.7% (in 2017) with peak years 2011–2014 (8.46% in 2013). Similarly in Oman and Bahrain we detect that between 2011 and 2014 the natural gas rents were the highest, 4.3% in Bahrain and 4.03% in Oman. Then in all remaining countries, from 2014 onward we note drops in natural gas rents' contribution to GDP.

Rapid and multiple changes over a short time period in rents from oil and natural gas affect negatively overall economic stability; the same applies to fuel export shares in total merchandise exports. Such turmoil does not promote entering a sustainable development path, and cannot be claimed as a valid and in-time stable source of financing for the economic development of countries. GCC economies are to a large extent monocultures; being dependent on one natural resource always constitutes a kind of threat to economic stability. In regard to electricity production from oil and from natural gas the time paths are highly unstable. Multiple ups and downs are reported; cross-country homogeneity in this respect is negligible. As for the electricity production from oil, we see that country-wise time lines vary substantially.

In Kuwait, starting from 13.9% in 1970 to 63.6% in 2017, in Qatar from 9.5 to 0.0%, in Oman from 100 to 2.6%, and similarly massive drops in Saudi Arabia, from 100 to 20% in 2018. Analogous in-time fluctuations are reported for electricity production from natural sources. Only Bahrain and Kuwait demonstrate stability over the period 1970–2018, where electricity is produced barely 100% from natural resources. In Kuwait it dropped radically, from 86 to 34% in 2018, while in Oman and Saudi Arabia it grew from 0% in 1970 to 97 and 56% respectively in 2018.

The process of substitution between electricity produced from oil versus electricity produced from natural resources is clearly visible in Fig. 2. Still, interestingly, this specific substitution goes in a different direction in Oman than in Kuwait and Bahrain.

Next, our intention was to examine country-wise patterns in regard to changes in contribution to gross domestic product of three major sectors of the economy: agriculture, industry and services; in here additionally we add information on how much of GDP is generated from oil rents and how much of total merchandise exports is constituted by fuel exports (see Fig. 3) That give us a broad view on each country, allowing us to assess its changing structure between 1970 and 2018.

Country-specific graphs in Fig. 3 report on shifts in the structures of the national economies examined. The first impression is that across all the countries analyzed, between 1970 and 2018 these shifts are pervasive and offer proof of the profound changes that took place. Still, despite clearly traceable tendencies, we observe highly unstable substitution paths (agricultural sector versus industry/service sector), which shows the relative volatility of GCC economies and their lack of resistance to external shocks and any turmoil that may occur in the world economy. Visibly in all economies, the contribution to national gross domestic product of the agricultural sector was negligible. In the cases of Bahrain, Kuwait and Qatar, the time series reporting value-added generated by the industrial and services sectors are short, which invalidates conclusions on long term tendencies. Despite this fact, both in Qatar and Kuwait the share of the services sector in total value-added created has doubled during the last 9 years, which speaks in support of the hypothesis on the fast changing structure of the GCC economies. In the cases of Oman, Saudi Arabia and the United Arab Emirates, the industrial versus service sector substitution paths are easily distinguishable. In Oman this switching from an industry-based to a service-based economy seems to be the most radical and dynamic, although in 1998 the highest share of GDP was generated by the service sector and from 1998 onward we again observe the reverse tendency, an increasing role for industry and a diminishing one for services. Finally, in 2018, the share of the industrial and services sectors in GDP was close to equal. In Saudi Arabia and the United Arab Emirates, the industrial versus services sector substitution paths are very similar. Between the 1970s and 1990s we note fast drops in the industrial sector's share in GDP generation, which was hence compensated for by services, and then since the early 1990s both industry and service sector timelines are unstable, with no visible tendencies. As for the fuel exports as a share of total merchandise exports, in the cases of each country except Oman and Qatar we observe high paths volatility. The cases of Bahrain and the United Arab Emirates especially draw attention, with ups and downs ranging between 0 and 100%.

Finally, to enrich this general overview of the GCC countries we add graphical and numerical evidence identifying statistical associations between GDP per capita and remaining macroeconomic variables considered in this research. Figure 4 reports the strength and direction of the correlations between consecutive pairs of variables (for rigid calculations of pairwise correlations, see Table 3 in Appendix) and Table 1 summarizes the results of panel regression estimates where GDP per capita is defined as a dependent variable.

At first glance, empirical evidence obtained from panel analysis does not indicate any rigid relationships. The relationship between per capita income and major economic sectors' contribution to the national economy is weak and scattered in all cases. Panel regression results report the strongest positive and statistically significant dependency between per capita income and the industrial sectors of the examined economies. As for the agricultural sector, the estimated coefficient reports its negative impact on level of GDP per capita. Surprisingly, panel regression estimates have also revealed an analogous relationship between service sector contribution and per capita income; it is negative and statistically significant. Next, graphical evidence suggests the existence of negative in-time associations between fuel export share in total merchandise exports and per capita income; the calculated correlation is (−0.42), however, results from panel regression estimates do not report the existence of interdependencies. The lack of the last is probably caused by frequently changing shares of fuel exports in total merchandise exports, as claimed in previous paragraphs. Analogously weak statistical associations are found in the case of natural gas rents as a share of GDP and electricity production both from oil and natural gas; no evidence supports the supposition of their strong impact on gross per capita changes.

5 Conclusions

This research aimed at unveiling general changes in the macroeconomic structures of the national economies of GCC countries between 1970 and 2018. Our target was to answer the question of whether the examined economies follow a steady development path which in effect enforces structural shifts in GDP composition. We have additionally examined the changing role of oil and natural gas rents in GDP composition, as well as fuel exports; finally we have tested how much electricity is produced from oil and/or natural gas sources. General conclusions that can be drawn are that over the period 1970–2018 all GCC countries radically changed their economic structure in terms of gross domestic product creation. In all examined economies we have traced a diminishing role of the agricultural sector in gross domestic product composition, which was compensated for by growing roles of industries and services.

Despite the fact that for industries the time-path indicates relative instability, fast drops until the 1990s and an upward trend until the 2010s, followed by further drops, the general trend is negative, speaking in support of our hypothesis on the diminishing role of industries. This negative trend in industry's role in GDP composition was

compensated for by dynamic shifts in services (compare Fig. 1) in all countries in the scope. This specific industry-services substitution shows one long-term economic reorientation of GCC countries; they restructured their economies so that the highest share of economic wealth was created in the services instead of the industrial sector. The process of substitution between industrial and services sectors is easily traceable, although the country-specific patterns are fluctuating intensively, which to some extent shows relative internal instability of these economies. The latter proves the significant modernization and macroeconomic transformation of GCC countries, which leads, inter alia, to employment creation in non-oil-based sectors. The specific reorientation in terms of GDP creation coincides with a growing role of natural gas rents in GDP and falling oil rents; and despite the fact that country-specific time lines vary the long-term trend is clearly defined. Even more dynamic fluctuations are observed in respect to changing fuel exports, oil and natural gas rents and their contribution to GDP formation. The last may be obviously a direct consequence of oil and gas prices on global markets; GCC economies as highly natural-resources dependent economies. Falling oil and gas prices affect not only diminishing budget surpluses but in broader perspective reduce the possibilities of state social transfers and spending, which in the 2000s boosted the GCC economies, and raise the threat of unstable budget inflows pushing GCC states towards more profound reforms, including in their education systems, labor markets and investment imperatives.

The GCC countries share several specific characteristics, of which one is high dependency of their economies on hydrocarbons (Ali et al. 2016). Fiscal revenues and share of the hydrocarbons sector in GDP still show significantly high values in GCC economies, and economic diversification is unquestionably one of the national macroeconomic policy aims. Reduction of oil-dependency and more dynamic development of the private, non-oil, sector seems to be a priority of GCC countries in a relatively short time horizon. “Doing more business with less oil” may be the right direction in diversification for Gulf oil economies. Being highly reliant on oil (Ross 2013) does not constitute a solid foundation for the long-run economic development of an economy overall; rather, massive investments in education systems and human capital in general, combined with an increasing role of private companies in GDP creation and higher female engagement in the labor market, may help in generating far less oil-dependent economies for the GCC member states.

Appendix

See Tables 2 and 3.

Table 2 Changes in economic structure

Year	Bahrain		Kuwait		Oman		Qatar		Saudi Arabia		United Arab Emirates	
	1970	2018	1970	2018	1970	2018	1970	2018	1970	2018	1970	2018
Agriculture (% of GDP)	0.98 (1980)	0.28	0.42 (1995)	0.48	15.5	2.2	0.3 (2000)	0.2	4.2	2.3	0.540188	0.7
Industry (% of GDP)	59.1 (1980)	43.4	66.06 (2010)	60.6	77.2	47.1	73.2 (2011)	61.1	58.6	48.2	73.9 (1975)	46.7
Services (% of GDP)	53.4 (2006)	55.3	47.04 (2010)	59.2 (2017)	21.5	46.6	26,7 (2011)	42.6	37.4	48.2	25.4 (1975)	52.4
Oil rents (% of GDP)	18.5 (1980)	2.1 (2017)	40.4	36.6 (2017)	50.1	21.8 (2017)	46.5	14.2 (2017)	29.3	0.57 (2017)	41.6 (1975)	13.1 (2017)
Natural gas rents (% of GDP)	1.9 (1980)	1.5 (2017	0.04	0.52 (2017)	0.0	1.6 (2017)	0.2	3.7 (2017)	0.02	0.0001 (2017)	0.07 (1975)	0.56 (2017)
Fuel exports (% of merchandise exports)	77.8	55.1 (2016)	94.5	90.2	99.7 (1975)	73.7 (2017)	97.3 (1973)	81.4	99.7 (1974)	0.0003 (2015)	94.9 (1978)	58.6
Electricity production from natural gas sources (% of total)	100	99.9 (2015)	86.08	36.4 (2014)	0	97.4 (2015)	90.4 (1971)	100	0	0 (2015)	100	98.5 (2016)
Electricity production from oil sources (% of total)	2.4 (2006)	0.03 (2015)	13.91	63.6 (2014)	100	2.6 (2015)	9.5 (1971)	0	100	55.8 (2015)	0.0	1.5 (2016)

