

AAM: A systematic literature review evaluating sustainable energy growth in Qatar using the PICO model

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Abstract

With the increasing importance given currently to sustainable development, countries around the world are shifting their focus and efforts to changing the previous unsustainable growth framework. Accordingly, Qatar has decided to introduce a sustainability plan to ensure prosperity through its national vision and strategy plans. In this chapter, a case example has been presented on the application of a systematic literature review according to the PICO model in built environment research based on a study of the efficiency of policies and tactics implemented by the Qatari Government, in its energy sector, pertaining to sustainability strategies. An initial literature search resulted in the identification of 1990 resources within five different databases, of which 82 met the pre-set inclusion and exclusion criteria, including date, geographic location, language, type of publications, participants, and design of studies. The findings showed that six key sustainability initiatives were noteworthy in the Qatar energy sector, which were: health and safety, environment, climate change and energy, economic performance, society, and workforce. The lack of knowledge of the scope of sustainability is a huge challenge for the organisations in the energy sector. The conclusion from this chapter was that the Qatari sustainable development policies still need great efforts to confront their shortcomings, as more holistic policies and more integrated and comprehensive strategies are required.

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Introduction

The industrial economy transformed the lifestyle of the human being and improved the standards of living. Carbon-based economies had driven humanity to invest more in technology and innovation, making life easier and more efficient. However, humanity's development has had a downside too. The increase of the earth's core temperature, the increasing number of pollutant-based particles in the air, and the continuous threats to the marine world are only a few examples, amongst a great deal of human activities that have an impact on the environment (Sneddon *et al.*, 2006). Therefore, policy-makers are required to make huge efforts to contain these problems before they intensify and result in catastrophic consequences for the planet (Boyd, 2003).

Sustainable development could be seen as a reactive response to the unhealthy regime of human activities and how they are carried out. The concept had been receiving a great deal of attention, especially after the Brundtland Report in 1987, and since then has become the focus of decision-makers all over the world (Singh *et al.*, 2012). However, human development had become highly dependent on unsustainable forms of resources, such as coal, oil, and gas, and the shift towards an economy with low dependence on fossil fuel would not be an easy task. The abundant oil and gas reserves within the Gulf countries made the region one of the energy leaders worldwide, as they are located collectively over up to 48% of the world's oil reserves and produce more than 85% of the world's natural gas (EIA, 2017). However, the significant increase in domestic consumption of energy threatens the region's future energy prospect and its position as the world's top oil and gas exporter. Much like the rest of the Gulf countries, Qatar, a small state within the region, achieved important economic growth because of its extraordinary gas reserves, making it the world's leading exporter of natural gas. However, British Petroleum (BP, 2017)

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predicted that Australia would overtake Qatar as the largest exporter of liquefied natural gas (LNG) by 2019. Similar to several countries that rely heavily on fossil fuel resources for their growth, Qatar has to make several changes to its social, economic, political, energy, and environmental structure to accommodate the necessary changes to ensure sustainable development. Therefore, two inter-connected streams of studies are discussed in this chapter, identified as:

- Evaluation of Qatar's current sustainable development plan and strategy;
- Performance of sustainability strategies within the oil and gas industry.

These discussions are indicative of the literature review that still needs to be conducted on the background context of the subject of interest, and the research gap that must be addressed even before applying a systematic literature review methodology.

Theoretical background

The 1960s and 1970s were a period marked by the population's high concerns about environmental problems and their impact on humanity, and the number of debates relating to humankind activities to address these problems increased considerably (Turner, 1988).

Therefore, questions regarding the effectiveness of the conventional growth objectives, strategies, and policies started to surface in public debates (Dresner, 2007). The term "sustainable development" was first introduced in 1969, when it was mentioned in an official document signed by 33 African countries (IUCN, 1980). It was during the 1980s that the main objective of the International Union for Conservation of Nature and Natural Resources (IUCN) became the achievement of sustainable development through the preservation of nature's resources (IUCN, 1980). However, the report was criticised for being limited and focusing only

