

Midocean University
Master of Risk Management
Management School

Energy Transition: An evaluation of the green renewable energy challenges facing the Kingdom of Saudi Arabia.

A Management Research Dissertation submitted in partial fulfilment of the requirements
of Management school for Master of Risk Management

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Submission date: 26/08/2023

DECLARATION

This work is being submitted in partial fulfilment of the requirements for the degree MBA and has not previously been accepted in substance for any degree, and is not being concurrently submitted in candidature for any degree.

Signed: *saad*

Date: 26.08.2023

This dissertation is the result of my own work and investigations, except where otherwise stated. Where correction services have been used, the extent and nature of the correction are clearly marked in a footnote(s).

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SUPERVISOR DECLARATION FORM

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I acknowledge that the above name student has regularly attended the planned meetings and actively engaged in the dissertation supervision process. They have provided regular, timely draft chapters of the dissertation and followed given guidance.

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Date:

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Abstract

Countries belonging to MENA (Middle East and North Africa) region and primarily members of Gulf Corporation Council (GCC), have been highly accumulating revenue through export from hydrocarbon products. Revenue from such exports have been major contributor towards their GDP as well.

Research aim, objectives & research questions

The primary research aim of the current dissertation is to evaluate the green renewable energy challenges faced by the Kingdom of Saudi Arabia.

The following listed are the research objectives to meet the above research aim:

- To examine the critical theories and concepts on renewable/green energy transition (this is a part of the literature review examining the background theory on green energy transition generally)
- To explore the green/renewable energy challenges facing KSA (this will involve government policy, what needs to be done etc.)
- To evaluate green energy strategies for a more effective transition, with a focus on KSA

Research question

How can the KSA transition to a greener energy/renewable economy?

Methodology

The researcher elected to do a desk study for the present dissertation and omitted field research and qualitative interviews. Although such a strategy may have produced deeper insights into information and potentially bolstered the points presented in the study, I chose a different approach for several reasons that will be detailed in the following sentences. Researchers investigating government actions and seeking access to key politicians and practitioners will find the Gulf states, and Saudi Arabia in particular, to be a challenging environment. The researcher will compare this study to a previous one on renewable energy policies in the MENA area.

This research looked at several levels of Saudi Arabia's radical situation and the factors influencing renewable vigor policies. Furthermore, essential barriers and reasons for growing alternative fuels have been acknowledged. According to the updated research, Saudi Arabia overcame some difficulties a few years ago, as mentioned in Saleh's al-study. However, more effort must be made in many places to facilitate a seamless switch to renewable vigor sources.

To effectively transition from oil to sustainable power, Saudi Arabia must have widespread acceptance and societal understanding of renewable vigor. However, the research reveals that the administration has ongoing to define biofuels in nationalist and Islamic categories, which might help protect universal support.

In summary, the researcher concludes that Saudi Arabia still faces significant challenges in distributing sustainable power, but recent government efforts indicate a growing resolve to overcome these obstacles. As the Saudi government is still in the beginning stages of integrating sustainability, we will need to regularly monitor their growth to success.

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Chapter 1

Introduction

1 Introduction

Countries belonging to MENA (Middle East and North Africa) region and primarily members of Gulf Corporation Council (GCC), have been highly accumulating revenue through export from hydrocarbon products. Revenue from such exports have been major contributor towards their GDP as well. They are also able to attract more foreign direct investments and have been considered as an important market for the west (Ratikainen, 2017, p. 27).

Kingdom of Saudi Arabia (KSA) rank's second for oil reserve followed Venezuela. Saudi Arabia produces a powerful position primarily for being the producer of swing oil and power in controlling oil prices. Decades of large oil export and production have given the nation with enormous overseas investments, which has significantly influenced its socioeconomic development and political ideology. A "ruling bargain" strategy is adopted by the country to ensure internal stability and survival of the regime. In such strategy the government has to ensure that the population have political acquiescence, and this can only be made possibly through considerable welfare services and social benefits as a social contract for their citizens (Center for International and Regional Studies, 2013).

Substantial expenditures on water, fuel, and electricity are a significant component of the general agreement. These subsidies have fostered the "illusion of plenty," resulting in exceedingly wasteful consumer behaviors and an important domestic energy demand. In addition, urban and technological expansion over the last decade has led to an increase in household energy consumption.

Saudi Arabia has one of the highest per capita oil consumption rates in the world, with an estimated annual growth rate of 5.7 per cent (Dermot, 2012). Citigroup believes that by 2030 Saudi Arabia might become a net importer of oil (Shwayder, 2012). This bleak prognosis may have a low possibility of coming true. Nonetheless, it emphasises Saudi Arabia's critical need to reduce its domestic oil use and develop other energy sources to meet its domestic energy demands.

Saudi Arabia throws behind massive carbon footprints due to its high energy consumption and oil production. Saudi Arabia accounts for 1.2% of the world's CO₂ emissions, making it one of the largest countries in this respect (Barolini, 2015). The Paris agreement was to keep the global warming below 1.5 degree Celsius however as per the reports there is an inadequacy from the Saudi since its just below 2 degrees Celsius. In comparison, global warming might reach 3–4°C if most nations followed the Saudi Arabian policy.

1.1 Research background

Saudi Arabia is concerned about climate change for two reasons: Rising sea levels, resource shortages, temperature spike, degrading of the land, and shortage of food are all repercussions of climate change that have catastrophic effects on the environment in Saudi Arabia and the greater MENA area, making living incredibly difficult, if not impossible, for the local population and possibly leading to an influx of migrants and public unrest. As opposed to that, global warming and the ecologically destructive impacts of CO₂ exhalation are well recognized, and the irresponsible what the oil industry is like has gained increased debate from the global society. At the Paris climate conference (COP21), 195 nations ratified the first time globally, lawfully enforceable world climate treaty – The Paris agreement – demonstrating the increasing efficacy of worldwide efforts to prevent climate change. Globally, the need for a sustainable environment has been defined, and a decarbonization that lowers reliance on fossil fuels is currently unfolding, as seen by the large growth in financing in renewable energy over the last some years. The favorable deployment of programs designed to restrict the consumption of fossil fuels and increase usage of less energy may have significant repercussions for Saudi Arabia's export profits and, if the country cannot find other sources of money, for its internal stability as well.

Current Saudi Arabian reliance on oil and oil earnings cannot be maintained. If uncontrolled, the development will place a further strain on the atmosphere and weather, as well as the radical economy, which might lead to civil dissatisfaction and political instability. Regionally and internationally, economic, financial, and energy-related issues might be exacerbated by Saudi Arabia's domestic instability.

