DOI: 10.18290/pepsi-2022-0006

Anna Llanos-Antczak*

Perspectives of Shifting From the Oil-Based Economy to a Knowledge-Based Economy in Saudi Arabia

ABSTRACT

This paper examines the role of Saudi Arabia's economic sectors in creating or rather transforming into a knowledge-based economy. It determines major enablers that could support the process. Judgments and opinions are used to make some general recommendations for the shift from an oil-based economy into a knowledge-based economy in the long term. As a main finding, it identifies four areas contributing most to that transformation: changes in the private sector and in the household (including education gaps and professional exclusion, especially of women), government support (including research and education, innovations, and new technologies, especially communications) and human capital (talent management).

KEYWORDS: Saudi Arabia; oil-based economy; knowledge-based economy; natural resources; human capital.

* Correspondence regarding the paper should be sent to: Anna Llanos-Antczak (ORCID: 0000-0003-2342-1521), University of Economics and Human Sciences in Warsaw, ul. Okopowa 59, Warszawa, Poland; e-mail: a.antczak@vizja.pl.

INTRODUCTION AND METHODOLOGY

Since its beginning, the world is in a state of a continuous change. Like other dynamics of this world, economy is also undergoing transformation globally. Several factors are responsible for this transformation, including advances in information and technology, globalization, depletion of mineral resources and changing biodiversity. Like other countries, the economy of Saudi Arabia is also changing after a decade or more of the oil boom. Saudi Arabia, with its abundant oil and mineral resources, has always been an oil economy. The term oil economy is used to describe those countries that derive most of their revenues from the export of oil and oil-based products. Thus, Saudi Arabia has been able to enjoy the fruits of abundant oil reservoirs for a long time. This is especially true for the years 2003 to 2013 due to a rise in the worldwide prices of oil. The GDP of the country doubled during that time and the government was able to develop infrastructure in the fields of education and health. Due to the changes in the global market and the introduction of alternatives to fuel sources, the price of oil fell. Moreover, the oil reservoirs in Saudi Arabia are gradually depleted, so it can no longer depend on mere oil for revenues. Now the country needs to explore new areas to generate revenue and increase the GDP, which in reality means a shift to a knowledge economy (a process of productive activity in which capital, technology, science, and other technology-related capabilities are put to use). One of the distinct features of the knowledge economy is that it calls for continuous creativity in the methods and procedures that are used for production purposes. Hence, in the realm of knowledge economy the main focus is to upgrade production methods with the help of technological advancements and skilled personnel.

The main objective of this article is to develop an understanding of the process of sustainable transition to a knowledge-based economy in Saudi Arabia. Moreover, its goal is to explore different

non-oil sectors of industry and to evaluate their potential in the context of the knowledge economy and resulting challenges. The main question is which branches of the economy need greater transformation and why, and what are the drivers of change.

For a country like Saudi Arabia, having limited local talent and research facilities, the transition from the oil economy to a knowledge economy is quite a challenge. Its management and maintenance are also difficult due to the lack of experienced personnel. The kingdom of Saudi Arabia occupies a crucial position among the nations of the world due to its vast economy and numerous oil and mineral resources. This is why the economy of this state has always been a subject of great interest for authors and economists around the world. Beginning from reforms in the economic policies, the kingdom of Saudi Arabia has been trying to diversify its economy. The conversion of this state from an oil-based economy to a knowledge-based economy has been studied by many authors (Al-Kibsi et al. 2015; Al-Sultan et al., 2012; Al-Torkistani et al., 2016; Cappalen & Choudhury, 2000; Even & Guzansky, 2016; Hubbard & Kelly, 2017; Kayed & Hassan, 2011; Khorsheed, 2016; Kirchberger, 2001; Nurunnabi, 2017; Abu-Rashed et al. 2020; Ahmadi, 2020; and Zaidi, 2020 to name but a few). This study is based on literature, documents and some statistical data analysis, which makes it possible to explore the reasons for the transformation of a resource-based economy to one based on knowledge in Saudi Arabia. Further, while discussing each economic sector's role, it uses judgments and opinions to determine how Saudi Arabia's economy can turn into knowledge-based models, emphasizing the importance of inter-sector knowledge transfer and showing some initial interdependencies between the sectors. It identifies four areas which contribute most to that transformation: changes in the private sector and in the household (including education gaps and professional exclusion, especially of women), support from the government (including research and education, innovations and new technologies, espe-

cially communications), and human capital (talent management). The paper is divided into six sections: introduction and methodology outlining the initial problem statement and the methods used, diversification of the Saudi economy which provides the background of Saudi economy, pre-requisites for a knowledge-based economy analyzing general drivers of transition to the knowledge economy, implications of the knowledge-based economy proceeded by its management processes, discussion of the research results which identifies four key areas contributing to the transformation from the oil-based to a knowledge-based economy in Saudi Arabia and conclusions.

The reforms undertaken in the late 1960s in the economic policies in Saudi Arabia changed the dynamics of the oil economy for a lot of businesses in the country (for instance, one of the policies involved in nationalization of oil companies accompanied by certain advantages provided to the national companies as a whole). As a result, the income of the whole country and the Saudi business class increased remarkably. According to El-Harmassy (1987), due to this strengthening of the national companies by the government of Saudi Arabia, it became difficult for foreign companies to establish themselves in the Saudi market without the help of a national counterpart. These reforms also brought about the recovery of oil prices in Saudi Arabia. As a result, the state was able to join the World Trade Organization in 2005, which enabled Saudi Arabia to be included in the World Economic Forum's Global Competitiveness Index in 2007, where it ranked 35th (Khorsheed, 2016).

As for the impact of these policies on the business class, there is little advantage that the businessmen outside the royal family can gain from these political and financial reforms. This is because the main entrepreneurs in the economy are the people from the royal family along with other Saudis. In order to make the political basis for the government wide enough without the support of other parties and civil societies, these links are established between

the royal family and the business class. Furthermore, there is no clear-cut borderline that exists between the government economy and the private earnings of the royal family. This is because the contracts in private firms are mostly offered as gifts or courteous offerings rather than merit. People who are hired without merit drive up expenses of the government in the form of inefficient business or delayed payments. Furthermore, these links between the business elite and the government officials are put under more pressure when the revenues from oil sales (Dewi et. al., 2019) and purchase are reduced. As a result, the government has to delay the payments to the private sector (Cappalen & Choudhry 2000). The business class who has no close links with the royal family is thus in need of more liberal and rational reforms.

