

## THE IMPACT OF CRUDE OIL AND NAPHTHA PRICE FALL DOWNS ON THE PETROCHEMICAL SECTOR IN SAUDI ARABIA

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### Abstract

The focal emphasis of this study is to explore alternative strategies for the petroleum companies during the sustained decline of the prices of crude oil. On the other hand, the study aims at investigating qualitatively and quantitatively the impacts on the profitability and competitiveness of Saudi petrochemical industry as a long term alternative for the Kingdom of Saudi Arabia to sell crude oil. In view of the oil prices decline, the KSA authorities need to diversify their economy by using petrochemical industries. This choice to recur to more downstream derivative sales rather than selling crude oil has proven to be the right decision. The petrochemical products are the right substitute to crude oil. With cheap feedstock advantage, petrochemical giants like SABIC and Aramco are planning to build more chemical plants which shall contribute to KSA economy growth and benefits the society as a whole. The upcoming number of new upstream projects launched by the private sector will lead to a reduction of the prices for resins, therefore, making downstream operations more attractive to internal and foreign investors. Expanding capacity of higher value added products will also mean that the country will have to shift from lighter feedstock (Ethane) and capital-intensive process to heavier liquid feedstock (Naphtha) and labor-intensive process. Security of feedstock supply creates value, drive growth, and innovation and creates huge potential for business investment opportunities and growth in Saudi Arabia. On the other hand, joint venture partnerships between local companies and U.S., European, and Asian counterparts would play an increasing role in the growth of the upstream and downstream plastics industry.

**Keywords:** Oil price decline, Naphtha price, petrochemicals, revenue diversification, economy growth, KSA

### 1. BACKGROUND OF THE STUDY

Naphtha refers to any of several liquid mixtures of hydrocarbons made by refining petroleum or by breaking down coal tar. According to Dicitonary.com (2015), Naphtha is usually flammable and is used as a solvent and as an ingredient in gasoline. It is also used to make plastics. The Encyclopedia Britannica (2015) defined Naphtha as a flammable liquid that contains several types of hydrocarbon which came from a process of distillation of petroleum, shale, and coal. It is also the primary source in the production of ethylene and propylene converted into polyethylene or polypropylene. Encyclopedia Britannica (2015), described polyethylene as the

most widely used polymers in the world for the production of bags and packaging materials, such as plastics bottles.

Gasoline blending uses proper butane as a fuel gas. The mixture of gas or a combination with propane for the feedstock of ethylene and butane is an essential ingredient of synthetic rubber. Isobutane is primarily used by refineries to increase the octane number of motor gasoline. Matar and Hatch (2013) described the process of normal butane. The mixture of other hydrocarbons and propane is commercial liquefied petroleum gas (LPG). LPG is a component of petrol in the production of feedstocks for producing petrochemical base. The steam cracking of petrochemicals is the component of lighters and deodorants. Refrigerants are pure forms of butane. Matar and Hatch (2013) blamed butane for depleting the halomethanes that replace the ozone layer.

This current study focuses on the effect of the falling prices of Crude Oil to petrochemical industry in the production of butane feedstock. This study helps to explain the notions that the devaluation on the prices of Naphtha has an effect on the competitiveness, profitability, and liquidity of Saudi petrochemical industry.

## 2. NATURE OF THE STUDY

This mixed qualitative and quantitative research approach aims to describe and analyze the effect of the prices of Naphtha on the competitiveness, profitability, and liquidity of the Saudi petrochemical industry. The existing literature on Saudi Oil industry, documents and publications of Saudi Basic Industry Corporation (SABIC), together with the annual financial reports of the oil companies in Saudi Arabia served as the secondary materials. The secondary sources were derived. The survey questionnaires and personal interviews with Saudi petrochemical company managers in Saudi Arabia became the primary sources of information.

The use of qualitative and quantitative research approaches on this study seeks to investigate the variables affecting the financial performance of SABIC. This research project tries to evaluate the situation of Saudi petrochemical companies based on the prices of oil in the global market. Through the use of interviews, this research study investigates the effect of the prices of Naphtha on the competitiveness, profitability, and liquidity of the Saudi petrochemical industry. The purpose of this study is to come up with a sound recommendation for Saudi Petrochemical industries that can enhance its performance in the market.

## 3. SIGNIFICANCE OF THE STUDY

This study is significant to the leaders of the organization in the petrochemical industry. It can give them valuable insights into the different factors affecting the financial performance of the organization. This study may provide information that can assist them in solving the issues involving prices of oil in the world's market. This research may appeal to financial analysts in aiding them find the effective way to resolve the problem of price hike in the petrochemical industry. It may also offer insights in forecasting and operating cost of the organization during a financial downturn.

The academe, as well as scholars may benefit from this research study because very few researchers have undergone this type of research work. This research may provide the academe

new theories and strategies that researchers can use as a starting point for their theoretical framework and conceptual study.

#### 4. OBJECTIVES OF THE STUDY

The primary purpose of this research study is to determine the real impact of the prices of Crude Oil to Naphtha as feedstock for petrochemical on the competitiveness, profitability, and liquidity of the Saudi petrochemical industry. The following enabling objectives are meant to achieve the primary goal of the research project:

- To determine the effect of Crude Oil's declining prices to Naphtha that may affect profitability, competitiveness, and liquidity of Saudi petrochemical industry
- To identify the factors influencing Naphtha's supply and demand
- To determine alternative strategies for the petroleum companies during Naphtha's price fall
- To determine the petrochemical companies' performance using feedstock diversification

#### 5. STATEMENT OF THE PROBLEM

The decline in the prices of oil in the global market triggered unfavorable effects on the performance of the Saudi petrochemical industry. From Naphtha came butane and ethane used as primary feedstock in the production of the petrochemical products. The company's profitability depends on the feedstock and product prices. In effect, the prices of Naphtha and other chemical products have declined considerably affecting Saudi Petrochemical production performance.

The supply of butane was altered drastically because of the global oil price decline in the last quarter of 2014 and it has decreased continuously up to the middle of 2015 (Roy, 2015). Its impact on the petrochemical industries in Saudi Arabia alarmed the companies in the country because its products depend largely on the supply and demand of oil products. The central research question of this current study is, "How do the Saudi Arabia Petrochemical industries solve the issue of declining price of Crude Oil to Naphtha that may affect the profitability, competitiveness, and liquidity of the companies in the petrochemical sector?"

