

# Non-renewable Resources and the Intergenerational Equity Problem in Saudi Arabia

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## Abstract

This study examines the intergenerational equity problem of Saudi Arabia, a country that is highly dependent on oil, a non-renewable resource, for most of her income. The first part which is introductory covers the definition of the main concepts, the importance of energy and the Saudi Arabian economic trend. The second part covers oil production and the alternative and future strategies. The paper has articulated documentation as the major source of information, while maintaining review through thinking holistically as the drive to making analyses of the discussion. It is a case study design as it focuses on Saudi Arabia. The third part of the paper discusses the challenges to models, alternatives, and the impact of future price of oil. The paper concludes that managing an economy which has the strength of nonrenewable resource such as oil, need highly adept understanding of resource management while containing other industrial products to support the economy.

**Keywords:** Intergenerational equity, Sustainable development, Oil

## 1. Introduction

The Saudi Arabian economy is dependent on oil, a non-renewable resource. According to Saudi Arabia statistical report (1999), oil dominates all sectors of the economy of Saudi Arabia amounting to 90%-95% of the country export. This in turn explains the need to focus on conservation in this field (Milanzi, 2000). Before assessing the position of Saudi Arabia on depending upon a non-renewable resource, it is important to verge into defining the main concepts absorbed in the study.

Non-renewable resource refers to natural resources which, once consumed cannot be replaced. The nonrenewable resources may include minerals such as a coal, gold and Tanzanite, these once consumed they are gone forever in that form. Others include oil, iron and bauxite (Gilpin, 1996). Minerals resources are generally regarded as depletable assets of this kind.

The second term is the intergenerational equity. Intergenerational equity can be defined as tendency for people and living creatures to consider that those living today should not compromise or restrict the opportunities open to future generations. It envisages a partnership among all the generations that will expect to thrive on the world's resources. It implies, at the very least, that each generation should handover to the risking generation a world in as good an order as possible and with the full benefits of sustainable development. The world commission on environment and development in our common future (Brundtland, WCED 1987) states that sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Intergenerational equity therefore advocates for sustainable development.

### *1.1 The Importance of Energy*

The importance of energy in the attainment of development is vital. It is energy that creates a smooth run of industry policy. It is a supra drive to the economy, as it dictates the nourishment of the agricultural sector, the health sector, education, water and the general health of the community. Oil is a source of energy and thus the importance of it is unquestionable, as we fly by air because of oil; we drive our vehicles because of oil; we run our machines whatsoever because of oil. Oil is a lubricant of our entire life. The flow of material and energy through the economic production systems is undoubtedly the basis or value for most value generating transactions. But theory of development with respect to material energy 'reductionist', which explained economic processes solely in biophysical terms, was arguably as seriously flawed as marxi's surplus value theory of labour, a theory which conveniently ignored capital and entrepreneurial inputs (Cleveland, 1999).

It is through this emphasis that the fourth and fifth presidents of Tanzania have altogether stressed on the importance of spreading electrical power as a source of energy throughout Tanzania. In this regard, Tanzania opted for the establishment of Rural Electrification Authority (REA) under the umbrella of Tanzania National Electrical Supply Company (TANESCO) for the purpose of improving electric energy in rural Tanzania. This cognizance is vital as it calls for the improvement of energy for the purpose of boosting industrial development in Tanzania. The call however, has been in amalgamation with other East African countries namely Kenya, Uganda, Burundi, Rwanda and South Sudan. From both economic and social perspectives and even political stance, energy undoubtedly catalyzes development. Nevertheless, there is a faint echo of this line of reasoning in some present day arguments that would deny there is much likelihood of a society being able to decouple increasing economic value creation (economic growth) from a finite material – energy resource base (Smith, citing in soddy's 1998).

First, provides argument that all wealth, even in a highly developed political economy such as USA had a physical basis and that the credit system was tantamount to the factious creation of wealth. Secondly, is the technocratic movement in the USA and Canada in 1930s, which used energy as unifying concept for social, political and economic analysis (Cleveland, 1999).

Explaining on the equation of energy with economic value reached its (unsustainable) logical

silliness with the novel idea of substituting (non transferable, non-negotiable, non-interest bearing) energy certificates for money, which among other things, denied the time value and opportunity cost of assets, including wealth and money. The account for natural resources protection has started long. From the 1st Century, French physiocrats focus on the productivity of nature as accounting for the whole economic process, to the materials balance principle as modeled by Ayres and Kneese in 1969. In short the history of biophysical model constitutes an attempt to reconnect human activities and the economy in particular, with the environment (Smith, 2000).