Saudi Vision 2030 is a comprehensive plan to lessen the kingdom's reliance on oil and expand its economy. In January of 2017, Saudi Arabia published its first global ambitious

solicitation for solar energy projects, and in 2016 the Energy, Industry, and Mineral Resources Ministry was founded to expedite decision-making. An official at the highest level of the renewable energy industry described the most recent measures as "the kingdom's highest-level commitment to renewable energy to date." (Ko et al., 2019.p.2898) In addition, energy-saving measures have been implemented, and plans have been established for the development of renewable energy projects. Former oil minister Ali al-Naimi said in 2009 about renewable energy and solar energy, "Saudi Arabia intends to generate as much solar electricity in the future as it does oil" (Ratikainen, 2017, p. 29). In addition, the government announced in 2012 plans for \$109 billion in investments in clean energy to establish a solar industry by 2032 that would produce one-third of the nation's electricity (Eco-Business, 2011). These lofty goals have not yet been accomplished. In addition to pledging to COP21, the Saudi Arabian government has also submitted a Climate Change Indicative Nationally Determined Contribution (UNFCCC). These contemporary proclamations and efforts illustrate the Saudi government's heightened commitment to sustainability.

In Saudi Arabia, unfortunately, previous pledges to diversified away from oil and implement renewable energy sources have been fulfilled slowly or not at all. In 2015, it was reported that the Kingdom was "delaying by eight years its intention to complete a clean-energy scheme involving \$109 billion in renewable energy," citing the need to "carefully study the technology it would use" as the motive for the delay (Bloomberg, 2015). In 2016, Saudi authorities one more time postponed the deployment of renewable energy sources, rather proposing a growth in dependence on natural gas and a drop from 50 percent to 10 percent of sustainable energy goals in power generation (Wael, 2016).

1.2 Research aim, objectives & research questions

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The following listed are the research objectives to meet the above research aim:

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1.4 Research scope

The empirical data in this thesis will be derived from both primary and secondary sources, including official public documents on energy protection, governmental websites and articles, published reports, and reports from non-governmental institutions and organisations such as the World Bank and the United Nations, IRENA, IEA, OPEC, etc., as well as government institution online profiles and Saudi Aramco. Although the bulk of these websites are written in English, others, like as the Ministry of Power, Industry, and Minerals' website, are written in Arabic. In addition, academic research will provide context for the many elements that influence the growth of renewable energy. The sources will provide data for the chapter 2 background information and chapter 3

analytical variable inference statistics. The most existing experimental sources are the business strategy documents "the Saudi Vision 2030" and "The National Transformation Plan," which provide prov with the official goals for implementing renewable energy and how the country plans to incorporate it into its economic diversification strategies, respectively. Thesideve The severable sources will provide current information on the policy of renewable energy and Chapter 4 will analyse their content.

1.5 Dissertation structure

Dissertation structure

This dissertation has five parts. In the preface, which is founded on previous theoretical research, the context and research direction are provided. Then, research topics and goals were suggested. This part concludes by outlining the format of the dissertation, including the opening, review of the literature, theoretical foundation, methodology, data collection and conclusion.

Chapter 2 presents the literature review, including the methodology and results of the literature survey. Depending on the merits of the research questions and goals, the author researches and evaluates the relevant literature and earlier research findings. In addition, a present study is highlighted after this section.

The methodology part of the Chapter explains the research approach, analysis technique, research techniques, data gathering tools, analytic methods, ethical considerations, and examination of study quality. The entire full presentation, the exact study methodology will be described. The substance of the technique is intimately tied to the research questions and goals.

In Chapter 4, the study results and analysis of data are described. This part comprehensively summarizes the data, procedures, and objects. This dissertation ends with a summary and analysis of the gathered data in light of the research issues.

Lastly, the conclusion section summarizes my study's results, research objectives, and issues addressed. The limitations of this research and the variables that affect the quality of research are then discussed. This is a projected future research direction for the area.

Chapter 2

Literature review

2.1 Introduction

In this chapter, the researcher will analyse critically past research on the shift to green renewable energy sources. In addition, the transition process's obstacles are explored. Also used are refereed journal papers, industry reports, and government reports.

2.2 Justification for the use of sustainable power in Saudi Arabia

Saudi Arabia wants to lessen its dependency on oil and implement renewable energy sources for a variety of reasons. The energy mix of a country consists of the main energy foundations that are used for internal energy consumption. These energy foundations include of fossil fuels such as petroleum, coal, and natural gas, renewable energy bases (solar, wind, biofuels, geothermal, etc.), nuclear-powered energy, and surplus energy. Conversion of main energy sources into secondary energy or energy carriers that may be utilized by society, such as electricity and transportation fuel. Saudi Arabia's current energy mix comprises of petroleum and natural gas, and its use of these fossil fuels is very hazardous.

2.3 Local energy requirement

Despite having vast energy resources, such as undiscovered renewable power sources and some of the world's largest oil and gas reserves, the state is undergoing an energy catastrophe. Saudi Arabia is one of the world's major energy patrons, and its oil consumption has increased by supplementary than fourfold during the previous year (El-Katiri and Fattouh, 2017). This dilemma is rooted in the rising domestic energy consumption, which is a result of wasteful consumer behaviors, population increase, industrialization, and economic progress. Perhaps the most major factor is the cheap cost of energy, which has caused the rising population to wastefully utilize power. As socioeconomic circumstances and national income improve, energy consumption will also rise.

Saudi Arabia burns almost 25 percent of its oil output, which is greater than Germany, whose demographic is three times that of Saudi Arabia and whose budget is five times

the size (Krane, 2015). According to a second estimate, the annual growth rate of Saudi power consumption is 9 percent, whereas the annual growth rate of Saudi electricity production is 7 percent. Nonetheless, it is evident that the rise in demand will exceed their ability to create power if nothing is done to avert this outcome (Export.gov, 2020).

In this circumstance, Saudi Arabia would be obligatory to ingress oil to meet local petition. This would be disastrous because they would have no supplementary crude for shipment and hence no oil profits, which are critical to Saudi Arabia since oil accounts for 86 percent of their yearly income. It would also result in resource instability since the state would have to depend on other countries to provide a portion of its vigor needs.

The issue may be resolved by lowering vigor use via vigor-saving measures, boosting power output, or both. Vigor competence procedures are a high priority in Saudi Arabia, as shown by the newly founded Saudi Green Construction Forum (SGBF), which promotes sustainability, and the state's new green building regulations (McCullough, 2014). Retrofits will be critical in Saudi Arabia's attempts to tackle vigor-related trials, but this topic is outside the scope of my dissertation, therefore I will concentrate on renewable vigor.

By establishing vigor schemes, they can meet national vigor demands with unsoiled, non-polluting vigor while simultaneously releasing oil for export and collecting oil revenues. Additionally, the introduction of renewable vigor may assist to the decoupling of the relationship between economic growth, high vigor consumption, and greenhouse gas (GHG) emissions, therefore fostering sustainable development (SD) (Edenhofer et al., 2011).

The majority of Saudi Arabia's power is currently used to generate oil, but this could be made more viable by integrating sustainable power into the national vigor mix, avoiding the need for additional oil exports and providing greener and cleaner vigor to the transportation and electricity sectors. Under this plan, renewable vigor and electric vehicles might reduce the environmental and economical burden caused by the use of liquid fuels, eventually eliminating their use in the transportation industry.