In gathering data for the primary research question, the following sub-questions served as the focal points.

- What is the effect of Crude Oil's declining prices to the profitability, competitiveness, and liquidity of Saudi petrochemical industry?
- What are the factors affecting Naphtha's supply and demand?
- How does petrochemical companies' perform using feedstock diversification?
- What recommended strategies apply to the petroleum companies during Naphtha's price fall?

#### 6. SCOPE OF THE STUDY

This mixed quantitative and qualitative research covers the Saudi Petrochemical industries in Saudi Arabia from 2010 to 2014 involving the prices of butane and ethane used in their products. This study included other factors affecting the company's operation. Future research can do a follow-up study on the same problem or venture into the areas that may have a direct

effect on competitiveness, profitability, and liquidity. The Saudi Petrochemical Industries serve as the focus of the findings of this current research, and this current research does not claim authority over petrochemical industries in foreign countries.

This section reviewed and analyzed the theories and peer-reviewed-articles competitiveness, profitability, and liquidity in the petrochemical industries. The Internet search engine used in finding the appropriate literature were the e-libraries such as Ebscohost.com and Emerald.com which were also very helpful in securing the needed peer-reviewed journals. Some comments from the interview participants of this current study were also included to substantiate the discussions in this chapter.

### 6.1. SAUDI ARABIA PETROCHEMICAL INDUSTRY

Aside from the production of oil and gas, Saudi Arabia also caters to the petrochemical industry as one of the most important industries in the country’s development. According to Hertog (2014), petrochemical is the foundation of a broad range of industrial productions of plastic in the container industry, along with textile, rubber, agricultural, and fertilizer. These industries help create tremendous value to Saudi Arabia’s exporting sector.

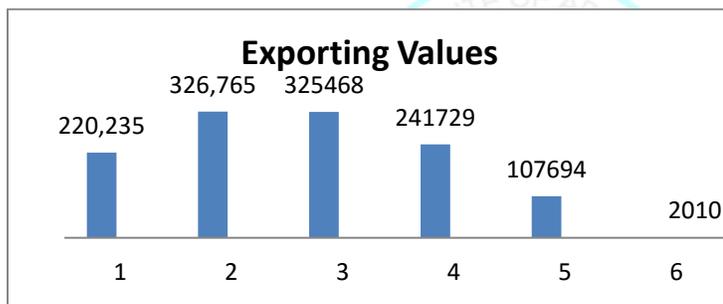


Figure 1 Exporting values of petrochemical products from 2010 – 2014 in billion USD

In 2010 to 2014, the exporting values of upstream, intermediate, and downstream petrochemical products were computed to be \$107,694, \$241,729, \$325,468, \$326,765, and \$220, 235 billion dollars, respectively (Al Jazeera Capital, 2015). Also, the country also saves billions of dollars per year on importing goods.

Hassan et al. (2014) reiterated the point that the utilization of natural gas in the process is also a right direction in increasing the value of locally available raw material that, in turn, benefits to Saudi Arabia’s economy and society as a whole. Continued expansion of this industrial sector is foreseeable in the future. While the petrochemical industry is part of the chemical industry, it differs from the oil refining industry in that it uses some products from the oil refinery for specific chemical products.

Hassan et al. (2014) argued that companies producing petrochemical products do not refine oil themselves. Even though there are some who do so, they would have separate administrations

for their refinery and their petrochemical productions. Therefore, the goal of the oil industry is to produce energy and get raw materials for petrochemical products as their by-products. Meanwhile, the petrochemical industry aims at creating a host of chemical products. The petrochemical industry brings in tremendous economic growth and development to Saudi Arabia.

The report of Saudi Embassy (2015) stated that Saudi Arabia caters to more than 25% of the proven oil reserves in the world. Saudi Arabia claims to have more than 257.8 trillion cubic feet of gas reserves. Despite, 40% not being qualified for oil and gas production, the oil reserves of Saudi Arabia remain the fourth largest in the world after Russia, Iran, and Qatar. More than 95% of the Saudi Arabia's basic petrochemicals are derived from butane. This country commits to expanding its natural gas feedstock and methane to enhance larger participation in the world's market for plastic and petrochemicals.

According to the Hassan Al Sami of the Royal Commission for Jubail & Yanbu (personal communication, May 2015), "Saudi Arabia produces 49 unique petrochemical products. The product slates of public petrochemical companies are shifting to show the increase of interest in the downstream chemical production. Take note that the petrochemical products in Saudi Arabia occupy the bigger portion of the upstream base chemical and polymers.

Among the 59 petrochemicals projects at present valued at approximately \$48.5 billion, 7% are "Greenfield" projects. The big companies such as the Ras Tanura Integrated Refinery and Petrochemicals Complex, the Petro Rabigh Petrochemical Complex, together with the Saudi Kayan Petrochemical Complex are the major, large-scale petrochemical projects expected to mold the future landscape of the Kingdom's growing petrochemical industry dramatically".

According to Fayez Al Muthker (personal communication, May 2015), "The volume of the Saudi petrochemical industry remains on its ascending stride despite the global economic downturn. Saudi Arabia has 80 new chemical plants undergoing planning and construction stages. Soon, Saudi Arabia will spend approximately \$91 billion in constructing a state-of-the-art petrochemical plant, expanding and modernizing the existing facilities, The Saudi government also plans to integrate the oil and gas refineries with the current petrochemical units. In spite of this, the Saudi petrochemicals remain under the state-owned SABIC with its affiliates, while Saudi Arabia's private petrochemical firms are trying to enter the market. The entry of these companies is the partnership with SABIC.

SABIC (2015) stated that the Saudi Arabian General Investment Authority has the authority in attracting investments. It recognizes the undetermined participants in the upstream projects of the private sector. These members from the private sector will bring the decrease in the prices of resins. The results would make the downstream operations more attractive to investors. The Saudi private investors are expected to invest over \$10 billion in petrochemical projects by 2015. The partnership of Aramco and SABIC is another milestone in the development of the petrochemical production in Saudi Arabia. These two industrial magnates' sustained collaboration will improve the petrochemical output and bolster the competitiveness of Saudi Arabia's petrochemicals in the global market (SABIC, 2015).