The material balance model which encompasses most of the biophysical model's cumulative development, explains the flow of energy and materials through the economy in a manner consistent with the first law of thermodynamics, and in which the problem of residuals such as pollution are recognized as arising as normal inevitable part of production and consumption process. Nature's limitations as a waste sink are also explicitly recognized. This suggests that there are indeed real limits to growth although the materials balance approach, even when connected with a neoclassical growth model with limited non-renewable resources doesn't exactly provide a method for arriving at definite solution.

## **2. Materials and Methods**

This paper is a review in nature and has utilized documentation as the major information collection strategy. Hence the analysis of information has observed a qualitative approach. It has further articulated the experiential mode of information gathering to set an argument on the matter. Reports on economic trend, particularly those on Saudi Arabia were the key in analyzing the information. Generosity on non-renewable resources and the challenges thereto were some key elements that have pushed for the preparation of the paper.

## **3. Literature Review**

### *3.1 Oil production and Its Sustainability*

Sustainable development considers both the living and non-living resource base with regard to conservation and the advantages and disadvantages of alternative courses of action for future generations. It allows the use of delectable resources in an efficient manner, with an eye to the substitution of other resources in due course. Sustainable development calls for much more emphasis on conserving natural systems and the resource base on which all developments depends for equity within society at present and between rich and poor nations, with particular regard to the world today. In this view, some gurus of governance emphasize on the importance of utilizing present resources objectively as endowment of minerals are likely to be depleted, hence must be used intelligently (Norman & Milanzi, 2013).

Oil production and sustainability sends a signal on all non-renewable resources such as Gold in countries such as Tanzania, Botswana, Ghana and South Africa. Arguably such minerals need optimum wisdom for reaping the benefits of them for the countries upon which these materials dwell. It is from this perspective development is a war, those who fight must do it intelligently (Norman, 2003). Sustainable development is that which takes care of the present and future generation with the view to cognizing the past (Norman, 2015). It is the development that meets the needs and demands of human populations without undermining the resilience of life supporting properties (Becker et al., 1999).

Sustainability is defined by imaginative attempts to dissolve the conflict between environmental and economic values that energizes the discourse of problem solving and limits. Although some authors indicate that there is still no consensus on the exact meaning of sustainability, yet we know that what guru confess on what is sustainability is consensus. We may thus concur with, but sustainability is the axis around which discussions occur, and limits are nowhere to be seen (Dryzek, 1997).

### *3.2 The Importance of the Concept on Renewable Resources*

On illustrating on prominence of sustainable development, reflecting of non-renewable resources Turner et al., (1994) provides an example on the exploitation of resources such as fossil fuels and minerals like Iron Ore and bauxite today means less of stock left for future generations. Other renewable resources such as fisheries and forests may also be over exploited and not given enough time to regenerate. Therefore the stocks of such assets for future generations will be reduced.

The explanation above shows how important it is to relate Economic Development, Social Development and the Environment, hence sustainable development. It is from such relation, an economic activity of today such as oil production is commented to many alternatives, so that ultimately the development attained is economically equitable, socially viable and environmentally trustworthy.

The question can then be 'Is it right' that those of us alive now should essentially destroy assets (and the economic opportunities that they yield) gaining benefits in the process, while passing on the costs to people not yet alive and who have had no say in the matter? This shows a number of important problems that are involved in the use and abuse of our environment (Turner et al., 1994), and especially non-renewable resource like oil.

### *3.3 Saudi Arabia Economic Trend*

The Gross Domestic Product (GDP) in Saudi Arabia expanded 1.2 percent year-on-year in the fourth quarter of 2016. GDP Growth Rate in Saudi Arabia averaged 4.74 percent from 1969 until 2016, reaching an all-time high of 27.49 percent in the fourth quarter of 1974 and a record low of -11.10 percent in the fourth quarter of 1982. In recent years Saudi Arabia GDP attained maximum in 2014 at the rate of 6.26, and minimum in 2016 at the rate of 1.2% (Saudi Arabia Report, 2015; 2016).