However, if Saudi Arabia is unable to lessen its dependency on oil revenues beforehand, the worldwide proliferation of EVs could have devastating implications on the economy. The oil industry, Saudi Arabia's principal source of wealth, might face serious hurdles if

the world transitions to EVs. In fact, some analysts anticipate that EVs would drastically disrupt the global oil industry, since the change to EVs will considerably cut oil consumption. According to RethinkX research, a smoother transition to EVs will occur by 2030, with significant economic ramifications for a range of businesses, counting the vigor industry, and will cause oil prices to drop due to decreased demand. Electric vehicle adoption is predicted to reduce world oil consumption to 70 million Containers per day by 2030.

2.4 Weather change, water scarcity, and detoxification as a point of departure

Environment change presents a danger to Saudi Arabia's way of living and creates several challenges. Higher global temperatures will culminate in "above-average temperature rises and decreased precipitation" in the Gulf area (IRENA, 2016). Increased infections would raise the need for air habituation, which presently consumes almost 900,000 Containers of oil every day during the summer months (Howarth et al., 2020). Furthermore, water shortage is already a big issue in the area, and a reduction in precipitation will boost the need for refining capacity. It is the process of eliminating salt and chemicals from seawater in order to make it suitable for agriculture and human use. This procedure is very resource; in Saudi Arabia, desalination facilities use 1.5 million Containers of oil per day (Vigor, 2012), accounting for around 10% of the country's total oil consumption (Rambo et al., 2017). As the population and industrial sector grow, so does the need for desalinated water, which contributes to the nation's water stress and domestic vigor demand. The desalinization process causes substantial environmental harm and is therefore a local and global environmental concern (Albanawi, 2015). By permitting oil to be exported, desalination might be made greener and more cost-effective by substituting renewable vigor for oil. The world's first large-scale solar-powered desalination plant is now under development at Al Khafji, Saudi Arabia (Saudi Aramco, 2022). (Water Technology.net, 2022). Saudi Arabia may become an early user of renewable vigor if it incorporates renewable vigor into its desalination process (Hepbasli and Alsuhaibani, 2011).

In addition to water diminution, which can seemingly cause key ecological ruins in Saudi Arabia (Sputnik. 2017), the state may experience future climate changes and environmental damages such as heavy rainfall (Saudi Gazette, 2016); rising sea levels

that will threaten marine ecosystems (Heather); and land degradation and extreme heat that will make life abhorrent in an already enormously hot country. In the most extreme scenario, Saudi Arabia might become more inhospitable, forcing large segments of the Saudi people to become climate refugees and relocate. Saudi Arabia must take severe efforts to reduce oil consumption and emission of greenhouse gases in order to address these tasks and shield the environment and temperature.

Despite the fact that weather factors were not formerly taken into account, the fact that climate change presents a threat to existing conditions in their nation may serve as encouragement for justifiable advance and arrangement of unsoiled vigor. Given Saudi Arabia's previous engagement in global warming discussions and mitigation initiatives, it is clear that their activities are not motivated by environmental concerns.

The Kingdom of Saudi Arabia will participate in a number of initiatives to fight climate change and make its growth more sustainable, according to the United Nations Framework Convention on Climate Change (UNFCCC). Al-Sarihi (2019) As Saudi Arabia vows in its INDC to transform its gdp away from fossil fuels and toward sustainable electricity, the climate issue provides incentive for renewable vigour.

2.4 Solar & Wind

Saudi Arabia offers several advantages for the growth of solar vigor, making it an obvious choice for the country. It is well positioned for solar grounds, with vast stretches of abandoned desert land-dwelling that may be used to gather solar vigor (Alraddadi and Conejo, 2021), as well as some of the greatest solar irradiance in the world. Multiple evaluations indicate concentrated solar power (CSP), solar-thermal, and photovoltaic (PV) as the United States' most promising renewable vigor technologies (Haddad et al., 2021). (Bundschuh et al., 2021). Moreover, renewable vigor sources such as astral and breeze have become progressively price inexpensive with predictable fuels (Ram et al., 2018). The delivered cost of vigor from solar photovoltaics, concentrated solar power, and wind is falling, sometimes fast. According to the International Renewable Vigor Agency, renewable technologies are the most cost-effective option for additional capacity in a growing number of nations and areas (Gielen et al., 2019). Renewable vigor technology is continually advancing and is backed by substantial global expenditures. This trend is anticipated to continue and lead to more advancements and new discoveries

in the area of renewable vigor technology.

Existing research indicates that transitioning to renewable vigor has numerous benefits, such as increased economic evolution probable, social wellbeing, job conception, and overall employment balances (Gielen et al., 2019), vigor access, secure vigor supply, mitigating climate change, and the reduction of negative environmental and health impacts (Sharma et al., 2020). In addition, "large-scale exploitation of renewable vigor may help to rural development and electrification, land restoration, increasing vigor variety, and reducing the danger of nuclear weapon proliferation." (Diesendorf and Elliston, 2018).

2.5 Electing economy over sustainability

What was once a choice between business and the environment, climate, and eco system will become outdated as sustainability and renewable vigor emerge into a sector with immense economic probable and development. Renewable vigor is increasingly causative to sustainable expansion, where financial progress and climate change mitigation measures go hand in hand. Because climate change is a global problem, some governments have profited from CC programmed while other nations strove for sustainability. This problem, known as a "free rider," may become less of a worry now that the corporation can combine economic development, sustainability, and weather patterns vigor demand via the use of cleaner vigor techniques. Indeed, many perceive the failure to transform away from relying and toward environmentalism as damaging to economies that rely largely on fossil fuels. Timing is everything, and both entrants and late long skirts may pay a high price. As the majority of the world appears to be rapidly deploying supportable power, igniting development practices, continuing to invest in cleaner fuels, and cooperating on weather patterns and ecosystems conscientious enterprises, Saudi Arabia would be wise to follow ensemble in order to cement itself in the burgeoning worldwide vigor market.

2.6 The political system in Saudi Arabia

Saudi Arabia is a monarchy and a devout devotee of Islam. Absolute monarchy is a kind of royalty in which the monarch's authority is unrestrained by law. Saudi Arabia's absolute monarchy is distinct in that the kingdom and, by implication, the sovereign must govern

in accordance with the Basic Law, a document resembling a constitution. According to the first paragraph of the Basic Law, the Quran and Sunnah make up the Saudi Arabian legislation. It declares Saudi Arabia to be an independent Arab Islamic state. Its foundation is the Holy Qur'an and the Sunnah (traditions) of the Prophet Muhammad (peace be upon him)" (Jamjoom, 2010). As a result, the dictatorship is obligated to follow these Islamic values, and its reign is legitimated solely by its adherence to Islam and the backing of the sacred establishment, the ulama. Opposition institutions and votes are prohibited, and the royal family develops and makes political choices in collaboration with the ulama. Thus, support and collaboration from the ulama are critical for the administration. The huge royal family, known as the House of Sauds, "comprises more than 15,000 people, with around 2,000 in the inner circle." (Gause, 2018) and is the ruler of the nation.