DIVERSIFICATION OF THE SAUDI ECONOMY

One of the major changes that the Saudi Arabian economy needs is to diversify the sectors through which it regulates its economy, so major amendments are required in several sectors of business and economy. Furthermore, it means that more percentage of the revenue will be obtained from other than oil sectors. For this purpose, growth and promotion of the public and private non-oil sectors is necessary. In this regard it is extremely important to reduce the relative control of the government in economic decisions and provide more independence to private companies. For this, the government needs to deliver a stable macroeconomic framework for entrepreneurs in the business sector. Furthermore, it should focus on providing a legal administrative system to the private segment. Consequently, the private sector will be able to take more control and responsibility for the economic development than the government, which should refrain from micromanaging the private companies and imposing political control over them. Some of the sectors which have benefited from

these reforms include mining industries and tourism which also benefitted from vast investments (Cappalen & Choudry, 2007).

The analysis of the effects of industrial diversification shows that the growth of the GDP in the private sector witnessed an increase in the first five years. This is because more investments are done in various sectors of the industry, particularly mining and tourism. These improvements are possible through building up capital stock due to more investment and less consumption of money. Moreover, improvements in the tourism industry have led to increased exports. Thus, a combination of lower imports and increased exports improved the current account balance of Saudi Arabia by 3 billion SR. These are the advantages that can be gained through by following the principles of the sharing economy in private sectors, both in business and industry (Cappalen, & Choudhry, 2007).

Saudi Arabia, which generates most of its revenue from oil and oil-based resources, is now struggling to diversify its economy and shift it to a knowledge-based economy. There are certain reasons why this change is badly needed by the country: oil, which is a non-renewable energy resource, reduction in budget deficit, curbing inflation, unemployment (Bokhari, 2020), adjusting to changes in the population dynamics.

It is a well-proven fact that countries that are blessed with oil and mineral resources have stable and flourishing economies (as long as the resources exist and there is sufficient technology to exploit them). The same is true for Saudi Arabia which has enjoyed this source of energy for quite a long time. These vast reservoirs have enabled the people to maintain a standard of living that is well beyond their production and means. But unlike many energy resources, oil is not a renewable resource. This means that there is a limited supply of it. This is the reason why Saudi Arabia's production of oil has dropped in the recent years. A decline in the country's oil reserves have created a sharp drop in oil revenues and thus Saudi Arabia is now facing a large

budget deficit and is searching for diversification. The country is capable of producing 268 billion barrels of oil, which constitutes one-sixth of the global proven oil resources. As a result, it needs to produce 10 million barrels a day to keep in balance its total share of production. Due to the vast reserves of oil, at the beginning, the country used to spend lavishly. For example, in 2015, government spending reached $260 billion. This year, the estimated budget for government spending was 229 billion dollars. The expenditure of $260 billion has thus created a budget deficit. Now, with the reduction in income generated from the oil sector, the budget deficit is increasing day by day. In this condition, the country needs to expand its resources and sectors for generating revenue (Even & Guzansky, 2016).

Saudi Arabia is one of the few countries whose citizens have enjoyed a very long period of low inflation. Because of the dwindling prices of oil in the market and other competitors in the oil market, inflation in Saudi Arabia has emerged as a short-term challenge. In order to curb this problem and keep it short term, it is necessary that sectors other than oil be promoted and that their growth increased. Therefore, developing and maintaining a knowledge economy is very important in this regard.

A large part of the population in Saudi Arabia comes under the umbrella of unemployment, which has many sources. Some Saudis are actually unemployed. Others do have jobs but are not interested in physical work. Some of them are not interested in doing the actual job but they do enjoy lavish salaries and other employee benefits as well. According to the statistics, the official unemployment rate is 11.6 %, but it is actually much higher. Diversification of the economy is necessary to curb the problem of unemployment as it will create more types of jobs (Even & Guzansky, 2016). According to the calculated values, the number of young individuals who will compromise the national workforce in Saudi Arabia will increase considerably. The oil economy of Saudi Arabia is not capable of containing this increased workforce.

For that purpose, the development of the knowledge economy is a must. It is also required to provide essential services to the increasing number of individuals in old age group (Al-Kibsi et al., 2015). Being heavily dependent on oil, it is very challenging for Saudi Arabia to manage this economic shift. This is mostly due to certain reasons: increasing competition in the international market, cutting benefits, no entrepreneurial culture, political problems, and budget deficit.

The world today is progressing at an exponential rate. Saudi's great dependency on oil has done much damage to the non-oil sectors with respect to their development and progress. Thus, after a period of prosperity, the economy of Saudi Arabia is now facing multiple challenges, one of which is fluctuating oil prices in the market. For example, in the second half of 2014, oil prices slumped to about 50 percent. Furthermore, the calculations made by the International Energy Agency demonstrate that the country will face more global competition in the years to come. This competition is further enhanced by alternative sources of energy such as US shale oil. In order to stabilize itself in this competitive market, the country needs to cut off some of its finances. One of the major expenditures of Saudi Arabian government includes providing benefits and lavish salaries to people in the royal family who are mainly controlling the oil and mineral resources. This is a major step towards abolishing the accepted norms of the country, which is quite difficult. Due to many dependencies on the government for most of their needs and services, Saudi Arabians lack the necessary devotion and skills to operate and maintain creative business ideas. Creative people, knowledge, and ideas are a pre-requisite for the development of any knowledge economy. So Saudi Arabia has to go a long way to create and train individuals who can innovate new ways of doing business and generating revenue.

It follows from the discussion above that the current government of Saudi Arabia has to go against many norms and previous

practices in order to create and maintain its knowledge-based economy. This has led to the rise of rivalry groups consisting of people who are dissatisfied and want to gain more and more authority. Moreover, some of them consist of conservative religious people who are opposed to and fearful of excessive liberalism and openness in the country. Hence, the current Prince is facing certain problems in this regard. But young people who comprise 50 percent of the population are in favor of current changes and policies. The situation in Yemen, however, can pose threats to the economy as well as the political stability of the country.

According to Even and Guzansky (2016), there are two ways to curb the problem of the Saudi budget deficit. One is to explore non-oil sectors of production and develop them for generating revenues for the country. The other is to cut government spending and costs. The process of cost-cutting has already been initiated, as evidenced by the budget spending, which is smaller each year starting from 2016. Moreover, subsidies have been limited to essential facilities.

