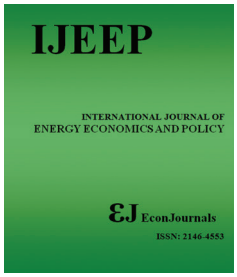

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2023, 13(3), 7-14.

Contract Structure of Production Sharing Agreement by International Oil Company in Exploration of Petroleum Resources in Developing Countries

Sha iqul Hassan[1], Yusuff Jelili Amuda[1], Mohsin Dhali[1]*, Saghir Munir Mehar[2]

[1]Prince Sultan University, Saudi Arabia, [2]MNA Management Group, Canada. *Email: mdhali@psu.edu.sa

Received: 04 January 2023 **Accepted:** 01 April 2023 **DOI:** https://doi.org/10.32479/ijeep.14142

ABSTRACT

Presently, there is little focus on the contractual agreement, particularly on the production sharing agreement by the International Oil Companies in the exploration of petroleum resources of developing countries. The primary objective of this paper is to critically explore the contract structure of production sharing agreement by the International Oil Companies in the exploration and development of petroleum resources in developing countries. Content analysis was used as the methodology of the study after examining several literatures. The findings indicate that the contract structure of the production sharing agreement (PSA) between National Oil Companies (NOC) and International Oil Companies (IOC) plays a significant role in the cost and risk of exploration and development of oil. In addition, it is noted that the joint committee of the NOC and IOC plays a paramount role in monitoring the operations of PSA between the NOC and IOC. Hence, from the gross oil production, the NOC gets its share as profit while IOC gets its share income tax. As an instrument of contract structure in the oil and gas sector, PSA needs further entrenchment between IOC and NOC to avoid likely issues that can emanate between the two parties in the face of current developments.

Keywords: Petroleum Resources, Contract Structure, Production Sharing Agreement, Energy, Oil
JEL Classifications: K120, Q40, Q48.

1. INTRODUCTION

The exploration and development of petroleum resources present enormous opportunities for the economic growth of many developing countries. At the same time, it offers various risks, constraints, and technical challenges for these countries too (Waterworth and Bradshaw, 2018). Typically, many developing countries suffer from the resource curse, among other related issues, when dealing with the production of petroleum resources, compared to countries less rich in oil (Rosser, 2006) due to their over-dependence on oil as a form of national revenue (Badeeb et al., 2017; Ross, 2012). Evidence of the poor economic performance of some oil-rich developing countries has given their huge return on oil profit (Waterworth and Bradshaw, 2018). A critical issue that continues to inhibit the economic development of these countries despite their resource wealth.

For International Oil Companies, issues associated with risks that are non-technical and uncertain are of concern, serving as a barrier to investment (Aven, 2016; Waterworth and Bradshaw, 2018), while for National Oil Companies in developing countries, it is the uncertainty in the future the demand for oil, and the projected availability of technological resources that is to mitigate climate change and facilitate the transition to renewable energy (Solano-Rodriguez et al., 2019). In addition, rentier states among developing countries that are fiscally reliant on petroleum resources revenue are known to experience severe institutional and political-economic shortfalls associated with the windfall nature of resource rent. They are also often susceptible to conflict

over the resources revenue (Barma, 2021). Furthermore, neither these countries nor their private organizations are endowed with adequate experience and capital for the development of their petroleum resources. This lack of technical expertise and capital in the oil and gas sector among developing countries, as examined in the case of Lebanon, results in brain drain, lack of a pool of scientists and researchers in specific units, inadequate institutional environment, inability to make public investments in relevant research and infrastructure (Dirani and Ponomarenko, 2021) in the face of the long-term, capital-intensive project which includes geological gap (da Hora et al., 2019). For these reasons, developing countries liaise with International Oil Companies based on an agreed contract structure for the exploration and development of petroleum resources. Meanwhile, the main issues for both parties in their contractual structure are the amount of risks to share and the distribution of revenue (Hurst, 1989).

Contract structure is the framework that determines the contractual relationship between an International Oil Companies (IOC) and National Oil Companies (NOC), otherwise known as a principal-agent agreement for the purpose of exploring petroleum resources in the oil and gas sector of a host country with stipulated terms of the agreement, condition and regulation between the major partners. However, despite this structural arrangement, many developing countries endowed with petroleum and natural resources still experience some level of constraints in dealing with IOC for several reasons, which have been highlighted above. For the purpose of emphasis, developing countries are usually faced with the inability to independently exploit these resources as it requires a large amount of capital and technical expertise for the whole process. Thereby issuing the right to perform such task to the IOC through the issuance of the license for the payment of tax under a number of terms of contracts such as production sharing agreement, concession, service agreement, and joint venture with bidding methods of negotiation and competitive bidding (Bindemann, 1999). Further, oil-rich developing countries with little capital and expertise and IOC are often faced with contractual challenges due to the dynamic nature of oil exploration and development either as a result of uncertainty in the quantity of reserves, the future price of oil, or geological constraints, among other issues.

