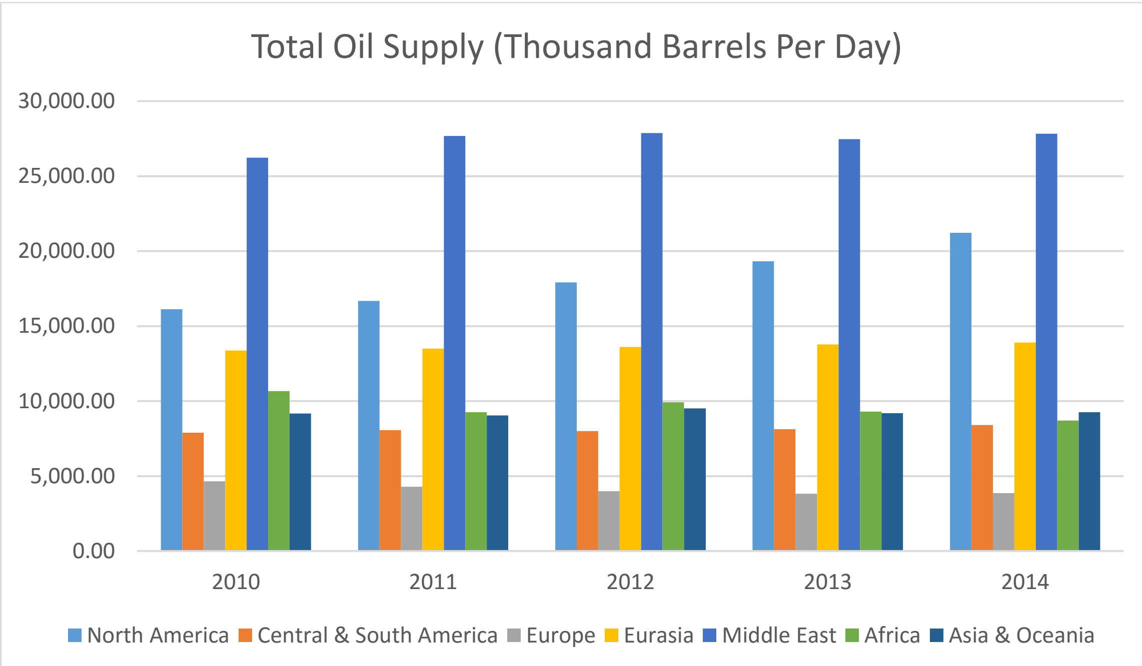
Introduction

Oil has been the driving force of the world's economies for decades. The first oil well is reported to have been drilled in 1889 in the United States, yet today most of the world's oil comes from the Middle East. The range of application of oil is immense, primarily serving as a means of energy generation for a variety of industrial applications. For this reason, governments spend billions of dollars annually in oil and oil product importation. Mining and the extraction of metals from the earth has also driven several economies and placed them on the global map of top mining nations. History is filled with tales of mining exploits and individuals who made a name for themselves in mining and oil production. This report seeks to delve into mining and oil in the modern setting and how global nations can take advantage of both existing and potential opportunities in the energy and mining sector. Mining will deal with gold as the only precious metal in Kenya with substantial quantity and availability. The report will look at the situation from a global perspective before narrowing down to the case in Kenya. it will discuss the challenges that are faced as well as the opportunities and players in existence within the sector. Finally, a conclusion will summarize the key points.

Global Oil Overview

While oil production has been on the rise globally and in most individual continents, it is worth noting that the production in Africa has been on the decline in the period 2010 to 2014. The situation has been similar in Europe. The Middle East continues to maintain its grip on global production with its supply increasing over the period under consideration. In 2014, region produced about 30% of global oil, the largest individual countries being Saudi Arabia (11.6 million barrels a day), United Arab Emirates (3.5 million barrels a day) and Iran (3.4 million barrels a day). Global production also increased in the 2010-2014 period, recording 88 million and 93 million barrels per day in 2010 and 2014 respectively.