PRE-REQUISITES FOR A KNOWLEDGE-BASED ECONOMY

For any country to change the trend of its economic and financial growth, amendments are crucial in many sectors (Matyushok et al., 2021). Besides, the ability of any country to develop and sustain growth in any sector depends on interactions among various institutions and policies. Still, some countries are more predestined to economic change than the others (Kedmenec & Strašek, 2017). Saudi Arabia has provided its citizens with numerous services and facilities without any charges. Thus, people are accustomed to these facilities without realizing that the state was able to provide these services due to the vast reserves of oil. Now, with oil production falling, the state can no longer meet all needs of its citizens. To be able to maintain their standard of

living, Saudi Arabian youth needs to find creative ways to earn and do business. Hence, entrepreneurship is a necessity both for the diversification of the economy and for the fulfillment of the citizens' basic needs (Even & Guzansky, 2016).

The spending on defense and security in Saudi Arabia increased considerably over the last few years due to issues arising in the Middle East. The major expense was related to the involvement of Saudi Arabia in campaigns in Yemen. Saudi Arabia imports most of its arms and security equipment from the United States. Due to the worsening of the bilateral relations of Saudi Arabia with the United States, the country now needs to reduce its imports. This will cut the costs and force the country to be more self-sufficient in its defense (Even & Guzansky, 2016).

As it was mentioned before, one of the biggest challenges that the Kingdom of Saudi Arabia is facing on its way to maintaining the knowledge-based economy is its budget deficit, which has increased over the years because of the country's dependency on the volatile oil sector. Therefore, to be able to maintain the knowledge-based economy, Saudi Arabia needs to develop industrial sectors that are not oil based or oil related. In this regard, the health, finance, mining, and tourism industry are the point of focus (Even & Guzansky, 2016).

For any country to be able to develop an innovation-based economy (Kolesnikov et al., 2016) and to sustain it, it requires a complex interaction among various institutions. Moreover, it is also dependent upon various policies, regulations and their effectiveness. Therefore, in order to understand the processes underlying the management of the knowledge economy, it is necessary to first understand the concept of knowledge economy. The knowledge economy involves continuous change and upgrading of services and products along with a transformation in the delivery of these services and products. In the realm of knowledge economy, no method or technology remains permanent; rather, innovation and reinvention of methods is the only permanent as-

pect of a knowledge economy. Thus, the knowledge economy can be defined as an accumulation of technology, technology-related capabilities, capital and science for the advanced production and management of services and goods. It is based on that paradigm of production that keeps reinventing itself. In the industrial sectors that are based on the concept of knowledge economy, there is a reconciliation of production at a large scale with "destandardization". It means that both production and its management are customized according to the need of the moment or the market. Along with this customization, coherence and production are maintained in the plan of production. The benefits received as a result of these changes and the efficiency of these services depend on the transformations that are implemented in the process (Bontis, 1999).

There are some basic phenomena that are to be kept in mind in order to exactly formulate the management policies in a knowledge economy state. In any type of economic activity, the way in which production and cooperation function plays a vital role in defining the outcomes generated as a result of that economic activity. There are many steps in which effective cooperation can lead to better results. These include institutional arrangements, technical division of human labor, and political and financial aspects. It is of huge importance that the way humans and methods cooperate in these aspects of an economic activity has the capacity of transforming the results. With regards to this production and cooperation, the realm of knowledge economy presents some useful methods through which the ability of the system, as a whole, to work and develop ideas can change effectively. Production has always been a major part of any economic activity. The knowledge economy, on the other hand, changes this phenomenon where the main focus is on the discoveries and use of information and technology. Thus, it can be said that the knowledge economy is based on the use and expression of imaginative powers in order to achieve the desired goals. Hence, it mobilizes the energy of the

brain to revolutionize the work practices from macro to micro level (Hansen et al., 1999).

At the macro level, it encourages the use of information and technology. It also promotes new discoveries that can change the way products and services are manufactured and delivered. At the micro level, the knowledge economy has the capacity to govern how we work and interact with each other. For instance, the policies that are designed at the executive level of any organization should be such that they promote those individuals who are more inclined towards devising innovative methods and formulas. In these dynamics, the central control of the government should also be limited in order to make progress. Most of the decisions (in any company) should rely on technical expertise. Thus, it can be said that the knowledge economy revolutionizes the way we think and work (Hansen et al., 1999).

Another very important feature of the knowledge economy is its tendency to transform the overall moral and ethical culture of work and production. This is because a major portion of knowledge economy is based on the tendency of individuals to develop new and creative ways of manufacturing. The dependence of processes of knowledge economy on human expertise and creativity makes the role of the talented people very central to this economic activity. This is why human expertise should have an increased level of trust and discretion in the processes involved in knowledge-based production. There are several reasons for providing this level of trust and discretion. These include increased ability to cooperate, minimal occurrence of conflict and enhanced performance (Hansen et al., 1999).

The procedure of constraining the diminishing marginal returns in order to enhance the commitment of an input in the production procedure is an everlasting and universal phenomenon that occurs in every type of economic activity. This process is carried out by the continuous and successive applications of input produced rather than by way of expanding the output.

These inputs may involve physical or financial activities. In the realm of knowledge economy, the first transformation that occurs is the promise of relaxing or even reversing the constraints that govern the diminishing of marginal returns. This change is only possible by technological and organizational innovations that can raise productivity by temporarily overcoming the force of diminishing marginal returns.

There are several reasons for the relaxation or repression of diminishing marginal returns in a knowledge-based economic activity. The first and foremost reason is that in a knowledge economy, the reproduction of goods and services may require close to zero marginal costs. The dwindling of returns in this type of activity is easily relaxed because if there is any reproduction of goods or services required, it means the simple extension of access to a platform that already exists. It means that if there is any kind of extension required, it happens simply at the click of a button without the use of any extra physical device or human labor. All this happens because the nature of goods and services provided in knowledge economy is mainly intangible. Thus, all they require is the intellectual service and the use of information technology networks. Another reason behind the ability of the knowledge economy to overcome the constraint of diminishing returns is the nature or character of knowledge and innovation used. The nature of knowledge and technology is such that the discovery of existing information makes the discovery of new information easier. Hence, one invention leads us to the periphery of another. As a result, the products that are manufactured as a result of this interplay of discoveries are more advanced than before. The continuous analogical extension of discoveries and production methods reduces and even overcomes the constraint of diminishing marginal returns (Bontis, 1999).

IMPLICATIONS OF THE KNOWLEDGE-BASED ECONOMY

The phenomenon of knowledge economy originated in those countries of the world that use R&D practices along with sophisticated IT systems. After its inception and application in the advanced economies of the world, it has started to gain ground in other regions of the world. These include Central Asian and Middle Eastern countries as well. Like other nations of the world, the importance of the knowledge economy has been recognized by Saudi Arabia, too. The country has realized that for the purpose of long-term growth, job creation, and consistent progress, there is no better way than the development and management of the knowledge economy (OECD). With this realization, the kingdom is ready to amend its policy-making and other legislations for a better adaption of knowledge-based economy. Nevertheless, for Saudi Arabia with its vast oil reserves the shift from an oil-based economy to a knowledge-based economy is particularly challenging and requires major amendments. These amendments are required in the private and government sector along with changes at the household level. Some of these challenges include the provision of a sophisticated IT system, promotion of R&D programs, inclusion of women in the workforce, and educational reforms. Keeping in view the importance and implication of knowledge-based economy, the country is ready to make amendments.