Usually, in contract theory, the agreement between the "principal-agent" is traditionally examined from the principal's perspective, who needs to ensure that the agent acts appropriately in line with the contract terms. Under this note, the study shall examine the production-sharing agreement as one primary form of contract structure between NOC and IOC in developing countries. It also investigates the continuous interplay between the IOC and NOC and deep further examines the investment pool in the industry in light of current development.

Several studies have provided an in-depth understanding of the economic analysis of production-sharing agreement (Bindemann, 1999; Dirani and Ponomarenko, 2021; Peters and Kumer, 2011). Other studies have also investigated the historical development, changes, and reformation of the PSA, particularly in the case of Indonesia (Dirani and Ponomarenko, 2021). While Zebaria studied the production-sharing contract in the case of Iraq (Zebaria, n.d.). In addition, Ngoasong also investigated the business practice of international companies in the oil and gas sector and their response to local content policies in developing countries (Ngoasong, 2014). However, limited literature is available to explore production-sharing agreement as the instrument of the contract between International and National Companies in light of current developments in the energy sector. This study attempts to fill this gap.

2. CONTRACT STRUCTURE OF PRODUCTION SHARING AGREEMENTS IN THE PETROLEUM INDUSTRY: A CONCISE OVERVIEW

The need for a contract structure between IOC and NOC would remain in academic discourse, specifically when dealing with the energy sector. Both parties (NOC-IOC) involved in the exploration and development of petroleum resources among developing countries understand the deeper meaning behind a contract structure, considering the risk and profit that may emanate from the investment and the synergy in their interest. In recent times, discourse about the structural sharing of production between International Oil Companies and National Oil Companies in the exploration and development of petroleum resources in developing countries has dominated the masterpiece. This is triggered by the fact that the sector is not only seen as a backbone for economic growth and development but also plays a significant contribution to job creation, poverty alleviation, enhancement of the Gross Domestic Product (GDP), and improvement of all-round social well-being of the people in these developing countries. In some quarters, perhaps, it is believed that no extractive industry has been more volatile than oil, being the primary source of energy for modern industrialization. An initiative driven by endless cycles of spikes in demand precipitates an influx of actors, an oversupply of oil, and eventual price collapse. As the supply of oil grew in the pre-and post-World War II eras, vast reserves were found in developing countries and former colonies, which gave rise to an essential dilemma over the ownership of the oil in the ground. A significant development in the oil and gas sector.

One of the most exciting aspects of the petroleum industry is that it has several sectors or segments. The petroleum industry comprises three segments: (1) Upstream sectors (exploration, development, and production of crude oil or natural gas); (2) Midstream sectors; (3) Downstream sectors (oil tankers, refiners, retailers, and consumers) (Jafarinejad, 2022). Based on the classification, there are also the following types of classification of morphological categories depending on the purpose and methods: (1) empirical; (2) morphological-semantic; (3) semantic-pragmatic. In addition, the oil industry was subdivided into four major companies. They include National Oil Companies (NOCs), International Oil Companies (IOCs), Operator Companies, and Service Companies.

Given this overview, the petroleum industry in developing countries seeks the exploitation of their petroleum resources with the demand for capital and technical expertise for the success of this project.

This brings the need for collaboration with an International Oil Company to provide these resources. In pursuance of this project, there is a need for both parties to reach an agreement structured in the interest of all actors. This agreement can be established in different forms of contract depending on developing countries' national objectives and the interest of the IOC. Notable among these contractual structures is the production-sharing agreement.

2.1. Common Features of Production Sharing Agreements and Petroleum Fiscal System

The Production-Sharing Agreement remains the most dominant form of contract for the exploration and development of petroleum resources in developing countries (Bindemann, 1999; Olleik et al., 2021). In this form of contract, the State remains the principal owner of petroleum resources. Still, it interacts with an IOC that provides her with both financial and technical expertise for the process of development and exploration. Usually, the State is represented by either the government or one of its units, particularly the national oil company. On the other hand, the IOC is entitled to a certain percentage of the extracted oil as compensation for service rendered and risk taken in the production process. In addition, PSA has four key features. First, the IOC is responsible for paying royalties to the government on total production. After which, the IOC is entitled to a predetermined amount to recover the cost. The quantity of production left (profit oil) is distributed between IOC and the government at a predetermined ratio. Afterward, the IOC is obliged to pay tax on its income from oil profit (Bindemann, 1999; Daniel et al., 2010).