A visual representation of these trends is provided:



Source: U.S. Energy Information Administration https://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=5&pid=53&aid=1

The 2014 upturn in production brought with it a disruption in the demand-supply equilibrium in the oil market. This led to a dramatic drop in global oil prices, which translated into losses for producing nations. For this reason, nations prospecting for oil have been forced to scale back on their ventures on account of diminished returns, a situation which has served to aggravate the African dream of discovering and commercializing more oil wells. While the low prices have damaged exports, however, they have served to reduce import expenditure, especially for non-producing developing nations.

In Africa, the largest oil producer is Nigeria, followed closely by Angola and Algeria. With the oil and gas prospects in the country has come conflict, a situation which has also affected Angola. The lack of political stability has seen Africa's potential limited, with individuals in influential positions either hoarding oil or smuggling the same for personal gain. Transparency International ranked the country 136th least corrupt country globally in 2015, with a score of 26. The case was worse in Angola, ranking 163rd with a score of 15. Algeria performed much better at 88th with a score of 36. The Middle East and specifically Saudi Arabia is renowned for its no tolerance to corruption policy, a factor which has helped prevent the diversion of returns from oil and gas exportation by unscrupulous individuals.

Provided below is a list of the top 10 biggest oil and gas companies in the world in 2016. Through their prospecting activities, the world's supply of oil and gas has continued to rise.

Company Name	**Base Country**	**Capacity (Barrels Per Day)**
Saudi Aramco	Saudi Arabia	12.5 million
Gazprom	Russia	9.7 million
National Iranian Oil Company	Iran	6.4 million
ExxonMobil	United States	5.3 million
PetroChina	China	4.4 million
BP	United Kingdom	4.1 million
Royal Dutch Shell	Netherlands	3.9 million
Pemex	Mexico	3.6 million
Chevron	United States	3.5 million

Kuwait Petroleum Corporation	Kuwait	3.2 million

Source: Forbes.com

Oil and Gas in Kenya

The exploration for oil in Kenya began in the 1950s, with the first oil well in the country being dug in 1960. The first firms involved in prospecting for oil in Kenya were BP (British Petroleum) and Royal Dutch Shell (or simply Shell). Through the 1980s several attempts to strike oil were made by companies the likes of Amoco and Total, but the findings were either too meagre to be commercially viable or non-existent. At the time, drilling was mainly in Lamu, parts of Turkana and Mandera.

In 2012, Kenya made an oil discovery in north-west Turkana, at the *Ngamia* site, a discovery which made Kenya the second country after Uganda to discover oil in East Africa. A later discovery was made at Twiga, after which other branches of *Ngamia* and *Twiga* have been discovered. In 2013 production of the discovered oil began at a rate of 3,200 barrels per day. It is estimated that *Ngamia* and *Twiga* could each contain about 250 million barrels of commercial scale oil. As at the end of 2015, the country had discovered the potential to drill over 600 million barrels of oil. Analysts place the value of the oil discovered at about $10 billion. In March 2016, the announcement of the discovery of more potentially commercial scale oil was made in Kerio Valley in the Rift Valley region of Kenya.

The discovery of oil for any net importing nation brings with it feelings of economic relief. Oil imports are necessitated by the need to generate electricity, refine the oil for vehicle and aviation use and obtain by-products such as tar and asphalt for road construction. Kenya has made discoveries of deposits of both oil and gas in the over the last 10 years. Domestic oil demand rose 8% in 2014 to 87,000 barrels per day against a gross domestic product (GDP) growth of 5.4%, indicating a surplus demand and below par output.

Kenya is engaged in oil refinery and the production of various petroleum products. The country is also an exporter of petroleum products, most notably to the United Kingdom, Holland, Uganda and Tanzania. The East African trade is the most active, since transport by road is easier across borders. Oil refineries in Kenya include Kenya Petroleum Refineries Limited (KPRL) and Gulf Africa Petroleum Corporation (GAPCO).