(continued)

Table 2 (continued)

Year	Bahrain		Kuwait		Oman		Qatar		Saudi Arabia		United Arab Emirates	
	1970	2018	1970	2018	1970	2018	1970	2018	1970	2018	1970	2018
GDP per capita (constant 2010 US$)	21,184.98	21.438	41,596 (1995)	33,537	9239	15,663	60,837 (2000)	63,222	22,133	20,775	103,604	40,782

Summary statistics. Period 1970–2018

Source Authors' compilation based on data derived from World Development Indicators database 2019

Table 3 Correlation matrix

	Agriculture (% of GDP)	Industry (% of GDP)	Services (% of GDP)	Oil rents (% of GDP)	Natural gas rents (% of GDP)	Fuel exports (% of merchandise exports)	Electricity production from natural gas sources (% of total)	Electricity production from oil sources (% of total)	GDP per capita (constant 2010 US$)
Agriculture (% of GDP)	1.0								
Industry (% of GDP)	−0.47	1.0							
Services (% of GDP)	0.19	−0.87	1.0						
Oil rents (% of GDP)	0.05	0.75	−0.73	1.0					
Natural gas rents (% of GDP)	−0.43	0.08	0.02	−0.32	1.0				
Fuel exports (% of merchandise exports)	0.28	0.25	−0.28	0.48	−0.1	1.0			
Electricity production from natural gas sources (% of total)	−0.48	−0.08	0.11	−0.47	0.59	−0.54	1.0		
Electricity production from oil sources (% of total)	0.19	0.24	−0.13	0.56	−0.54	0.51	−0.88	1.0	

(continued)

Table 3 (continued)

	Agriculture (% of GDP)	Industry (% of GDP)	Services (% of GDP)	Oil rents (% of GDP)	Natural gas rents (% of GDP)	Fuel exports (% of merchandise exports)	Electricity production from natural gas sources (% of total)	Electricity production from oil sources (% of total)	GDP per capita (constant 2010 US$)
GDP per capita (constant 2010 US$)	−0.41	0.14	−0.05	−0.07	−0.31	−0.41	0.29	0.15	1.0

Source Authors' calculations

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UAE Economic Diversification: A Medical Tourism Perspective

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Abstract Economic diversification is the process of structurally transforming an economy away from a single income source toward multiple sources from a growing range of sectors and markets. Given the economic diversification, ethical implications, and social impact of medical tourism, combined with the foreign income potential and the growth in the number of countries offering medical tourism services, the way a destination brands itself is critical to attracting medical tourists. This chapter will identify how top medical tourism destinations position themselves, while uncovering the key attributes they mention as part of their branding strategy and defining the emphasis they place on different aspects of the medical tourism experience upon contributing to economic diversifications in the United Arab Emirates. The critical insight of medical tourists' decision-making process and their motivation to travel overseas countries for the treatments is provided in this study through a qualitative approach and semi-structured interviews. In a recent study conducted by the authors, there were nine motivational factors identified which effecting on the medical tourism decision-making process for economic diversification: (1) expert physicians and doctors, (2) quality of care and services, (3) medical treatment cost, (4) sources of information, (5) tourism facilities, (6) excellent vacation spot, (7) improving health, (8) risks, and (9) communication and language barriers.

Keywords Economic diversification · United Arab Emirates · Medical tourism · Medical tourists

1 Background

The number of countries positioning themselves as medical tourism destinations, offering different forms of surgery, dental treatment or other medical services, is

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increasing. Medical tourism is a fast-growing industry due to the aging population of baby-boomers in wealthy countries and the problem of under-insurance for health care in those countries, with substantial benefits to the host destination. These benefits include, firstly, foreign investment, with medical tourists typically spending more than regular tourists as they stay at the destination for longer as part of their post-operative recuperation. This contributes to economic diversification, and this foreign investment helps to stimulate the local economy and infrastructure provisions. Secondly, it leads to greater investment in the destination's medical technology and facilities, which could benefit locals.

Perceived risk is one of the biggest barriers to the growth of medical tourism. Risk perceptions are particularly high in this field because:

- Medical tourism can be susceptible to quackery.
- The business of medical tourism takes place outside national regulatory frameworks due to its cross-border status.
- Patients travelling for medical purposes may be exposed to greater risk due to limited or absent post operative care and potential for complications due to travel.
- Some procedures that people may travel to other countries to undergo could be sensitive or could exist on the fringes of what is considered to be ethical.

It is necessary to ensure that patients feel protected, and therefore willing to visit. Destination marketing and branding can play a role in helping to position the destination as a safe place for medical procedures. It is important to note that medical tourism differs from medical travel, in that the latter is motivated by serious medical conditions that may need specialized care only available at a medical facility or center in a foreign location. Expertise, while important, plays a role of lesser significance in medical tourism. It, therefore, comes down to other aspects of the destination's brand to attract individuals seeking medical procedures.

1.1 Need for Research

Given the economic diversification potential, ethical implications and social impact of medical tourism, combined with the foreign income potential and the growth in the number of countries offering medical tourism services, the way a destination brands itself is critical to attracting medical tourists. An understanding is therefore required of how places may brand themselves as medical tourism destinations. Previous research has largely looked at policy implications of medical tourism, benefits to host destinations and impact on home destinations, and does not pay adequate attention to the brand components that contribute to building a successful medical tourism destination. Understanding the brand components of a successful medical tourism destination will help destinations position themselves as a medical tourism destination more effectively. Such an understanding will also underpin policy development initiatives by identifying the key aspect of a medical tourism offer.

1.2 Objectives

This chapter will identify how top medical tourism destinations position themselves. This will include uncovering the key attributes they mention as part of their branding strategy and identifying the emphasis they place on different aspects of the medical tourism experience and how it can contribute to economic diversification in the United Arab Emirates.

1.3 Methodology

Top medical tourism destinations will be identified based on the number of medical tourists visiting those destinations. These destinations will be used as case studies of successful medical tourism destinations. Publically available documents (websites, policy documents, etc.) will be reviewed to identify how these destinations talk about their brand and medical offer for improving economic diversification. A qualitative textual analysis approach will be used to identify the key themes contained in these documents.

2 Economic Diversification

Economic diversification is the process of structurally transforming an economy away from reliance on a single income source toward multiple sources from a growing range of sectors and markets (Amanto et al. 2019). Economic diversification is a strategy used to endorse economic growth and development (Alsharif and Bhattacharyya 2019). It is also a key element of structural reform, in which a country transforms into a more diverse production and trade profile. A key reason for the almost unprecedented promotion of economic diversification in resource-rich countries concerns its role as a panacea for various aspects of the so-called "resource curse" or "Dutch disease". The latter is a term that broadly refers to an economic situation where the rapid development of one economic sector (particularly a primary one) causes a decline in other sectors. Due to common worldwide demand for the emerging sector's products; domestic currency appreciation tends to be inevitable. "Dutch disease" is a paradoxical situation where the rise of one sector, particularly due to large discoveries of natural resources, triggers a change in the production configuration that results in the contraction of other manufactured goods. This dislodgment of the manufacturing sector comes at the expense of productivity, income, job creation and global competitiveness (Mahroum and Al-Saleh 2016).

A second key reason that explains the popularity of economic diversification is the fact that it contributes substantially to mitigating the impact of the volatile growth associated with resource-dependent countries. Prices of commodities are known to

be highly volatile, particularly with respect to oil. The opposite is true in the case of manufactured goods where their prices tend to depend on movements of international demand and supply. Hence, a lack of economic diversification is often associated with increased vulnerability to external shocks that can undermine prospects for longer-term economic growth (Aid 2019). With the world witnessing undeniable plunges in global growth; successful diversification is becoming all the more important. With respect to developing countries and emerging economies, it is the one guaranteed token for increasing not only job opportunities, but also the sophistication of those created.

2.1 Why Economic Diversification?

Furthermore, with economic diversification there comes trade expansion and international presence in world markets. Over the past years, the increasing drive of medical tourism development has been prominent and countries have witnessed the influx of a large amount of additional revenue to the national budget and attracted high-paying tourists (Perkumienė et al. 2019). Widening a country's export base allows it to create for itself shock-proof cushions should unstable global demand hit. Worst case scenarios usually involve inelastic demand for primary products that hit price troughs and lead to dramatic drops in export revenues for those highly dependent on certain natural resources. This can consequently have a significant adverse impact on an emerging economy in terms of investment and employment. Thus, export diversification is one means to mitigate the side-effects of trade specialization in one sector in particular. It also paves the way towards creating new, higher productivity, jobs that will facilitate growth through structural transformation (Aid 2019).

Given this economic perspective, medical tourism delivers profits to the government of the destination, businesses, residents and citizens; in addition to reducing the overall costs of transporting people and exchanging information (Agbeh and Jurkowski 2015; Černikovaitė and Mameniškis 2015; Ruggeri et al. 2015). Some countries perceive medical tourism as the formation of a prevalent form of culture, whereby persons in need of medical care can travel long distances and be considered tourists as well (Connell 2013). Such a culture of medical travel has become an emergent and growing business globally, characterized by the combination of tourism and medical care for reasons of seeking lower medical costing, availability of services, better perceived quality, lower waiting times and access to specific types of medical services (Moonesar et al. 2018; Ormond and Sulianti 2017). In modern times, medical tourism is defined as a form of tourism which facilitates medical therapeutic services for patients (Perkumienė et al. 2019) via the common private sector and public sector in partnership with the tourism industry.