The government, the principal owner of the resources, has the privilege to partake in several areas of the project. Furthermore, PSA provides an avenue for both parties to dialogue in the form of a joint committee with the responsibility to monitor and manage the process of operation. Two unique features distinguish PSA from other forms of contracts. First, the government is the sole owner of the equipment and its installations. Second, the IOC is responsible for the entire risk of operations. In the case whereby no oil is discovered, the IOC bears all the risk as established in the contract structure. However, this agreement varies between the government and IOC, depending on how the contract is structured. For example, under the PSA in Indonesia, when it is discovered that the oil and gas field is sufficient for commercial purposes, the State is responsible for all costs of exploration and production. In the case of Peru, the risk burden in the process of exploration and production is shouldered by the company with a considerable compensation of oil revenue compared to the terms of the contract in Indonesia (Dirani and Ponomarenko, 2021). Some of these companies are Chevron Pacific Indonesia, Pertamina EP, CNOOC, ExxonMobil Cepu Limited, and Pertamina Hulu Mahakam. However, Zebaria argued that in the case of Iraq, it establishes a maximum level of oil production and recovery for international oil companies (Zebaria, n.d.). Making it an attractive contract structure for both parties. Especially when NOC uses local content legislation or policy to deal with the IOC. For example, in the case of Nigeria, there is a Nigeria content bill, while Kazakhstan relies on Kazakh Content law (Ngoasong, 2014).

2.2. Developing Countries Adopting the use of Production Sharing Agreement

This flexible nature of the agreement and negotiation process also makes PSA a unique contract structure. Although the production-sharing agreement first began in Indonesia in 1966 before being adopted by other oil-rich developing countries. Around the world today, the production-sharing agreement is commonly applied in many developing countries such as China, Peru, Indonesia, Qatar, Egypt, Syria, Guatemala, Malaysia, Jordan, Libya, Bangladesh, Angola, and Jordan (Babusiaux, 2004). Solano-Rodríguez et al. argued that the majority of the developing countries in the Caribbean and Latin America also fit into PSA (Solano-Rodriguez et al., 2019). It is also widely adopted in Central Asia and the Caucasus region (Radon, 2005). However, under PSA, oil produced cannot be processed or sold by IOC; the NOC processes and sells the share of the oil extracted (Brunnschweiler and Poelhekke, 2021). Despite the differences among developing countries adopting PSA, what remains predominant is that the state government is the rightful owner of the petroleum resources while also granting the right to control and manage the exploration and development process to IOC. Yet, the interest of individual states differs and are influenced by certain conditions and circumstances (Radon, 2005). Notwithstanding, generally, the PSA formula is often embedded in the contract structure and is usually present in the government's policy and legislation. The prominent constructs for measurement are variable scales and fixed percentages which determine the sharing of oil profit between IOC and NOC.

Variable scales: the rate of distribution differs depending on one or more variables such as prices, rate of return, "R" factor (income/disbursements), and production, among others.

Fixed-rate: the share that resonates with the existing PSA governments differs between 40% and 85%. Table 1 below shows an example of sharing formula under PSA.

If daily average production as stipulated in the time period was 45,000 bbls per day

Government Profit Share = [(30%*25,000) + 35% (20,000)]/45,000

Government Profit Share = 32.2%

Source: Committee of Experts on International Cooperation in Tax Matters (2020).

Meanwhile, the IOC, on its share of profit oil, needs to pay income tax. At times, this share of profit allocated to the IOC is included

Table 1: Percentage of government profit share based on daily production rate

Daily production rate (thousands bbls/day)	Government profit share (%)
0-25	30
>25-50	35
>50-75	40
>75-100	55
>100	60

in the production sharing formula (through tax oil) and can be paid in kind. This is usually specified in the PSA fiscal clauses.

2.3. Developing Countries Adopting the Use of Production Sharing Agreement

The histories of International Oil Companies (IOCs) can be traced as far back as the late 19th century during the time of their establishment. In the beginning, they acted similarly to other corporations, with the exception that they were also engaged in the production of petroleum resources. For example, until 1911, in the United States, the majority of the IOCs emerged from the dissolution of Standard Oil, which was, at this period, the leading oil corporation. As for the IOCs, they are commonly regarded as supermajor. In fact, globally, the *Supermajors are* the six biggest oil companies that are publicly traded. It is worth فخ mention that since the 1990s, these supermajor companies have undergone different forms of changes due to mergers and acquisitions, which are subject to forces in the market. Globally, it is estimated that the supermajors companies are in charge of 6% of oil as compared to NOCs, who are in charge of 88%, respectively. Table 2 below: shows the six supermajors companies

National Oil Companies (NOC), on the other hand, are State-owned agencies or corporations that also deal in petroleum resources. Al-Falih asserts that (NOCs) are oil firms owned by host countries having a more significant portion of shares in the oil sector and whose objective is to act in the interest of the country they represent (Al-Falih, 2011). Colen et al. further corroborated that the common mandate of NOC is usually to permit and provide assess foreign investors, as well as co-owners and service providers, to its petroleum resources (Colen et al., 2016). Looking at current development, in the majority of the countries with large oil deposits, NOCs have commonly been utilized to organize and control its operation.