1.8 trillion cubic feet of natural gas were found onshore, North East of Kenya. This discovery was followed by yet another one offshore in the *Mbawa* block in Lamu at the coast. Subsequently, the Government of Kenya delayed gas import plans in 2015 following the aforementioned discoveries. Kenya has long been an importer of liquefied natural gas (LNG) and the discovery of gas in the country is set to save the national government millions of dollars.

Natural gas has a wide range of applications. The use of natural gas in electricity generation is possible, through both gas and steam turbines, which is important in adding more power to the Kenyan grid. Manufacturing processes also make use of natural gas, such as in the production of glass, steel and plastics. In the developed world, the gas is piped and relayed to homes for central heating purposes, most commonly in Europe and North America where winter temperatures can drop to -7°C. Owing to Kenya's favorable climate, it has not been deemed necessary to set up domestic gas delivery as a utility for central heating. The use of vehicles running on natural gas has also been on the rise in recent years owing to the global warming dilemma presented by the reliance on fossil fuels for energy generation and vehicle powering. The use of gas in airplanes is also currently under development, with such aircraft expected to not only be environmentally friendly but also be cheaper to run and maintain.

Competitive Environment

The oil and gas sector in Kenya has firms engaged in either extraction, sales and marketing or both. The most notable firms in Kenya will be analyzed in the following section.

Tullow Oil

Tullow Oil was founded in 1985 and is headquartered in London, United Kingdom. The company has been in operation in Kenya since 2010, and was responsible for the first commercial scale discovery and announcement in 2012. It also has operations in Uganda within the East African region. Tullow is the most successful oil prospector in the country so far, with oil wells in several locations. Key among these are *Ngamia*, *Twiga*, *Etuko*, *Ekales*, *Agete*, *Amosing*, *Ewoi*, *Ekunyuk* and *Etom*, with the first two being the most commercially viable and most renowned. In March 2016 the company also announced the discovery of more potential deposits in the Kerio Valley Basin.

Africa Oil Corp

Canada-based firm African Oil Corp is involved in the exploration for and extraction of oil and gas, with interests in Kenya and Ethiopia. The company owns 25% stake in the Lokichar Basin jointly with Tullow Oil. Drilling operations in Kenya began in the fourth quarter of 2009. Its joint operations with Tullow saw Africa Oil Corp prospect for oil in the *Ngamia* well. It is worth noting that the company made the first discovery of the oil in the *Etuko, Ewoi, Amosing* and *Agete* wells in 2013, jointly held with Tullow Oil. As at the end of 2015, Africa Oil Corp was involved in the *Emesek* and *Cheptuket* wells, although the former was pronounced commercially unviable.

Marriott Drilling Group

The company is based in the United Kingdom and was established in 1947. Most of the company's operations have been in Europe, but it has successfully set up in Northern Kenya. Its workforce has 225 workers who brave the harsh desert conditions, and have previously worked with Tullow Oil in drilling operations.

National Oil Corporation of Kenya

The National Oil Corporation of Kenya was established in 1981 and exists as a statutory body. It is fully owned by the Government of Kenya and is involved in oil and gas exploration, infrastructure development and marketing of petroleum products. NOCK is involved in direct exploration exercises and has its own site from Lake Bogoria to Lake Magadi. The organization has service stations spread nationwide in its marketing operations.

Libya Oil Kenya Limited

In Kenya the company operates as OiLibya. It is involved in the sale of fuel and petroleum products such as lubricants on both a retail and commercial scale through a chain of service stations spread out countrywide. OiLibya is also involved in the sale of liquefied petroleum gas (LPG) for both domestic and industrial uses.

Royal Dutch Shell

Known in Kenya as simply Shell, Royal Dutch Shell was established in 1907. It deals with the exploration and drilling for oil and gas as well as marketing and distribution of petroleum products. It is one of the largest global oil and gas firms and operates a chain of service stations with a countrywide reach. However, the company has not set up exploration activities in Kenya.