The knowledge-based economy has many implications for the economy and the overall well-being of a state. One of the remarkable benefits it brings is the promotion of innovation and creativity. The knowledge-driven technological change brings innovation in the products as well as the processes through which these products are manufactured. This is due to the fact that the introduction of technology brings changes in business models and structures. As a result, the value of the product for the consumer, producer, and society improves. This process is complicated and

involves a variety of interactions between multiple organizations and individuals, bringing benefits to all (Khorsheed, 2016).

As it was mentioned before, Saudi Arabians have depended on the government for the most products and services for too long. This is the reason that the private sector is very small in Saudi Arabia. But on the other hand, it has the greatest potential to grow. It is evident from the statistics for the years 2003-2018 which demonstrated that the non-oil private sector industries outperformed the economic sector as a whole. In those years, the rate of GDP growth remained at around 6%, but the private sector demonstrated an annual growth rate of over 10%. The productivity in the private non-oil sectors was also high, which is evident from the average 2.5 percent growth rate. This increased growth rate was due to the enlarged base of industries in which the private sector grew. Most of these industries were based on consumption, attracting a lot of consumers. They included wholesale trade, communications, retails, and transport industries. Among all these industries, the ones dealing with manufacturing and production showed the highest growth rates (Al Kibsi et al., 2015).

The kingdom of Saudi Arabia, like the rest of the world, is experiencing a change in the population. It is because the ratio of the people who are involved in the workforce has changed over the past few years. According to the current statistics, more than half of the population of Saudi Arabians is comprised of young people. This means that this percentage of the population is either involved or want to be a part of the national workforce. The projected values are even higher and show that by 2030 the number of young people above the age of 15 will increase to approximately six million. As a result, the number of people in the workforce will also increase.[1] If the growing number of individuals that can be part of the workforce are not provided with suitable jobs

[1] According to an estimated value, the number of people in the workforce will increase to a maximum of about 10 million.

available in the market, it will create severe disparities (Al-Kibsi et al., 2015). As the number of knowledge-dependent sectors and individuals grows, these disparities will decrease.

MANAGING A KNOWLEDGE-BASED ECONOMY

One of the most remarkable changes that occurred during the last two decades is the use of technology and knowledge for and within the businesses. This has created a realm of knowledge economy where a large proportion of economic growth is based on change and innovation. This economic model has been adopted by many modern economies. For Saudi Arabia to pave its way for managing a knowledge economy, it is necessary to diversify its industrial and economic sectors.

Due to the vast reservoirs of oil, the kingdom of Saudi Arabia is quite self-sufficient in other oil and mineral resource-related products. This includes hydrocarbons and other petrochemicals. The petrochemical industry constitutes almost two-thirds of the non-oil exports. This makes the country competitive in these goods in the global arena. The petrochemical industry is already a well-established industry in the region. It is evident from the example of Saudi Basic Industries Corporation (SABIC) which is among the top five global companies to produce petrochemicals. Moreover, Saudi Arabia maintains the production of four of the twenty ethylene productions in the world (Al Kibsi et al., 2015). To make this industry part of the knowledge economy, it is necessary to enhance its efficiency as a whole. To this end, integrated systems should be developed in which skilled engineers and researchers can work in the refineries to develop and maintain refining, extracting, and production techniques. Moreover, just like all knowledge economy sectors, a management department is necessary for the effective allocation and development of a valuable human resource pool.

Among the non-oil natural reservoirs of Saudi Arabia, various metallic and non-metallic minerals are found in the country especially on the western side of the Arabian Peninsula. These minerals include bauxite, limestone, high-quality silica, gold, kaolin, magnesite, zinc, and gypsum. Unlike the abundance of natural resources, the country still lacks proper equipment and skilled personnel for the extraction and proper use of these resources. As a result, the mining industry is underdeveloped. It makes this sector highly suitable for development and inclusion in the knowledge economy. As the country lacks skilled local personnel to develop this sector, the Saudi Arabian government should provide a fair and competitive ecosystem for global companies where they can compete and achieve their goals in the related sectors. According to an estimate, the development of the mining sector will not only contribute to the total GDP, but it will also create thousands of jobs for the Saudi nationals (Al Kibsi et al., 2015).

Saudi Arabia presents a large market when it comes to products like machinery, automobiles and other electronics. As compared to the increased demand for these products, there are very small domestic production units. Most of the demands are fulfilled by imports from other countries. Saudi Arabia can use its regional large market as an opportunity to convince international manufacturers to set up local units in the country while opening and maintaining the country's own manufacturing units. For this, the country first needs to revise and remove some conditions and obstacles for international businesses. These include lengthy customs and complicated visa procedures, as well as high import duties. Moreover, more skilled and productive workforce plus strong investment and legal procedures will give domestic businesses the opportunity to thrive. As a result, the gaps in the supply chain will be reduced by the development of the manufacturing industry (Al Kibsi et al., 2015).

As the average household income of Saudi nationals increased in recent years due to less dependency on government and a decrease in various subsidies, there has been much involvement of women in the retail and trade sector. This is especially true for the modern format of retail that includes online sales and purchase. If the proper development and management of this sector is introduced, it has the potential to employ approximately 800,000 Saudi nationals. Another aspect that this sector caters for in terms of managing the knowledge economy and the related problems is unemployment among Saudi Arabians. This is because until now, most of the workforce in the country consists of low-paid foreign workers. New forms of retail and trade along with online stores can involve women in the workforce. This is evident from the statistics which show that the number of Saudi women doubled between the years 2010 to 2014 as a result of these changes and the numbers keep rising. This is especially true for the sectors of cosmetics and lingerie (Al Kibsi et al., 2015).

As the knowledge economy calls for constant upgrading of services and goods, it can be best developed in those sectors that have a large margin to grow and expand. In this regard, the finance sector can have substantial expansion in various aspects. One of them is through the economic growth of the private sector. Other aspects include the provision of better financial services to households, advance mortgage policies and better investment products. Furthermore, the finance sector can help small and medium-sized businesses to grow by providing them easy and effective financial solutions. This will not only enhance the finance sector but also promote entrepreneurship which will eventually pave the way for a smooth knowledge economy-based state (Al Kibsi et al., 2015).