Saudi Arabia is also making progress in its plastic industry. It considers the chemical industry as part the Kingdom's economic goals in diversifying the economic programs away from hydrocarbon alone. Historically, Saudi Arabia's polymer processing facilities began in 1956 but the significant shifting point came about in 1987 when the polymer industry operated with SABIC. SABIC began its production of plastic resins for its plastics manufacturing affiliate and its units working in Saudi Arabia. SABIC became the supplier of raw materials for hundreds of local and international plastic and chemical plants around the globe (Ministry of Planning and Statistics, 2015; SABIC, 2015).

Hussein Al Hamad (personal communication, May 2015) said, "The expansion of Saudi Arabia's plastic industry came with much lower domestic energy consumption. Saudi Arabia has available raw material. The Saudi Government has demonstrated its full support for the industrial diversification in the country by inviting foreign investment. The petrochemical industry in the Kingdom has undergone a significant diversification from basic to more sophisticated products because of the increased investment and technological know-how of its foreign partners. Through some financial incentives and a supportive national policy, the Saudi Government has encouraged industrial joint ventures or the licensing of technical and industrial companies. The action of the government helped the industry to move away from import substitution to actual growth in domestically manufactured plastic products".

Based on the documents of the Saudi Embassy (2015), the strategic alliance and joint venture activities between Saudi Arabia's companies and the United States including investors from Europe and Asia played an important for the development of both upstream and downstream industry. The plastics industry program benefited significantly from the government incentives because of their role in the Kingdom's diversification program. The Saudi government offered incentives ranging from a 10-year tax holiday, access to low-cost feedstock from Saudi Aramco and SABIC, granting loans on favorable terms commonly covering 50 percent of the total capital cost, The Saudi Industrial Development Fund became the main protagonist in this effort by the government. Excellent opportunities for new joint venture projects of SABIC and the private sector gave the U.S. manufacturers and suppliers' industrial equipment to boost the petrochemical and plastics industry in the country.

In a report published by Zawya (2015), the Saudi petrochemical sector has made rapid strides towards profitability since the financial crunch they have experienced in the first quarter of 2009. The sector's total revenues aggregate of the 14 listed companies surged 54% Year-on-Year in Fiscal Year 2012 while net income shot up 83% Year-on-Year to USD7.9 billion. The inventories of customers can trace the improved profitability of re-stocking. The high demand along with the strengthening of macroeconomic activities globally has contributed to a surge in prices. Furthermore, the delay in starting new supplies from the Middle East improved the demand environment. The growing demand catered for a vivid recovery of the petrochemical industry in terms of product pricing and level up rates. It also reversed the weak operational performance of the industry during the 2008 and 2009 economic crisis.

Roy (2015) claimed that the global slowdown in 2010 affected the Saudi petrochemical sector severely. In the second quarter of 2011, demand for ethylene, the central building block for petrochemicals, fell dramatically (nearly 4mn tons or 3%) as business and consumer confidence collapsed. The declining prices moved the petrochemical companies into de-stocking. It is due to

the declining prices of raw materials and chemical products because of the recessionary movement in the global market, especially in the automotive and construction industry. The smaller utilization and collapse in petrochemical product prices, the petrochemical company, recorded considerable contraction in margins and losses (Roy, 2015).

However, the sector strived to go back on the recovery track in the third quarter of 2013. The petrochemical sector also reported a net profit of USD7.9 billion on revenues of USD62.8 billion in FY 2013. In FY 2013, net profit stood at USD2.8 billion on revenues of USD40.8 billion. The significant bottom-line gave rise to higher product price ceiling and improved consumption level. Saudi businesspeople established a growth rate in earnings and liquidity coming from different speeds. The Sahara Petrochemical got the highest growth in net profit, and then the National Industrialization Co. (NIC) together with the Saudi International Petrochemical Co. (SIPCHEM), and SABIC.

Continuing with the positive momentum, the consolidated revenues and net income of the Saudi petrochemical sector further increased by nearly 43% and 59%, quarter-on-quarter (QoQ), respectively, in the first quarter of 2014. At \$1,075 per ton, the average price of ethylene in FY 2012 was 29% higher than the 2011 average of \$834 per ton and had twice the lows seen towards the end of 2010. Other petrochemical products of importance to KSA such as LDPE, HDPE, LLDPE, and PP gained nearly 24%, 4%, 11%, and 31%, respectively, over the same period. Prices further continued with its uptrend in 2011, with average ethylene prices rising by 10% in May 2011 since 2010, while propylene and polypropylene prices are increasing by 26% and 13%, respectively, over the same period (Alawi et al., 2015).

According to Matabadal (2012), at the time companies in Saudi Arabia were selling petrochemicals based on the international market current prices of oil, the price of ethane as a feedstock remained stable. Saudi Arabia's ethylene capabilities reached as high as 81%. Saudi Arabia's ethane as the primary feedstock played in the market at a fixed and discounted price. Petrochemical companies based elsewhere in the world mostly used Naphtha as a feedstock and procured it at international prices. The process exposes the Western and Asian nations under the peril of unstable earnings because the prices of Crude Oil raise the cost of feedstock.

On the other hand, the process became favorable for Saudi Arabia's petrochemical producers because it gave them more benefits including higher and stronger prices of their products. As the price of feedstock continues its stable situation in the market, the petrochemical players remain optimistic toward profitability. Alawi et al. (2015) claimed Saudi Arabia's petrochemical industry gained a high net income amounting to SAR 9.4 billion in the third quarter of 2013. It was at this time that the price of Crude Oil reached as high as \$145.

Hassan et al. (2014) reported that the concerted global policy responses including monetary and fiscal measures as well as flexible emerging markets have put the world economy back on the growth track. Strong economic performance in emerging markets, particularly China and India, has fueled confidence in the global economic recovery. When the world's economy plunged by 0.5% in 2009 and then bounced back in 2010, the petrochemical industry in Saudi Arabia grew by almost 5.1% (Alawi et al., 2015). The emerging and developing economies of Asia, the USA, and India, including China contributed to the 7.4% growth in 2013. It showed that the

petrochemical industry in Saudi Arabia outperformed the advanced economies of other countries by 3.0% in the same year (Alawi et al., 2015).

According to Barakat et al. (2014), tracking the GDP growth is as relevant as demand for petrochemicals. GDP's derivatives follow global economic trends, given their extensive use in everyday applications. Demand for petrochemical products shares a close correlation with GDP growth.