Other notable firms involved in the importation and marketing of oil and gas as well as petroleum products in Kenya are Kenol/Kobil, Total and Vivo Energy which distributes Shell's products.

Challenges

Local Community Concerns

There have been questions raised by communities living in the areas mapped out for drilling on whether they will be compensated for land lost and on whether locals will be absorbed and get job opportunities. In some instances, the concerns have intensified and led to demonstrations which have interrupted operations. This was the case with Tullow Oil in 2013 when the company was forced to train locals and increase its social budget as well as give women and youth in Turkana tenders after locals staged demonstrations against the firm.

Volatile Prices

Oil in the international market does not have a fixed price. The market operates under the laws of demand and supply (free markets). Since 2014, the international oil prices have dropped 75% to as low as $40 per barrel. This has made investors jittery and unwilling to delve into the lucrative black gold sector since at the prevailing and near-future projected prices they might not recover their investments.

High Operation Costs

The high costs associated with prospecting and drilling for oil have underscored the need for partnerships, such as the Africa Oil Corp-Tullow Oil joint venture. Companies which are unable to secure such partnerships often either have to be financially strong or shut down operations.

Opportunities

Since the oil and gas exploration and extraction sector in the country is relatively young, opportunities in existence involve partnering with already established firms engaged in drilling. The uptake of gas and its distribution has been well received in Kenya, with a significant number of homes and institutions such as schools, hotels and restaurants using gas for cooking purposes. Therefore, partnership will allow the formation of stronger supply chains, with an even wider reach.

Regulation

The Energy Regulatory Commission established under the Energy Act, 2006 is involved in the regulation of energy, petroleum and related products in Kenya. it serves as the main regulatory body in Kenya's energy sector. Some of its other functions include protection of consumer interests, collection and maintenance of energy data in Kenya, ensuring fair competition in the local energy sector and the preparation of a national energy plan.

The Ministry of Energy and Petroleum is also involved in oil and gas in the country. It derives its powers from Executive Order No.2/2013 of May 2013. With specific regard to oil and gas, the Ministry is mandated to oversee exploration, the sector's capacity development and to manage the policies revolving around the import, export and marketing of petroleum products. The other energy-related aspects dealt with by the ministry include fossil fuel exploration (excluding oil), hydropower, geothermal exploration and development, thermal power and electrification.

National Oil [Corporation of Kenya] is involved in all aspects regarding the petroleum industry in Kenya, according to its mandate, obtained in 1981. It is the Kenyan Government's policy formulation instrument as far as oil and gas in the country are concerned, specifically exploration, infrastructure development and marketing of oil and gas.