Healthcare is one of the basic services that is provided by the government to its citizens. Saudi Arabia had been able to meet most of the demands related to healthcare in its history. The infrastructure specially developed during the period of oil boom

where vast and efficient health care facilities were built. There are, however, few problems that are encountered in this sector. One of the biggest challenges faced by the country is the lack of an experienced workforce. This lack of professional expertise is present among the doctors, nurses and other paramedical staff. Due to this lack of expertise, the healthcare workforce is unable to prevent the spread of non-communicable diseases. This lack of workforce is then replaced by foreign nationals. This points to the second problem faced in the healthcare sector: the lack of teaching hospitals and training institutes for doctors and other healthcare professionals. The third problem is the current lack of suboptimal productivity along with the financing of commodities and services in this sector. This can be covered by the private sector. Among all the problems that exist in the healthcare sector, the one connected most with the management of knowledge economy is the lack of research and training institutes for doctors and other healthcare professionals.

In the field of construction and infrastructure, the country has expanded a lot in the past 15 years during the oil boom period. But just like other sectors of the economy, the country faces the same problem of hiring labor from outside the country. This problem can be overcome by introducing efficient and modern construction techniques. The modernization of techniques will also lead to better provisioning of services and on-time completion of projects. Furthermore, it will be able to fulfill the increasing demands of the private sector in the field of construction (Al Kibsi et al., 2015).

Just like the manufacturing industry, the tourism industry in Saudi Arabia can also grow at an exponential rate if the visa process is made efficient and easy for the visitors. Apart from possessing oil reserves, Saudi Arabia is blessed with another landmark that brings thousands of Muslims each year for the purpose of pilgrimage. Despite that the industry is in decline for several reasons. If the Saudi Arabian government improves the tourism sector by providing high-quality services to the visitors,

openness to the foreigner and efficient security measures, this sector will be able to employ additional 1.3 million Saudi nationals. Apart from religious tourism, the country can capitalize on its archaeological treasures, the vast Red Sea coastline and other areas of scenic beauty.

DISCUSSION OF THE RESEARCH RESULTS

The analysis conducted above let us identify the key areas which, when combined, would definitely support the development of Saudi's knowledge economy: changes in both the private sector and the household (including education gaps and professional exclusion, especially of women), support from the government (including research and education, innovations and new technologies, especially communications), and human capital (talent management).

CHANGES IN THE PRIVATE SECTOR

The private sector in Saudi Arabia is still in its forming stages and development. It is, however, a well-known fact that without the involvement and development of the private sector, it is almost impossible for any country to pave its way on the road to the knowledge economy. There are several sectors in which private companies and organizations in Saudi Arabia need to start and develop projects. Some of the key aspects which are considered as the most crucial include information and communications technology, education, human capital, innovation, economy, and employment issues (Nurunnabi, 2017).

The government of Saudi Arabia has taken several measures to promote the environment of research and development in the country. This is evident from the reforms that were introduced in

the years 2007–2011. Some of these include increasing the number of so-called R&D chairs from 50 in the year 2007 to 221 in the year 2011 (Al Hamazani, 2012). However, the government is failing to fulfill the demands of the private sector. This is mainly because one-third of the allocated funds for research and development are designated to humanities and social science. Even though these areas are very important, for a country to be able to maintain its knowledge-based economy, more focus should be given to IT. The main objective of the governmental and private sector in this regard is to fill the gap between the requirements of the market and the amount of research done in a particular field. Along with the support from the government, the private sector should also engage in measures that can reduce this gap. For this purpose, the private sector can approach the universities and research institutions and offer them financial grants and aid that can help in the required research. Moreover, executives from the private sector can encourage foreign companies and firms to take an active part in promoting the research and development activities. These foreign companies, besides providing financial aid, can act as a bridge between the research conducted in foreign countries and the local research. It will not only increase the exposure of researchers in the country but will also provide a platform to promote their innovative ideas internationally.

CHANGES IN THE HOUSEHOLD

In Saudi Arabia, the changes that are required in household trends and norms are as follows:

- reducing educational gaps
- eliminating illiteracy among women
- introducing career and educational counseling.

For many years, the people in Saudi Arabia have had a limited vision about the requirements that can enable them to be part of

the knowledge-based economy. The first and foremost change that is required in the household trends is the alignment of educational choices. Even with the increasing trend of gaining professional degrees, the market gaps are not filled (Ghulam & Mousa, 2019). This is because most of the students are pursuing degrees which have no application in the labor market. For instance, in 2009, more than 41% of the students chose humanistic subjects and arts as their field of choice (Banque Saudi Fransi, 2011). Another reason behind the disparity is that at the initial stages of education, much emphasis has been laid on memorizing the theoretical facts and figures without promoting any practice or gaining any experience. As a result, most of the educated individuals lack the necessary skills and experience that are required for the labor market (Kirchberger, 2001).

One of the major problems which is a cause of further issues including unemployment and a smaller number of individuals in the workforce is the high rate of illiteracy among women in Saudi Arabia. This is evident from the fact that the illiteracy rate of women reaches almost 30% which is almost triple than male illiteracy rate (11%). It results in a smaller participation of women in the country's economy. Even if women receive education, it is not in accordance with the demands of the labor market. For instance, it has been reported that 61% of women who enrol in secondary education opt for social studies as compared to the men who mostly adopt applied sciences as their major (Schwab, 2012; McAdam et al., 2019). Women, after receiving appropriate education, could play greater role in the economic activity of the country and contribute to its growth.

The kingdom of Saudi Arabia is in its initial stages when it comes to the adoption of processes that are required for the smooth running and management of the knowledge economy. In order to reduce the disparity between the requirements of the labor market and educational credentials of the individuals applying for jobs, it is essential that counselors and counseling centers

are introduced. They can collect evidence-based data in order to guide the students in the selection of their majors.

SUPPORT FROM THE GOVERNMENT

As shown above, one of the problems faced by the government is the gap between education that young Saudis get and skills in-demand in the labor market. It is the reason for high unemployment rate especially among women as their skills are not relevant to the Saudi labor market requirements. To overcome this problem, it is the duty of the Ministry of Education and the Ministry of Higher Education to launch awareness programs that would explain the country's economic directions and the different specializations required. These types of initiatives would broaden the students' horizons and reduce the gap between labor market needs and education outputs. Not only will it assist in employing young Saudis, but it will also reduce the high number of immigrant workers.