Barakat et al. (2014) claimed that central to Saudi Arabia's diversification plan for its economy is the petrochemical sector. Herto (2014) argued the Saudi government kept focusing on developing industries with value-added. These industries depart from the energy sources aiming to exploit the abundant hydrocarbon reserve of the country. The Saudi Arabia government also offered various incentives and encouragements for petrochemical industries by giving project financing schemes. The Saudi Industrial Development Fund (SIDF) served as the credit institution of the government of Saudi, offering to finance the petrochemical projects. As a result, Saudi petrochemical producers progressed with considerable expansion plans despite the risk of an expected increase in feedstock prices.

Based on the reports of Al Jazeera Capital (2015), at the same time, the government of Saudi Arabia did not neglect the activation of downstream petrochemical companies. These companies continued to produce high value added products to respond to the government incentives. The downstream petrochemical industries acquired the capabilities to maximize their return on investments through a continual expansion of the downstream sector of the petrochemical industry.

A good example of this area is plastic engulf with value-added and engineering thermoplastic sphere. Chemicals can provide raw material to the domestic industries including appliance and other consumer products. Instead of exporting this primary petrochemical feedstock to other emerging petrochemical industries outside Saudi Arabia, these raw materials can support the needs of both the upstream and downstream industry players in the country. The production of the value-added product with higher capabilities does not only diversify the economic program of the government but makes the industry's profits more stable and sustained. It is also an indication that Saudi Arabia can utilize its innate capacity for shifting from lighter feedstock such as ethane to a heavier feedstock such as Naphtha. It may be a labor-intensive process but it will generate more employment in the country.

Associated Partners	Products
Aramco, Total SA	Paraxylene, benzene and propylene
SABIC, Mitsubishi Rayon	Methyl methacrylate
Aramco, Dow Chemicals	Polyethylene, ethylene oxide, glycols, propylene oxide, vinyl chloride, polycarbonate
SABIC, Sinopec	Polycarbonate
SABIC, ExxonMobil	Butyl rubber and EPDM (ethylene propylene diene monomer)

Figure 2 Upcoming downstream project of the Saudi government (Al Jazeera Capital, 2015)

SAMA (2014) and Al Jazeera Capital (2015) reported that high GDP growth in Asia is good for KSA petrochemical companies. Saudi Arabia’s petrochemical industry exports raw materials for the petrochemical solutions from countries with abundant non-oil exports. In 2010, KSA reported 13.7% YoY growth in non-oil exports to USD33.25 billion and petrochemical exports worth USD16.5 billion. Saudi Arabia’s petrochemical export volume grew 17% Year-on-Year to 30.7 million tons in 2010. During the first quarter of 2011, KSA’s petrochemical exports rose 31% by value to USD1.3 billion while it shipped 6.5% more in terms of volume – 7.3 million tons. Over 50% of the country’s petrochemical production exported to Asian economies with China being the largest destination. Expected economic growth in the range of 8-10% in China and India until 2014, as forecasted by the IMF, will drive steadily the demand for petrochemicals from these economies. According to Business Monitor International (BMI) report, China is expected to experience substantial growth in its plastic and chemical consumption in 2016. (See figure 2 below)

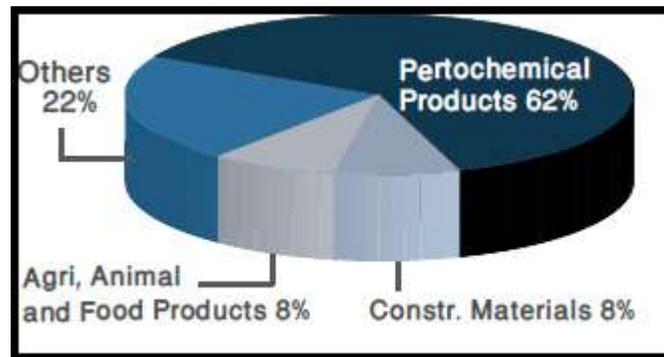


Figure 3 KSA non-oil export in 2013 (SAMA, 2014)

## 6.2. SAUDI BASIC INDUSTRIES CORPORATION

The dominant firm in Saudi Arabia that handles the majority of petrochemical production in Saudi Arabia is the Saudi Basic Industries Corporation (SABIC), the state-owned Government Corporation. SABIC handles 75% of Saudi Arabia’s domestic petrochemical output. SABIC has several subsidiaries depending on its need for raw materials. It is a varied manufacturing company, dynamic in chemicals and intermediates, industrial polymers, fertilizers, and metals. The organization remains the largest petrochemical public company in Saudi Arabia because the Saudi government owns 70% of the company’s shares. For many investors, SABIC is also the largest listed company in the Middle East. The company’s private shareholders hailed from Saudi Arabia and the member countries of the Gulf Cooperation Council (GCC) (Alawi et al., 2015).

In 2013, SABIC ranked fourth as the world's largest producer of chemicals. Currently, SABIC is the second largest producer of ethylene glycol in the world. The introduction of the country’s new projects may put SABIC at the top the list of ethylene glycol producer. SABIC is also the third largest maker of polyethylene, ranked fourth as the world’s largest polyolefin manufacturer and placed fourth largest producer of polypropylene. At present, SABIC holds the title as world’s largest maker of polyetherimide, mono-ethylene glycol, polyphenylene, the MTBE, polycarbonate, and the granular urea (SABIC, 2015).

Unknown to many Saudis, Fortune Global 500 considered SABIC as the number four chemical company all over the world and the 205th largest corporation worldwide. Measured by its assets and values, SABIC ranked number one, and it became the second largest diversified chemical company in 2010. Together with SABIC global affiliates, units, and branches, SABIC is the 98th largest corporation as of 2015 based on the ranking of Forbes Global 2000 (SABIC, 2015). Only publicly traded companies belong to the list of Global 2000. In 2014, SABIC reached \$50.4 billion in revenues with a \$6.7 billion net profit with principal assets around \$90.4 billion (Alawi et al., 2015).