Global Gold Overview

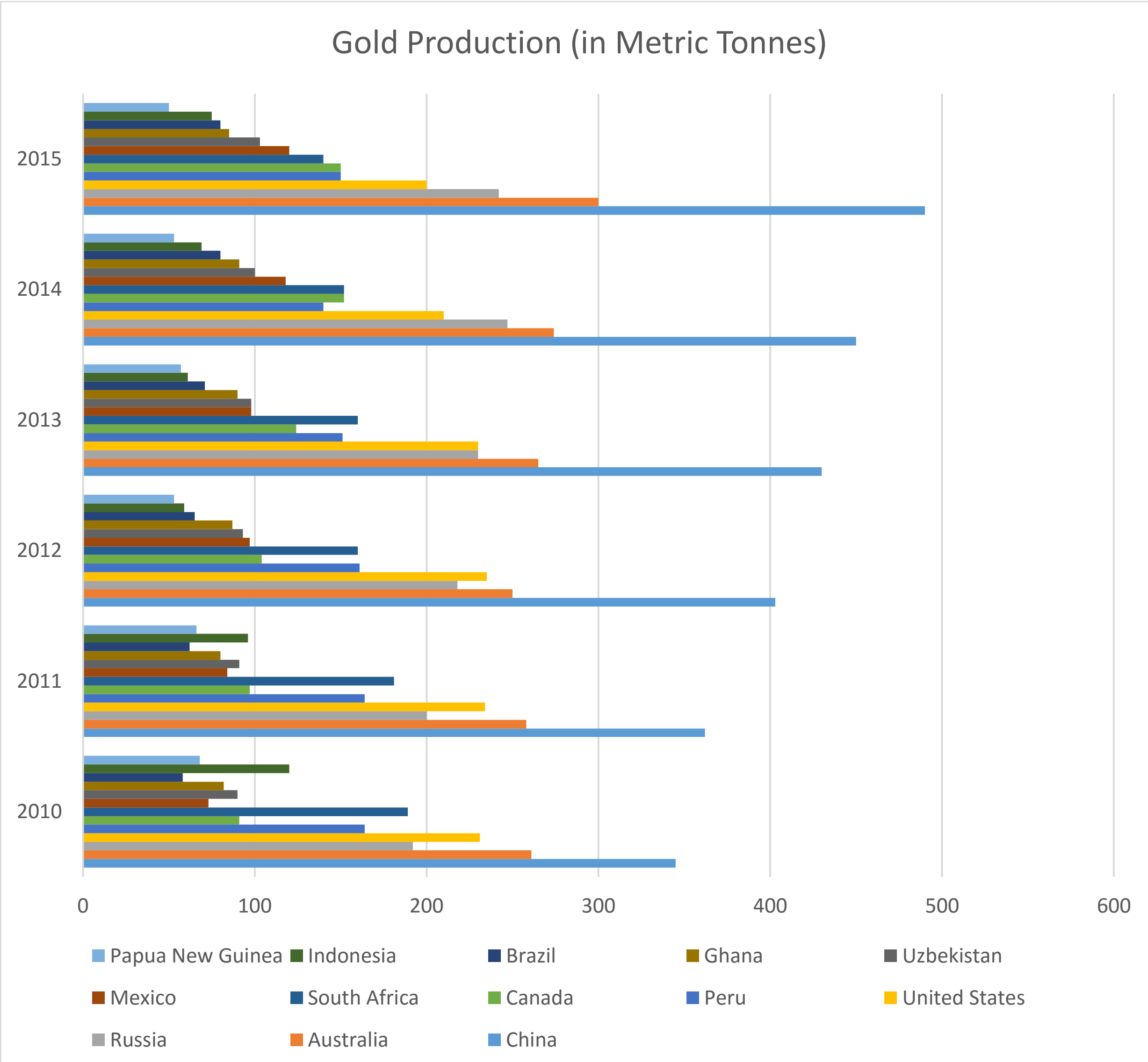
Gold was and still is the most highly valued metal on earth. Its use dates back hundreds of years, when it was a medium of exchange, traded for a variety of commodities. In the modern world, however, gold is perhaps most famed for the Gold Standard era, where nations determined the value of their currencies based on gold reserves available to back it up. Upon the break out of World War II, countries participating in the war were forced to print more money than their gold supplies to enable them finance themselves and their armies. In 1944, the Bretton Woods Conference led to the establishment of the International Monetary Fund (IMF). Nations pegged the values of their currencies of the United States dollar, which itself pegged its value on gold.

According to the World Gold Council, as of 2015, the top 10 gold reserves held by countries and organizations ranked as follows:

	Tonnes	% of Reserves
United States of America	8,133.5	72.6
Germany	3,384.2	67.8
IMF	2,814.0	Unavailable
Italy	2,451.8	66.6
France	2,435.4	65.6
Russia	1,208.2	12.2
China	1,054.1	1.0
Switzerland	1,040.0	7.7
Japan	765.2	2.4
Netherlands	612.5	55.2