2.7 Conclusion

In the present chapter, the past research on green vigor transition studies is assessed critically. In addition, the present political situation in Saudi Arabia is briefly reviewed. Following is a discussion of the procedures employed by the researcher to acquire and analyze secondary data.

Chapter 3

Methods

3.1 Introduction

According to Saunders and Lewis (2017), the selection of proper research methodologies is crucial for the effectiveness of the research plan. This chapter will offer a comprehensive overview of the evaluation methodologies used to assess the green renewable vigour problems confronting the Kingdom of Saudi Arabia.

3.2 Research Methodology and Strategy

Understanding the study technique and underlying concept is key. For the planned inquiry, the researcher used (Saunders and Lewis, 2017), who had changed the research procedure into a "onion" (Figure 1). Designing and implementing research instruments are essential steps in the research process. The researcher should also clarify his or her study methodology and research philosophy.

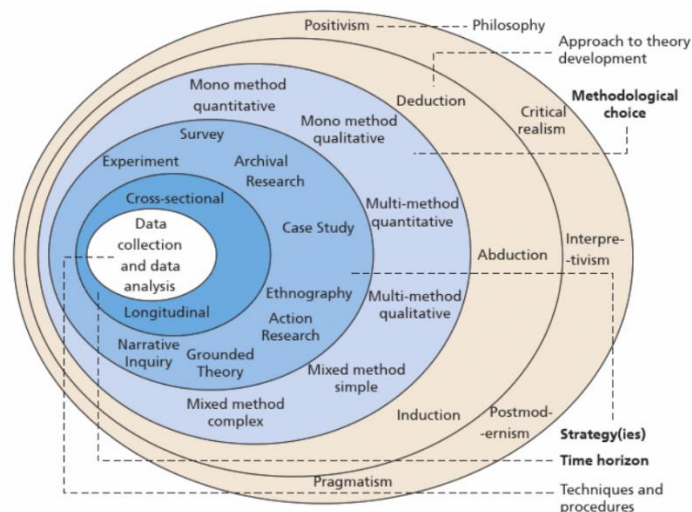


Figure 1: Research Onion (Source: Saunders and Lewis, 2017, p.5)

According to Saunders, Thornhill, and Lewis (2019), the four aspects of a research philosophy are empiricism, pragmatism, relativism, and simplicity. Due to the nature of

the inquiry, the researcher approached the present study pragmatically. The researcher aimed to examine a single decision-maker in an actual situation. The fundamental objective of the pragmatic research philosophy is to identify an issue and assess it from a broader perspective, so enabling the researcher to explore, analyses data from several angles, and ultimately solve the problem. As a consequence, the researcher was able to remark on and give suggestions for the investigated case. Because the researcher wished to address all research topics, a pragmatic approach was used. This study's primary objective is to analyze the research questions in the actual world, establish their validity, and apply the findings to the real world.

A deductive research technique was used for the proposed investigation, which led to the creation of the hypothesis. The study problems will be stated logically from a larger perspective, and the results will be unique. In deductive research (Schindler, 2019), a top-down approach (Figure 2) was used, in which the researcher first identified the theory and then formulated a hypothesis that could either accept or reject the theory.

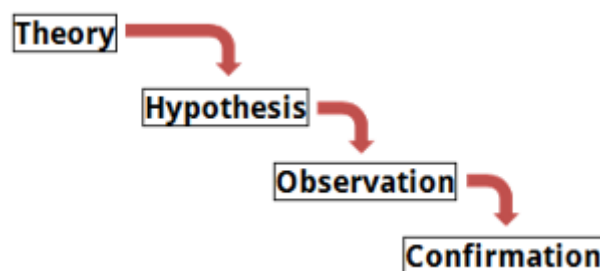


Figure 1: Deductive Research Approach Model

After examining peer-reviewed academic articles and industry data, the following hypotheses, research questions, and goals were formulated.

3.3 Research Design

This study used a qualitative research methodology. To comprehend thoughts, views, or experiences, qualitative research requires the collection and analysis of nonnumerical data (e.g., text, video, or audio). It may be utilised to get a thorough grasp of a topic or to generate novel research ideas. The purpose of qualitative research is to discover people's perceptions on the world. While qualitative research employs a range of approaches, data evaluation is usually centred on preserving rich meaning (Schindler, 2019).

3.4 Sample size

Only government reports on green renewable vigor were included in the dataset for this research. Reports were collected directly from the website of the Kingdom of Saudi Arabia. The years 2015 through 2021 were used for the data analysis. Each report was extremely comprehensive and described the method and procedures that will be implemented by government officials, as well as their relationship to the Saudi Arabia 2030 goal. Any industrial data from ARAMCO publications from 2015 to 2021 was also used.

3.5 Sampling techniques

Purposive sampling was employed to pick the appropriate demographic groups for the present dissertation.

3.6 Data Collection Methods

3.6.1 Primary data collection

According to Schindler (2019), primary data are the data acquired by researchers for their own study interests. However, time constraints prevented the researcher from using any of the key methodologies. Access to government officials and ARAMCO officials was similarly impossible in Saudi Arabia.

3.6.2 Secondary data collection

Prior to employing secondary data in an analysis, it is necessary to do a number of essential tasks. Typically, the researcher is unfamiliar with the data since he or she did not gather them. It is essential for the researcher to get acquainted with the data collection, including how the data was obtained, what the answer categories are for each question, if weights must be applied during analysis, whether clusters or segmentation must be accounted for, etc. Essentially, the researcher must get as acquainted as feasible with the data set and the method of data gathering.

The variety of data accessible is a key benefit of utilising secondary data. The federal government performs various large-scale national studies that would be impossible for private researchers to obtain (Jin et al., 2015). Many of these data sets are longitudinal, which means that the same data was gathered from the same population across many time periods (Johnston, 2017). This enables researchers to examine changes and patterns in phenomena across time. Second, the data gathering process is often directed by experience and professionalism that may not be accessible to individual researchers or small-scale research groups (Moser and Korstjens, 2018). Data collecting for various government data sets, for instance, is often conducted by staff people who specialise in certain activities and have extensive knowledge in that field and with that survey (Jin et al., 2015). Many smaller research initiatives lack this degree of skill, since data collection is often performed by students working part-time or temporary jobs.

When it is difficult for a researcher to acquire primary data, they depend on data from other studies, which are referred to as secondary data (Schindler, 2019). In this dissertation, secondary sources such as the Sudi government website and the ARAMCO website were used to determine the rules and assessments of green renewable vigor. For this dissertation, scholarly journal articles, airline annual reports, and industrial data were used.

3.7 Research instruments

For this study, a content analysis was used.

Content analysis

Sentiment analysis refers to the procedures, techniques, tactics, and approaches used to extract information on customer sentiments toward a product, service, or brand. It also

attempts to analyze the emotional state of the customer when they convey their ideas and opinions. (2018, Zhang et al.)