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on ecological sustainability and not linking it to either society or economy. Therefore, the necessity for a clearer and more inclusive concept became essential. Seven years later, and during the United Nations Environment Programme, the World Commission on Environment and Development (WCED) published a report titled *Our Common Future*, which became known as the Brundtland Report (WCED, 1987) that gave sustainable development a broader and better understanding. Brundtland defined sustainability as “development that meets the needs of the present without compromising the ability of the future to meet their own needs” (WECS, 1987). The report introduced the concept of integrating environmental policies within developmental strategies, refuting the common beliefs that protecting the environment could be done only at the loss of economic development. However; the report was criticised for lacking a clear, theoretical base (Simon, 1989) and being vague, leaving room for interpretation. Lèlè (1991) reported that the concept as introduced remained elusive and could be used wrongly to solicit funds. Still, Brundtland’s report was the first to link global goals of sustainable development to changes in politics and society successfully. For instance, the elimination of poverty, equal distribution of natural resources, new methods of ensuring population control, changes in lifestyles, appropriate technological development, and necessary institutional changes (WCED, 1987), thus giving great importance to inter-generational and intra-generational equity in the use of resources (Baker, 2016).

The amount of literature regarding sustainable development and sustainability within organisations has seen an important increase in the last decade, especially in business firms (Renukappa *et al.*, 2014). From an organisational perspective, sustainable development is a holistic approach that addresses social, economic, and environmental issues that would be beneficial for current and future generations of the stakeholders concerned (Renukappa *et al.*,

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2012). However, Brundtland's definition of sustainability is difficult to adapt at this level.

Therefore, several scholars argue that the concept of the triple bottom line, developed by Elkington (1998), has the best fit for organisations to follow to implement sustainability practices within their activities. Elkington (1998) developed the triple bottom line concept to be a more practical definition of sustainable development, a concept according to which the economic (profit), social (people), and environmental (planet) performances of organisations can be assessed simultaneously and equally. Elkington (1998) relates corporate progression not only to economic growth, but also to environmental sustainability and social responsibility. Therefore, managing these three aspects simultaneously represents one of the biggest challenges for organisations (Epstein *et al.*, 2010).

Research methodology

The methodology used in this chapter was based on the systematic literature review approach, which has been used in a wide range of studies, such as health care, social sciences, and education (Boaz *et al.*, 2002). The systematic review approach was developed to collect available data systematically, filter them according to the credibility of sources, analyse filtered data to determine its overall effect, and finally, disseminate the data based on their effectiveness (Higgins and Green, 2011). Several studies that adopted the systematic literature review approach have been well received amongst academics and industry practitioners, especially in social sciences (Adams *et al.*, 2016).

The systematic literature review approach is different from the traditional narrative review, as it adopts a replicable, scientific, and transparent process with the objective to minimise bias

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through extensive literature exploration of existing published and unpublished studies (Tranfield *et al.*, 2003). This approach was adopted for this chapter because of:

- the great interest Qatar has received since the early 2000s from academics and research institutions, giving rise to a huge number of research studies on Qatar's sustainability strategies and the sustainability of its energy sector;
- the uncertainty of the effectiveness of the already implemented strategies in the country and its energy sector.

Systematic review steps

Although the systematic review approach is relatively new compared to the traditional literature review method, a methodological process (see Table 7.1) was reported by Higgins and Green (2011).

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For the study presented in this chapter, the systematic literature review approach was followed with qualitative analysis of the resources, to provide clarifications about Qatar's current sustainability strategies, both overall and in its oil and gas sector. At the planning stage, a review panel was formed of a number of academics and industry practitioners with expertise in both research methodology and sustainable development, as proposed by Tranfield *et al.* (2003). The process of the first stage was carried out by the panel through regular meetings, where disputes regarding the inclusion or exclusion of studies were resolved. The material gained from this approach was treated as questions and issues which would be of interest to academics, industry practitioners, and policy-makers. The steps followed within this study were as follows:

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- Identify keywords and terms, based on a scoping study, available literature, and the panel's suggestions.
- Identify the most appropriate search strings.
- Compile a full list of the information search output of all the articles and papers reviewed.
- Incorporate studies that meet the inclusion criteria, as specified, into the research.
- Ask multiple reviewers to consider the inclusion/exclusion of resources, which can be subjective, and resolve disagreements during the panel meetings.

Research question

Formulating a carefully identified and well-constructed research question guarantees a focus on the research scope to avoid unrelated searching and to ensure the review of only useful information (Akobeng, 2005). A poor or unidentified question has the risk of being time-consuming, as the research would turn out to be significantly large and non-systematic.