Saudi Arabia has an oil-based economy. Shipments of oil account for 87 percent of total exports and for 46 percent of GDP. In recent years, in order to diversify the economy, the government has been investing in telecommunications, petrochemicals, natural gas exploitation and power generation sectors. This page provides - Saudi Arabia GDP Growth Rate - actual values, historical data, forecast, chart, statistics, economic calendar and news. Saudi Arabia GDP Growth Rate - actual data, historical chart and calendar of releases - was last updated on September of 2017 (Saudi Arabia Report, 2016).

No doubt the economic trend of Saudi Arabia need to be growing fast. It should be among the fastest growing economy in the world if diversification of investment would be a priority. Certainly because the country need intelligent investment through realizing that oil is depletable and thus should invest in other ventures of economy such as airline and manufacturing industries. The current reserves of Saudi Arabia stand at 261 barrel of proven

oil reserves (more than a quarter of the world total) and to about 1 trillion barrels of ultimately recoverable oil. Up to the year 2000 the country was the world's largest producer at eight million barrels per day. The trend has been almost the same as it still takes a lead in oil production.

#### **4. Discussion**

##### *4.1 Oil Production and Future Strategies*

The Production of any non-renewable raw material is subject to limit to growth. Therefore the endowment of such non-renewable resource would come to an end. It is fortune that the oil production (looking at energy perspective) is prominent today than was looked decades ago. Its prominence has led to some academicians to consider it as one of the factors of production, others being Capital (K) and labour (L).

Oil production in Saudi Arabia has vivid impact if cut without any other source of replacement. In years ago, most developmental activities were focusing on Capital and labour as a factor of production. However (Smith, citing in Ayres (1988) "in the cow boy economy", while capital was scarce, natural resources were not, so economic models with just two factors (Capital K and Labour L) were an appropriate choice. But now a third factor of production needs to be added, X for energy supply, which includes food, fuels and raw materials.

Therefore an observation of instability in any developmental activity should be of great concern. Van den Bergh (1997) says a survey of state of ecological modernization, globally as well as in Australia, indicates that Insufficient Progress towards sustainable development has been made. After an analysis of the main factors constraining dematerialization of economic processes, we examine a stylized framework by an analytical device for Identifying and better articulating the differences between five disparate perspectives, (the Immaterialist, pessimist, democrat, carp diem are optimist) in the often-heated growth over heated growth versus environmental debate.

Therefore dependency in the non-renewable resource for the economy of the country would mean 'economy of specified period' irrespective of whether short or long period. Such a country would need scientific intervention for bettering her future, including asserting the observation of policy make and that of scientist. Scientist analysis is typically characterized by statistical analysis (e.g. statistical intervals and model output). Decision making in the sciences, such as that accomplished by hypothesis testing based on frequents statistics, is usually performed according to consistent, through arbitrary standards such as probability (Briskin, 1998).

##### *4.2 Oil Production Versus Weak and Strong Sustainability Approach as Income Alternative*

Noting the dependency of oil and its derivatives, which account for 90% to 95% of Saudi Arabia earnings, and 75% of the budget, and about 35%-45% of the GDP, (Saudi Arabia, and 2000 report on export p. 5).

Adapting weak sustainability development approach, which is selling its oil at a price reflecting its growing scarcity and value would mean setting price that would determine its fate of future production. This would further mean conversing other oil producers especially of the OPEC, on the agreed quantity in terms of barrel to be produced. Basing on that,

changes would be manifested in terms of price. This is supported by the Saudi Arabia report (2000) on export.

After facing an unusually low world price throughout 1998, the SAG worked diligently to arrange production cutbacks by OPEC and leading to non-OPEC producers. Following an OPEC production cut back in March 1999, the price of oil began a dramatic rise as a direct result of improved producer's compliance with the reduced quotes. The west taxes intermediate price tripled from a low of about \$10 per barrel in February, 1999 to \$34 per barrel in early 2000. The report continues, although Saudi Arabia economy benefited in the short term from this price increase the SAG grow increasingly concerned about oil price volatility and the long term effects of higher prices on OPEC'S future revenues (Saudi Arabia economic trend U.S embassy-Riyadh, 2000).

The explanation above suggests that in near future oil prices will depend on a combination of growing world demand, producer compliance with output restraints and new non-OPEC sources of oil.