Hence, it is only logical to assert how shifting from agricultural to non-agricultural sectors, or from manufacturing to services, contributes substantially to the generation of both static and dynamic gains. The static gain is the improvement in labor productivity and efficiency as the latter transforms into more productive sectors with more

sophisticated production technologies. Dynamic gains, on the other hand, emerge as the knowledge, skills, and abilities of labor develop, adding to the reservoir of human capital. This process ultimately generates productivity growth within sectors and shifts of labor from lower- to higher-productivity sectors, thereby creating more, better-remunerated, more formal, and higher-productivity jobs (Busse et al. 2019).

However, diversification will not allow countries to reap its fruits if they do not enjoy open flow markets among themselves. Having a large variety of goods and services to choose from, and accessing cross-border markets to sell them, are actually measures of diversification. Subsequently, expanding into external markets leads to positive externalities such as the efficient deployment of skilled labor, knowledge sharing, and the inevitable investment in greater worldwide demand. This helps to alleviate structural unemployment by "future-proofing" economies. It also creates fluid and smooth environments for foreign direct investments that chase economies who nurture growth and trade diversification (Tipu and Sarker 2019).

2.2 The UAE Medical Sector for Pursuing Economic Diversification

For decades the topic of economic diversification has been high on the agenda of governments in all natural resource rich countries. In the past two decades, governments of these countries have been making substantial investments in what one might call diversification clusters of new economic activities (Aker and Aghaei 2019). These have included high-tech sectors, energy renewables, creative industries and service-oriented businesses. The investments channeled into these clusters mirror governments' thinking on how to achieve broader economic diversification, which rests on the assumption that government's role lies primarily in economic factors on the supply-side, such as necessary investments in infrastructure and training (Mahroum and Al-Saleh 2016). With the intention to re-direct governments' focus towards innovative and unconventional industries such as entertainment, healthcare, and renewable energy, emerging economies, particularly the Gulf Cooperation Council (GCC) members, have taken serious steps since the unprecedented drop in oil prices and export revenues of 2014.

Over the last decade, the healthcare industry has positioned itself as one of the most critical sectors for pursuing economic diversification in the GCC countries. Governments have started looking at private sector collaboration as an alternative to sustain healthcare funding since oil prices started plunging. With emerging laws that endorse public-private partnerships, mandatory insurance coverage, and private players being encouraged to set up facilities, the UAE medical sector is witnessing a structural shift as a younger, more health-conscious population is seeking preventive care rather than curative care (Ahmed et al. 2018). Medical tourism is known to be growing across global markets, with estimated annual revenues of US$50 to US$65 billion and an annual yearly growth of approximately 15–20%. Many countries in

Asia, such as India, Singapore, Thailand, South Korea and China, are investing millions of dollars to support the increase in demand for access to quality care across borders.

With considerable business opportunities attached to medical tourism, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in 2005 produced a list of countries that have started experiencing an increase in medical travelers to their destination. Leading names included India, UAE, and the Philippines as emerging major health-care destinations. According to Han and Hyun (2015), other countries such as Turkey, Colombia, Argentina, Bolivia, and Brazil were taking strides in placing their names on the same list. Despite the rising popularity of cross-border medical transactions, there is little literature on the dynamics of trade. A handful of academic studies have focused on this sector. Most accessible studies delve into the sector's economic contribution to GDP, or marketing aspects of the health industry (Han et al. 2015). The most notable finding of the literature available is the fact that patients' main incentives to cross borders to receive certain treatments are affordability and quality of care (Han et al. 2015).

As for India, it is known for its inexpensive services and high caliber doctors that cater to a wide market of patients. The UAE, on the other hand, is popular for its sophisticated, state-of-the-art technology and medical infrastructure that may have no competing counterparts in the nearby region. Historically, Egypt was the medical tourists' favorite destination in the 1960s and up to the 1990s. Unfortunately, this rank was seized by other countries in the same region two decades later, due to consistent investment in the health sector that was not matched by the former leader in the field (Shukla and Kulshreshtha 2020). Although the UAE is not currently ranked among the top 10 medical tourism destinations in the world (Shukla and Kulshreshtha 2020), it does possess the potential to become more prominent in the sector, due to the generous provisions of advanced medical technologies that it injects into the industry.

Realizing this promising opportunity, the UAE is on its way to becoming a global hub and a destination favorite of foreign patients seeking high-quality services (Al-Talabani et al. 2019). Accordingly, the partnership of the government of the UAE with prestigious health care companies and organizations like the Cleveland Clinic, the John Hopkins University-Al Tawam Hospital partnership, and Mubadala Health Care are among the new faces of the UAE's health system (Shukla and Kulshreshtha 2020). In this light, one of the Emirate's main administrative cities, Dubai, is fast becoming a major hub for medical tourism. The city's health care sector is reported to currently employ over 35,000 professionals from more than 100 countries. If it maintains this pace, the Dubai Health Authority (DHA) is expected to attract over 500,000 medical tourists by 2020 (Al-Talabani et al. 2019). With the objective to diversify the UAE economy there comes the imperative need to invest in specialized infrastructure and highly skilled human capital, to allow for the solidification of a well-established tertiary industry. Diversification, while moving up the value chain, will result in higher incomes and further economic growth as the economy transitions into high-value exports and demand-driven international demand.

3 A Glimpse into the Medical Tourism Industry

For the last decades, medical tourism has been gaining more popularity and recognition from people, government, media, and other stakeholders in the healthcare sector. Medical tourism occurs when people or patients are traveling to another place or traveling abroad to access cross border healthcare and medical services paid for out of pocket (Lajevardi 2016). The tourism industry, in order to expand and to maintain its position as one of the fastest-growing industries and one of the largest service sectors influencing the economy worldwide, is dependent on tourists' travel decisions and factors which influence travel behavior and control its relative distribution, such as motivation, tradition, culture and ethical background, past experiences and financial status (Van Vuuren and Slabbert 2012).

The medical tourism industry's scope and size are staggering and it has shown remarkable growth since its inception. The value of the medical tourism industry is estimated to reach USD100 billion (AED 367 billion) and expected growth of 25 percent each year, reaching USD 3 trillion (AED11 trillion) by 2025 (Medical Tourism Index 2017). Approximately 11 million patients travel for medical care annually, and spend approximately USD 3500–5000 (AED 12,800–18,300), making the market size of the medical tourism industry around USD 38.5–55 billion (AED 141–202 billion) (Ganji 2015). An estimated number of 14–16 million medical tourists from all countries traveled for medical care in 2017, at an average estimated cost of USD 3800–6000 (AED 13,900–22,000) per visit per traveler, which globally is equivalent to USD 45–72 billion (AED 165–264 billion) in total spent per year (Dalen and Alpert 2019).

However, it is difficult to determine the actual size of the industry since the estimates vary widely due to the different survey methods used from country to country. According to Global Buyers Survey 2017, most governments do not record official data on medical tourism visitors because the numbers are complicated to ascertain, due to confusion introduced by repeat patient visits, expatriates within countries, spa visitors, pharmaceuticals and medications purchasers, friends and relatives who are accompanying patients. Likewise, many hospitals do not release verified data on individual patients for reasons of patient confidentiality (Global Healthcare Resources 2017). The following sections briefly highlight the current situations regarding medical tourism in different countries and in the UAE.

3.1 Current Medical Tourism Situations in Different Countries

Different factors are influencing medical patients to consider traveling abroad for treatment, such as the increasing costs of domestic medical care, expanding economies, aging societies, and worldwide medical technology equalization (Han et al. 2015). As identified by Heung et al. (2011) and Yu et al. (2011), the medical

tourism market components offered by a destination country which attract potential medical patients include medical market structure, infrastructure, products, benefits of consumer, target markets, branding, communication channels, operators, legal framework, social issues, and intermediaries.

Gerhard et al. (2011), categorized medical patients into two types according to the health care they were receiving: (1) patients receiving acute care, where they received treatment (either through a specialized doctor at the hospital or primary care through a family doctor) for conditions that are the result of disease or complications suffered during recovery from surgery. (2) Patients receiving elective (planned) care, where they receive planned in-patient specialized care such as low frequency, minor or ordinary care, dental care, private treatment and treatment for research support.

Each medical tourist has their unique and most competitive and attractive medical tourism destination, which mainly depends on cost, technical quality, excellence, and the availability of the desired facility (Khan and Alam 2014). The medical tourists travel from developed countries like Western Europe and the United States seeking treatments in developing countries, particularly in South and Southeast Asian countries, including Thailand, Singapore, India, Malaysia, and South Korea. The other primary flows are to European countries, including Hungary, Czech Republic, Latvia, Latin American countries including Mexico, Brazil, Costa Rica, and Guatemala, and some Middle Eastern countries (Hopkins et al. 2010). Heung et al. (2011) stated that patients first select the destination and then they start choosing medical and tourism facilities offered in that destination, which influence their decision to seek healthcare services abroad. Moreover, many factors were identified for the development of the medical tourism sector which are at the same time considered barriers for some other countries, such factors as healthcare and service quality, costs, reputation, accreditation, physician expertise, medical facilities advertisement (promotion), companionship, hospital hardware, economic conditions, laws and regulations of the country.

Further, Khan and Alam (2014) designated three characteristics which help to attract new travelers to a medical tourism destination, namely: (1) personal security, (2) services availability and (3) convenience and flexibility, where they can receive various healthcare services in one location at lower prices and are able to have their family and friends stay with them in the same facility. These factors affect medical tourists' country choice.