GDP Current Price (Billion SAR)	5,450,643	5,928,87	6,503,48	7,104,22	7,423,91
YEAR	2010	2011	2012	2013	2014
<b>Petrochemical Status</b>					
Total Revenue (billion SAR)	239,060	290,150	382,500	432,645	447,760
Compare to GDP	4.40%	4.90%	5.90%	6.10%	6.00%
Net Revenue:Exclude Import	153,202	188,578	244,486	264,231	260,714
Compare to GDP	2.80%	3.20%	3.80%	3.70%	3.50%
Value Added of Petroleum.	128,458	143,812	182,829	181,427	160,257

Index					
Exclude Import and Feedstock					
Compare to GDP	2.30%	2.40%	2.80%	2.60%	2.20%

Figure 4 Total Value of SABIC’s petrochemical production with all its aggregates

SABIC has six strategic business units and manufacturing groups. These business units include Fertilizers with three fertilizer affiliates namely, Safco, Samad and Ibn Al-Baytar, Chemicals, Polymers, Performance Chemicals, Metals, and Innovative Plastics, plus manufacturing. The Innovative Plastics units also contain manufacturing plants (Alawi et al., 2015).

SABIC manufactures and sells chemicals, plastics, fertilizers, and metals worldwide. Its compounds include olefins comprising ethylene, propylene, butadiene, and butene-1 to produce various consumer products such as OXYGENATES including methanol and methyl tertiary butyl ether, AROMATICS containing styrene monomer, benzene, paraxylene, and pyrolysis gasoline production of paints, clothing, and packaging using purified terephthalic acid. Chemical intermediate includes caustic soda, ethylene dichloride, and vinyl chloride monomer used the production of polyvinyl chloride (PVC), soap, textiles, and some kinds of plastics.

SABIC chemicals used to produce antifreeze, paints, polyesters, and paint came from fiber intermediates industrial processes used argon, crude krypton or xenon, nitrogen, and gaseous hydrogen. Linear alpha olefins form the components of comonomers, alcohols, lubricants, surfactants, and other intermediate chemicals.

Also, SABIC offers performance chemicals, including base products, functional chemicals, and functional polymers such as plastic products comprising PVC, PS, and polyesters for its customers. SABIC commercial and industrial products also include various materials, waterproof films, and industrial food packaging that used polyolefins, polystyrene, polyethylene, and the widely used polypropylene. The fertilizer products of SABIC comprised mainly of granular urea, ammonia, prilled, and phosphates (SABIC, 2015).

Additionally, SABIC also produces metals and flat steel such as hot and cold rolled, hot dip galvanized, and pre-painted coils. SABIC long steel with reinforcing bars includes wire rod coils; rebar-in-coils, steel billets, and light sections (Matar & Hatch, 2013).

SABIC works tirelessly to extend and diversify its product portfolio and accelerate the exploration of new chemical and polymer value chains to meet customers’ needs. Ever closer customer relationships, consistently excellent product quality and service, and security of feedstock supply create value, drive growth, and spur innovation.

According to Abdullah Al-Issa (personal communication, June 2015), “Fertilizers SBU this year continued with development and implementation of the STAR (SAFCO TOTAL ASSETS RELIABILITY) project – an initiative designed to empower managers with better, more timely information. It is enabling better-informed decisions, leading to improved reliability and capacity utilization and less need for reactive maintenance.

Al-Issa further said, “SABIC’s Innovative Plastics SBU works in close collaboration with global auto manufacturers to develop innovative materials that, by substituting for metal, offer designers greater scope for styling complexity while also delivering improved fuel-efficiency and substantial reductions in greenhouse gas emissions”.

## 7. Methodology

This research project used a mixed qualitative and quantitative approach to gathering data. Data gathering came through browsing and analyzing SABIC annual reports from 2010 to 2014. Each year will have a corresponding income statement based on the company’s annual report. The company’s profitability was presented graphically to show the impact of oil price increase or decrease on competitiveness, liquidity, and profitability of the petrochemical companies in Saudi Arabia as reflected in SABIC annual financial statements from 2010 to 2014.

The Internet search engine, along with journals, textbooks, newspapers, and magazines serve as sources of secondary data. Lists of materials such as books and articles, which were taken by previous examiners for their research purposes, were used in validating the findings of this current research. Availability of bibliographies confined in the library indexes and internet search engines. For updated and useful references, electronic journals, magazines, newspapers, citations and researchers’ latest abstract were also made available for data gatherings. Ideas and guidelines created to preserve the integrity of the research were carefully assessed and commented to strengthen the position of this research project.

This research project used individual interviews with six participants from the hierarchy of SABIC. The discussion aimed at soliciting primary information from the interview participants about their observation and experiences on the factors affecting SABIC competitiveness, liquidity, and profitability. The interview participants’ responses served as a basis for evaluating the effect of oil price on the performance of the organization. Data gathered from individual interviews was used to determine the strategies that SABIC implemented when the global prices of Crude Oil fell.

Aside from personal interviews, this current research distributed survey questionnaires to 80 managers of SABIC and its subsidiary companies. Before the distribution of the survey questionnaire, the participants were adequately informed that the results of the survey would be strictly for academic purpose. It is not for any other purpose except the one stated on this current research paper. Strict confidentiality and anonymity were enforced. The survey questionnaires bear no markings that can identify the respondents. Documentation is considered the best approach to gather facts regarding the problem and purpose of this research project.

### 7.1. Data Gathering

The data presented in this report contained the primary and secondary sources. The central data came from the survey questionnaire distributed to 80 SABIC managers including the company’s subsidiaries in Saudi Arabia using LAN online facilities. The secondary sources came from various documents, peer-reviewed journals, and annual reports from the Saudi Ministry of

Trade and Industry and SABIC. Other data originated from previous studies on the petrochemical industry situation in Saudi Arabia. The majority of the data includes the primary sources because of the relatively close affiliation with the questions on this research project.

The respondents were taken randomly from SABIC and subsidiary companies that have knowledge about production and financial situation of the organization. The most experienced and tenured managers participated and replied actively through email or phone call. They participated in the survey without any pressure or obligation on their part. They got the assurance that the results of the study would be for academic purposes only. The survey questions contained general information that the study participants had to rate their agreement or disagreement with the statement.

Eighty respondents were long-term managers of the company while 15 of the participants had been a director for five years or less. The educational attainment of the respondents were mostly college/undergraduate degrees. The majority of the members, 96% of them, had excellent qualifications to manage the affairs of their respective organizations. The data were tabulated in a frequency distribution table to determine the percentage of the participant's answers to the questions. The results appeared on the tabulation table to see clearly the preferences of the respondents on the survey questions. Then, the results were matched with the secondary sources to see whether there is a relation between the two sources.