Therefore, it is essential for the researcher to frame and clarify the research question carefully to ensure a successful application of systematic literature review. Petticrew and Roberts (2006) argued that breaking the review question into sub-questions ensures a better framing and formulation of the question. The population, intervention, control, and outcomes (PICO) model is a tool that could be applied in this case.

The PICO model is a concept introduced originally as part of the guidance to assist in standardising the formulation of clinical research questions in the medical field, so that a literature review is carried out to answer them. The model was later adapted in social sciences studies to encourage researchers to consider different components when formulating review questions. The elements of the PICO Model include the following:

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- Population (P): What population is the researcher interested in studying? This includes a clear identification of the population to be studied to eliminate any possibility of ambiguity.
- Intervention (I): What intervention is the researcher interested in reviewing? This could be one or multiple interventions, depending on the researcher's approach and chosen population.
- Comparison (C): To what is the intervention being compared?
- Outcome (O): What outcome does the researcher hope for from the proposed intervention? It is crucial to identify which outcomes are the most relevant to the question, in order to ensure an efficient collection of information.

The PICO Model has been used by Stone (2002) (Table 7.2).

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What are the key sustainability strategies that have been implemented in the Qatar oil and gas industry?

Reliability of inclusion/exclusion decisions

Three panels, composed of a mixture of three members each, including academics with engineering, policy, business, and energy backgrounds, industry practitioners from the energy sector, and researchers were formed, first, to set the inclusion standards and, second, to review the sources to decide whether to include them or not. The inclusion/exclusion criteria were applied to the full content of the reviewed studies. Each reviewer of the review panels analysed the proposed articles separately to assess the extent to which the focus of the articles was on topics related to Qatar or its oil and industry's sustainable development strategies. Then, coders

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resolved the disagreements through discussion. A similar process was undertaken by Garcia *et al.* (2015), when they studied the factors that influence entrepreneurship.

The review focused on peer-reviewed journal articles that were available in five different databases: Science Direct, ProQuest, Google Scholar, Dawsonera, and Scopus. The reports of the Government and international associations also were considered considering the nature of the study (Table 7.3).

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Generation and analysis of keywords

The members of the panels identified the keywords of the research based on their previous experience, using brainstorming sessions during the panel meetings. A list of the main keywords and terms was drafted and grouped by the researchers of the study into different categories. The list comprised 17 keywords classified under three major categories: sustainability policies, keywords related to the sector, and performance outcome. The keywords were: Qatar sustainable development; Oil and gas sector; Carbon-based policies; Sustainability performances; Qatar Vision 2030; Sustainability strategies; National development strategy; Qatar energy sustainability performance; Knowledge-based economy; Qatar environmental development; Qatar economic development; Qatar human development; Qatar social development; Ladder of sustainable development and Qatar; Qatar Ministry Of Energy and Industry; Sustainable development practices; GCC sustainability; and Sustainable development goals.

The search timeframe

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Specific target dates were set at the start of the literature review process in order to finish the preparation tasks within the agreed upon schedule. The targets were set in collaboration with the authors and different panel members (Table 7.4).

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Data extraction

Microsoft Excel spreadsheets, available on a shared, open access platform (Google Drive), were used as a tool for data extraction. All the reviewers put their extracted data on their specific sheet within the document to be analysed afterwards. This strategy was used because it provided an inexpensive and easy access solution and presented the data in a format that can be easily summarised and analysed. An example of the data extraction form is shown in Figure 7.1 and the research framework that was followed is illustrated in Figure 7.2.

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Results and discussion

An initial literature review search resulted in a list of 1990 sources. The selected sources were screened according to the series of criteria mentioned in the previous section. The selection was narrowed to 82 sources. Several papers were excluded as they were not considered to be relevant to the research topic or did not meet the inclusion criteria. Among the selected studies, 41 were from peer-reviewed journal articles, 10 from governmental reports, 14 from corporate reports, 11 textbooks, and 4 conference proceedings. The findings were reported in two sections, namely energy sustainability strategies and Qatar energy sustainability performance.

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Energy sustainability strategies

Qatar's abundance in oil and gas resources had a significant impact on Qatar's economy.

However, this exceptional and rapid development had a downside as well, evident in the detrimental impact on the environment. Furthermore, further excessive consumption of fossil fuel would increase the risk of the long-term impact of climate change. Therefore, the Qatari Government placed the inter-generational fairness of non-renewable energy usage at the heart of its sustainable development plan for energy (General Secretariat for Planning and Development , 2009).