3.8 Validity and Reliability

Many of the comments were written in Arabic and were translated utilizing API software. 5% of the comments were cross reviewed by an Arabic – English translator to confirm the trustworthiness of data. To confirm the authenticity and dependability of the remarks, only comments from the Saudi official website were used. We utilized scholarly journal articles and ARAMCO financial statements to verify the material.

3.9 Data Access

The websites of the Saudi government were largely utilised to gather these reports. Since these reports are publicly accessible, no special authorization was necessary to view the data. ARAMCO's annual reports were also publicly accessible on their website. The obtained information has been preserved on the Cardiff one drive and will not be utilised for any other research projects.

3.10 Ethical consideration

Before collecting data, the researcher requested Cardiff Metropolitan University's ethical permission. In addition, the following ethical approval was provided:

Ethics approval number: 2021DE880

3.11 Conclusion

In this chapter, the researcher describes the methodology used in the study. The researcher employed secondary data to achieve the study goals and objectives.

Chapter 4

Results, Analysis and Discussion

This chapter will offer a multifaceted investigation of Saudi Arabia's sustainable power initiatives. I will explore the factors affecting the Kingdom's apparent renewable power strategy and the degree to which it seems to have one.

4.1 Environmental topography considerations

4.1.1 Political structure

Implementing policies that call for extensive cooperation and coordination amongst several entities is highly challenging due to the intermittent nature of the state and the inadequate capacity for horizontal collaboration between institutions and agencies.

Secondary impediments may include discrete administrators' "veto" influence and their capacity to resist elite-selected policies. Policies and initiatives allocated to and directed by "islands of efficiency" such as Saudi Aramco are often executed more successfully than those limited to various firms and institutions.

This requires the involvement of the relevant entities and ministries. It will be crucial for many government agencies to develop a cross-cutting partnership since the general dissemination of renewable vigor in the United States involves numerous other subdivisions outside the vigor sector, including the academic, commercial, industry, and workforce sectors (which will be discussed in the conforming segments below). As Hertog explains in the literature, the regulatory obviousness of the system-wide massive overhaul in Saudi Arabia does not bode well for the mandatory linear collaboration for the development of RE, with all that this entails in terms of managerial skills and leadership effectiveness, and policy implementation configuration. The obscurity of Saudi politics makes it challenging to appreciate how institutions and departments function (Sim, 2021).

According to Hertog's examination of the viability of transformation, the Saudi government will have the best success implementing laws and programs restricted to a single or constrained number of ministries or companies, notably if they are recognized as "isles of effectiveness." Forming the REPDO and the new vigor department may be a noteworthy phase toward eliminating the organisational barrier. It will be intriguing to

watch whether they can achieve their lofty objectives. As the need to expand their business and become more sustainable grows, the Saudis' reasons for change must become far more robust than their first endeavor.

Saudi Aramco, the model "island of efficiency" in Saudi Arabia, will play a vital role in developing renewable power sources and realizing Saudi Vision 2030. Saudi Aramco has played a crucial role in the communal, financial, and infrastructure expansion of Saudi Arabia, and its executive talents are unmatched in the Realm and Bay area. This is how the company contributes to the development of the Saudi monarchy (Murphy et al., 2019). Regarding vigor projects, Saudi Aramco has a wealth of knowledge and a track record of producing excellent achievements. Their expertise in fossil fuels is a significant argument against their capacity to handle renewable vigor programs. To acquire the knowledge and skills necessary to do massive vigor projects, they are broadening their collection and collaborating with Masdar, one of the world's most significant renewable vigor projects in the MENA region.

The effects of renewable vigor technologies on governance include regime stability vs democratization.

Switching away from fossil fuels and toward sustainable power and how this impacts administration must be on the administration's plan - if not overtly contested - as oil is intimately related to the management and security of the Saudi Arabian system. Before widespread diffusion, it won't be possible to evaluate how renewable vigor affects regime stability.

The shift from oil to renewable vigor (RE) may be accomplished in several ways, from a total switch to RE to the inclusion of local RE requirements in the vigor mix. Different situations have different governance consequences. While it is beyond the choice of this thesis to evaluate all alternative outcomes and their properties on democracy, and since such deliberations would also constitute merely conjecture, given that Saudi Arabia has not yet drastically transformed the transformation, a short explanation of the link between the government and vitality can help assist Saudi Arabian politicians in analyzing their possibilities and the probable effect of the spread of distributed generation power in the country.

4.2 Regime-level factors

4.2.1 Technological regime

Difficulties for the electricity industry

The vigor requirements of Saudi Arabia, as detailed in chapter 2, make it clear that the kingdom will need to boost its vigor output considerably. The United Kingdom would need an extra 4 GW annual production capacity to meet the increased demand. Renewable vigor sources may dramatically lower existing costs to the government and the environment while also helping to meet domestic vigor needs. Stable and growing vigor sources are necessary for the growth of the local business and residential sector. This potential may be leveraged to motivate the installation of RES and their incorporation into the national grid to expand the vigor mix. This concept is accepted by Khalid al-Falih, the current deputy minister of vigor, commerce, and natural resources and former chairman and president of Saudi Aramco. A recent press release describes their efforts to implement renewable vigor.

Although the Saudi Kingdom has long planned to incorporate renewable vigor sources into its vigor mix, nothing has happened. According to sources, the current contribution of RES to global vigor output is relatively modest, ranging between 17 MW (Shobrak et al., 2022) and 23 MW (Alrashoud & Tokimatsu, 2020). They are anything but meeting the aspirational targets outlined in official pronouncements and considerably meeting the expanding demand against present utilisation, X, and the requirement for an extra 4GW each year.

Following three procurement rounds, the Saudi government plans to purchase 700 MW, 1.02 GW, and 1.73 GW, opening in 2017. The initial phases have been taken, and before RE programs, timely relevant complement actions have been made. For the proposed projects, the initial developer selection has already taken place. Companies responded to a request for qualifications (RFQ) in the first round for the NREP to ascertain who had the financial and technical capability to carry out projects of this scale. Twenty-seven companies were chosen for phase two of this process, where they will be asked to present their designs for a 300 MW solar PV project and a 400 MW wind project that will be unveiled in the upcoming weeks.

The state oil company, Saudi Aramco, has helped to build the renewable energy industry and aspires to diversify its portfolio by including renewable energy. To diversify the country's energy mix, Saudi Aramco has been given a prominent role by the government. By 2023, the organisation hopes to generate 10 GW of power from renewable sources and spend \$5 billion on renewable energy firms. In that case, the method in the R&D sector will not only demonstrate that Saudi Arabia is beginning to implement its plans to accomplish its intended aims of sustainable power and relieve pressure on the country's central power plant park, but it will also assist in the development more job positions and strengthen the private sector. The subsequent sections will go into further depth on this topic. These first steps toward the Saudi Vision 2030 (Alrashoud & Tokimatsu, 2019) target renewable energy and the NTP initiatives show the political will to make the country's transition to renewable energy a reality. The acts of Saudi Aramco also show that al-entrepreneurial Saleh's function is functional. Saudi Aramco's attempts to implement renewable power are very successful because it is one of the nation's most significant, influential, and vital enterprises, particularly in the energy industry. They have so started to get past the problem of an "absence of commercial spirit." The fact that the government is backing SV 2030 (Al Zohbi & Al Amri, 2020), the NTP, and other initiatives shows that they have overcome the obstacle of "low information of renewables among Saudi guidance."