## 7.2. Instruments of the Study

The survey questionnaire contained three dependent variables that the respondents had to rate their agreement or disagreement with the statements under each construct. The three dependent variables included:

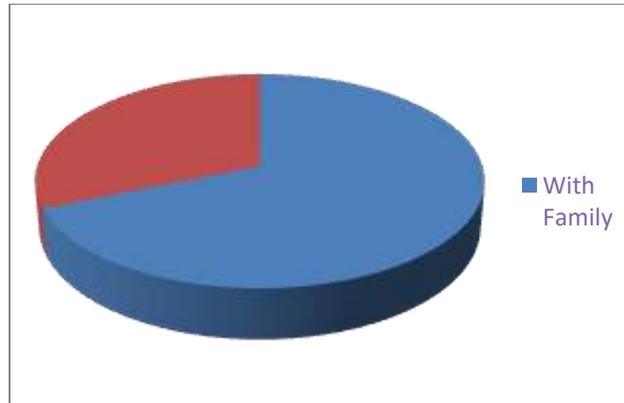
- Competitiveness
- Liquidity
- Profitability

The Likert Scale model was used to measure the level of agreement or disagreement on the statement under each variable.

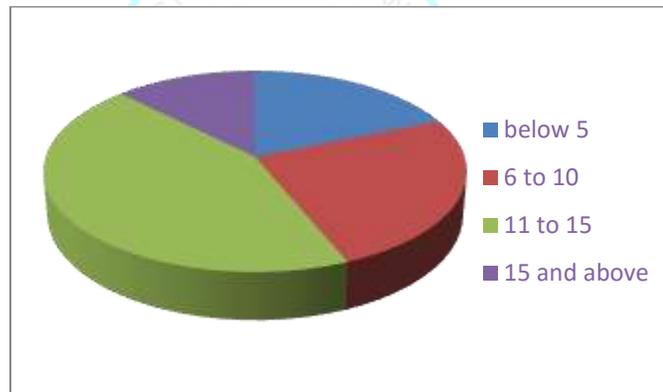
- 1 refers to STRONG DISAGREE
- 2 refers to DISAGREE
- 3 refers to neither DISAGREE nor AGREE
- 4 refers to AGREE
- 5 refers to STRONGLY AGREE

## 7.3. Profile of the respondents

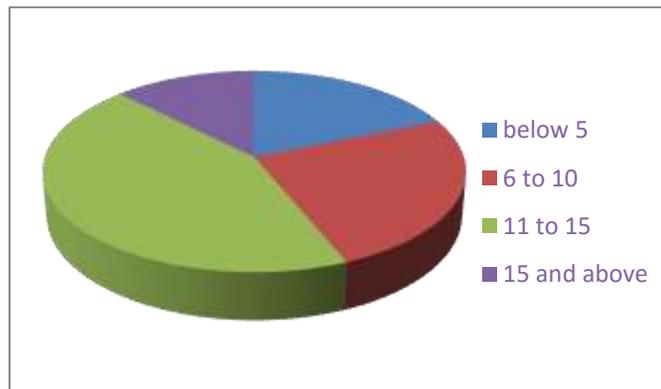
*GENDER*



*CIVIL STATUS*



*LENGTH OF SERVICE TO THE COMPANY*



Out of the 80 survey questionnaire respondents, 65 (81.25%) were males and 15 (18.75%) were female. The civil status of the respondents included whether they have a family or they are a bachelor, of which 55 (68.75%) have families, and 25 (31.25%) are bachelors. As to length of service with the company, 15 (18.75) respondents were below five years, 20 (25%) have remained for six years to 10 years, while 35 (43.75%) were on their 11 to 15 years in the organization. 10 or 12.5% were respondents who have served the longest years from 15 years and above.

## 8. Findings

This chapter shows the collected data from the sub-questions to uncover the answer to the central research question. This section displays the data gathered from the secondary sources and primary sources. The main research problem states, “How do the Saudi Arabia Petrochemical industries solve the issue of falling Naphtha prices that affect the profitability, competitiveness, and liquidity of the companies in the petrochemical sector?” In answering the research questions, this chapter presents the data from the qualitative approach and the data generated from the survey questionnaire.

### 8.1 What is the effect of Crude Oil’s declining prices to the profitability, competitiveness, and liquidity of Saudi petrochemical industry?

In answering this question, an analysis of three Saudi Arabian petrochemical companies such as the Advanced Petrochemical Company or APC, Yanbu National Petrochemical Co (YANSAB), and National Industrialization Company (Tasnee) are necessary. Figure 6 below shows Tasnee’s potential upside of 16.3% because of its diversified product portfolio, its leading position in the production of titanium dioxide globally, and feedstock advantage. YANSAB showed the potential upside of 24.1%, which recently started operations with its strong relationship with SABIC, which is a crucial driver for growth. The APC also showed the potential upside of 13.7%, a pure polypropylene play. Its growth is because of its low feedstock cost advantage and strategic marketing alliances with leading international companies.

Company		Tasnee	YANSAB	APC
12-months Target Price	SAR	48.0	58.2	38.4
Potential Upside	%	16.3	24.1	13.7
Current Market price	SAR	41.3	46.9	33.8
Market Capitalization	SAR mn	24,192.3	26,606.3	4,849.2
YTD price change	%	27.9	-0.6	23.5
P/E (11E)	X	10.6	8.6	10.4
P/B (11E)	X	1.3	2.7	2.4
EV/ EBITDA (11E)	x	6.9	8.9	7.0
Dividend Yield (11E)	%	2.9	2.3	5.8

Figure 5 Petrochemical Companies in Saudi Arabia affected by the oil price increase (Source Al Jazeera Capital, 2015)

This figure shows that the Saudi petrochemical's primary feedstock is likely to surge upwards as supplies of ethane remain tight (with no new allocation of ethane since 2010). It will change from current USD0.75/mmbtu to USD1.25/mmbtu or USD1.50/mmbtu beyond 2014. It is possible that the cost advantage may erode. If it happens, the profitability enjoyed by the industry against their competitors in an emerging market may be lost.