According to Al-Fattah, presently, the majority of the developing countries which dominate the oil and gas sector, such as Saudi Aramco, Kuwait Oil Company, and the Iraqi National Oil Company, could all retrace their cradle back to partnerships established with international investors in the petroleum industry for the development of domestic resources right at the beginning of century (Al-Fattah et al., 2013). Darko confirms that these international agreements for drilling oil and gas are becoming hypercompetitive, technology-driven, and exponentially higher-cost businesses (Darko, 2014). In addition, it is evident that the producers in the petroleum sector show many stakes, and public expectations are disturbed by over-reliant on oil income which is volatile and uncertain, considering the increase in oil prices as these are crucial for creating an economy that is sustainable towards a long-term human development (Dietsche et al., 2013).

Studies by Yergin posited that during the 1990s, two primary forces were driving oil exploration and development in developing countries (Yergin, 1992). The first factor was the interest of the (IOCs) to control and incorporate upstream and downstream assets in order to avoid excess production to gain price stability. Second, the powerful nations of this period were concerned with organizing a world order under their control and influence. Therefore, as part of geopolitical concerns to counter the Russian empire's expansion and also to secure the energy supply of the Royal Navy, which incentivize Great Britain to embark on oil exploration in Persia (Yergin, 1992). During this period, IOC was privileged to sign a number of concession agreements with many governments, given its technological prowess and expertise for the exploration and development of oil. For a certain period of time, the IOC is responsible for upfront expenses in exchange for an agreed share of profit; at the same time, the government receives royalty from her. Although this remains the contract structure for many years, both IOC and NOC still have some gray areas influencing their relationship, which shall be further examined.

3. INTERNATIONAL OIL COMPANY AND NATIONAL OIL COMPANY: POINT OF DIVERGENCE

Several factors have been put forward to explain the rapport between IOC and NOC. The critical point of divergence between International Oil Company and National Oil Company can be captured broadly in terms of access to capital, standard technology, breadth of capabilities as well as partnerships, and local engagement efficiency.

3.1. Access to Capital and Finance

The primary motivating element of the investment agreement between IOC and NOC is access to capital and finance. Given that capital and finance is the backbone of any investment. As such, its pool is tantamount to economic efficiencies, viability, and policy decision-making. Based on this, the NOC oil project depends on State-backed capital and having access to equity and debt in global capital markets. Unlike the IOCs that acquire their capital from publicly floated firms with access to liquid stock markets, banks, and bond buyers.

3.2. Standard Technology

The technology standard is another noticeable divergence between the IOC and NOC. Standard technology in IOCs is usually characterized by inclining towards minimal expenses in the areas of RandD, which reduces costs under challenging environments targeted for development. Comparatively, given the current State of

Table 2: The six supermajors' companies

Name	Location (country)	Revenue (billions of dollars)	Reserve size in billions of barrels
ExxonMobil	Texas –United States	383	72
Royal Dutch Shell	The Hague –Netherlands	368	20
BP/Amoco	London –United Kingdom	308	18
Total SA	Paris –France	229	10.5
Chevron	California –United States	204	10.5
ConocoPhillips	Texas –United States	198	8.3

Source: UNCTAD (2017)

standard technology in NOC, there has been tremendous progress in RandD innovation and technology. Equally, this has, in recent times, culminated and paved the way for an increase in RandD budgets in developing countries. This actually has its own effect in the sense that it encompasses the activities that these companies undertake in developing, designing, and enhancing their product or perhaps to innovate and introduce new products, goods, and services in the oil industry (Al-Fattah et al., 2013).

3.3. Breadth of Capabilities and Partnerships

Another point of contrast between the IOC and NOC is the concept of comprehensiveness of capabilities and partnerships. It is a common phenomenon to observe IOCs having a long history of partnerships in multiple environments and governments of different countries, NOCs, Oilfield Services Companies (OFSCs), and other IOCs and similarly coming to terms with new partners. While in contrast, the NOC principally focuses on domestic operations. Gallagher and Birch noted that in most cases, NOCs establish alliances with IOCs, Independents and OFSCs as required, thereby expanding businesses globally (Gallagher and Birch, 2009). Pointing to this, for instance, was the agreement between Chevron and Aramco of Saudi Arabia for developing and exploring massive oil wells. Similarly, both Aramco of Saudi Arabia and Total entered a joint venture deal to construct the Al-Jubail refinery to process large volumes of oil. In the artic, an agreement was also struck between ExxonMobil and Rosneft, among other colossal oil investment deals.

3.4. Engagement Efficiency

As aforementioned, in general, the majority of the international oil companies have a deep-rooted societal engagement at multiple levels to make deals with developing countries with poor institutional infrastructure using PSA as it appears convenient for them due to the risk exposure for the lack of transparency, legal uncertainty, and of political instability in the host country. Al-Fattah noted that, in essence, IOCs develop models with local engagement by necessity (Al-Fattah, 2013; Garcia et al., 2014). While on the other way round, NOC mainly operates in their domestic market and has little need for local overseas engagement even though they have access to resources globally. Essentially the fiscal policy demands that the NOCs are responsible for the ownership and management of the supply chain of petroleum resources from upstream to downstream in the host country (Ike and Lee, 2014).