Source: World Gold Council, Feb 2015

Several countries rely heavily reliant on gold exports to supplement a percentage of their GDP. Some of the most noteworthy as at 2013 included Papua New Guinea (18%), Suriname (16.7%), Burkina Faso (13%), Kyrgyz Republic (12.7%) and Ghana (11.1%). The main gold-producing countries in the world between 2010 and 2015 are summarized in the following visual:



Source: Statista, 2016 http://www.statista.com/statistics/264628/world-mine-production-of-gold/

As at March 2016, gold was priced at $1,232 per ounce and $39,632 per kilo. With such prices prevailing in the international market, the suppliers of the precious metal have had added incentive to supply, and prospecting nations have more reason to intensify efforts. Currently, East Africa's only notable gold producer is Tanzania, with production reported to have reached

34 tonnes in 2001. For this reason and in a bid to reap the financial gains that come with the precious metal, Kenya has sought to venture into the world of commercial-scale gold mining.

Gold Mining in Kenya

The prospect for gold in Kenya began in 1882 at Lolgorian in Narok, Rift Valley Province. Additional deposits have been found in Kenya’s western region, in such towns as Kakamega and Migori. By 1952, about 259,000 ounces of gold had been mined in Kenya, and analysts indicate that more still exists. The interest in gold mining in the country had been dormant and in the shadows for a significant period, until reports of the smelting of 13.5 kilos (476 ounces) of gold surfaced. There have also been reports of small-scale miners who jointly process about 500 kilos (17,636 ounces) of gold on a monthly basis. However, most gold mining activity in Kenya is either too small scale for commercial viability or done without transparency such that it is difficult if not impossible to trace the financial benefits that accrue. The main method used in gold mining in the country is panning, where pans are made use of and water to shake off impurities and retain the gold. In 2013, Kenya set up the Ministry of Mining to oversee and regulate the mining of gold in the country in order to mitigate the problem of miners and traders seeking to undercut the nation in the trade of the precious metal.

Competitive Environment

There are a number of companies which have set up operations in Kenya and are involved in the mining and partial processing of gold. This section gives a highlight of the main players in Kenya’s gold mining sector.

Goldplat plc

Goldplat is famed for its involvement in the Kilimapesa mining project, a joint venture with International Gold Exploration. It acquired 100% stake in the Kilimapesa mine in 2009 for $2.7 million and the first announcement of commercially viable gold by the company was in 2012. The company invested $500,000 in the improvement of the mine and in upgrading its techniques and equipment. As at 2014, it announced that operation near break-even was possible and that gold recovery had significantly been increased. In its 2015 report, Goldplat stated that it had produced 2,278oz up from 1,163 in 2014 and sold 2,073oz up from 919oz in 2014.

Red Rock

Red Rock operates mainly in the Migori region of western Kenya as well as in Narok county. Exploration for gold in the region occupied by Red Rock began in the 1930s, and was revived in 2010 with more extensive coverage. The company estimates that the mines in the areas will yield about $95 million at the current market price in revenues and produce 80,000oz of gold. Red Rock has also generated a list of 12 new sites for investigation in Migori in addition to the existing ones.

Advance Gold Corp

The company operates mainly in western Kenya, with mining projects in Rosterman, Bukura and Sigalagala, all in Kakamega. The Rosterman project which the company acquired is reported to have produced the aforementioned 250,000oz of gold up until 1952, after which there has been fairly little activity. Advance Gold Corp. was founded in 2007 and is headquartered in Vancouver, British Columbia, Canada.

African Queen Mines Limited

Until 2015, the company operated in Kenya and ran a mine in Rongo, in the Nyanza region of Kenya. the decision to terminate operations in the country were fueled by security concerns and its perceived state of political instability in Kenya.

Challenges

Lack of Transparency

There have been reports of the country producing gold in substantial amounts. However, this gold is either smuggled out of the country or marketed in unclear and untraceable ways. The lack of transparency and information-sharing has discouraged potential investors, who may be unable to recover their money. They also lack clear information on production capacities and the best mining locations, both current and potential.