Even then, the Saudi players will still enjoy the feedstock cost advantage and will continue to be substantial. In line with plunging oil prices, petrochemical product prices in the international markets continued its upward trend in 2012 and 2013. The prices of ethylene and propylene may go down on average together with a few other products, but they will rise by over 29% Year-on-Year in 2013. Even though the prices of these products increased further in the range of 10-25% YTD as of May 2014, they are showing some signs of moderation. It is mainly on account of short-term volatility in demand from the fast-growing Asian economies.

The demand environment will remain weak in the short run, but on account of declining demand from emerging economies and slow pick-up in economic activity in Saudi Arabia in 2014 the profitability will remain active. The long-term forecast is encouraging because the per capita consumption of the main petrochemical products is low in the emerging countries compared to developed nations. Thus, as economic output in emerging markets continues to expand at a much higher rate compared to the established ones, the per capita of petrochemical consumption may rise faster and may catch up with the advanced nations.

Saudi Arabia is geographically approaching higher growth and is expanding its capacity continually in feedstock cost; which may benefit the growth process in the long-term. . Saudi companies sell their petrochemical produce at a price determined by international Crude Oil prices, and their primary feedstock price remains stable. Almost 81% of Saudi Arabia's ethylene

capacity is ethane. The feedstock remained at a fixed and discounted price of USD0.75 given by the government of Saudi Arabia. The Petrochemical companies based elsewhere in the world mostly use Naphtha as a feedstock and procure it at international prices. The marginal producers of feedstock in the Asian and Western regions suffer the exposure to high risk in volatility earnings.

However, Saudi Arabia's petrochemical sector, despite fears that it will be affected by the prices of Crude Oil, recorded profitability since the depression witnessed in 2009 and had been continuing its competitiveness and liquidity until the fourth quarter of 2014. The total petrochemical revenues collected from the 14 listed companies was up by 54% Year-on-Year in FY 2013 while net income shot up 83% Year-on-Year to USD17.9 billion. The profitability was the result of the restocking of inventories by petrochemical customers with higher and stronger demand in the midst of the increase of macroeconomic activities in the world's market.

## 8.2. What are the factors affecting Naphtha's supply and demand?

Based on the literature of this current study, the stoppage in establishing new supplies from the Middle East created the demand environment affecting Naphtha's supply and demand. However, the build-up of demand cannot be considered an adverse situation because of a fast rate of recovery for the product's price realizations and utilization rates. It reverses the weak performance of the petrochemical sector in 2008 and 2009.

During the period of global financial crunch, the economic slowdown in the world affected the Saudi petrochemical sector severely. In the second quarter of 2008, ethylene demands fell sharply amounting to 4mn tones or 3% due to the collapse in consumer confidence affected by the economic crisis in that year. The following year, the petrochemical companies suffered destocking for several months because of the declining prices. The recession continued and had a hard impact on the business activities of automotives and construction. Due to the double standard of having a collapse in the prices of petrochemical products and lower demands for petrochemicals there was a high contraction in losses and margins. The sector's bottom line suffered terribly in the fourth quarter of 2008 and the whole year of 2009.

The Saudi petrochemical companies learned the lessons of the 2008 and 2009 financial crisis. They do not want to commit the same mistakes. Therefore, they developed a healthy supply and demand for Naphtha. The significant bottom-line performance led to an increased product price realization and improved utilization rates. Saudi petrochemical players recorded growth in profitability from 2010 until the fourth quarter of 2014 although at different speeds. The Sahara Petrochemical enjoyed an increase in its net profit, followed by the National Industrialization Co. (NIC), and then followed by the Saudi International Petrochemical Co. (SIPCHEM), SABIC, and a few others. (See Figure 6 below)

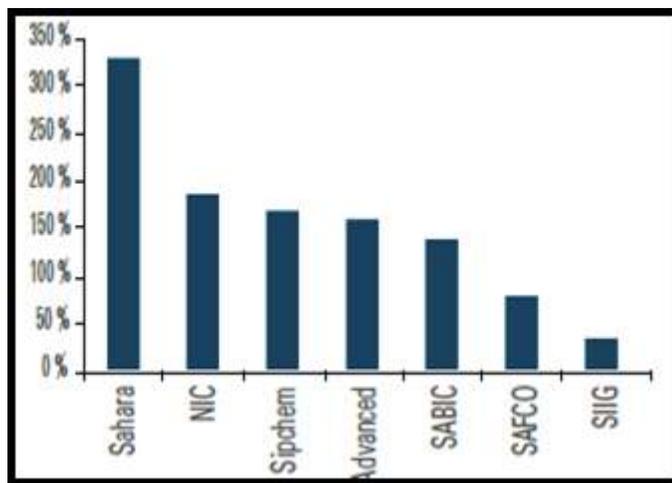


Figure 6 Profitability drivers of petrochemical companies (Zaywa, 2015)

The positive momentum continued, and the Saudi Petrochemical industry showed an increase in its revenues and income from nearly 43% and 59%, quarter-on-quarter (QoQ), respectively, in the first quarter of 2011. (See Figure 7 below)

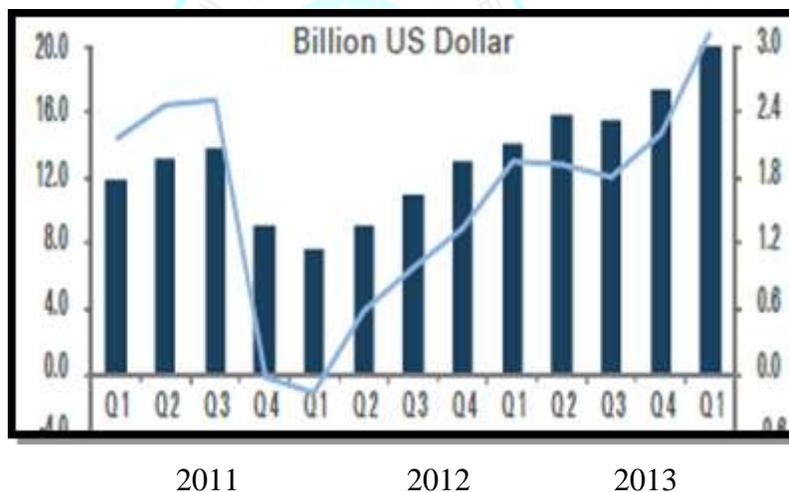


Figure 7 Petrochemical Companies returning to profitability (Zaywa, 2015)

The intensive global strategy including monetary and fiscal measures as well as flexible emerging markets are the factors that affect Naphtha's supply and demand. Strong economic performance in emerging markets, particularly China and India, has fueled confidence in global economic movements. Emerging markets' GDP growth is significant as demand for petrochemicals and their derivatives follow the world financial trend as shown in their extensive use of petrochemical products in everyday applications. Demand for petrochemical products

shares a close correlation with GDP growth. The average GDP growth reflects the petrochemical industry's business cycle.