3.5. International Oil Company and National Oil Company: The Meeting Point

The point of convergence between International Oil Companies and National Oil Companies is having increasingly equal unrestricted access to capital markets. Meanwhile, among some developing countries, the increase in the issuance of external sovereign bond has also been reflected in the increase in debt sustainability with grave concern that could be worsened by external or domestic shocks, including slippages in the management of public funds. In advanced economies, the majority of companies have firmly embarked on using their financial window to finance share buy-backs, higher acquisitions, and dividends (Mudford and Stegemeier, 2003).

Most of the time, there is usually an overlap between IOC and NOC in the area of shared operations because IOCs often train local workers to help developing countries advance and improve their workforce, which is often inadequate (WEF, 2019). This is considered a significant factor contributing to GDP growth but does not reflect the essential aspects of sustainability and well-being. It has also contributed to the improvement of NOCs workers to become qualified domestic operators by utilizing IOCs' expertise with healthier agreements, acquiring and providing small-size companies the opportunities to have technical skills, as well as developing skilled workers and expertise via partnerships on a global scale.

The point of convergence between International Oil Companies and National Oil Companies is also having in-house Research and Development capabilities. Both IOC-NOC interactions often result in the commencement of cross-national investments as well as building and establishing institutional knowledge and skills in major areas of technical expertise. This interaction between NOCs and IOCs is usually established in a unique and mutually productive avenue for the exchange of knowledge, technology, and skills. Such education and training create a new experience for businesses and opportunities to operate at a level that contributes to national development, thereby increasing human capital, stimulating domestic firms, and helping these participants in the diversification of their economy.

The NOC-IOC corporations focus on developing and promoting the local economy by leveraging the upstream sector. For illustration, large oil importers have the opportunity to profit from the development of domestic renewable energy sources, which will, in turn, lead to developments in energy supply, security, and external balances. This reflects the urgent requirement why these countries are beginning to introduce environmental sustainability objectives into their strategies and policy for national development and to as well comprehend the resource consequences of achieving and reaching the Sustainable Development Goals by 2030. The IOCs also play an important role in national development objectives, often described as corporate social responsibility (CSR). Jaffe confirms the concept of CSR strategies as requirements for operational activities that include the delivery of goods outside tax for the host country and the mitigation of risk (Jaffe, 2020). This is also supported by Al-Fattah et al., 2013 who sees CSR as a mutual objective between national and commercial development needs, organizing projects with the appropriate government stakeholders and other community participants (Al-Fattah et al., 2013).

4. CURRENT POOL OF INVESTMENT AND PROSPECT IN OIL GROWTH OF DEVELOPING COUNTRIES

Despite the fall in oil prices between 2014 and 2016, investment in the petroleum industry continues to increase, picking from the drop experienced in the past years. A number of developing countries such as Angola, Timor-Leste, Libya, Venezuela, Qatar, Iran, Darussalam, United Arab Emirates, Russia, Nigeria, Saudi Arabia, Azerbaijan, Bahrain, Gabon, Kuwait, Trinidad and Tobago,

Colombia, Kazakhstan, Brunei Darussalam, Algeria, and Oman are seeking to exploit their new founded petroleum resources to drive revenue. The economic situation in some countries is reinforced by the increase in the production of oil as a result of these new oilfields contributing to stream coupled with more efficient extraction strategies and policies.

In several developing countries, it is projected that mild economic expansion will likely occur because of the increase in oil production. For example, in Libya, there is a record of stable growth due to the regain in the production of petroleum resources. Similarly, in Nigeria, as the production of oil increased with the improvement of the private sector, growth is estimated to have picked up to 2.1% in 2019. Meanwhile, in 2018, growth in GDP remained at 1.6%, where it is projected to reach 2.7% in 2019 and 2.9% in 2020, respectively. In Gabon, the economy is estimated to improve by 2.5% in 2019 and 2.8% in 2020, reflected by the increase in the production of oil.

In addition, growth acceleration in Chad is estimated to climb from 3.8% in 2019 to 5.5% in 2020. The export of oil and gas in other exporting countries declined due to the ongoing repair of oilfields in Kazakhstan, while in Azerbaijan, economic activities progressed due to the increase in the production of natural gas and the operationalization of the Southern Gas Corridor. Further, in Turkmenistan in April 2019, the continuation of gas exportation to Russia also contributed to the prospect of economic growth (Filatova et al., 2021; WEF, 2019).