Yu et al. (2011) categorized the critical factors for decision-making for choosing a country for medical tourism. These included level of development and modernization of medical facilities and technologies, medical services quality, travel expenses, country safety level, weather conditions, diversity of tourism and tour programs, convenient transportation, availability of delicious foods and beautiful scenery. This study aimed to enhance the perception of medical tourism in South Korea as a new growth industry by identifying the main features to improve to reflect other countries.

3.2 Current UAE Medical Tourism

The United Arab Emirates (UAE) consists of seven federation emirates, Abu Dhabi (the capital city), Dubai, Sharjah, Ajman, Fujairah, Umm Al Quwain and Ras Al Khaimah (The Executive Council 2019). The UAE population has reached 9.52 million which is comprised 11.48% of Emiratis and 88.52% of expatriates (Global Media Insight 2019). Despite being a small country in size compared to the world's largest countries, such as Russia, Canada, United States of America, China, India, Brazil, it is located in a very important geographical and strategic location in the Persian (Arabian) Gulf, sharing borders with the Kingdom of Saudi Arabia and the Sultanate of Oman (Global Media Insight 2019). UAE maintains important diplomatic relationships with other countries which has helped them in enhancing international understanding by promoting cultural exchanges, diplomacy and policy development, peace, security, solving global problems like poverty, human trafficking, racism, drugs, diseases, terrorism, and war. Likewise, it is encouraging industrial development and promoting economic growth through the trade of goods and services and financial and technical support (International Relations 2019).

The growth of the medical tourism industry in the UAE has transformed it into a medical tourism hub of the region, where the government has increased its spending in advanced healthcare infrastructure for healthcare service providers in both qualitative and quantitative terms. A variety of specialized services and facilities offered along with wellness treatments including sports medicine, orthopedic, ophthalmology, dermatology and skin care, plastic surgery, rehabilitation, dental procedures, preventive health check-ups, wellness and long-term care (Sadaqat 2018). The medical tourism industry in the UAE generated revenue of USD11.8 billion (AED 43.7 billion) from international patients in 2016, which contributed to reinforcing the national GDP growth of the sector. The Emirate of Dubai boosted the sector further, to reach more than USD 381 million (AED 1.4 billion) in revenue, and received more than 325,000 medical tourists, of whom 37% came from Asian countries, followed by 31% from Arab and GCC countries and 15% from Europe. Furthermore, the UAE is aiming to boost the economy by USD 707 million (AED 2.6 billion) by reaching 500,000 medical tourists by 2020, from countries such as Russia, India, Pakistan, the Commonwealth of Independent Countries (CIS), the United Kingdom (UK), Angola and Nigeria (Dubai Health Authority 2017).

The UAE has tremendous potential to maintain its position as the world's top destination of choice for quality healthcare for many medical tourists. Dubai is positioned first in the MENA region and 16th globally in the ranking of best medical tourism destinations, while Abu Dhabi ranked 25th. Likewise, Dubai and Abu Dhabi were respectively ranked globally as 10th and 16th in quality of facilities and services, 18th and 22nd in quality of destination environment and 22nd and 31st in medical tourism industry (Medical Tourism Index 2016), by virtue of having a wide range of technology and highly specialized doctors, along with a strategic location and affordability of treatments and services (Sadaqat 2018).

According to the Dubai Ministry of Health and the Health Authority of Abu Dhabi, the UAE's total expenditure on Emirati patients' treatment overseas reached USD 169 million (AED 623 million) in both years 2016 and 2017, the number of patients was 1994 in 2016 and 1582 in 2017 with an average cost of USD 849,000 (AED 3.12 million) and USD 735,000 (AED 2.7 million) per patient respectively. Treatments in the UK amounted to USD 939,000 (AED 3.45 million), in Germany USD 1.1 million (AED 4.24 million) and in the USA USD 318,000 (AED 1.17 million) per patient. The most requested overseas treatments were oncology, which was sought by 24.2%, followed by 17.1% for neurology and neurosurgeries, 11.3 for orthopedic, and 6.2% for cardio-surgeries (Zain 2018).

The UAE government works in collaboration with all health authorities to ensure that all public and private hospitals in the country get accredited according to international quality standards for medical services and staff, with around USD 1.19 billion (AED 4.40 billion) being allocated for the healthcare sector from the total USD 16.4 billion (AED 60.3 billion) federal budget for the year 2019 to expand and improve the healthcare system, to support economic diversification and meet its people's growing needs and expectation (UAE Government 2019). In the UAE there are five government regulators for the healthcare services, the Ministry of Health, the Health Authority of Abu Dhabi, the Dubai Health Authority, the Federal Health Insurance Authority, and the Ministry of Finance (US-UAE Business Council 2014). There are 292 government and private hospitals and clinics of which 209 are accredited throughout the seven Emirates (Joint Commission International 2019). This is illustrated in Table 1.

The UAE government spends millions of dirhams every year for the development of public and private hospitals in the country, through providing good quality healthcare and free funding and financial support from the government, and this forces us to question, why do Emiratis patients still seek medical care abroad? What are the factors affecting and influencing decision making for choosing overseas countries in order to access medical facilities and services?

4 Way Forward and Conclusion

The overall purpose of this chapter was to determine and identify the motivational factors that influence Emiratis medical tourists and patients in their decision making to travel overseas to access medical treatments, facilities, and services, considered in relation to the contribution to the UAE's economic diversification plans. Consistently with previous literature, this study defines medical tourism as a situation where a patient receives healthcare beyond their national border, motivated by seeking cheaper medical treatment and combining a holiday and leisure activities with their health-related visits. The medical procedures and services reported in this research include general care (major surgery), dental care (dentistry), and health checkup.

The critical insight into medical tourists' decision-making process and their motivation to travel to overseas countries for the treatments is provided in this study

Table 1 JCI accredited government and private hospitals in seven Emirates

Location	Type of hospital	Number of hospitals	Number of hospitals JCI accredited
Abu Dhabi	Private	67	54
	Government	23	15
	Semi government	1	1
Total hospitals in Abu Dhabi		*91*	*70*
Dubai	Charitable organizations	1	0
	Private	104	88
	Government	17	14
Total hospitals in Dubai		*122*	*102*
Sharjah	Private	17	13
	Government	4	4
Total hospitals in Sharjah		*21*	*17*
Ajman	Private	6	4
	Government	3	2
Total hospitals in Ajman		*9*	*6*
Al Fujairah	Private	23	2
	Government	15	1
Total hospitals in Al Fujairah		*38*	*3*
Umm Al Quwain	Government	2	2
Total hospitals in Umm Al Quwain		*2*	*2*
Ras Al Khaimah	Private	8	8
	Government	1	1
Total hospitals in Ras Al Khaimah		*9*	*9*
Grand total		292	209

Source Joint Commission International Resources, 2019

through a qualitative approach and semi-structured interviews. In a recent study conducted by the authors, there were nine motivational factors identified which effected the medical tourism decision-making process for economic diversification: (1) expert physicians and doctors, (2) quality of care and services, (3) medical treatment cost, (4) sources of information, (5) tourism facilities, (6) excellent vacation spot, (7) improving health, (8) risks, and (9) communication and language barriers.

In contrast, this chapter's review findings suggest that the quality of care and services, expert physicians and doctors, sources of information and improving health are participants' primary concerns which affect their final decision. The positive recommendation via word of mouth from family and friends plays an essential role in the decision-making process, which transfers detailed and significant sources of information that reveal their satisfaction with the treatments and the overall medical

tourism experience. Other critical motivational factors are tourism facilities, vacation spot, and treatment cost. Moreover, the findings suggest that perceived risks, communication problems, and language barriers do not have an effect on patients' motivation and their decision-making process regarding medical tourism and overseas treatments. Further research and exploratory studies are needed in the field of economic diversification.

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Why Gulf Rentier Economies Must Pursue Economic Diversification

Ahmed A. Khalifa and Abdul-Jalil Ibrahim

Abstract Within the mandate of their national visions, GCC countries have announced several strategies to expand their manufacturing, tourism and financial activities (economic diversification). However, the path towards the ultimate goal is still unsettled. Evidence of the Dutch disease (deterioration in the economic performance during decreasing oil prices) is provided in the current chapter. The different economies, although looking similar, have varied competitive advantages when it comes to identifying areas with potential, which are partly influenced by past investment allocation and infrastructure availability. Integration among the GCC countries in an atmosphere of stability will support trade creation, sustainable growth, and consequently a better performance towards economic diversification. We provide analysis of the consequences of counting on one commodity (oil or natural gas) in the economic activities of GCC countries and the importance of pursuing economic diversification to achieve sustainable development.

Keywords Economic diversifications · GCC economies · Economic activities · Tourism · Financial sector · Manufacturing

1 Introduction

The economic growth model anchored on petroleum revenues as pursued by the Gulf Cooperation Council (GCC) countries over the years is fraught with some weaknesses as a result of the volatility in the oil market and the finite nature of petroleum resources. This weakness has justified the need for economic diversification. Callen et al. (2014) conclude that a well-diversified economy would ensure a lower exposure to global oil market volatility and uncertainty. It would also help to increase

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productivity and serve as a driver for creating jobs, by providing an avenue for an increased private sector role in sustainable development. Economic diversification and sustainable development thus have become the goals for GCC countries and this is captured in their respective national "visions". Some examples of these are Oman 2040, Kuwait 2030, Saudi Arabia 2030, Bahrain 2030, and Qatar National Vision 2030. Within the mandate of these national visions, GCC countries have announced several strategies to expand their manufacturing, tourism, and financial activities. They are planning to provide trillions of dollars worth of opportunities to SMEs, and inaugurate mega projects in creating new industrial cities, new petrochemical complexes, and new sustainable cities, as outlined in their vision statements. Additionally, they are revising and adding investment regulations to create an improved business climate as well as extending finance facilities for entrepreneurial activities.

