

**Dr.Sara Elgazzar**

College of International Transport  
and Logistics  
Arab Academy for science,  
Technology and Maritime  
Transport

## An analysis of 2016 oil crisis: winners and losers in the oil supply chain

### Abstract

Oil industry is considered one of the strategic industries that shaping the trend in the global supply chain. Changes in oil prices can lead to a significant impact on the different players in the oil supply chain, particularly where the oil cost presents a considerable amount of the total production and trading costs. Since the second half of 2014, oil prices witnessed a downturn phase which continued and reached its peak in 2016, resulting in a mixed impact on the global supply chain, however, the negative impact was faster and more severe. Still the main causes of the crisis and its impact on the oil supply chain are open questions worth further investigation. This paper provides an analysis of 2016 oil crisis and its impact on the oil supply chain. The paper demonstrated the evolution of oil market and the volatility the market witnessed since 1948. The main drivers impacting the oil supply chain were identified, providing an insight about the causes of 2016 oil crisis. Simulation game, followed by focus group were conducted to identify the impact of the crisis on the different players in the oil supply chain, as well as to provide future directions to deal with the crisis for both winners and losers in the oil supply chain.

**Keywords:** 2016 oil crisis, supply chain collaboration, oil exporters, and oil importers

### ملخص البحث

تعتبر صناعة النفط واحدة من الصناعات الاستراتيجية التي تساهم في تشكيل سلسلة الامداد العالمية. ويمكن أن تؤدي التغيرات في أسعار النفط إلى تأثير كبير على مختلف الجهات الفاعلة في سلسلة إمداد النفط، خاصة ان تكلفة النفط تمثل قدرا كبيرا من إجمالي تكاليف الإنتاج والتجارة. ومنذ النصف الثاني من عام ٢٠١٤، شهدت أسعار النفط مرحلة انكماشية والتي استمرت حتى بلغت ذروتها في عام ٢٠١٦، مما أدى إلى تأثير مختلط على سلسلة الامداد العالمية، غير أن التأثير السلبي كان أسرع وأكثر حدة. ومع ذلك فإن الأسباب الرئيسية للأزمة وتأثيرها على سلسلة إمداد النفط لازالت غير واضحة و تتطلب مزيد من الدراسة. ويقدم هذا البحث تحليل لأزمة النفط لعام ٢٠١٦ وأثرها على سلسلة إمداد النفط. حيث يوضح البحث تطور سوق النفط والتقلبات التي شهدتها السوق منذ عام ١٩٤٨ مع تحديد العوامل الرئيسية التي تؤثر على سلسلة إمداد النفط، كما يوضح البحث الأسباب الرئيسية لأزمة النفط في عام ٢٠١٦، حيث تم تنفيذ نموذج محاكاة تبعه مجموعة تركيز لتحديد تأثير الأزمة على مختلف الاطراف التي تتعامل في سلسلة إمدادالنفط، ويخلص البحث بتحديد اهم الاتجاهات المستقبلية للتعامل مع الأزمة لكلاً من الفائزين والخاسرين في سلسلة إمداد النفط.

## 1. Introduction

Crude oil gained attention regionally and globally since its first discovery, not only as one of the most important sources of energy but also as one of the economic pillars in both oil exporter and importer countries, in addition to its importance in shaping the economic and political relations between countries (Rima, 2015). However, oil prices witnessed severe declining in recent years from 2014 to 2016 resulting in a dramatic impact on the value of exports, current account deficits, government budget deficits, and large currency depreciations (The World Economic Forum, 2016).

The supply-driven that pushed oil prices down should have led to a net positive impact on global GDP; however it is less likely to provide significant support to the global activity. Moreover, the market has increasingly reflected weakening global demand. The demand-driven witnesses high degree of uncertainty due to the financial instability and fiscal challenges in some commodity-exporting countries and the economic slowdown in emerging market economies, fueled by widening domestic imbalances and tighter financial conditions in some countries (ECB Economic Bulletin, 2016).

The downturn in oil prices requires strategic solutions to transform oil supply chain and improve efficiencies. The strategic collaboration in distribution, planning, and scheduling phases between different players in the oil supply chain (exporters and importers) can help in maintaining an effective supply chain ecosystem during this downturn in the oil industry (Stroud, 2016). This rese-

arch aims at analyzing the 2016 oil crisis to investigate the main causes and drivers and identify the impact on the different players in the oil supply chain, upon which the paper will propose future suggestions to deal with the crisis for both winners and losers economies.