More than that, a sharp recovery from the breakdown of oil prices in 2014/15 still remains fragile due to instability and insecurity in these countries. Apart from that, the factual prospect in assessing demands in the future, it is understood that there is an exposure to risk in decisions and policies linked with stranded losses and assets. Furthermore, there is room for the increase and expansion of renewable energy. The International Renewable Energy Agency (IRENA) projected that over the period between 2015 and 2050, global assets could possibly be stranded due to the transition into a new form of energy which will aggregately result in the use of trillion dollars, with a minimum of roughly $5 trillion buildings and equipment. In the upstream energy sector, there is an additional amount of $4 trillion, which is approximated to be about 45-85% of the total value of the present upstream oil producers. Also included is an additional amount of $900 billion in assets that deal with the production of power and about $240 billion in industrial assets (IRENA, 2018). In addition, top energy analytical firms estimate that in the next 20 years, there will be a steady increase in the demand for hydrocarbon and a steady rise in the price of oil which is a short-term indicator of an accumulation of the investment for new projects (Yakovlevicha et al., 2019). The following summarizes the prospect of oil growth among developing countries.

4.1. Wealth Fund Management

Petroleum resource producers must carefully manage revenues from current oil sales to have a buffer against potential losses and invest in a diverse portfolio of long-term assets with the majority of long-term oil and gas produced. Therefore, countries such as Oman, United Arab Emirates, Iran, Bahrain, Kazakhstan, Qatar, Angola, Colombia, Saudi Arabia, Libya, Venezuela, Russia, Gabon Azerbaijan, Brunei Darussalam, Kuwait, Nigeria, and Timor-Leste have commenced their establishment of sovereign wealth funds and programs to help in their process of transition. In March 2018, more than 78 commodity-based sovereign wealth funds were in existence, with more than $7.4 trillion in the global gross product in assets (WEF, 2019). This would inevitably shape the continuous interaction between NOC and IOC regarding their future contract structure. This is because NOC is structuring its national interest and objective to sustainable development in the face of dire and current challenges in the oil and gas industry.

4.2. Economic Diversification

In the words of Al-Fattah, key priorities that have strengthened economic resilience and have enhanced the prospect of long-term development between the IOCs and NOCs include investments in both education and infrastructure and providing the means to promote the importance of economic diversification (Al-Fattah et al., 2013). United Nations further asserted that there had been economic diversification in the last decades via strategic investments in training and skill development, infrastructure, and technology (United Nations Department for Economic and Social Affairs, 2020). This has helped to reduce the weight on external balances due to the decline in commodity-related profit, creating fresh employment opportunities and promoting an easy route to transit to a cleaner energy mix.

4.3. Transparency in Risk-Sharing Agreements

Notwithstanding, developing petroleum resources needs substantial physical and human capital investments. However, developing countries that are very much interested in considering future investment in the petroleum industries must adequately and openly establish that these risks are well defined in contractual agreements and transparently shared with the IOC. This, for the majority of developing countries, would serve as a significant issue, which predominantly relies on international investors and firms to embark on exploration projects that are expensive in order to commence with the fundamentals aspect of such sectors (United Nations Department for Economic and Social Affairs, 2020). The consequences could be far greater than the cost to be shared if both parties assumed full responsibilities using the proper contract structure.

5. RESULTS AND DISCUSSION

The study's main objective is to explore the contract structure of production sharing agreement between the IOC and NOC in the exploration and development of petroleum resources in developing countries. We find that PSA remains the most dominant contract structure between NOC and IOC in developing countries. In addition, evidence suggests that both parties have a strong common interest in exploring and developing petroleum resources for profit maximization. This factor, among others, has continued to shape their interaction during negotiations before any agreement that further leads to renegotiation. Furthermore, both NOC and IOC have their unique contribution to the development of petroleum resources which can be described as symmetric cooperation for

the common interest. From a historical standpoint, the Concession contract by happenstance remained the leading form of contract structure until PSA overtook it as the host government began to realize the need to control and benefit more from their petroleum resources. Although there are a number of gray areas which define their point of divergence and convergence in terms of capital, technical expertise, resource allocation, and distribution in their contract structure, the use of production-sharing agreements as a contractual mechanism has helped to facilitate ease this practice with many rooms for improvement considering the present and future challenges confronting the global production of oil due to its effect on the environment. Despite this challenge, the study still anticipates that the exploration and development of petroleum resources among developing countries would remain in the future with the pool of investment in the industry despite the global movement to transit to clean energy.

At this junction, it is critical to expand the scope and content of PSA to accommodate this new development, as most developing countries have seen the need to adopt the production sharing agreement due to its flexibility and power vested in state ownership and control. Even though most of these agreement might vary from country to country yet, it does not change the fundamental nature of the system and structure, as the ownership of resources and equipment usually belongs to the host government. Given the benefit from oil revenue, most oil-producing developing countries have seen the need to be prepared with this revenue for future energy challenges through their sovereign wealth investment, while others are lacking behind. In addition, it is likely to see some oil-rich developing countries less dependent on foreign capital and expertise looking at this wealth growth and increase in expertise in the development of petroleum resources under the umbrella of the energy transition.