Sustainable power and the alternative nuclear

By incorporating nuclear energy into its energy portfolio, Saudi Arabia can help open up more hydrocarbons for export and meet its rising domestic energy demand. Nuclear energy is another energy option that may assist Saudi Arabia in overcoming some of its challenges. Nuclear energy differs from renewable energy in several ways. I won't select which form of energy is best for Saudi Arabia. However, I'll highlight some differences to give you a rough idea of this resource.

Nuclear power facilities can be managed similarly to Saudi Arabia's oil sector, which is agreeable to the autocratic leadership and "island nations of excellence" (Ratikainen, 2017).

Nuclear energy does, however, face several challenges and worries. Due to the country's financial difficulties and the consequently low oil prices and revenues, Saudi Arabia may find it challenging to finance the construction of nuclear power projects. These facilities

also require enormous amounts of water to operate, which is problematic in an area with severe water shortages (Khan & Iqbal, 2020). Furthermore, it is challenging to find skilled nuclear engineers in Saudi Arabia. Thus the country's government would perhaps need to ingress the knowledge required to build and function the reactors. The education of Saudi people appears to be the most practical choice as Saudi Arabia strives to "study" its labor force. Deploying nuclear vigor could be delayed because training and educating the appropriate local workers take longer than importing the requisite skills. The nuclear option has additional environmental and safety issues, as shown by the numerous deliberations on nuclear activities in Iran and North Korea, as well as the fallout from the tsunami-related Fukushima Daiichi nuclear accident in Japan in March 2011.

In contrast, solar power is often highlighted. When nuclear power or technology is given as an element of the nation's future vigor supply, the NTP generates a different outcome. It pursues SV 2030's strategic objective to "Improve the Affordability of the Vigor Sector" by safely integrating atomic vigor into the nation's vigor mix in conformity with international and federal safety and security regulations. A further objective is to localize or investigate the domestic content contribution by boosting the local working populations in the business and business economic activities and technical capabilities to 30 per cent by 2020. This estimate is shown as a total since it is unknown how employment will be distributed across the nuclear and renewable vigor industries. By 2020, the overall number will approach 7,800. The Council of Economic Development Authority has integrated these objectives into a five-year budget plan with allotted public funding.

4.2.2 User and market regime

Market environments

Photovoltaic systems must be cost-competitive with the existing vigor source to be adopted by the market and take the lead position in the vigor mix. Domestic vigor in Saudi Arabia is "almost entirely" produced from crude oil, refined oil, or natural gas. RET must convert to cost-competitive to become more desirable and contest the existing vigor system in Saudi Arabia, as the country's current oil-based vigor system is well entrenched and has many vested interests (Alghamdi and El-Hassan, 2019).

Advancements and enhancements are lowering the prices of renewable vigor sources. The price gap between fossil fuels and RETs is rapidly closing, and it is anticipated that

renewable vigor will soon outcompete fossil fuels in terms of cost (Aldhalaan, 2019). In some regions, solar vigor costs are already comparable to imported gas, as evidenced by the astonishingly short offer to construct a giant solar farm in Abu Dhabi in 2016 (Goodwin et al., 2018). RET's cost-competitiveness is anticipated to increase, and RE will rapidly be the inexpensive form of vigor. Despite falling charges, alternative fuels are not yet fully integrated into the global vigor mix; they are not sufficiently cost-competitive and will require promotion through policies and initiatives to become so.

The lack of a legislative framework to assist the renewable vigor industry is a crucial obstacle in Saudi Arabia. It is good that they want to tool such legislation; they will alter the rules and guidelines to facilitate private-sector investments (Arain et al., 2020), but it remains to be seen whether this will materialize. Their existing electrical legislation permits IPPS but is mute on renewable vigor, hindering their attempts to attract investment.

The system of binary subventions

Saudi Arabia has a double-subsidy structure that encourages the use of fossil fuels while impeding the growth of renewable vigor sources. The system functions as follows: The national oil company Saudi Aramco provides power plants that produce vigor using subsidized fuel. The end user subsequently receives the point at a reduced cost. Fuels for transportation are also supported. This shows that two transactions are subsidized, each with a prospect cost. In other words, hydrocarbons and vigor are wholesaled below market value, robbing the oil industry and power plants of profits they might have made had they been sold at market value instead of being subsidized. According to reports, the power plants pay Saudi Aramco, the nation's oil company, between \$5 and \$15 per barrel of lubricant, which is far less than the market price (Alghamdi and El-Hassan, 2019). This illustrates the significant relative value of purchasing oil at domestically subsidized prices. According to estimates from the International Monetary Fund, these subsidies resulted in "lost" oil and gas earnings that were over \$80 billion in 2011 and rose to "\$107 billion, or 13.2% of gross domestic product, in 2015." (IMF) (Alghamdi and El-Hassan, 2019).

However, eliminating these supports can come at a high partisan cost. A reduction could be seen as a fissure of the indenture and is a complex subject that could cause dogmatic

instability. Contributions have been and continue to be a vital part of the governing relationship between the state and society (Griffiths, 2017).

The Saudi government has been reluctant to change the ruling agreement until now because it is mindful of the budding partisan risk involved with changing the community contract and removing well-being benefits from the populace. It is generally accepted that breaking the social compact will lead to political unrest (Eveloy et al., 2016). The Saudi regime's resistance to changing it suggests that they see the ruling pact as crucial to maintaining their power.

According to Gurr and Krane, alterations to welfare programs have historically had detrimental effects: "Declines in state payments and social happiness are key risk factors for catastrophic conflict and even the collapse of governments." Socioeconomic dissatisfactions were a factor in the upheavals and revolutions of the Arab Spring. To prevent the insurrection from spreading to Saudi Arabia, the state "instigated outlay \$130 billion to boost civil servant economic advantages and salaries (paying two extra months' pay rates), encouraging the construction of 500,000 new low-income covering units, and significantly cumulative its monetary sustenance for spiritual organisations." It also compelled the Saudi government to develop long-term reform strategies to increase the standard of life for Saudi citizens progressively.

Due to the recent decline in oil prices, Saudi Arabia's current budgetary condition is unsustainable; yet, the government is compelled to begin cutting spending and raising prices rather than expanding subsidies (Sarhan et al., 2019). In this quest, however, the government will need to determine how malleable the social compact actually is and how far it can go to place financial responsibilities on the populace.