## 2. Literature review

The prices of crude oil shows a series of increases, decreases, collapses and sharp rises over the past years. Prior to the Second World War, oil production and consumption was mostly within the United States. In 1948, competitive market price concept appeared leading to a very large cut in the price from 1948 through to the end of the 1960s. In 1973, the Arab-Israel war resulted in one of the biggest oil crisis happened. Organization of the Petroleum Exporting Countries (OPEC) members imposed an embargo against the USA and Holland and decided to decrease their oil production which led to a rise in the overall oil price by around 300%. From 1979 till 1981, the oil prices faced a volatile period again due to revolution in Iran in 1979 and Iran /Iraq War in the 1980s, which led to decreased oil production. These events resulted in more than doubling crude oil prices from 1978 to 1981. Then, price of crude oil dropped again in the first half of 1986, back to the level of 1974.

In 1990s, the price of crude oil rose again with lower output as a result of the Gulf War. In 1998, The combination of Asian consumption decrease and increase in OPEC quota production caused the price to decrease, then in 1999, prices began to get back due to decrease in OPEC quota production (Rima, 2015; Majumdar, 2016; Karim, 20-17).

Since 2000, international oil prices have witnessed a large amount of fluctuation. Russian output increases dominated non-OPEC output growth around 2000-2007. In 2011, demand from emerging markets, particularly from China and the Middle East pushed crude oil prices higher, however in 2013 prices started to decrease sharply due to increasing crude oil output by the United States (Rima, 2015; Majumdar, 2016; Karim, 2017). Between mid-2014 and early 2015, the excess supply along with weaker demand than expected in Europe and Asia played a vital role in driving the drop in the oil price by 50% .. Since then, the prices continue to decrease (Husain et al., 2015), resulting in a crisis in the oil supply chain reached its peak by 2016. The evolution of oil price (from 1946 till 2016) is presented in figure 1.

The international studies and reports attributed the reasons for the collapse in oil prices to both the supply and demand sides. From the supply side, the increase in the oil production- especially US production of shale oil and higher than expected OPEC output in countries such as Iraq, Libya, and Saudi Arabia- resulted in excess supply, at a time that coincided with decrease in the global demand due to slow economic growth particularly in China, Asia and Eurozone (Baumeister and Kilian, 2015; Husain et al., 2015; Khater, 2015; Middle East and North Africa -World Bank Group, 2015; The International Monetary Fund, 2015). In addition to other reasons contributed indirectly to the decrease of oil prices, such as the improvement in the fuel efficiency and fuel economy level in many developed

countries and the political instability in the Middle East (Khater, 2015).

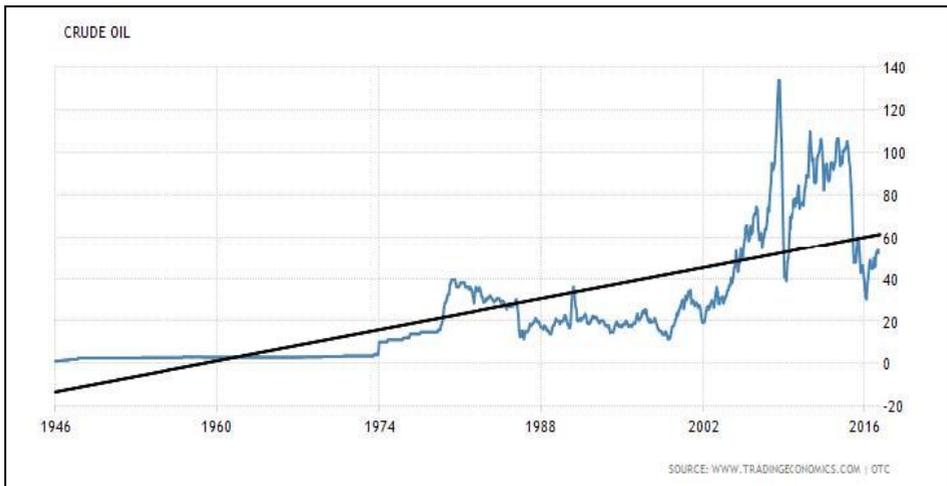
The 2016 oil crisis resulted in economic impacts and consequences in both oil-exporting and oil-importing countries. The oil-exporting countries faced serious and quick negative repercussions on public finances and the current account deficits, especially those that rely mainly on oil export revenues, such as Saudi Arabia, Russia and Venezuela. The positive impact of falling prices on oil-importing countries will take longer time to be recognized and it is likely to be, on average, a slight impact and tainted by ambiguity and uncertainty according to the share of oil imports in the GDP and the general level of confidence in the economy (Middle East and North Africa -World Bank Group, 2015).