The transition to a renewable energy source is considered one of the biggest challenges facing the petroleum industry. However, this study argues that such a challenge can be mitigated and controlled with an appropriate strategic approach and the commitment of NOC and IOC to diversify their revenue and investment into renewable sources of energy to remain relevant and sustainable. History shows that although there has been a new form of energy since the 18th and 19th century with the transition to a new source of energy, the newly discovered alternative does not completely overwrite the old source from biofuel to fossil fuel and renewable in contemporary discourse. Therefore, in the best interest of the NOC and IOC, such an issue must be critically examined as the world is moving to net zero by 2050.

For the time being, the contract structure using production sharing agreement between IOC and NOC will steadily improve. It will develop further into a more sophisticated agreement in the lens of global environmental policy that will have a tremendous effect on the system of production of petroleum resources and the business model of leading companies in the oil and gas sector, as posited by this study. This challenge does not seem to be over in the near future, but it will instead transform into something bigger under a contractual structure in which PSA would remain highly relevant. More importantly, host countries must clearly define their national interest in the energy sector to formulate policies appropriately. In the same vein, IOC must be ready to identify the national interest of the host countries towards their development to serve as a win-win package for all parties.

6. CONCLUSION

The issues and challenges associated with the exploration and development of petroleum resources in developing countries will remain long-term friction between IOC and NOC, as identified by this study. Although, over the years since 1966, there have been massive changes and adjustments in the contractual system between the two parties. Production Sharing Agreement has been one of the most common systems of contract between IOC and NOC in recent years due to its robust advantage for NOC, although it differs among developing countries.

Several factors influence the exploration and production of petroleum resources in developing countries. States' fiscal policy and regulation, reward and risk, control and monitoring, national interest, institutional shortfall, and lack of capital and technical expertise, among others are the common factors identified as influencing the exploration and development of petroleum resources in developing countries. In the nearest future, most of these factors are still likely to remain, although they may differ among countries. Whether or not PSA would remain the most dominant form of contract between IOC and NOC, even though it will continue to experience a number of reforms considering the global push for renewable energy consumption.

Both NOC and IOC have shared some common interests and diverged in others, yet, for the interest of all parties, it is imperative to reform their contract structure to accommodate the new development and challenges. Notably issues dealing with climate change and environmental challenges due to global concern for the survival and protection of nature and humanity.

7. ACKNOWLEDGEMENT

The authors would like to acknowledge the support of Prince Sultan University for paying the Article Processing Charges (APC) of this publication.

REFERENCES

Al-Falih, K. (2011), Addressing the Real Sustainability Challenge. In The Second International Energy Forum NOC IOC Forum. Available from: https://www.chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ief.org/_resources/files/events/2nd-noc-ioc-forum/khalid-al-falih-keynote-speech.pdf

Al-Fattah, S.M. (2013), The Role of National and International Oil Companies in the Petroleum Industry. USAEE Working Paper No. 13-137.

Al-Fattah, S.M., Aramco, S., Abdullah, K. (2013), National oil companies: Business models, challenges, and emerging trends. Corporate Ownership and Control, 11(1), 727-736.

Aven, T. (2016), Risk assessment and risk management: Review of recent advances on their foundation. European Journal of Operational