This chapter deals with the consequences of counting on the petroleum sector for the last five decades by GCC economies, and their vulnerabilities associated with the fluctuations in global energy prices on their economies.

2 The Consequences of Being Rentier Economies

GCC economies have adopted some policies towards diversification and reducing their dependence on oil revenue over the years. Policies towards achieving economic diversification have seen the macroeconomic fundamentals strengthened and stabilized, the business environment improved, enhancing human capital through education prioritized, trade and foreign direct investment liberalized, and the financial sector deepened (Callen et al. 2014). There has been some modest achievement in diversifying their economies owing to these policies. Figures 1 and 2 show that the non-hydrocarbons share of GDP has increased markedly across all GCC economies; however, this is highly driven by the oil market boom, and progress to sustainable growth with the critical ingredient of export diversification has been more limited. Sequel to this, we provide insight to policymakers and CEOs of state-owned enterprises in the GCC countries into some of the opportunities that can be explored to support the economic diversification strategy of their economies.

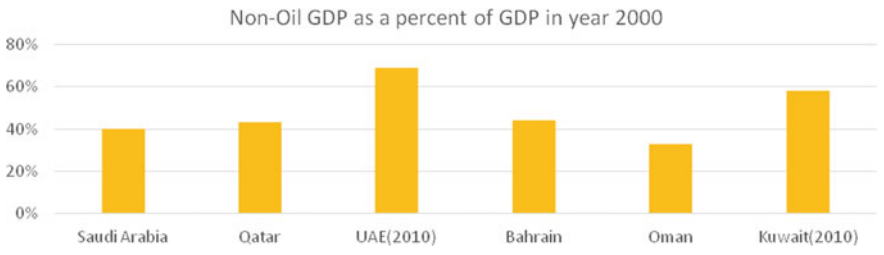

Fig. 1 Non-oil GDP as a percentage of GDP in the year 2000. *Source* World Bank Development Indicators (2019)

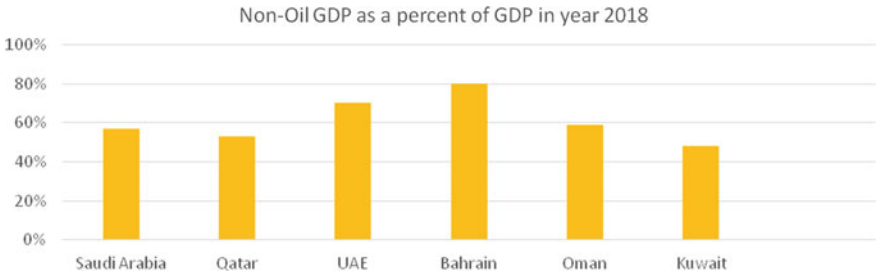

Fig. 2 Non-oil GDP as a percentage of GDP in the year 2018. *Source* World Bank Development Indicators (2019)

The economic consequences of the deterioration of the prices of natural resources are dire for countries that depend primarily on resource rents. The share of the petroleum sector represents more than 80% on average of the GCC countries' export earnings, according to data from the World Bank. The implications of this are that any fall in the oil price will negatively impact the economies of these countries, posing a challenge for sustainable economic development.

Any fluctuations in oil prices will potentially cause sharp changes in the economic activities of all of the GCC countries. The price of oil, like that of any commodity, is determined by global demand and supply. Other factors (economic, political, and geopolitical), in addition to economic events and news (market microstructure), contribute to the demand and supply components and consequently lead to fluctuation in oil prices. For example, the global financial crisis (2007–2009) led to a collapse in the demand for oil, leading to the decline in the oil price from 140 USD/Barrel in June 2008 to below 40 USD/Barrel in February 2009. A similar scenario was repeated as the oil price decreased from above 100 USD/Barrel in April 2011 to below 40 USD/Barrel at the end of 2015 (See Fig. 3). These scenarios mean that GCC countries

Fig. 3 Oil price 1980–2019, monthly data. *Source* Thomson Reuters Eikon

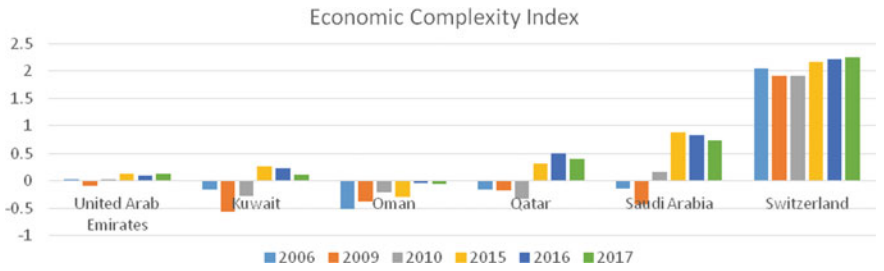

Fig. 4 Economic complexity Index of GCC and Switzerland. *Source* https://oec.world/en/rankings/country/eci/?year_range=2013-2017

may have lost more than 75% of their revenue during this bearish oil market. Also, oil price fluctuations impact economic diversification as measured by the Economic Complexity Index (ECI) developed by Harvard University Center for International Development. Figure 4 shows that when oil prices are high economic diversification is hindered and vice versa for falling oil prices. According to Fig. 4, ECI for all the GCC economies was very low. Still, Saudi Arabia recovered afterward, but saw a declining ECI between 2015 and 2017, while at the same time, Switzerland, which was the second most diversified economy in 2017, saw an increasing ECI rank within this period.

2.1 The Performance of Public Finance (Government Budget Surplus/Deficit) During the Deterioration of Oil Prices

Following the oil price collapses in 2009 and 2015, Saudi Arabia experienced a budget deficit of more than 23 Billion USD and 100 billion USD, respectively. Similarly, in 2010, the state of Qatar's budget surplus decreased sharply by more than 12 billion USD, and it had a budget deficit of more than 1 billion USD in 2015 and 14 billion USD in 2016.

In the UAE, there was a significant impact on the fiscal position in 2009 relative to 2008, with a loss of 71 billion USD in this period. Then there was an increase in the budget deficit from 9.5 billion USD in 2014 to 22.8 billion USD in 2015. Oman experienced a budget surplus of 205 million USD in 2008 and shifted into a deficit of 1.7 billion USD in 2009. This was followed by a sharp increase in the budget deficit from 2.7 billion USD in 2014 to 12.1 billion USD in 2015. Bahrain recorded a budget surplus of 1.5 billion USD in 2008 and shifted into a deficit of 1.2 billion USD in 2009. This was followed by a sharp increase in the budget deficit from 1.2 billion USD in 2014 to 4 billion USD in 2015. Similarly in Kuwait there was a substantial adverse fiscal impact in 2009 relative to 2008, with a surplus of more than 31 billion USD in 2008, falling to 9.2 billion USD in 2009. Then there

Table 1 Surplus or deficit (in Million USD)

Year	Qatar	Saudi Arabia	Bahrain	Oman	Kuwait	UAE
2008	11,705	156,849	1467	205.4	31,050.9	29,228.3
2009	15,150	(23,390)	(1195)	(1782)	9136.2	(42,203.8)
2010	2664	23,486	(1232)	(128)	21,435.9	(16,743.8)
2014	30,409	(27,125)	(1220)	(2788)	42,984.0	(9547.5)
2015	(1185)	(104,922)	(4066)	(12,134)	11,690.0	(22,803.5)
2016	(14,232)	(83,985)	(4381)	(13,886)	(15,357.6)	(4571.6)

Source Central Banks reports

was a decrease in the budget surplus from 42 billion USD in 2014 to 11.6 billion USD in 2015 (see Table 1).

2.2 *The International Reserves During the Deterioration of Oil Prices*

Both Saudi Arabia and the UAE suffered from the decline in international reserves, by more than 6% and 17% respectively in 2009, but Qatar, Oman, Bahrain, and Kuwait did not experience any decrease in international reserves in 2009. On the other hand, in 2015 the state of Qatar suffered a deterioration in foreign reserves of more than 13%, more than 15% in that of Saudi Arabia, more than 43% in Bahrain and over 11% in Kuwait and the UAE in 2016 suffered a fall of more than 8% (see Table 2).

Table 2 GCC's total reserves in Billion USD (includes gold, current US$)

Year	Qatar	Saudi Arabia	Bahrain	Oman	Kuwait	UAE
2007	9.75	309.29	4.34	9.52	18.78	77.24
2008	10.00	451.28	4.05	11.58	19.32	31.69
2009	18.80	420.98	4.01	12.20	23.03	26.10
2014	43.22	744.44	6.23	16.32	35.18	78.42
2015	37.26	626.99	3.55	17.54	30.96	93.93
2016	31.89	547.27	2.61	20.26	33.94	85.39
2017	15.01	509.46	2.82	16.09	36.89	95.38

Source https://data.worldbank.org/indicator/FI.RES.TOTL.CD?view=chart

Table 3 GCC GDP growth rate

Year	Qatar (%)	Saudi Arabia (%)	Bahrain (%)	Oman (%)	Kuwait (%)	UAE (%)
2007	18	2	8	4	6	3
2008	18	6	6	8	2	3
2009	12	−2	3	6%	−7	−5
2010	20	5	4	5	−2	2
2014	4	4	4	3	1	4
2015	4	4	3	5	1	5
2016	2	2	3	5	3	3
2017	2	−1	4	−1	−3	1

Source Countries' Central Bank reports; the authors did the conversion. https://www.centralbank.ae/en/statistics/publications

2.3 The GDP Growth Rate During the Deterioration of Oil Prices

Noticeably, the growth rate of economic activity or national output [measured by gross domestic product (GDP)] decreased significantly from 18 to 12% between 2008 and 2009 in the state of Qatar. In Saudi Arabia, there was a sharp deterioration in the growth of GDP from 6% in 2008 to −2% in 2009. In Bahrain, the GDP growth rate decreased by half in 2008 to reach 3% in 2009. In Oman, the rate fell from 8% in 2008 to 6% in 2009. In Kuwait, there was a sharp deterioration from 2% in 2008 to −7% in 2009 of the economy. In the UAE, economic growth rate of 3% in 2008 fell to a contraction of 5% in 2009. In 2015/2016, the growth rate of GDP shrank in the states of Qatar, Saudi Arabia, and the UAE by 2% (see Table 3).