The assessment and planning of how to positively change the liveliness pricing may benefit from considering regional achievements with switching incentives and prior national experiments. Similar attempts to raise contributions in the area in recent years have had varying degrees of success; in the UAE, they were able to do so without receiving considerable opposition, but when Kuwait increased the price of paraffine. As was previously reported, Saudi Arabia's move to raise water prices drew criticism. Given the various views, management must pay close attention to what the general public thinks about cutting subsidies.

4.2.3 Socio-cultural regime

Environmental ethics, the influence on the career of religion, and public adoption of renewable vigor technologies

The position of the administration's awareness and getting of renewable vigor is immediately understandable given that it is the body in charge of developing and carrying out crucial policies, including regulatory frameworks. Ordinarily, uninterested bureaucrats at lower levels of the bureaucracy might become more involved in implementing new renewable legislation if they are made aware of environmental and sustainable vigor challenges.

It may seem at first glance that public opinion on renewable vigor is unimportant given the authoritarian nature of the Saudi state. However, it is necessary and may even be considered "a critical success factor." It is essential that the public embrace these changes since adopting sustainable power may need modest modifications to the social compact, such as an increase in power costs or an adjustment of the funding program to promote renewables. There is still a general understanding that material breaches of the agreement could lead to instability, despite some contesting its rigidity and asserting that it is more adaptable than generally thought. Additionally, Saudi Arabia has made significant investments in education, which has led to an increase in the number of young, educated people with higher aspirations for the future and less intolerance for innovations than their parents (Malik et al., 2019). Advocate organisations that work to lessen resistance to sustainable power are typically a significant motivator. According to Al-Saleh, Saudi Arabian organisations lack the clout to promote renewable vigor in the country. It doesn't seem like the government is now promoting the usage of solar panels in homes.

Conducting studies or opinion polls would be the perfect way to determine how the general public feels about these topics, but these are uncommon in the nation (Karatop et al., 2019). Only a few surveys that were either out-of-date, small-scale, or didn't specifically address the subject of renewable vigor were found during the research for this proposition.

The research discussed in the preceding section and Jim Krane's investigation of the popular perception of subsidies provide important and intriguing information for this

argument. Even though participants were not directly questioned about renewable vigor, their responses might still be used to measure acceptability. An essential general conclusion drawn from the research is that "the public consensus on the need for change seems to be a crucial factor in policy support." Further illustrating the significance of framing is that the overwhelming majority would tolerate compromises if they served national objectives.

The people should be appropriately informed that the condition's objectives and, subsequently, the inhabitant's "entitlements" are in danger due to the state's long-term curiosity in transitioning away from fossil fuels and toward sustainability. Additionally, conservationism and national interest might and should be used to justify solar power. The situation of the various groups and emotions in Saudi society, including those who feel entitled to certain privileges and those who are willing to make sacrifices, may necessitate the use of a multifaceted framing to persuade individuals of the need to change their purchasing habits, use electricity more proficiently, and allow slight differences after the incorporation of renewable vigor.

Raising awareness

An in-depth examination of the government's initiatives to raise public knowledge of renewable vigor was outside the purview of this thesis. However, a quick look at how the government promotes renewable vigor sources shows that attempts are being made to raise the general public's level of knowledge. The majority of the increase in renewable vigor may be attributed to the official state discourse that has supported renewable electricity projects and programs via press releases, policy papers, media remarks, and social media postings. As part of KA CARE, the Mishkat Interactive Institute was designed to educate and engage young people about the significance of nuclear and renewable power in their everyday lives. The center operates a summer program and takes its exhibit on the road. However, it is doubtful that this institution has a large audience. More severe and broad efforts are required to reach everyone, regardless of how admirable this endeavor is.

The general public has received less attention than the commercial and industrial sectors thus far (Akbaba and damar, 2019). It is essential to look into increasing public knowledge further, perhaps as the main focus of an academic investigation.

Numerous organisations and projects are attempting to raise environmental awareness. To address environmental issues and encourage sustainable development in the kingdom, the Saudi Environment Society (SENS) was established by the government. SENS works to educate the public and spread environmental knowledge so that society may take action to preserve the environment. The organisation explains its objectives in Islam and references article 32 of the Basic Law, which reads, "The State should strive to defend, safeguard, and reduce emissions and prevent its deterioration." According to the organisation, Islam is responsible for the Saudi government's environmental responsibility.

4.2.4 Policy regime: governing arrangements at the regime-level and transregional level

Goals for renewable vigor and actual results

Regarding Saudi Arabia's goals, plans, and strategies for developing renewable vigor, a lot happened between 2012 and 2017. KACARE started "a \$109 billion plan to establish a power sector that engenders a quarter of the country's power by 2032" in 2012. While there have been some bumps in the road and modifications since then, 2016 and 2017 have seen a noticeable improvement.

The Saudi Vision 2030, which set a very ambitious objective to wean the Saudi economy off of its reliance on oil, was unveiled in 2016. The use of renewable vigor throughout the nation is also part of this plan. To grow the renewable vigor industry, they specifically mention that "we have set a preliminary target of producing 9.5 gigawatts of renewable vigor," or around 5% of the overall vigor mix (Ratikainen, 2017). To reach 9.5 GW by 2023 is the goal. A business analyst claims that the required annual deployment of roughly 1600 MW would make the Saudi market the largest MENA region in terms of new installations per year. Vigor Minister Khalid al-Falih intends to invest \$30 to \$50 billion in the sustainable vigor program.

Although the Saudi Vision 2030 lacks a clear roadmap and is less explicit, this is not its goal. They have numerous programs that provide metrics and implementation information for the various purposes and strategies mentioned in SV 2030, as stated on the webpage for that document. The National Transformation Program (NTP) is one example, which includes 543 activities along with the metrics, "key performance indicators," and budgetary support they receive. These initiatives work to accomplish the 178 strategic

goals listed in the SV 2030. The NTP includes several objectives for implementing renewable vigor, as well as programs to aid in their implementation, like enhancing the educational system and labor market, opening the private market, and cultivating a skilled workforce and funding.

4.3 Factors about a particular sector

4.3.1 R&D and industrial frameworks, as well as technology transfer tactics, in the science regime

The development of an indigenous knowledge base and the facilitation of knowledge and expertise sharing about renewable vigor are current priorities for Saudi Arabia. The three most notable examples are KACST, KACARE, and KAUST. The renewable vigor sector will be housed in the sustainable city in KACARE, which will support its academic, R&D, and economic development. 222 (Aldhalaan, 2019). They are obliged to cooperate and contract with imperative players in the MENA region and other intergovernmental groups in addition to their efforts to develop a domestic knowledge hub.

Business structures, knowledge transfer, and research and development

Saudi Arabia has been active in RET study and development since the 1970s, and for an extended period, it was considered the GCC leader in this field. Influential organisations, like KACARE, KACST, and KAUST, contributed significantly to developing R&D programmes. Giving investors first-class information on renewable vigor in the Kingdom is the centre's stated goal. 2020 (Alrashoud). The Saudi Arabia Renewable Vigor Investment Forum (SAREIF), which attracted 800 international and domestic delegates from the academic, financial, and development sectors, was also recently organised by the government.