Poor Technology

While panning is the most widely used method for gold mining, it is largely traditional and its yield is very low compared to modern methods. Its reach is also limited since only surface gold can be extracted. South Africa makes use of hard-rock mining which is more modern and allows the extraction of more gold encased in rocks. This method is the most widely used in countries with large gold deposits such as China and the United States.

Poor Regulation

The mining sector in Kenya has been overshadowed by other sectors and industries such as tourism and agriculture. As such, regulation of the mining sector has been loose, allowing unscrupulous miners and traders in gold to reap benefits, at times in unlawful fashion. Lack of regulation has also slowed down the search for and compilation of useful information on mining in Kenya which potential investors can make use of.

Cost of Operation

There are currently no subsidies provided by the Kenyan Government to miners. The high taxes, poor infrastructure and rampant cases of mismanagement and corruption involving the payment of bribes for tenders has driven up the cost of operation. Although a survey placed Kenya in an average rank in terms of political stability and ease of mining activities, the country is still largely behind its African counterparts such as Tanzania and South Africa.

Corruption Allegations

There have been cases of reported asking for and the offering of bribes by mining companies and individuals seeking to establish themselves as small-scale miners. The bribes are intended to allow tenders and permits to be issued out, with no proper procedures and systems to track the investments or returns. An example is the Chinese firm Fenxi Mining Industry Company's questionable tender allocation, where the company was to engage in coal mining in Kitui County. In 2015, the Ministry of Mining sought to curb this trend through the set-up of an online tender application process which is more transparent and less prone to corrupt dealings.

Opportunities

Technology Upgrade

Due to the application of small-scale and largely traditional mining techniques, gold mining in Kenya has stagnated significantly. There is therefore an opportunity for investors seeking larger profit margins with the use of modern mining technology and industrial scale methods such as hard-rock mining which is more effective and has a higher yield.

Easy Market Entry

Since there are relatively few firms involved in gold mining in Kenya, the barrier to market entry posed by competition is almost non-existent. Therefore, for potential investors with modern prospecting techniques and financial capability, the market is open, with no dominant player.

Improved Regulation

With the set-up of the Ministry of Mining, the sector is set for more streamlined and regulated growth. Investors and mining companies will be better able to track their financial input and tender applications respectively. The use of online services as Kenya seeks to digitize all its government services will also mitigate instances of corrupt dealings and ensure there is increased transparency. It is also hoped that the Ministry will ensure that all miners are licensed so as to lock out unscrupulous small-scale miners making unregulated profits, some of who are involved in gold smuggling activities.

Regulation

Mining in Kenya falls under the Ministry of Mining, which was established in 2013. It derives its mandate from Executive Order No.2 of 2013. The Ministry was formed in order to tap into the potential of Kenyan mining which was unregulated and under the control of individuals.

Other than the mining ministry, there is no independent institution involved in the regulation of mining in Kenya.

Conclusion

Oil and gas in the country has generated international interest in Kenya. the success of companies like Africa Oil Corp and Tullow Oil have set the stage for other international firms to prospect for and produce oil and gas in the country. Plans for commercialization are still underway, but it is expected that by 2020 the country will have begun exportation. The discovery of new wells further instills hope in investors and in the country's citizens, due to the potential financial gain Kenya could enjoy with proper regulation, transparency and management. Offshore wells have presented additional promise in the sector, and the production of gas on a commercial scale could very significantly increase the country's energy output. Currently, Kenya is heavily reliant on hydropower and geothermal power.

The highlighting of the case of gold being produced by small-scale miners and smuggled out of the country brings not only concern but also opportunity for improved regulation. The country has in the past been successful in its endeavors to prospect for and mine gold. With improved mapping and exploration technologies as well as better machinery and technique application, gold mining in Kenya can have a bright future. Increased regulation in addition to the efforts of the Ministry of Mining are required so as to solidify set legislation and guiding principles on extraction of the precious metal.