#### *4.3 Future Price of Oil*

In first place price would be expected to increase due to the expected reduced quantity of oil production. This will conform to the principle of e of supply, the high the supply the low the price and the vice verse. Secondly, is the possibility to adapt the strong sustainability approach of not fully exploiting its oil resource? In this case Saudi Arabia would require reserving a substantive part of its oil endowment for her future economy, at the same acquiring willingness to purchase the same raw materials from other countries for her consumption (a case example of USA).

However it is difficult to predict the consequences of exhausting particular resources. The exhausting process is gradual and probability accompanied by a steady increase in price. A rising price intensifies exploration and ensures treatment of low grades of ore, recycling, and reclamation of scrap and residues. Meanwhile research into substitute materials and processes accompanied by changes in the pattern of demand, could mean that and indispensable' mineral becomes totally redundant. The virtual collapse of the coal industry in Great Britain illustrates this point (Gilpin, 1996).

#### *4.4 Alternative in Approaching the Problem*

Beside, Saudi Arabia share of the world oil production has declined from 17% in 1980 to 10.4% currently. Recent price trend notwithstanding, the long term trend for oil prices has been downward, given greater world wide production, more efficiencies in usage, new technologies, and conservation. Faced with these factors, Saudi Arabia must diversify to create a basis sustainable economic growth in the coming decades. Economic liberalizations are intended as an answer to these problems.

The report on Saudi Arabia statistics (2000, p. 9) among other things asserts on the establishment of Gown prince's and gas as substitutes initiatives. Recent announcements have opened the door for potential huge investment in upstream natural gas, and reinvigorated petroleum company interest in investment in Saudi Arabia.

The report suggests that Saudi Arabia just as other countries depending on renewable resource would need to examine critically the oil production in relation to sustainability and



ecosystem in general. It would need to consider replacement of technology or other reliance of energy for her future resilience properties.

#### *4.5 Adapting Liberalization Policy*

Trade liberalizations should be adapted in Saudi Arabia to improve future economic plans. Currently the economy of Saudi Arabia is vested into the hands of large state corporations, the monopolies that have failed to provide economic enhancement for employment opportunities creation. US-Saudi Arabia report, (1999) alerts, ‘that in Saudi Arabia the unemployment rate is increasing with young people under 24 covering over 50% of the population hovering with no hope of employment, thus the government should focus on adopting trade liberalizations to pave way for private investors, though its inception seem to be slow compared to other countries.

Adopting such a policy of liberalization would mean new inventory including technologies hence diversifying the economy. Other strategies that have been taken by Saudi Arabia includes formulation of US-Saudi Arabia business council which its main objectives is to improve knowledge and understanding of Saudi Arabia within the U.S business community, and the vice versa, and to promote trade and investment between the two countries. For enhancing development especially on adopting the liberalizations policy such as privatization for economic diversification and employment creation the following measures should be considered:

- Adopt and enhance flexible and integrative planning approaches that allow the consideration of multiple goals and enable adjustment to meet changing needs.
- Undertake planning and management activities according to demand. There is need to examine cumbersome planning methodologies and their cost effectiveness.
- Design economic incentives to stimulate the sustainable use of natural resources in the production process, not merely to maximize output. This is especially important in the land-based production activities.
- Consider the human population, as a resource in the development process when planning industrialization, tourism and agriculture as an alternative to oil extraction in future. Introduce economic incentives e.g. subsidies, for the promotion of alternative energy systems where initial capital investment discourages their use.

#### *4.6 The Expected Impacts*

Some impacts are expected if Saudi Arabia government’s strategy for achieving non-decreasing welfare overtime would be in place.

Since both option, whether of weak or strong sustainability version for delectable resources, such as oil production would mean highly investment in technologies, including trade liberalization so as to open door to foreign technologies. World wide technological change would be manifested. For example countries that depend on Saudi Arabia for import of oil would need to diversify economies in terms of energy dependency as a substitute to oil.

However some critics may arose to challenge the practicability of the explanation above, especially when an assumption is made to the situation where the non-renewable resource like oil is completely depleted (ITRC, 2000). As there has been a trend of unexpected and

unpredictable innovations in different periods of time in the world (Norman et al., 2015). This suggests the possibility of unexpected and probably unpredictable resolutions that would do away with suspicious of depletable resource like oil.