Some businesses in the nation have experience in renewable vigor because some have led or taken part in RE projects abroad. Al Zohbi and AlAmri (2020) note that the Saudi corporation ACWA POWER is "a constructor, investor, co-owner and mechanic of a portfolio of power generating and available freshwater production plants" and has a wealth of knowledge in this area. Knowledge, knowledge, and skills can help build a national knowledge centre if they are shared and communicated.

It will be some time before we can assess their effectiveness in this area based on their actual outcomes since some of these initiatives are still in the planning phases. In contrast, others are set for implementation soon and are just starting.

This is also true for the drill and support of an accomplished workforce, as they lack the skills and education level required to develop a more advanced software industry (Alrashoud, 2020), and they will need to accomplish the time-consuming education and training required to achieve the current level of tutoring and expertise in the expertise fields. In addition, they must be able to create the educational sector appropriately.

It may be difficult for the Saudi government to foster a vibrant technological and entrepreneurial culture from scratch owing to the current lack of an educated workforce and their harsh regime, discouraging bottom-up approaches to innovation. This industry's performance is likely to be hampered by the Saudi governmental structure's restriction of the sort of open inquiry essential for its success.

Chapter 5

Conclusion

5.1 Introduction

In this chapter, the student examines and achieves the data reviewed in chapter 4.

5.2 Research objectives

5.2.1 To examine the green/renewable vigor concerns confronting Saudi Arabia

Saudi Arabia's lubricant dependence is perilously untenable. Swelling domestic vigor use leads to the consumption of oil that might have been transferred, resulting in high opportunity costs and a significant fiscal imbalance. If nothing is done, Saudi Arabia may become an oil consumer within a few generations, leaving them with insufficient finances to fulfil half of the agreement. This circumstance might have disastrous repercussions for the nation, which could confront resistance and political instability. To address these issues, Saudi Arabia has announced incorporating sustainable power into the national vigor mix.

This research looked at several levels of Saudi Arabia's radical situation and the factors influencing renewable vigor policies. Furthermore, essential barriers and reasons for growing alternative fuels have been acknowledged. According to the updated research, Saudi Arabia overcame some difficulties a few years ago, as mentioned in Saleh's al-study. However, more effort has to be made in many places to facilitate a seamless switch to renewable vigor sources.

This barrier remains concerning the political system and government bureaucracy barrier that hampered KACARE's previous effort to implement sustainable power. The platform's headstrong inability to collaborate and coordinate with a wide range of organisations will likely impede the practical application of sustainable management. Finally, to speed up decision-making and implementation, the government has reorganized and established a new electrical agency and the Renewable Vigor Project Development Office (REPDO). There is uncertainty about whether this will improve institutional and management viability. Still, it seems encouraging, and the REPDO has already shown results by open

bidding for two renewable powers.

These efforts show that the political elite's understanding of renewable vigor has increased, enabling them to overcome this barricade. By selecting 'the archipelago of effectiveness,' Saudi Aramco, which has an evident history of infrastructural expertise and experience with significant vigor projects, as a critical player in the use of sustainable power, they have chosen to sidestep the government bureaucracy barrier. This methodology has resulted in several modernization successes and may also increase their chances of successfully implementing sustainable vigor.

Additionally, one of the most powerful radical figures, Vice Crown Prince Mohammed bin Salman, plays a critical role in promoting renewable vigor and more extensive reform measures, displaying political support. According to the research, this is a crucial aspect of the geographical realm of renewable vigor. This is also visible in the official outcome targets and the inclusion of solar vigor in official policy documents and announcements. Given the highly individualistic character of Saudi governance and decision-making, princely rivalry and power realignment may impact the future of clean vigor.

The shift from oil to sustainable power in Saudi Arabia has not yet occurred. Hence its consequences on governance remain uncertain. However, the present study contends that such a change may significantly affect social agreement and political equilibrium. The Saudi monarchy may be intelligent to keep command in the immediate. Moreover, it is doubtful that renewables can provide the same cash as oil, which would impact the state's capacity to fund welfare payments. It is too soon to tell how the government will respond to these repercussions, and they are, as expected, remaining silent about governance ramifications.

This paper contends that entrenched interests in the oil-based vigor system impede the development of renewable vigor, notwithstanding the opaque nature of the Saudi government.

Additional research reveals several other obstacles preventing renewables from joining the Saudi electricity market. The absence of a framework for law and regulation creates uncertainty for prospective funds and must be addressed to acquire financing and implementation instructions. The government has vowed to review, establish, and execute the necessary regulations, but this has not yet transpired. Since it perpetuates

the oil-based vigor economy and excludes renewables, the system of double incentives remains one of the most severe hurdles to the growth of renewable vigor. However, these ideas have yet to be realized. Small cutbacks have now been made, which are insufficient to promote renewables adequately. Nuclear power, formerly seen as a rival to sustainable power, is no longer an impediment to developing both vigor sources. It is now viewed as a supplement to renewable vigor.

5.2.2 To assess green vigor transition methods with a focus on Saudi Arabia

It is essential to have an organisational structure and innovation hub that facilitates the transfer of information, ensures a high level of competence, and cultivates a competent labour force. Saudi Arabia possesses the creative culture necessary for a high-tech business, and its dictatorial, top-down governmental system may make it challenging to foster the required atmosphere. They take the appropriate baby steps as they strive to establish ties and technical collaborations with foreign institutions.

Their labors in offering schooling and drilling are now somewhat poor, but they want to strengthen the educational sector to develop a suitably competent labor force. It is commonly anticipated that the potential for job development in renewable vigor is enormous. Yet, the Saudi strategy statement sets relatively common goals for economic growth in their renewable vigor industry, underutilizing this opportunity to ease their massive unemployment issue.

To effectively transition from oil to sustainable power, Saudi Arabia must have widespread acceptance and societal understanding of renewable vigor. However, the research reveals that the administration has ongoing to define biofuels in nationalist and Islamic categories, which might help protect universal support.

In summary, the researcher concludes that Saudi Arabia still faces significant challenges in distributing sustainable power, but recent government efforts indicate a growing resolve to overcome these obstacles. As the Saudi government is still in the beginning stages of integrating sustainability, we will need to regularly monitor their growth to success.

5.3 Future research

Saudi Arabia has recently begun deploying sustainable power; a lot will happen in the following years when everything goes according to Saudi intentions. As described in the

paper and above, this method will be intriguing since it has the potential to significantly alter diplomacy, Saudi Arabia's, and the world environment and low-cost.

Future studies may find it advantageous to analyst societal awareness utilizing an in-depth technique to determine the amount of understanding, acceptance, and resistance to renewable and environmental issues. It will be fascinating to see whether the religious establishment participates in awareness-raising programs, if Islamic environmentalism emerges, or if the government strives to interpret efficient vigor, environment, and biodiversity in a new way.

Another study topic may be the government system's decision-making processes and the selection inclusion sophistication of renewable vigor policy. This is only conceivable if the investigator gets access to the necessary interviews, which have proven very difficult.

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