2.4 The Stock Market Performance During the Deterioration of Oil Prices

The performance of the stock markets of the GCC countries is strongly associated with the oil price movements and fluctuates in the same direction.

2.4.1 Saudi Arabia Stock Market (TADAWUL)

The financial market index in Saudi Arabia reached its peak (15,500 points) in February 2006. It then started to decrease to a low point of around 4300 points in February 2009 (during the global financial crisis). The sharp drop in TADAWUL translates into a loss of more than 77% of the market value within this period. After an improvement in the oil prices in 2010–2014, the market value made some gains,

and the index approached 11,100 in August 2014, but then deteriorated again to 5600 in September 2016 as a response to the decline in oil prices and linked to the economic performance of Saudi Arabia during 2015 and 2016.

2.4.2 Qatar Financial Market Index

The financial market index in Qatar followed the same trend as Saudi Arabia, approaching 12,500 points at peak and then deteriorating sharply during the global financial crisis to reach 1438 in February 2009. In 2010, with the winning of the bid to host FIFA 2022, the state of Qatar followed expansionary economic policies, and the stock market responded to these policies and approached its peak in late September 2014 (14,728). However, with the deterioration of oil prices in 2015 and 2016, the financial market index collapsed to less than 9500 points in January 2016, and the decline continues because of the geopolitical instability in 2017, in addition to the blockade by four countries (Saudi Arabia, UAE, Bahrain, and Egypt) against the State of Qatar.

2.4.3 MSCI Kuwait Financial Market Index

The financial market index in Kuwait (MSCI) approached 1278 points in February 2008. It then deteriorated sharply during the global financial crisis accompanied by falling oil prices to reach 449 one year afterwards, without further improvements until 2017. There were slight improvements after 2017, and anecdotal evidence suggests that the blockade by the four countries against Qatar may benefit the state of Kuwait in terms of logistics.

2.4.4 Bahrain Financial Market Index

The financial market index in Bahrain approached 2780 points in February 2008. Then it deteriorated sharply during the global financial crisis, which was accompanied by the deterioration of oil prices, to reach 1438 in November 2009. The decline continued because of the political instability (the unrest during 2011 and 2012), which led to the index reaching 1090 in February 2013. After stability was re-established, the index improved and reached 1429 in December 2014. Once the oil price went down again in 2015 and 2016, the index deteriorated once more, reaching 1118 as of June 2016.

2.4.5 Oman Financial Market Index

The financial market index in Oman approached its peak (11,500 points) in May 2008. Although Oman's oil was depleted and the country therefore started a diversification strategy, the financial index continued to decline until 2019. This deterioration was attributed to the lack of net exports after the depletion of natural resources. Additionally, lack of foreign direct investment in other sectors (agriculture, tourism, the industrial sector) may also account for this poor performance. Further study is required to understand the root cause of the deterioration in the economic indicators and the financial market index in Oman.

2.4.6 Abu Dhabi Financial Market Index

The financial market index in Abu Dhabi is more dynamic; however, the oil market has had a significant impact on the deteriorating trend of the Abu Dhabi index. Typically, the index approached the peak of 5500 points in October 2005, then 2256 points in January 2009. The United Arab Emirates has started its diversification program and has attracted a lot of foreign direct investment in the last ten years. Besides, it is only the UAE which has been able to achieve the stability of the index at around the level it was at before the financial crisis (Fig. 5).

2.5 The Trend of the Economic Sectors in the GCC Countries

The commercial sector is the dominant economic sector in all GCC countries as of 2017. Figures 6 and 7 show that in 2006, most of the GCC countries displayed an economic structure dominated by the petroleum sector, which accounted for at least half of the GDP except in the case of the UAE. Fast forward to 2017, and the economic structure had shifted towards the commercial sector for all the GCC economies, with the sector accounting for over 50% of the GDP of Saudi Arabia and the UAE, closely followed by the remaining GCC countries. Even though the UAE has the most significant commercial sector proportionate to GDP within the GCC, Saudi Arabia has seen the most visible structural shift towards the commercial sector by gaining over 50% growth between 2006 and 2017 (see Fig. 6 for the trend).

The strong growth in the financial services, telecommunications, real estate, wholesale and retail trade, and hospitality sub-sectors has boosted the commercial sector. The industrial sector has also seen some moderate structural shifts between 2006 and 2017, and this is led by Qatar, which by 2017 had witnessed over 65% growth in the industrial sector from its 2006 position, as shown in Figs. 7 and 8.

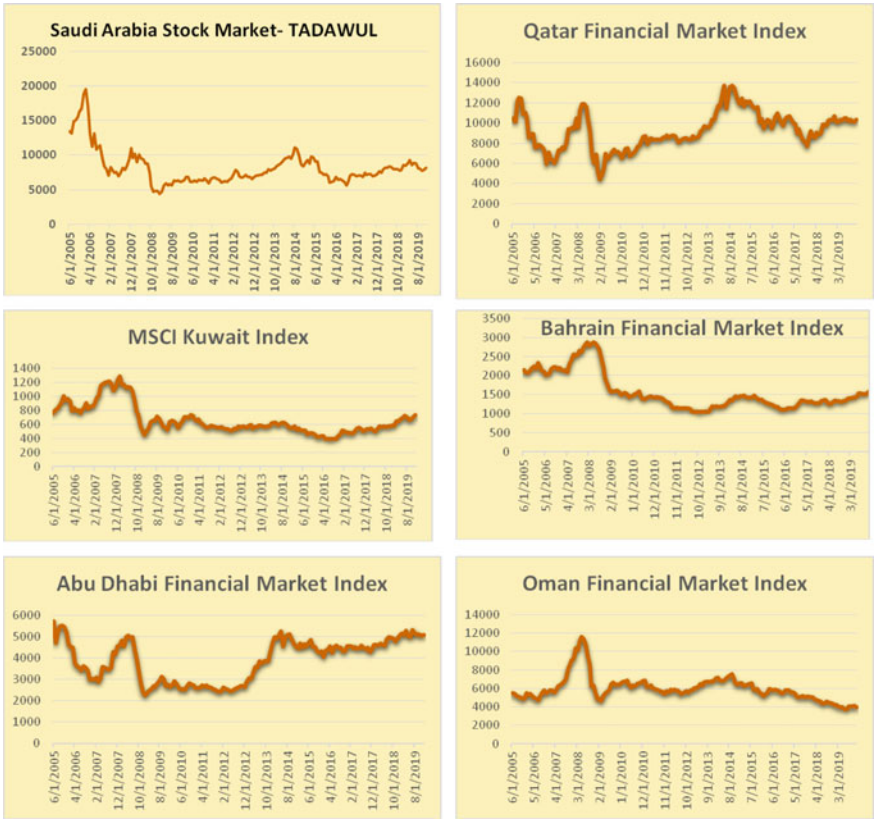

Fig. 5 The stock market indexes of the GCC countries. *Source* Eikon Thomson Reuters and Bloomberg

3 The Diversification Strategy for the GCC Countries[1]

3.1 Petrochemicals Industry in the GCC Countries

The petrochemical industry in the GCC enjoys a comparative advantage over others in the US and Europe due to the availability of feedstock and the government's support (EIU 2019). The sector has seen massive investments as governments embarked on building large-scale integrated plants to diversify their products offering and out-compete global competitors. Saudi Arabia is the leading producer of petrochemicals in the region, and the Saudi Basic Industries Corporation (SABIC) is the state-backed company that is at the forefront of this drive. Qatar has made tremendous efforts in the petrochemical sector over the years. Figure 9 shows the seismic shift in the

[1] SWOT analysis for each sector can be provided upon request.