Therefore energy (oil production) should be of great concern today than yesterday. It is because the focus for Development would imply considering the resilience of future generation at the same time maintaining economic growth for bettering the present generation. It is an observation meant for socio-economic sustainability. Currently, there is an on going debate in modeling as to whether ecology should be incorporated into economics or primary given to ecosystem modeling, incorporating economic components.

And since any shift from oil production to for example other sector of the economy, would mean evaluate changing of natural ecosystem, hence necessity to ascertain much more about their inherent stability (i.e. robustness), and elatedly about the relationships between productivity gains and their environmental cost. It is important, therefore to make better environmental and ecological linkages with economic processes and models are primary method of achieving this. Here, for Saudi Arabia would not mean choosing a model. The choice should rely on merit. The issue of whether this should be undertaken using an economic model with an attached ecological system or an ecological model with an economic model attached, amounts to a choice of which is the better developed more robust option (smith, citing in Van den Bergh & Folks, 1997).

#### *4.7 Challenges on Oil Price, Models and Alternatives*

While we are ascertaining challenges on the future price of oil, we take into caution the dynamics of the world economy. Today we may face agricultural production to be the world drive of the economy, tomorrow another product takes lead. In the modern economy there are many factors that can cause the predictions to be difficulty. For example a mere ban of one nation from exporting her product may alter drastically the economy of that country, and may equally alter the world economy depending on the stake of that country in the world economy. Therefore we provide some models and alternatives while realizing that economic trend and its interplay is not static rather dynamic. It is not linear but multi-figure. The economy can assimilate any shape at any time depending on other political forces in particular from big nations.

The problems of the concept arise on the practicability of the models both van den berg and folks and the dominant model of intergenerational equity. Careful examination of the non-replaceable resource like oil would mean increase concentration on alternatives that would act as replacement for both social and economic development and ultimately sustainable development. Therefore the production oil in Saudi Arabia should mean looking at sustainable perspective that is resilience of future properties. Problems arise with the application of the concept and bring challenge to future price and general level of development to the country like Saudi Arabia.

Clearly, a treeless barren planet scorched with ultraviolet radiation and littered with radioactive waste, would not meet the criteria. Yet considering more likely outcomes, it is impractical to envisage the circumstances of generations as yet unborn. The paces of development backed by the high technology and science paves a way to uncertainty when



dealing with future generations and especially stocks of non-renewable resources like oil (Gilpin, 1999).

The concern is on whether oil production will in future be demanded as it is now or a substitute will emerge to take place. Because one would argue that so long as the early generation used water (steam) engines for running vehicle and probably no body (including scientist) predicted the use of fuel as a source of energy, it is obvious then that the potentiality of oil today should not mark unbeatable record of being the source of energy.

Therefore the general trend of future price of oil and of course the economy at large of the country like Saudi Arabia should encompass historical developmental progress than only relying on models. As Gilpin (1997) stresses that one has only to ask whether anyone living in 1795 could predict the needs and aspirations of those living in 1895; and whether any one living in 1895 could predict the needs and aspirations of those living in 1995 recalling in that period alone the development of motor cars, aircraft, telecommunications, computers, satellites, medical and surgical techniques industrial productivity, and a general advance in the standard of living. It is equally difficult in 1995 to envisage the changes that will occur by 2095, or to identify the needs and aspirations of that generation.

Having that in mind I would see that the intergenerational equity concept though good and others might look at, it lacks a substantive part of truism as (noble concept) cannot be translated into any practical policies other than the pursuit now of responsible environmental management and sustainable development.

It is worth noting concern that a significant step towards achieving sustainable development is the economically efficient management of resources both renewable and non-renewable. Traditionally economic development policies have been developed to help the country make more efficient use of scarce resources (Saudi Arabia statistic centre report, 1998). However, adverse effects on the externalities have been neglected in the past. Currently in Saudi Arabia planning decisions have to focus on either research environmental conservation or promoting change through major development, although promotion of change in the development process may have a negative or a positive impact on the economy (U.S- Saudi Arabia economic report, 2000).