So far, the government has taken several steps to encourage students and researchers to engage in the field of research and development. As a result, at the beginning of the 2010s, the country has ranked 5th in the category of "Government procurement of advanced technology products". Moreover, it has ranked 37th and 49th in "Quality of scientific research institutions" and "University-industry collaboration in R&D" respectively (Schwab, 2012). Despite achieving these ratings, the country still spends very little of its total GDP on activities involving research and innovation. The government should increase the spending itself and also encourage foreign private firms to take a keen interest in the promotion of innovation and entrepreneurship.

The government sector policies are important because they provide incentives to the private sector, encourage companies to invest and enable institutes for the promotion of research and

developmental programs. These policies act as support pillars for various aspects of managing the knowledge-based economy. With respect to the support of private sector, these policies are important because nations who have high private expenditure on research and development along with significant public programs to support these development projects, have a sounder knowledge-based economy. Meticulously elaborated policies are also important for maintaining a balance between the involvement of the private and public sector in research and developmental programs. Another aspect of the knowledge economy that requires public intervention is infrastructure especially related to information and technology. Saudi Arabian government has always been active in building infrastructure in various sectors of life. However, without efficient public involvement, the IT sector may face underinvestment.

Policy formation for the purpose of managing a knowledge-based economy should be a crucial part of national policy formulation, because they are crucial for any country when it tries to make a difference in the competitive environment by the exploitation and use of knowledge (Rollo, 2002). An ideal policy formulation should be aimed towards bringing a balance between internal resources and capabilities and external environmental relations. It should be formulated on the basis of identifying the factor which determines the tendency of a country to acquire, share, create, and apply the knowledge to excel within a competitive environment. For this purpose, all the environmental contexts should be considered and then aligned with the internal strengths of the nation to formulate a strategy that gives maximum return on investment. It can be said that the better a state can formulate policies related to knowledge economy, the better it is equipped to deal with the social, human, and economic issues related to the knowledge economy.

The problem of unemployment acts both as a cause and an effect when it comes to the knowledge economy. This is because

without increased participation of workforce, it is difficult for knowledge-based economic activity to prosper. There are many factors behind unemployment in Saudi Arabia. One of them is the number of foreign expatriates whose percentage has increased from 11% in 1974 to 27% in 2004 (Saudi Arabian Monetary Agency, 2011). Aligning the educational degrees of students in the country with job market requirements and giving them access to skill and vocational training will solve this problem (Mahdi, 2010). Furthermore, the government of Saudi Arabia needs to formulate education policies in such a way so that the students leaving universities and institutions are better equipped to compete in the global market. For this purpose, highly trained and professional individuals are hired to formulate policies. Still, there should be an efficient system of verification and revision of these policies. In this way, individuals will be able to cope with the changing trends of the global market (Young, 1995).

Finally, it should be the priority for the government to provide the entire industrial and domestic sector an efficient and updated information, communication and technology (ICT) system. The importance of ICT can be assessed by the fact that countries which already excel in these systems, work even harder for the upgrading and modernization of the ICT system (Koh & Wang, 2003).

HUMAN CAPITAL: TALENT MANAGEMENT AND EMPLOYEE RESOURCING

The role of human expertise and skills lies at the very core of the knowledge economy. This is the very reason that the functions of the HR department in any sector within the knowledge-based economy are essential. It is only obvious that with changes in the global trends and markets, all the sectors of life are affected. The same is true for the employee resourcing sector which is largely

affected by globalization and other changes in the global market. It is important that the organizations transform their dynamics avoiding negative effects of unpredictability. These include changes in the human capital and employee resourcing practices as well. One of the key features of the knowledge economy is that it keeps reinventing itself.

Therefore, Saudi Arabia has a lot of potential in non-oil sectors in the industry. It just needs to manage some adjustments like the involvement of the private sector, promotion of entrepreneurship and integrated use of information and technological systems. Another point that can be made given the discussion above is the fact that changes at the micro level are required in order to manage the human capital hired in a knowledge-based economic state or organizations. The first and foremost requirement for managing is to find the right person for a job or position. This is decided not just on the basis of education and credentials but also skills such as communication and compassionate attitude. Only then can the person cope with the increasingly changing demands of the market that happens in the area of the knowledge economy.

The management of the knowledge-based economy requires certain skills and practices that go beyond the conventional norms of organizations. A number of phenomena occurring across the globe are pointing towards the possibility of a massive change in employee and employment trends. It is predicted that organizations will be struggling to fill the job post across the globe. There are several reasons for this. For instance, it was reported that in many industrialized nations, smaller, middle-aged population segments and early retirements are significantly reducing the size of working-age populations. As this trend continues, a severe shortage of workforce will occur. Even when this shortage is filled by the arrival of Generations Y and Z in the job market, it is predicted that there will be fewer workers who are fit for the job. This is because the current education trends are not likely to generate enough workers with the skills and experience that

employers need. The current trends in education and learning produce young people who are less skilled. As a result, the demand for skilled work will rise. In any knowledge economy, most jobs require high levels of skills and knowledge. This knowledge also needs to be updated with the changing global trends. Thus, it is becoming quite difficult to find individuals in the market who have the relevant education, skills, and experience to do a particular job (Taylor, 2004).

The government and private sector in Saudi Arabia have always been efficient in building and maintaining infrastructure. The development and management of human capital, on the other hand, is another matter. It is crucial in the knowledge-based economy that the human capital, their skills, abilities, and personality traits are sought after. The government and private organizations in Saudi Arabia need to develop programs that are focused on the identification of intangible aspects. Moreover, efficient development and management of these factors should be the priority. This system will produce more skilful and efficient personnel who will be more competitive for jobs in the global market (Guellec, 1996).

Artificial intelligence is making its way in every industry and every profession. The department of human capital and talent management is no exception. There are many AI applications, but it is predicted that AI will witness an increased use in the process of matching candidates with jobs. As a result, recruiters will have no restriction to spend less time adding value to the selection and sourcing process. They can now ensure efficient conducting of the interviews and making offers to a considerably reduced and selected pool of candidates. It heralds a better talent acquisition experience for everyone.

Skilled and creative personnel lie at the foundation of a knowledge economy. Hence, any organization involved in such an economic process is required to ensure personalized services related to employee engagement and management. Retaining

and managing top talent present in the market requires special customized learning and development opportunities for the employees. The one-size-fits-all approach is outdated. The use of the ICT system is, again, beneficial in this regard, as the machine learning algorithms will deliver data and employee patterns based on employee surveys. In this way, HR professionals will have a clear evaluation of employee sentiment, engagement, and productivity. The use of knowledge and technology requires specialized services, but it also provides useful software to deal with these requirements in an efficient manner.