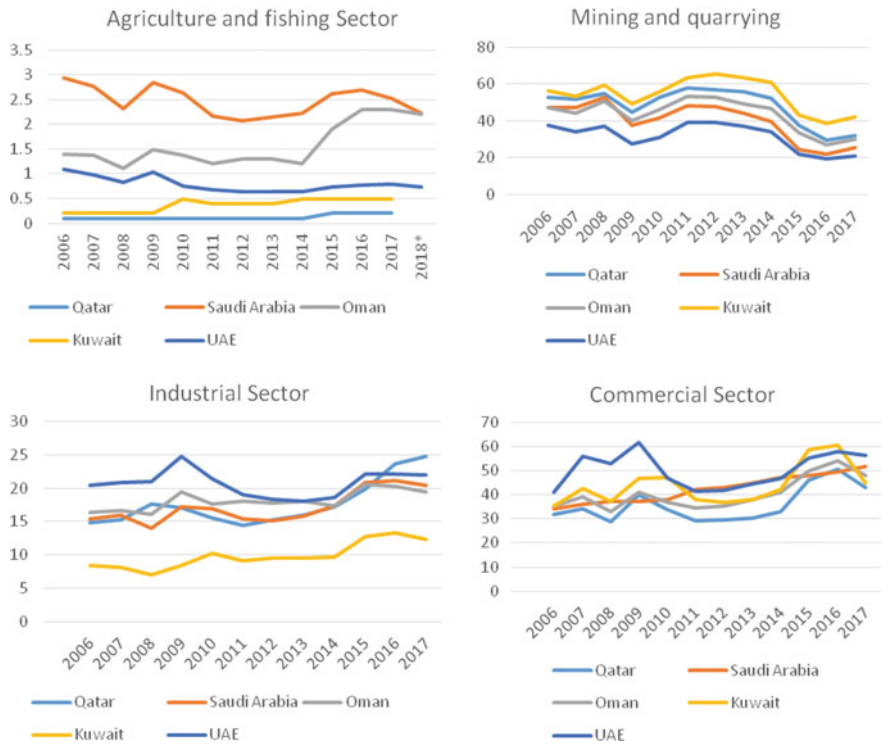

Fig. 6 Economic sectors trends for GCC countries (2006–2017). *Source* World Bank Development Indicators (2019)

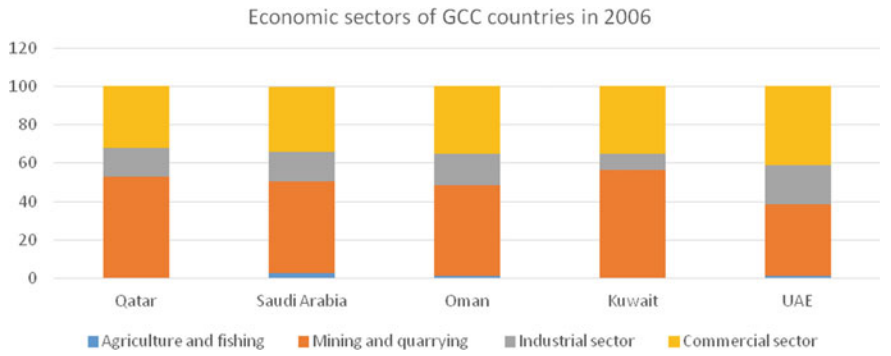

Fig. 7 Economic sectors of GCC countries in 2006. *Source* World Bank Development Indicators (2019)

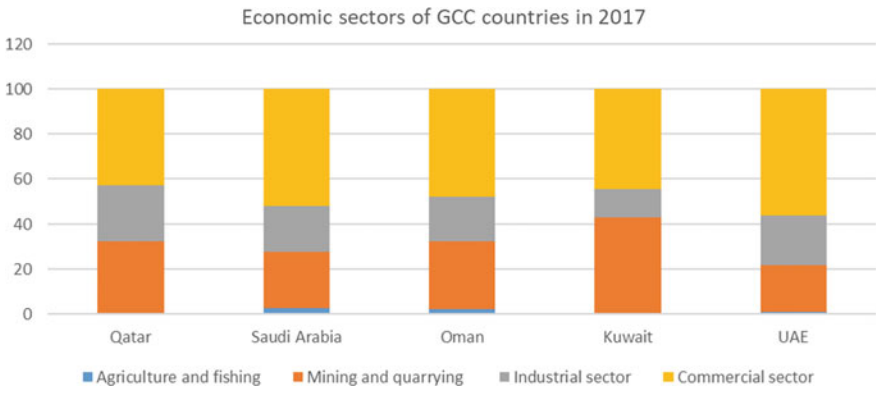

Fig. 8 Economic sectors of GCC countries in 2017. *Source* World Bank Development Indicators (2019)

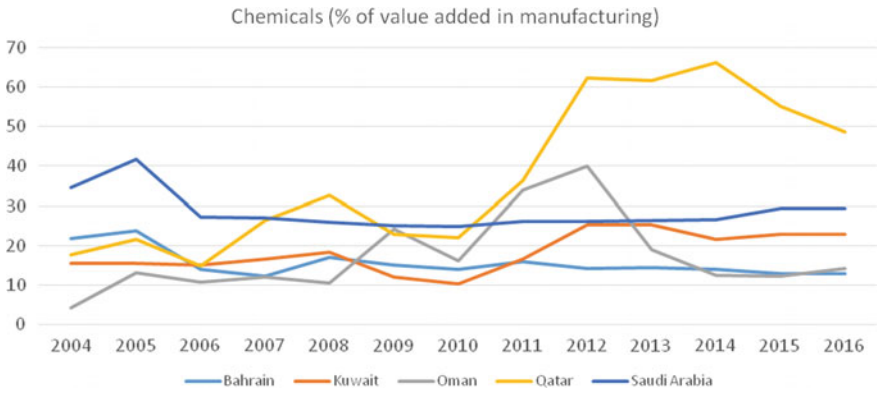

Fig. 9 Chemicals (% of value-added in manufacturing). *Source* World Bank Development Indicators (2019)

proportion of chemicals to manufacturing products in Qatar, from 18% in 2004 to almost quadruple that in 2014, and following Qatar are Kuwait and the UAE. There is a huge opportunity for the governments of Saudi Arabia, Qatar, and Kuwait to continuously position the chemical industry as a strategic industry to contribute to their economic diversification agenda. Doing this will require building skills and attracting top talent and companies to build the ecosystem that will provide a global market place beyond the availability of the feedstock.

Several factors, including the global financial crisis, the sharp decrease in oil and natural gas prices in 2007–2008 and 2014–2016, and the instability in the GCC, exacerbated by the blockade of Qatar on June 5, 2017, have caused policymakers to continually look for ways to build sustainable and diversified economies in the GCC. A significant concern in this regard is the slow growth of the manufacturing sector

in the GCC countries despite their potential. For example, Qatar and the rest of the GCC countries have a competitive advantage (a comparative advantage accompanied by the market, infrastructure, and government regulations) in producing petroleum and chemicals. There is an opportunity to access the global market if Qatar and the GCC countries can create competitive products. Besides, with their abundant energy resources, Qatar and the GCC countries can manufacture products with a lower energy cost and lower taxation of companies, thereby offering a competitive advantage in this regard.

We suggest shifting the policymakers' attention to the products in which GCC countries have a competitive advantage, through undertaking market analysis.[2] The three products are polypropylene, polypropylene fiber, and fertilizers, intensive energy products like aluminum. The feasible demand for the three products is 781 billion USD for polypropylene, 24 billion USD for polypropylene fiber, and 1637 billion USD for fertilizers. The global market demand for the three products was more than 2.4 trillion dollars in 2015, and it is growing steadily from year to year. At present, Qatar and the rest of the GCC countries provide the raw material for the production of these goods (oil and natural gas) to industrial countries at a meager price and import the same products (after manufacturing) at a very high cost. These products could create billion-dollar opportunities for SMEs and large-scale enterprises through the supply chain of the selected products. The details of licenses and the feasibility studies will be available upon request from the authors.

The three products are natural gas intensive products. There are two scenarios in the natural gas market globally, and this, of course, will affect the market share of Qatar. To tap into this over 2 trillion USD market for petrochemicals, the authors propose establishing a mega petrochemical complex (a hub to include the three products) with a comprehensive supply chain in order to have a market share in the recommended products in collaboration with Iran and Turkey.

Building these factories will mean consideration of different scenarios. The first scenario is keeping the current market share of oil and LNG for the GCC countries. The only approach to feeding the proposed product demand for natural gas is to increase production. As Qatar hosts the third-largest reserves of NG in the world, in addition to the vast reserves of oil in Kuwait, Saudi Arabia, and Abu Dhabi, this will not be difficult. The second scenario would see GCC countries lose part of their global market share of oil and LNG. In this case, the GCC countries can use the supply of oil and natural gas they produce that is lost to the international market for the manufacture of the proposed products. The investment strategy of public-private partnerships, in addition to the various stakeholders (domestic, the government, and foreign investors), should emphasize the need for a fast and accurate study of the details of the proposed products.

[2]The market analysis is available upon request.

3.2 Renewable Energy in the GCC Countries

The huge opportunity cost of using oil and growing electricity demand, coupled with the continuous reduction in the price of solar panels and wind turbines, have been the factors that have led to the rallying around of the GCC countries in directing investment towards building the renewables sector (World Bank 2019). Towards this end, about 10.1 billion USD has been committed to renewable energy businesses in the GCC. The UAE has built its capacity for renewable energy by leading the investment in this sector within the GCC countries. Figure 10 shows that the UAE invested a total of close to 7 billion USD between 2015 and 2018 and is distantly followed by Oman and Qatar. These investments translate into 600 Megawatts of installed electricity capacity from renewable sources for the UAE, as shown in Fig. 11. The UAE, Saudi Arabia, and Oman are leading the pack in renewable energy as a share of total energy production. The other GCC countries are also implementing strategies for building their capacity in this industry.