Secondly, Saudi Arabia should invest in energy serving research and development as Socio-economic development planning is of necessity in a country like Saudi Arabia, focusing on macro and sectoral concerns. The effects on the sectors or the macro-economy are to measure the success or failures of strides made in development. Some measures lead to the inadvertent use of resources without proper accounting for their untimely depletion or destruction. On the case of Saudi Arabia concerns are on the socio-economic position of its people once the country experiences oil depletion and the exportation rate decreases. In this view, some of the problems for achieving sustainable development planning will include:

Socio-economic development planning that is dominated by political parameters with several limitations such as: human activities will purely be controlled by political decisions, and there will be a tendency to underestimate the strong influence of biophysical factors on development (Norman, 1998). Market control by recipient countries such as USA who will rule out oil price could be of value in paving way for Saudi Arabia development.

## 5. Conclusion

It can be humbly concluded that there are a number of structural factors that affect the relationship between non-renewable resource use and development. The human population, for example is an important means of achieving socio-economic development. However rapid population growth, in the absence of appropriate technology and adequate facilities poses new challenges to the sustainable utilization of resources. Consequently it's difficult to plan to determine what, where and how will Saudi Arabia manage in future without oil production/extraction as explained in part. Secondly, it's becoming increasingly difficult to meet development demands without compromising future resource availability. Attempts to achieve efficient and rational utilization of resources can be guided by economic incentives. As Saudi's economy changes in the direction of increased market-orientation, the use of such incentives should be explored. Not all-economy changes in the direction of increased market-orientation, the use of such incentives should be explored. Not all-economic incentives, however, encourage efficient and rational utilization of resources. Incentives have traditionally been designed to promote the maximization of output from a particular resource mix. In order to use resources in a sustainable manner, the incentive will have to promote, rather, the optimal use of a resource mix taking into account long-term conservation.

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## References

- Becker & Jahn (ed.) (1999). *Sustainability and the social sciences: a cross disciplinary approach to integrating environmental consideration into theoretical reorientation*. Zed books Ltd: London.
- Bergh, van den, & Hofkes, M. W. (1997). A survey of economic modeling of sustainable development: Tinbergen Institute discussion paper 107/3
- Deweese, D. (1999). Ecosystems as part of the economy, views from neo classical economies. Institute of environmental studies university of Toronto
- Dryzek, J. S (1997). *The politics of the earth: environmental discourses*. Oxford university press Inc: New York.
- Gilpin, A. (1996). *Dictionary of Environment and Sustainable development*. John wiley & sons: England.
- Institute of Training, Research and Consultancy (ITRC). The report on challenges of sustainable development in Tanzania. ITRC: Dar-es-salaam.
- Norman, A. S. K., & Milanzi, M. C. (2015). *Administrative plant strategies a focus on the big four regions*. Tanzania Research Education and Environment Care: Dar es Salaam.
- Norman, A. S. K., Milanzi, M. C., Massoi, L., & Kyando, N. (2014). The role of anonymity

- in research. *International journal of multidisciplinary research*, 5(8), 53-60.
- Norman, A. S. (1998). *The role of training in boosting organizational success*. Institute of Development Management: Mzumbe.
- Norman, A. S. K. (2003). *Globalization in the third world: Challenges and realities*. Lefkosia: Cyprus.
- Smith, L. (2000). Guiding manual for 21567 citing in Hedger, W. (2000). Sustainable development and social welfare. *Ecological economics*, 32(3), 481-492.
- Smith, L. (2000). Guiding manual for 21567, citing in Sachs, I (1999) “social sustainability and whole development: exploring the dimensions of suitable development” in Egon Becker and Thomas Jahn (eds) sustainability and the social sciences. Zed Books, London, Chapter 2.
- Tisdell, C. A. (1993). *Environmental economics, Policies for environmental management and sustainable development*. Gower house: England
- Turner R. K., Pearce, D., & Bateman, O. (ed) (1994). *Environmental Economics an elementary introduction*. Harvester wheat sheaf England.
- Wills, I. R. (1997). *Economics and the environment: a signaling and incentives approach*. SRM production: Sydney.
- U.S. Saudi Arabia. (2000). *Reports on economic trend: Saudi Arabia statistics bureau*.
- Saudi Arabia (1999). *Economic report on oil production and export*. Saudi Arabia.
- Saudi Arabia (2000). *Economic trend: US embassy – Riyadh AAR*. Saudi Arabia statistic on key economic data.
- Saudia Arabia. (2015). *Economic trend in Saudi Arabia*. Saudi Arabia
- Saudi Arabia. (2016). *Economic trend in Saudi Arabia*. Saudi Arabia.

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