Following the steps of the Qatar National Vision (QNV) 2030, the Ministry of Energy and Industry began to implement its sustainability programme: Qatar Energy and Industry Sustainability Strategy (QEISS). The programme was implemented to demonstrate and support the sector's contribution to the country's sustainable development plans and strategies.

Considering the sector's fast rate of development and diversity, the Ministry of Energy and Industry had embedded innovation and business excellence culture within the programme, to help guide companies within the sector to implement sustainability management within their operations. The ministry opted also to improve the sector's impact on the economy, environment, and society and to optimise its contribution to the country. The QEISS Programme is built around six components to ensure the integration and smooth implementation within the sector of policy input and formation, sustainability performance reporting, rewarding of good performance, sustainability performance assessment and targets, national and international engagement, and finally, sector sustainability strategy.

The sustainable development industry reporting was the first step taken by the ministry when establishing the QEISS. The reporting scheme was started initially as a voluntary programme to

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encourage companies to develop their own sustainable strategies and subsequently was made mandatory and incorporated other aspects to encourage existing and new companies to participate. Several sustainability aspects were prioritised in the sector's sustainability strategy and were categorised into six different areas: health and safety, environment, climate change, economic performance, society, and workforce. A wide range of indicators were used to measure the performance of companies in each area. The number of indicators increased each year since the start of the programme, which might represent a challenge to the participants as the overall number of data collected and provided would increase, thus posing questions about their quality. The QEISS started with the participation of only 17 companies, four of which released their sustainability reports. The number increased to 36 participating companies by 2013, 21 of which released their sustainability reports, more than any country within the Gulf region. However, the number of companies participating was still small, especially considering the huge number of companies operating in the sector's eight sub-sectors (Qatar Online Directory, 2015). As the programme matured, amendments have been made by the ministry and participating companies on ways to improve the sector's sustainable development strategy. Thus, great importance was given to collected data and its quality, but the assurance level of companies' data was still a challenge, as only 55% of the data submitted in 2014 had been through some form of internal auditing process, approximately 27% was reviewed by an external auditor, and only 19% of the data were verified by international certifications such as the International Organization for Standardization or the British Standard for Occupational Health and Safety Assessment Series. This level of assurance was still low and did not meet the government's expectation and hope, thus raising questions about the data's level of transparency.

Qatar energy sustainability performance

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Six areas were identified as the main components of sustainability performance within the Qatar energy sector. Each area contained several indicators that help companies to assess their sustainability status.

Workforce

The energy sector is one of the large employers of the national labour force together with the construction sector, owing to its frequent expansions and innovation projects. The country is trying to attract and retain the best international talents and invest simultaneously in its local population. The number of imported foreign labourers in the country increased to a point of seven to one in 2011 (Weber, 2011). Barrebi *et al.* (2009) explained that this derives from the structure of the Qatari labour market, because it diminishes any incentives for local Qataris to develop and acquire skills and knowledge required within the private sector. At the beginning of the last decade, the Ministry of Energy and Industry proposed a five-year strategic plan, referred to as “Qatarisation” to ensure 50% of the sector’s employees are from a Qatar background (Ministry of Energy and Industry, 2014), but failed considering the desire of freshly graduated Qataris to work within the public sector as a result of the advantages and flexibility offered to Qatari citizens within the public sector (Randeree, 2012). Furthermore, based on the Qatar Statistics Authority (2014), the average salary per month within the public sector is QR22 781 (£4,786) and in the mixed public/private sector is QR18 700 (£3,740), while the average wage within the private sector is QR6883 (£1,446). Companies within the sector are still working towards the Qatarisation target by organising and participating in programmes and recruitment fairs for Qataris, such as the Qatar Independent Technical School Career Fair and Annual Career Fair for Qatar students in the United Kingdom. The companies also offer university students internships and partnerships. These efforts resulted 242 more Qataris being employed in the

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sector by 2014. Through sustainability strategies, the aim was to increase diversity within the sector to create an inclusive environment in the workforce, by employing people from different backgrounds and especially increasing the number of females in the workforce. Programmes included the Qatar International Business Women Forum led by Qatar Fuel Additives Company Limited (QAFAC), Ladies Group led by Qatar Petrochemical Company, and Maersk's mandatory inclusion of diversity e-learning for its employees. Programmes such as these led to an increase of 189 females being employed within the sector.