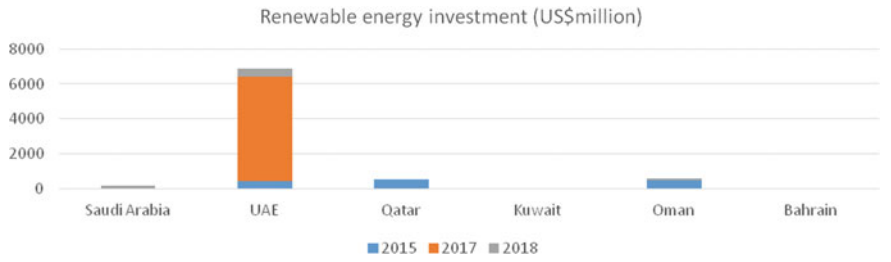

Fig. 10 Renewable energy investment by GCC countries. *Source* World Bank Development Indicators (2019)

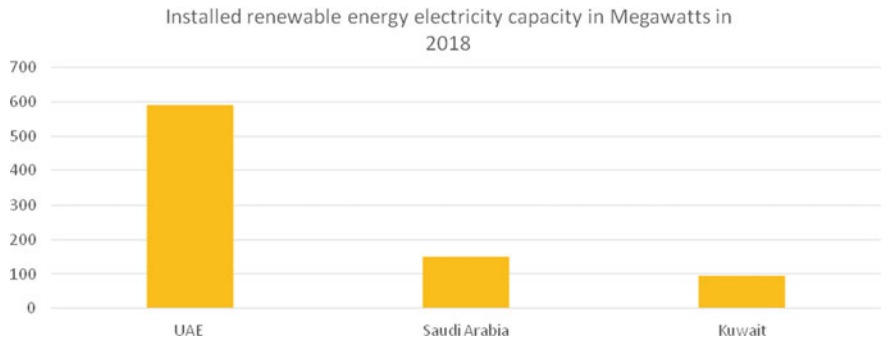

Fig. 11 Installed renewable energy electricity capacity in Megawatts in 2018. *Source* World Bank Development Indicators (2019)

3.3 Tourism Sector in the GCC Countries

The travel and tourism industry contributed 10.4% to global GDP in 2018, according to the World Economic Forum's report. The Middle East and North Africa has improved its travel and tourism industry and achieved the third-best improvement in Travel Tourism Competitiveness Index (TTCI) scores since 2017. Out of the top 25% of destinations for travel and tourism, the United Arab Emirates is the only state in the region to feature, scoring 33rd in global ranking.

Figure 12 presents the trend of international arrivals in various GCC countries. Saudi Arabia remains the highest recipient of visitors, with over 16.1 million tourists and visitors in 2017. The large number of visitors to Saudi Arabia is attributed to the religious pilgrimages, the Hajj and Umrah. This advantage makes Saudi Arabia one of the favorite destinations, and the country can leverage this to attract non-religious tourists. Bahrain has also seen a remarkable number of visitors and even surpassed Saudi Arabia in the year 2010. It is significant that the country can attract these tourists, as they are not "captive" religious visitors. Bahrain thus has a huge opportunity to build this industry by investing more in infrastructure and introducing policies towards consolidating these gains. Qatar has also seen an increase in the number of international arrivals in the country, which increased from some 700,000 visitors in 2004 to almost 3 million in 2016. Building tourism as a strategic industry will require that GCC leaders to address security challenges in the region. According to WEF (2019), the GCC area is very price competitive, but safety, terrorism threats, and international openness remain monumental challenges. The GCC governments must develop a strategy to improve their security ranking at the global level to consolidate the gains made on the tourism front.

Fig. 12 International tourism arrivals (2004–2017). *Source* World Bank Development Indicators (2019)

3.4 Medical Tourism in the GCC Countries

The medical tourism industry is a fast-growing global niche market. According to Transparency Market Research (2013), the global medical tourism market was worth around US$11 billion in 2012 and reached US$33 billion by the end of 2019, a compound annual growth rate of 18%. Asia was one of the first movers in this field to position itself competitively in the global medical tourism market in terms of affordable and high-quality medical care (Patients Beyond Borders 2014). Qatar has embraced the idea of developing the health sector. Hamad Medical Corporation, Qatar University, and Weill Cornel-Qatar offer a variety of degrees, including Medicine, Pharmacy, and Dentistry, while the College of the North Atlantic and the University of Calgary also offer postsecondary programs in Nursing in Qatar. Additionally, there has been billions of dollars of investment in the health sector and medical R&D. The UAE has a first-class hospital system that can coordinate with the state of Qatar in this regard. There has to be a strategy to develop the medical tourism ecosystem in the UAE and Qatar and regionally. Once the impactful business criteria are designed with a focus on economic diversification through health tourism, then the various stakeholders (governments, private sector, and banks) can help to build the ecosystem. At the international level, the UAE and Qatar have to be attractive for medial tourists to visit especially in developing countries as the developing world provides a vast market for health care and there are infrastructure and workforce deficits within these countries.

3.5 Islamic Finance and FinTech in the GCC Countries

The financial services sector has been one of the value drivers of GCC economies. It has contributed an average of 5–16% to the GCC's GDP (World Bank 2019). Regulatory reforms and the growing FinTech ecosystem are the major supporting drivers of the financial services sector in the region (World Bank 2019). Bahrain is one of the leading economies with healthy Islamic finance development. Bahrain is a major global center for the Islamic finance industry. It hosts major standard-setting institutions and infrastructure providers for Islamic finance, namely the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI), the Islamic International Rating Agency, the International Islamic Financial Market (IIFM), and the General Council for Islamic Banks and Financial Institutions. The Islamic Finance Development Indicator (IFDI) ranks 131 economies with Islamic finance presence in the areas of quantitative development, knowledge, governance, corporate social responsibility, and awareness. Bahrain was ranked number one in the Middle East and North Africa in 2018 for the seventh consecutive time. The report highlighted FinTech as a key driver and shaper of the Islamic finance industry, noting that sharia scholars and regulators are also exploring crypto-assets in developed Islamic finance markets such as Bahrain and Malaysia.

Fintech development in the GCC and Middle East is promising as the region hosts one of the largest unbanked populations in the world (FT 2019). Technology will be required to address this problem, and FinTech holds a promise. Bahrain is at the forefront of innovation when it comes to FinTech. The country was the first to launch a regulatory sandbox, which created a platform for testing, refining, and licensing startups within a controlled environment to prepare them for market entry. Through this, the central bank has come out with regulations relating to crowdfunding, robo-advice, open banking, crypto assets, and insurance aggregation (FT 2019). The discussion above shows that Bahrain has the potential to build a strategic industry with Islamic finance and FinTech as means of diversifying its economy and providing a hub for Islamic finance and FinTech investment within the GCC and the Middle East.

3.6 Value Added Tax as Revenue Diversification

According to KPMG, Value Added Tax (VAT) is "an indirect tax applied upon the consumption of most goods and services. The VAT is levied on VAT registered businesses which make supplies of goods and services in the course or furtherance of their business". The business can levy the 5% VAT imposed on each supply chain of the products, collected by the firms from the end-users as revenue to the central governments. The VAT was introduced in the UAE and Saudi Arabia in 2018 and Bahrain also implemented it in 2019. Qatar, Oman, and Kuwait have pushed it back to 2020. The VAT may be an avenue for the GCC economies to diversify the fiscal revenue sources. Some of the targeted sectors of the VAT implementation include energy consumption, financial services (except for Islamic finance), retail, and industrial products imports, except for the free zone areas in some of the GCC countries. The VAT also applies to the importation of goods, with a possibility of excluding essential products and services (health care, medicine, educational material, and food).

We have estimated the GDP until 2035, based on a 2% increase in the growth rate (see Table 4). We have chosen very conservative scenarios for both the growth rate in GDP (2% yearly) and 2% of the GDP value-added tax revenue (based on the International Monetary Fund estimation). The results are shown in Tables 4 and 5.

Table 4 The announced GCC VAT schedule

GCC members	2018	2019	2020	2021
Saudi Arabia	SA			
UAE	UAE			
Qatar			QA	
Kuwait				KUW
Bahrain		BA		

Source World Bank Group; Issue 5/Dec. 2019

Table 5 An estimation of VAT revenue in the GCC countries

Years	Bahrain	United Arab Emirates	Kuwait	Saudi Arabia	Qatar
2019	0.69	8.01		14.28	
2020	0.70	8.17		14.57	3.66
2021	0.71	8.34	2.94	14.86	3.73
2022	0.73	8.50	3.00	15.16	3.81
2023	0.74	8.67	3.06	15.46	3.88
2024	0.76	8.85	3.13	15.77	3.96
2025	0.77	9.02	3.19	16.08	4.04
2026	0.79	9.20	3.25	16.41	4.12
2027	0.80	9.39	3.32	16.73	4.20
2028	0.82	9.58	3.38	17.07	4.29
2029	0.84	9.77	3.45	17.41	4.37
2030	0.85	9.96	3.52	17.76	4.46
2031	0.87	10.16	3.59	18.11	4.55
2032	0.89	10.37	3.66	18.48	4.64
2033	0.91	10.57	3.73	18.85	4.73
2034	0.92	10.78	3.81	19.22	4.83
2035	0.94	11.00	3.89	19.61	4.93

The values are in Billion USD

Source The conservative scenarios and estimation of 2% VAT/GDP for the GCC countries. The authors have estimated all the numbers and the values of the GDP are based on constant 2010 US$ value. Oman adopted excise taxes instead. The GDP data until 2018 are collected from the World Bank database; see (https://data.worldbank.org/indicator/NY.GDP.MKTP.KD)

4 Conclusion and Policy Recommendations

In summary, there are many opportunities within the sphere of economic diversification in the GCC countries, including manufacturing, tourism, and the financial sector. The different economies, although looking similar, have varied competitive advantages when it comes to identifying areas with potential, which are partly influenced by past investment allocation and infrastructure availability. Integration among the GCC countries in an atmosphere of stability will support trade creation, sustainable growth, and consequently a better performance towards economic diversification. Unifying the market within the ambit of "trade creation" with the support of advanced technology can play a critical role in ensuring that GCC countries leverage their abundance of natural resources to drive their economic diversification agenda. To this end, necessary policy recommendations include increasing the funding for business-oriented research and development, detailed studies of the domestic, regional and international markets, and continuing to develop the infrastructure to match the industry 4.0. In addition, the technology will be the driver of value creation concerning the tourism sector, especially medical tourism. This study

recommends coordination among the GCC governments to promote the provision of an integrated tourism product (deserts, climatic, beach, cultural, and religious). Not all of these will be possible without stability in the GCC. Thus, policymakers must ensure that the political stability of the region is a priority if they want to create the requisite market and attract foreign direct investments into their economies.

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