If the situation continues with the same direction (excess oil production versus weak demand), prices will remain low for long period. The change in the supply policy depends mainly on two factors. The first factor is the willingness of OPEC and Saudi Arabia to cut production in the future. This depends on shifting geopolitical vision from focusing on the price to focusing on the market share (quota), which requires a strategic agreement among the main producers in or outside the OPEC. The second factor is to what extent the oil production investment and economies of scale will response to such changes in the oil production strategy. The decrease in oil prices put financial pressures on the producers who generated losses over the last period, which raises a question concerning their ability to survive in case of the cut of production in the future as it might enforce

many producers to exit the market (Khater, 2015).

The impact of the oil crisis will differ from country to another according to many factors such as the terms of trade impact, fiscal and external vulnerabilities, domestic cyclical position, and

persistence of the shock (Husain et al., 2015). The rest of the paper will focus on defining the impact of oil crisis on the different players in the oil supply chain along with future directions to deal with the crisis for both winners and losers in the oil supply chain.



(Source: Trading Economics, 2017)

**Figure 1: Oil prices' trend analysis from 1946 to 2016**

### 3. Methodology

The research applied an inductive research approach incorporating both quantitative and qualitative research methodologies. Triangulation technique was used combining literature review, simulation game and focus group research methods to investigate the 2016 oil crisis and ensure the validity of findings.

In game research, emerging around mixed methods has the benefit of not being limited to theoretical implicit view; as it takes the research to a proper empirical approach, particularly when it is mixed with focus group interviews as

a way to evaluate and understand game play experiences. Game research can be used as part of a practice oriented problem-solving method. This makes game research a practical field now emerging at a high pace with industry stakeholders and university researchers. This could for instance include the use of simulation as a research technique to stimulate creativity and empower ideas for problem solving (Lankoski and Björk, 2015). Gaming based empirical studies employ simulation technique for understanding stakeholder interaction and decision making in complex systems. Simulation games have unique potential to expand the understanding

of stakeholder dynamics and identify action necessary to foster transition towards problem solving (Mochizuki, 2016).

As illustrated in the previous section, secondary sources of data was collected from published international report, statistical records and literature review to analyse the 2016 oil crisis, investigate the main causes and drivers and identify the impact on the different players in the oil supply chain.

The United Nation (UN) simulations Model was then conducted as a simulation game method, followed by a focus group comprising experts in the field as a primary source of data collection. The simulation game and focus group enabled deep analysis of the 2016 oil crisis and its impact on the oil supply chain, upon which the paper proposed directions to deal with the crisis for both winners and losers economies.

UN simulations Model is a simulation model entailing the creation of a real or hypothetical scenario in which participants typically roleplay delegates to the United Nations and simulate UN committees (Consules, 2017). The simulation has been conducted through three phases. In the first phase, a 60 minutes undergraduate student seminar was held in the College of International Transport and Logistics to introduce the idea of UN simulation and the topic of 2016 oil crisis, where introductory documents about the topic were provided to the students. The students were chosen from the College of International Transport and Logistics since they have the required knowledge in the field of logistics and supply chain management. The students have been given one week

to read the documents and search online about the topic, then a call for participation in the UN simulation was open. 31 students have been selected and divided into 14 groups representing 14 countries that most affected by the 2016 oil crisis (Venezuela, United states of America, United Kingdom, Saudi Arabia, Emiratis, Kuwait, Qatar, China, France, Iran, Israel, Germany, Egypt and Iraq).

In the second phase, 5 day workshop was organized to carry out the simulation game. In the first two days, an overview was given about the United Nation and OPIC organization, in addition to orientation sessions about simulation game as a research method and the negotiation and debating skills needed to conduct the simulation. The third day focused mainly on introducing the 2016 oil crisis from different perspectives, while the last two days of workshop were dedicated to running the simulation model. Each group simulated a country of the selected 14 countries and started the negotiation from the country's perspective.

In the last phase, each group presenting a country prepared a report analyzing the problem from the country's perspective including the impact of the crisis on the supply chain and the suggested future steps. Finally, the researcher studied and combined these reports to draw an initial view of the proposed directions to deal with the crisis, which has then been verified by the focus group.

A focus group of four experts was assembled comprising academic experts in the area of supply chain management and practitioners in the field of oil industry to discuss the initial results ex-

tracted from both literature and UN simulation model. The following questions were asked and the group discussed each question, in sequence:

- In your opinion, what are the main causes and drivers of 2016 oil crisis?
- The findings from UN simulation game proposed some directions to deal with the crisis, do you agree on these directions?
- From your own point of view, are there any other directions to deal with the crisis for both winners and losers economies?