Health and safety

Companies within the energy sector had been part of four out of eight economic activities that contributed to non-fatal occupational injuries in 2013 (Qatar Ministry of Energy and Industry, 2014). This huge number of injuries had a negative impact on the sector in general and on companies, as it led to personal loss, reputational harm, fines, compensatory damages, and loss in production. This led to major institutions within the country – the Supreme Council of Health, the Ministry of Labour, the Ministry of Business and Trade and QP Ports, The Ministry of Environment and the Health, Safety, and Environment (HSE) regulations, and Enforcement Directorate – intervening to support the sector and its companies in managing their health and safety. By 2013, several laws and regulations were being implemented in the sector with regards to health and safety, where the HSE regulations and enforcement directorate was overseeing the activities. In the same year, the framework for Management of Major Accident Hazards was developed, which was completed in 2014. Upon completion, the framework became the basis for managing risk within the sector, with the objective to reduce major accident hazard risk to a level as low as reasonably practicable. The framework was intended also to prevent the occurrence of major accidents, minimise their consequences, and improve the sector's preparedness to react

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appropriately to potentially major emergencies. However, it is necessary for more audits and inspections to be implemented by companies to monitor their health and safety performances and check how rigorous they are, with the assistance of external auditors as they provide a more objective assurance of effectiveness and help identify more gaps and areas to work.

Society

Qatar places great importance on its social development. The government's commitment has been stated clearly in the QNV 2030 and NDS by implementing systems and approaches dedicated to social welfare to ensure the provision of essential amenities and services to the community. In the same context, the Qatar Energy and Industry Sector plays an important role, as it is one of the main sources of financial revenue for the state, and its economic contributions finance national social development work and infrastructure in several areas such as education, health, sports, arts, and environment to the amount of \$208 million (Qatar Ministry of Energy and Industry, 2014).

Energy companies have a great responsibility towards society. They should be the example of responsible corporates that contribute and act to society's benefit. Especially since corporate social responsibilities tend to be very limited to sporting events, education, health, and environment, while areas such as human rights, workers' rights, and anti-bribery and corruption measures are not covered by the energy companies' corporate social responsibilities (CSRs), mainly because there is a gap between the overall awareness and practices, considering that the industry is in its formative stage with regards to sustainable development (Kirat, 2015).

Furthermore, it could be argued that organisations within the industry are selecting stakeholders with great importance given to media, public image, and pleasing the government above all. That is why the sector should be engaging more with the community to promote and support social

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development and working to protect the welfare of workers by implementing business integrity and ethical policies. A few energy companies have been engaged already in such CSR activities, like RasGas's commitment to having human rights audits for itself and its ten largest contractors led by an independent international expert on human rights management. Following the examples of RasGas and Qatar Shell, the QAFAC ensured the inclusion of human rights criteria with all its contractors and suppliers, both national and international.

Environment

The sector as a whole, and companies as individual entities, started developing and adapting systems and strategies for environmental management, to mitigate the environmental impact of their activities and to generate short- and long-term benefits for the environment and people. Four aspects have been given great importance by the Qatari Government: water, waste, gas emissions, and spills. Enforcing environmental regulation is within the responsibilities of the Ministry of Environment, which has set specific requirements and environmental limits for companies that are in line with international standards.

Being one of the countries with the least amount of freshwater resources in the world, Qatar must manage its water resources strategically if it wants to realise its ambitions for long-term growth and sustainable development. Therefore, desalination of seawater, undertaken by QEWC, RLPC, RGPC and Q Power, remains the main source of freshwater used by households and companies. Several energy companies have on-site desalination and water treatment plants to process water used in their operations. The Ministry of Environment oversees companies' water management (and has placed limits on water withdrawal) and seawater discharge, and agreements were signed between companies and the ministry to regulate the quality and temperature of the water, depending on the companies' operations. The amount of water discharged by the energy sector

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experienced a 5% increase between 2013 and 2014, reaching more than 24 million cubic metres.

This slight increase was caused by the expansion of the sector's production capacity, but the sector is working alongside the Ministry of Environment to reach a Zero Liquid Discharge to the sea.