As IT is gaining ground in all spheres of life, more and more employees are being released from their conventional workplaces and time schedules. This is due to the increased use of wireless phones, high-speed broadband connections, and personal digital assistants along with the rising proportion of work that can be done and transferred electronically (Wallace, 2004). This phenomenon has given rise to virtual teams. The management of public and private organizations needs to update their equipment and technology to develop an effective working virtual team. Moreover, leadership and management dynamics also change in virtual teams.

CONCLUSION

Saudi Arabia has a long history of relying on the revenues generated from the export of oil and oil-based products. The recent changes in the global economic trends have made it necessary for the country to shift its economic activities from oil-based to knowledge-based ones. Several factors play their role when it comes to this transformation. The most important is the interest and management of the government to provide all the basic necessities for the maintenance of the knowledge economy. The priority of the government should be to formulate policies that

promote the use of knowledge both as an input and output for growth and progress. In this regard, the first pre-requisite is to develop a sophisticated infrastructure that can conform to the requirements of the procedures done under this economic activity. In the case of Saudi Arabia, special focus should be on the education sector where alignment of university degrees with formal professional requirements is the priority. Skilled personnel forms the backbone of the knowledge economy. Unfortunately, Saudi Arabia is far behind in producing skilled individuals. The jobs created as a result of business activity are mostly filled by low-paid foreign expatriates. The government of Saudi Arabia needs to devise an integrated system where vocational training programs should be offered to individuals so that they can cope with the changing trends across the globe. Other sectors where the government can provide support include infrastructure, information technology as well as research and development. Governmental subsidies and aid are not enough to run a country keeping in view the dynamics and prerequisites of the knowledge economy. This is the reason why adequate support and involvement of the private sector is also required. The most crucial aspect of the knowledge economy that the private sector can support is the financial and logistic aid of the research institutes. The more developed are research institutes of a country, the better it will adapt to the changes that come along with the knowledge economy.

Transiting from the oil-based economy to a knowledge-based economy requires changes and amendments from a management perspective. These amendments should be focused on those aspects which are crucial for developing and maintaining a knowledge-based economy. The most important of them are information and communication technology, infrastructure to support that technology, and humans who can run and maintain that technology. Saudi Arabia has sophisticated infrastructure when it comes to oil industry and healthcare. The country now needs to focus on the development of infrastructure that supports

the latest ICT. Moreover, educational and training courses that enable the youth to develop and run such technologies should be introduced. This will enable the country to develop its capital customized systems that are well suited to its requirements.

HR management gains supreme importance in any knowledge economy state because skilled personnel lies at the core of all business activities. Thus, for Saudi Arabia to manage the transformation from an oil economy to a knowledge economy, it needs to better adapt to the changing trends of employee resourcing and management. The personalized development plan should be provided to talented employees. Moreover, strategies should be designed to work effectively in culturally diverse teams and virtual teams as well. Only then will the state be in a position to manage the shift to the knowledge economy effectively.

REFERENCES

Abu-Rashed, J., Almafdali, I., & Ballard, J. A. (2020). The role of business intelligence in a knowledge-based economy: the case of Saudi Arabia. *International Journal of Economics and Business Research*, *19*(1), 30–41.

Ahmadi, M. (2020). A computational approach to uncovering economic growth factors. *Computational Economics*, *58*(4), 1051–1076.

Al Hamazani, M. (2012). *Chamber of Riyadh: It is time to benefit from the 221 Research Chairs*. Al Riyadh Online. http://www.alriyadh.com/2012/07/23/article753962.html

Al Rasasi, M. H., Qualls, H. J., & Alghamdi, B. K. (2018). *Oil revenues and economic growth in Saudi Arabia*. SAMA Working paper, *17*(8), 1–19.

Alkhathlan, K. A. (2013). Contribution of oil in economic growth of Saudi Arabia. *Applied Economics Letters*, *20*(4), 343–348.

Al-Kibsi, G., Woetzel, J., Isherwood, T., Khan, J., Mischke, J., & Noura, H. (2015). *Saudi Arabia beyond oil: The investment and productivity transformation*. McKinsey & Company.

Al-Sultan, K. S., & Alzaharnah, I. T. (2012). Academia-industry innovation linkages in the case of Saudi Arabia: Developing a university-industry triple-helix framework to promote research and development collaboration. In D. Sou-

mitra (Ed.), *The Global Innovation Index 2012: Stronger innovation linkages for global growth* (pp. 89–95). INSEAD.

Al-Torkistani, H. M., Salisu, M. A., Maimany, K. A. (2016). Modelling a sustainable Saudi Arabian economy: The real issues. *International Journal of Sustainable Development & World Ecology*, *23*(2), 186–193.

Amin, A., & Thrift, N. (1994). *Globalization, Institutions, and Regional Development in Europe*. Oxford University Press.

Amirat, A., & Zaidi, M. (2020). Estimating GDP growth in Saudi Arabia under the government's vision 2030: A knowledge-based economy approach. *Journal of the Knowledge Economy*, *11*(3), 1145–1170.

Aubert, J. E., & Reiffers, J. L. (2003). *Knowledge economies in the Middle East and North Africa: Toward new development strategies*. World Bank Publications.

Bahgat, G. (2016). Lower for longer: Saudi Arabia adjusts to the new oil era. *Middle East Policy*, *23*(3), 39–48.

Banque Saudi Fransi. (2011). *Saudi Arabia Economics*. Available at http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCwQFjAA&url=http%3A%2F%2Fwww.alfransi.com.sa%2Fen%2Fgeneral%2Fdownload%2Ffile%2F1045&ei=CfUMLPE4zRrQeCu4CgCA&usg=AFQjCNHQOsjSQg9Ihkbpfu0NJsn9T_umdA&sig2=- zuwifjBB6xYP57N-Jpi2w

Bokhari, A. A. H. (2020). The twinning of inflation and unemployment phenomena in Saudi Arabia: Phillips curve perspective. *Contemporary Economics*, *14*(2), 254–271.

Bontis, N. (1999). Managing organizational knowledge by diagnosing intellectual capital: Framing and advancing the state of the field. *International Journal of Technology Management*, *18*(5–8), 433–62.

Cappalen, A., & Choudhry, R. (2000). *The future of the Saudi Arabian economy: Possible effects on the world oil market.* Statistics Norway. https://www.ssb.no/a/english/publikasjoner/pdf/rapp_200007_en/rapp_200007_en.pdf

Dewi, A., Somsathid, P., Somjai, S., Ghani, E. K., & Pambuko, Z. B. (2019). Stock market trends and oil prices: Evidence from a developing country. *Contemporary Economics*, *13*(3), 351–362.