#### 4. Findings and analysis

Findings from the UN simulation and focus group confirmed the causes of 2016 oil crisis illustrated in the literature review and highlighted the excess oil production and the weak demand due to global economic slowdown as the main causes of the oil crisis.

The analysis of post process simulation and the results of focus group concluded with four main directions to deal with the crisis for both winners and losers economies. The proposed directions considered providing solutions that will contribute to solving the problem on an international scale (the first and second directions), as-well-as solutions to support the countries affected negatively by the crisis (the third and fourth directions):

1. Building strategic collaboration between different players in the oil supply chain
2. Enforcing the cut of the production of the crude oil to go back to equilibrium.

3. Creating a diversified portfolio considering different sources of income
4. Shifting towards efficient and cost effective technology

These are described below in turn

Creating strategic collaboration among players in the oil supply chain can help all players to survive, resulting in a winwin deal even for these players who suffered from losses since the start of this crisis. This can be achieved through creating alliances between oilimporting countries and oil-exporting countries. For example, Venezuela as one of the countries which has a high reserve in oil can collaborate with oilimporting countries in Asia and Eurozone to attract the experts from these countries who would be able to extract oil efficiently and share the experiences with the excavators in Venezuela. The contracts can be made based on BOT terms (Build, Operate and Transfer) for which will benefit Venezuela as it will nourish their petrol extraction. Another application could be in United Arab Emirates (UAE) as the second largest producer of Shell oil (Rocky oil) which is hard to extract and needs high technology. The experts from oil-importing countries in Asia and Eurozone can extract the oil for UAE in return of a share of the oil, in addition to BOT models whilst working on developing renewable energy (Green energy).

On the other hand, enforcing the cut of the production of the crude oil to go back to equilibrium became a must. Kingdom of Saudi Arabia (KSA) being the leader of the OPEC does not prohibit the other members to vote that KSA should increase the selling price to be equal to the international market price

rather than encountering a loss in order to gain all of the demand of the petroleum importing world. In other words, KSA is producing oil at a loss by selling at a lower price than the global market formal price thus it has the urge to produce more in order to cover its losses. However, KSA is not willing to go for that option, therefore it is the duty of the rest of the world to have the market in control and try to rely on other suppliers for oil like UAE for example as the second largest producer of oil after KSA, or even relying on renewable sources of energy such as solar or hydro-electric energy or any form of sustainable energy along with oil in order to enforce the cut of the production of the crude oil to give a chance to the oil markets to stabilize and go back to equilibrium.

Shifting from oil to other sources of energy is a fact that oil-exporting countries should consider. Relying on petroleum exports as the main source of income can be a serious threat in the near future facing the main oil-exporting countries. Creating a diversified portfolio considering different sources of income became a must for these countries to diversify their economies. KSA ranks as the largest exporter of petroleum and its petroleum exports account for almost all of the government revenues. On the contrary, The UAE changed its strategy about being a fully dependable petroleum country to a non-dependable petroleum country.

Finally, shifting towards efficient and cost effective technology could be a solution for oil producing companies which face a big challenge to survive and maintain its profitability while the oil prices are down and not expected to

increase for long period. It is time now to change the innovation direction from being fast – which was the trend when the oil prices were up- to focusing on efficiency and cost reduction. However cost cutting is not the only mission for oil suppliers to survive, focusing on building strategic relationship (supplier relationship management) and collaborating with other partners in the oil supply chain is essential in this phase.

## 5. Conclusion and future directions

The review showed different determinants that affect the oil prices, mainly the global demand, the global production, wars and world political stability, the technological and industrial development level and policy of governments. Moreover, the volatility of oil prices lead to different consequences on the global supply chain.

Between 2014 and 2016, the excess oil production accompanied with the weak global demand resulted in a crisis in oil supply chain. Downturn phases can have a positive impact on the industries and sectors that spend a significant amount of their total costs on fuel cost, mainly retail business, logistics companies and transportation industry; in addition to any manufacturing industry relies on oil as part of the needed input in the production process. On the other hand, oil producers struggle to survive and cut costs in order to face the decreases in prices. However, the impact of the oil crisis differs from country to another according to its economic, political and technological situation.

That being said, it is certainly the objective of each country to fulfil its own welfare. However, in order to be

able to pass from the current situation, it is the responsibility of each country affected by the crisis to provide solutions to fulfil its own welfare, as well as solutions that will contribute to solving the problem on an international scale and cross to the safe zone. This requires strategic collaboration between different players in the oil supply chain to ensure the surplus for the extended supply chain.

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