The energy sector is responsible for emitting various pollutants that have an adverse effect on the air's quality, because components such as nitrogen oxides (NO₂), sulphur oxides (SO₂), and volatile organic compounds which, when combined with the high levels of dust in the country, can have a destructive impact on the environment and people's health. The country is faced with a serious challenge to find a way to maintain good air quality while continuing to increase industrial production. Therefore, the Ministry of Environment established acceptable emission levels for companies within the sector, based on their activities. The government is also providing specific guidance to companies regarding air quality management. Since the beginning of 2015, several companies have installed the Continuous Emissions Monitoring Systems within their production line, and two of them have set a five-year objective to control and reduce their NO₂ and SO₂ emissions by 75.5%.

Climate change

The Gulf region's extensive development of fossil fuel extraction and energy-based industry was responsible for the region's notable increase in greenhouse gas (GHG) emissions from 0.8% in 1973 to 5.2% of the worldwide emissions in 2012, with Qatar being responsible for 4.6% of the region's emissions (QatarGas, 2014) and the world's highest rate of GHG emissions per capita. The energy and industry sector's GHG emissions have increased by 2.2% between 2012 and 2013, owing to the production growth in several sub-sectors, with the LNG/NG companies being responsible for the largest share of emissions amounting to 47%. Considering Qatar's geographic

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position, the country could suffer considerably from climate change. With the risks of rising sea levels, the country would be obliged to invest significantly in adaptation measures to protect the community and industry located in low-lying areas. The National Flaring and Venting Reduction Project is amongst the measures that the government has taken to reduce GHG emissions, caused mainly by flaring. Qatar has also established a national committee for climate change, which is responsible for formulating the country's climate policies. Moreover, during the Conference of the Parties (COP) 18 held in Doha in 2012, the Centre for Climate Research was launched in partnership with the Potsdam Institute for Climate Impact Research to encourage the exchange of climate change strategies amongst countries. The energy sector also has several initiatives in developing carbon capture and storage, because of the important role it plays in reducing GHG emissions. QAFAC has established the largest Carbon Dioxide Recovery Plant in the world (Qatar Ministry of Energy and Industry, 2014).

Economy

The energy sector contributes significantly to Qatar's economy, since it creates direct economic value by producing and exporting energy and other diverse products and services. The sector also provides an increasing number of well-paid jobs, thus helping to stimulate economic activities. The sector has suffered a minor challenge since 2014 when the stability of oil prices ended. After five years, oil that was traded for US\$111 at the beginning of 2014 reached approximately US\$27 at the start of 2016 (Beth, 2016), and oil and gas analysts and specialists came to the conclusion that the oil market had reached a turning point and would be flooded with a great excess in supply and shortage of demand (Khan, 2017). Despite these challenges, the energy sector was performing well, and its total hydro-carbon revenues continued to provide about 50% of the country's nominal GDP as a result of its variety of fossil fuel products and low

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production costs (Qatar Ministry of Energy and Industry, 2015). Furthermore, Qatar's strong fiscal reserves and savings rate played an important role in reducing the impact of the drop of oil prices and low energy demand on the country. The country also benefits from a low, fiscal, break-even point that protects it from any drop in oil prices. Moreover, Qatar is shifting towards short-term contracts with spot market sales instead of the long-term, oil-indexed contracts that remain linked to the volatility of oil prices (Wright, 2017).

Qatar has experienced an impressive growth in GDP since the early 1990s, out-performing its competitors in the Middle East (Alam *et al.*, 2016). In 2014, the country achieved a 6.5% increase in the GDP compared with 6.3% in 2013. This was mostly owing to the contribution of the construction and services sub-sectors, while the energy and industry sector was responsible for 40.4% of the country's GDP growth in 2014. In terms of revenues, the majority is generated by the LNG and oil and gas sub-sectors (56% and 26%, respectively), even though they experienced a drop in revenues in 2014. The contributions of the transport, storage, distribution, and refining sub-sectors' had increased by 11.9% and 9% between 2013 and 2014. Overall, the energy sub-sectors, apart from oil and gas and mining, have increased their revenues considerably since 2012.

Conclusion

“Sustainable development” is a term that embodies the integration of environmental, economic, and social aspects into one model to promote equity in accessing the planet's limited resources. In terms of this new model, great importance is placed on economic development while considering ecological protection, while offering flexibility in adoption within different cultures to meet their social needs.