East Policy Council. https://www.mepc.org/journal/lower-longer-saudi arabia-adjusts-new-oil-era

El-Harmassy, E. 1987. State building and regime performance in the Greater Maghreb. In G. Salame (Ed.), *The foundation of the Arab States* (pp. 76–90). Instituto Affari Internazionali, Croom Helm.

Enders, K., & Williams, O. (2008). *IMF survey: Saudi Arabia: Managing the oil bonanza*. International Monetary Fund. https://www.imf.org/en/News/Articles/2015/09/28/04/53/socar091908a

Even, S., & Guzansky, Y. (2016). *Saudi Arabia's Vision 2030: Reducing the Dependency on Oil.* The Institute for National Security Services. http://www.inss.org.il/publication/saudi-arabias-vision-2030-reducing-the-dependency-on-oil

Fortin, P., & Helpman, E. (1995). *Endogenous Innovation and Growth: Implications for Canada*. Industry Canada, Occasional Paper No. 10.

Ghulam, Y., & Mousa, W. I. (2019). Estimation of productivity growth in the Saudi higher education sector. *Technological Forecasting and Social Change*, *149*(C), 119741. https://doi.org/10.1016/j.techfore.2019.119741

Guellec, D. (1996). Knowledge, skills and growth: Some economic issues. *STI Review*, *18*, 17–38.

Hansen, M. T., Nohria, N., & Tierney, T. (1999). What's your strategy for managing knowledge? *Harvard Business Review*, *77*(2), 106–116.

Harrison, R., & Kessels, J. (2004). *Human Resource Development in a Knowledge Economy: An organisational view.* Palgrave Macmillan.

'Healthcare in Saudi Arabia – Opportunities in the Sector – May 2018' report highlights expansionary drive. (2018). Saudi Gazette. http://saudigazette.com.sa/article/536050/BUSINESS/Healthcare-in-Saudi-Arabia-ndash-Opportunities-in-the-Sector-ndash-May-2018-report-highlights-expansionary-drive

Hubbard, B., & Kelly, K. (2017). Saudi Arabia's grand plan to move beyond oil: Big goals, bigger hurdles. *The New York Times*, October 25, 2017.

International Monetary Fund. (2011). *World economic outlook: Slowing growth, rising risks.* https://www.imf.org/~/media/Websites/IMF/imported-flagship-issues/external/pubs/ft/weo/2011/02/pdf/_textpdf.ashx

Kedmenec, I., & Strašek S. (2017). Are some cultures more favourable for social entrepreneurship than others? *Economic Research – Ekonomska Istraživanja*, *30*(1), 1461–1476. https://doi.org/10.1080/1331677X.2017.1355251

Kayed, R. N., & Kabir Hassan, M. (2011). Saudi Arabia's economic development: Entrepreneurship as a strategy. *International Journal of Islamic and Middle Eastern Finance and Management*, *4*(1), 52–73.

Khorsheed, M. S. (2016). Saudi Arabia: From oil kingdom to knowledge-based economy. *Middle East Policy*, *22*(3), 147–157.

Kirchberger, A. (2001). *The knowledge economy and education reforms in MENA countries: Selected examples*. Discussion paper prepared for the World Bank.

Koh, W. T. H., & Wang, P. K. (2003). *Competing at the frontier: The changing role of technology policy in Singapore's economic strategy*. Social Science Research Network. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=626342

Kolesnikov, Y. A, Epifanova, T. V., Usenko, A. M., Parshina, E., & Ostrovskaya, V. N. (2016). The peculiarities of state regulation of innovation activities of enterprises in the global economy. *Contemporary Economics*, *10*(4), 343–352.

Krishnadas, K., & Gugrani, B. (2016). *Saudi Arabia Budget 2017 – Expect Aggressive Deficit Reduction*. Aranca. https://www.aranca.com/knowledge-library/articles/investment-research/saudi-arabia-budget-2017-expect-aggressive-deficit-reduction

Leopold, J., Harris, L., & Watson, T. (2005). *The strategic managing of human resources*. Financial Times, Prentice Hall.

Mahdi, W. (2010). *Analysts: Population growth straining Saudi*. Middle East Online. http://www.middle-eastonline.com/english/?id=38662.

Mankiw, G. (1995). The growth of nations. *Brookings Papers on Economic Activity*, *26*(1), 275–326. https://doi.org/10.2307/2534576.

Matyushok, V., Krasavina, V., Berezin, A., & García, J. S. (2021). The global economy in technological transformation conditions: A review of modern trends. *Economic Research – Ekonomska Istraživanja*, *34*(1), 1471–1497. https://doi.org/10.1080/1331677X.2020.1844030

McAdam, M., Crowley C., & Harrison R. T. (2019). "To boldly where no [man] has gone before" – Institutional voids and the development of women's digital entrepreneurship. *Technological Forecasting and Social Change*, 146, 912–922.

Nakov, A., & Nuño, G. (2013). Saudi Arabia and the oil market. *The Economic Journal*, *123*(573), 1333–1362. https://doi.org/10.1111/ecoj.12031

Nurunnabi, M. (2017). Transformation from an oil-based economy to a knowledge-based economy in Saudi Arabia: The direction of Saudi Vision 2030. *Journal of Knowledge Economy*, *8*(2), 536–564.

Organisation for Economic Co-operation and Development. (1996). *The knowledge-based economy*. Paris.

Population of Saudi Arabia. (2019). *Fanack*. https://fanack.com/saudi-arabia/population

Rollo, C. (2002). *The knowledge strategy within a business context*. The Third European Conference on Organizational Knowledge, Learning and Capabilities.

Saudi Arabian Monetary Agency. (2011). *Annual report Riyadh*.

Schwab, K. (2012). *The global competitiveness report 2012-2013*. World Economic Forum. https://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf

Taylor, C. R. (2004). Retention leadership. *Training & Development*. https://compass.arizona.edu/sites/compass.arizona.edu/files/Retention_Leadership_-_PDF%5B1%5D.PDF

United Nations Development Programme. (2009). *UNDP Saudi Arabia Annual Report 2009*. http://www.undp.org.sa/sa/documents/home/annual_report.pdf

Wallace, P. (2004). *The Internet in the Workplace*. Cambridge University Press.

World Bank. (2016). *World development indicators*. http://data.worldbank.org/country/saudi-arabia

World Economic Forum (2016). *The Human Capital Report 2016*. http://reports.weforum.org/human-capital-report-2016/economies/#economy=SAU

Young, A. (1995). *Growth without scale effects*. National Bureau of Economic Research.