Research, 253(1), 1-13.
Babusiaux, D. (2004), Oil and Gas Exploration and Production: Reserves, Costs, Contracts (Technip). Institut Francas Du Petrole Publication. Available from: https://www.books.google.com.sa/books?id=XgL7oXjAkdcC&printsec=frontcover&hl=ar&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
Badeeb, R.A., Lean, H.H., Clark, J. (2017), The evolution of the natural resource curse thesis: A critical literature survey. Resources Policy, 51, 123-134.
Barma, N.H. (2021), Do petroleum rents fuel conflict in developing countries? A case study of political instability in Timor-Leste. Energy Research and Social Science, 75, 102018.
Bindemann, K. (1999), Production-sharing Agreements grAn Economic Analysis. United Kingdom: Oxford Institute for Energy Studies.
Brunnschweiler, C.N., Poelhekke, S. (2021), Pushing one's luck: Petroleum ownership and discoveries. Journal of Environmental Economics and Management, 109, 102506.
Colen, L., Persyn, D., Guariso, A. (2016), Bilateral investment treaties and FDI: Does the sector matter? World Development, 83, 193-206.
da Hora, M.A.B.P., Asrilhant, B., Accioly, R.M.S., Schaeffer, R., Szklo, A., Hawkes, A. (2019), Decision making to book oil reserves for different Brazilian fiscal agreements using dependence structure. Energy Strategy Reviews, 26, 100377.
Daniel, P., Keen, M., McPherson, C. (2010), The Taxation of Petroleum and Minerals: Principles, Problems and Practice. 1st ed. London: Routledge.
Darko, E. (2014), Short guide summarising The Oil and Gas Industry Lifecycle for a non-Technical Audience. Available from: https://www.partnerplatform.org/eps-peaks
Dietsche, E., Dodd, S., Haglund, D., Henstridge, M., Jakobsen, M., Sindou, E., Slaven, C. (2013), Extractive Industries, Development and the Role of Donors. Available from: https://www.eldis.org/document/A66736
Dirani, F., & Ponomarenko, T. (2021). Contractual systems in the oil and gas sector: Current status and development. Energies, 14, Issue 17, 14175497
Filatova, I., Nikolaichuk, L., Zakaev, D., Ilin, I. (2021), Public-private partnership as a tool of sustainable development in the oil-refining sector: Russian case. Sustainability, 13(9), 5153.
Gallagher, K.P., Birch, M.B.L. (2009), Do investment agreements attract investment? Evidence from Latin America. In: The Effect of Treaties on Foreign Direct Investment: Bilateral Investment Treaties, Double Taxation Treaties, and Investment Flows. United Kingdom: Oxford University Press.
Garcia, R., Lessard, D., Singh, A. (2014), Strategic partnering in oil and gas: A capabilities perspective. Energy Strategy Reviews, 3(C), 21-29.
Hurst, C. (1989). Transnational oil companies and natural gas in developing countries: The implications of the fiscal regime. Energy Policy, 17(5), 501-510.
Ike, C.B., Lee, H. (2014), Measurement of the efficiency and productivity of national oil companies and its determinants. Geosystem Engineering, 17(1), 1-10.
IRENA. (2018), Global Energy Transformation: A Roadmap to 2050. Available from: https://www.irena.org
Jafarinejad, S. (2022), Control and treatment of sulfur compounds specially sulfur oxides (SOx) emissions from the petroleum industry: A review. Chemistry International, 2(4), 242-253.
Jaffe, A.M. (2020), Stranded assets and sovereign states. National Institute Economic Review, 251, R25-R36.
Mudford, B., Stegemeier, D. (2003), Analyzing the Sensitivity of Production Sharing Contract Terms Using Simulation. In: Paper presented at the SPE Hydrocarbon Economics and Evaluation Symposium, Dallas, Texas.
Ngoasong, M.Z. (2014), How international oil and gas companies respond to local content policies in petroleum-producing developing countries: A narrative enquiry. Energy Policy, 73, 471-479.
Olleik, M., Auer, H., Nasr, R. (2021), A petroleum upstream production sharing contract with investments in renewable energy: The case of Lebanon. Energy Policy, 154, 112325.
Peters, M.S., Kumer, A. (2011), An insight into production-sharing agreements: How they prevent states from achieving maximum control over their Hydrocarbon resources. International Research Center for Energy and Economic Development (ICEED), 37(1/2), 285-295.
Radon, J. (2005), The ABCs of petroleum contracts: License-concession agreements, joint ventures, and production-sharing agreements. In: A Reporter's Guide to Energy. Available from: https://www.gmec-ee.com/wp-content/uploads/2013/08/the-abcs-of-petroleum-contractspdf
Ross, M.L. (2012), The oil curse. In: The Oil Curse. United States: Princeton University Press.
Rosser, A. (2006), The Political Economy of the Resource Curse: A Literature Survey. https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/4061
Solano-Rodriguez, B., Pye, S., Li, P.H., Ekins, P., Manzano, O., Vogt-Schilb, A. (2019), Implications of Climate Targets on Oil Production and Fiscal Revenues in Latin America and the Caribbean. Energy and Climate Change, 2, 100037. https://doi.org/10.1016/j.egycc.2021.100037
United Nations Department for Economic and Social Affairs. (2020), World Economic Situation and Prospects 2020. United Nations. United Nations Department for Economic and Social Affairs.
Waterworth, A., Bradshaw, M.J. (2018), Unconventional trade-offs? National oil companies, foreign investment and oil and gas development in Argentina and Brazil. Energy Policy, 122, 7-16.
WEF. (2019), The Speed of the Energy Transition Gradual or Rapid Change? Available from: https://www.weforum.org
Yakovlevicha, B., Sergeevich, K.K., Mikhailovichc, P.V. (2019), Investment strategies of international oil and gas companies. International Journal of Innovation, Creativity and Change, 8(5), 63-69.
Yergin, D. (1992), The Prize: The Epic Quest for Oil, Money and Power. Free Press. Available from: https://books.google.com.sa/books?hl=en&lr=&id=WiUTwBTux2oC&oi=fnd&pg=PR3&dq=the+prize:+the+quest+for+oil,+money,+and+power.+&ots=_4B_v2a_21&sig=y06objtvbnv2ne7r_i1ezelrkks&redir_esc=y#v=onepage&q=The%20prize%3A%20the%20Quest%20for%20Oil%2C%20money%2C%20and%20Power.&f=false
Zebaria, D. (n.d.), Oil Production Sharing Contracts (PSCS) With a Focus on Iraqi Kurdistan Region Oil Contracts. Available from: https://www.ijicc.net/images/vol_13/Iss_4/13410_Zebari_2020_E_R.pdf [Last accessed on 2022 Oct 12].