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The study presented in this chapter is representative of Qatar and its oil and gas industry, thus giving this research a largely exploratory nature, with its results being limited to Qatar, and of limited value in terms of generalisability. In this chapter, a case example of the systematic literature review has been presented that was based on the PICO model. The systematic literature review is limited to papers in the English language, and governmental and corporate reports, because of the availability of data. However, it should be acknowledged that with the focus of the study being on Qatar, which is an Arabic-speaking country, the research might be missing a number of studies that could be of importance. Therefore, the inclusion of Arabic papers might be considered in future studies.

Qatar's alarming energy consumption could endanger the country's long-term oil and gas reserves seriously and could hinder its economy directly. In accordance with the QNV 2030, the energy and industry sector introduced its sustainability program (QEISS). The sector identified six main areas of interest in which to evaluate the performance of the sector and its companies: workforce, health and safety, society, environment, climate change, and economy. In all of these areas an improvement in their sustainability performances has been experienced, except in the environment and specifically indicators related to air emissions, as the volume of GHG has increased since 2012 as a result of the sector's continuous growth in production. The programme was welcomed by the government that encouraged its development to ease and smooth its implementation within the sector and its companies. However, one of the main concerns regarding the strategy was the low number of participants within the sector. Although the overall number of participants had increased since its introduction, the number was still small and did not fulfil the vision of the country or the sector.

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The QEISS Programme clearly provided guidance in measurement and management to the sector and companies with regards to sustainability, and the commitment of the ministry to continuous improvement of the programme was shown through its projects in different areas. However, it is worth mentioning that the last sustainability report by the sector, published in 2015, was for the year 2014. The sector had been focusing closely and working hard on lowering its impact on the environment and on improving accessibility of energy, but has been neglecting two of the energy pillars of sustainability – the renewability of energy resources and efficiency in energy conversion, distribution, and consumption. Even with the efforts of some companies to implement energy efficiency measures to decrease the consumption of energy, the overall energy consumption increased between 2013 and 2014. Therefore, companies within the sector should improve their performances relating to energy efficiency and reduce their consumption of fossil fuel resources by reviewing their business models to remain competitive and meet shareholders' expectations, especially in view of the rise of the Australian and American LNG market. The adoption of smart solutions is becoming essential to cope with the constant changes within the sector. New technologies such as “Distributed ledger – Blockchain” and “Big data” would have an important impact on the country’s exploration and production activities, especially with Qatar’s oil wells status

Table 7.1 Stages of systematic review

Stage I – Plan the review	
Phase 0	Identify the need for a review
Phase 1	Prepare a proposal for a review
Phase 2	Develop a review protocol
Stage II – Conduct the review	

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Phase 3	Identify research
Phase 4	Select studies
Phase 5	Assess study quality
Phase 6	Extract data
Phase 7	Synthesise data
Stage III – Report and disseminate	
Phase 8	Report and make recommendations
Phase 9	Put the data into practice
Phase 10	Keep the review up to date

Source: Original.

Table 7.2 Description of the PICO model

Acronym	Definition	Description
P	Population	Qatar oil and gas industry
I	Intervention	Government/organisation sustainability activities
C	Comparison	Qatar's situation before implementing sustainability
O	Outcome	The country and industry's sustainability performance

Source: Original.

Table 7.3 Criteria for inclusion/exclusion of studies

	Inclusion criteria	Exclusion criteria
Date	2008–2017	Prior to 2008
Geographic location	Qatar	
Language	English	Papers not in English
Type	Original research paper and	Articles and book reviews,

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	textbooks	research notes, dissertations
Publications	Peer-reviewed articles, government reports, published textbooks, conference proceedings	Papers focusing on the technical areas
Participants	Organisations within the Qatar energy sector	
Design	Qualitative, quantitative, case study, survey, studies that used a validated methodology	Informal papers, with no research questions, no research process, and defined data
Focus	Does the study examine Qatar's current overall sustainability strategies? Does the study identify practices and strategies to embed sustainability within Qatar and its energy sector?	Studies with no relationship to sustainability

Source: Original.

Table 7.4 Target dates for preparation tasks

Duration (weeks)	Phase
3	Preparation and development of review protocol
7	Search for relevant studies

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6	Inclusion assessment
6	Data extraction/collection
5	Data analysis/synthesis
5	Reporting and recommendation

Source: Original.

Figure 7.1 Data extraction form for conducting the systematic literature review.

Figure 7.2 Research framework.

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