### **8.3. How does petrochemical companies' perform using feedstock diversification?**

SABIC has already started feedstock diversification before the unforeseen falling of Crude Oil prices in the world market. SABIC's utilization of natural gas in the process was on the right path to increasing the value of locally available raw material that, in turn, benefited the company and the country's economy and society as a whole. SABIC's commitment to expand its natural gas infrastructure enhanced its competitive advantage in the global petrochemical and plastics markets.

As stated in the literature review of this current study, SABIC, with the support of the Saudi government, is aggressively encouraging the downstream petrochemical value chain in the country, manufacturing more high value-added products in the petrochemical industry. The real benefits of cheap feedstock are maximizing the return on investments through widening and expanding the reach of the downstream sector of the industry. One good example is the plastic manufacturing. The value-added in engineering thermoplastics and chemicals may help domestic companies such as cars, appliances, or other consumer products to produce and market locally rather than selling them outside as raw materials.

In fact, the production of higher value-added products can diversify the company's profitability and can provide competitiveness for the organization. It is true that downstream products have less volatile margins in petrochemical companies. However, by expanding its capacity of higher value-added products, it will show that the country has to change its usual position of having lighter feedstock (ethane) as its capital-intensive process, to heavier feedstock (Naphtha), a labor-intensive process. It is likely to generate more employment in the country, which further finds strong support from the government.

### **8.4. What are the recommended strategies for the petrochemical industries?**

The first strategy is a paradigm shift in product design from feedstock diversification. This approach paves the way for various products that do not depend mostly on the Naphtha as feedstock. Naphtha is being used in almost all countries in the world for its feedstock. These countries buy Naphtha at an international rate. It means the increase in the oil price of Crude Oil will also increase the cost of raw material. The price increase in raw materials will expose the marginal producers in Asia and Western region giving the earning volatility. On the other hand, once the price of crude oil falls in the world market, Naphtha's price in the international arena will become volatile resulting to uncertain earning of petrochemical companies. Therefore, a

diversified product not solely dependent on Naphtha remaining in the chemical industry would be more stable and profitable.

The international Crude Oil prices dictate the Saudi companies in selling its petrochemicals to the market, but the amount of the primary feedstock (ethane) price remains stable. Approximately 81% of Saudi Arabia’s ethylene capacity is based on ethane as its feedstock but it is bought at a discounted price from the Saudi government. It brings us to the second strategy that recommends the floating of the prices of ethane as a primary feedstock and allows the petrochemical companies to decide its market price. Overall, the demand environment is likely to remain weak in the short-term, primarily on account of declining Crude Oil prices; however, the long-term outlook remains encouraging, especially in feedstock diversification.

The third strategy gives way to Saudi Arabia’s petrochemical industry with its geographical proximity to high growth emerging plastic markets. It is likely to benefit the most in the long-run shift in production capacity to high-value intermediate and derivative products.

### 8.5. Survey Results

Eighty respondents from the different petrochemical companies of SABIC participated in providing data to the statements given on the survey questionnaire. Table 1 shows the 80 respondents, based on GENDER, rated the statement, “The decreasing prices of Crude Oil affect the supply and demand of Naphtha”. The 65 male respondents have a mean average of 3.68 that corresponds to AGREE while the 15 female respondents have 5.0 that means they STRONGLY AGREE.

The respondents, based on GENDER, rated the statement, “The high price of Naphtha affects the production quantity of the organization”. The 65 male respondents have a 4.95 average that corresponds to AGREE while the 15 female respondents rated the statement with 5.0 mean average or STRONGLY AGREE.

Table 1: Competitiveness based on Gender

Gender		Decreasing Prices	High Price of Naphtha	High Price of Crude Oil
Male	Mean	3.68	4.95	1.43
	N	65	65	65
	Std. Deviation	1.105	.211	.499
Female	Mean	5.00	5.00	1.00
	N	15	15	15
	Std. Deviation	.000	.000	.000

	Mean	3.93	4.96	1.35
Total	N	80	80	80
	Std. Deviation	1.123	.191	.480

The respondents, based on GENDER, rated the statement, “The high demand for Crude Oil stabilizes the supply and demand for Naphtha”. The 65 male respondents have a 1.4 mean average that corresponds to STRONGLY DISAGREE while the 15 female respondents rated the statement with a 1.36 mean or STRONGLY DISAGREE.

The respondents, based on GENDER, rated the statement, “The high demand for Crude Oil stabilizes the supply and demand for Naphtha”. The 65 male respondents have a 1.4 average that corresponds to STRONGLY DISAGREE while the 15 female respondents rated the statement with a 1.36 mean average or STRONGLY DISAGREE.

Table 2 represents the 80 respondents, based on CIVIL STATUS, rated the statement, “The decreasing prices of Crude Oil affect the supply and demand of Naphtha”. The 55 respondents WITH FAMILIES have a mean average of 4.42 that corresponds to simply AGREE while the 25 respondents WITHOUT A FAMILY have 2.84 which means they DISAGREE.

The respondents, based on CIVIL STATUS, rated the statement, “The high price of Naphtha affects the production quantity of the organization”. The 55 respondents WITH FAMILIES have 5.0 on average which corresponds to STRONGLY AGREE while the 25 respondents WITHOUT A FAMILY rated the statement with 4.8 on average or simply AGREE.

The respondents, based on CIVIL STATUS, rated the statement, “The high demand for Crude Oil stabilizes the supply and demand for Naphtha”. The 55 respondents with families have 1.0 mean average or STRONGLY DISAGREE while the 25 respondents without family rated the statement with 2.0 mean average or DISAGREE.

Table 2: Competitiveness based on Civil Status

Civil Status		Decreasing Prices	High Price of Naphtha	High Price of Crude Oil
With Family	Mean	4.42	5.00	1.05
	N	55	55	55
	Std. Deviation	.498	.000	.229
Bachelor	Mean	2.84	4.88	2.00
	N	25	25	25
	Std. Deviation	1.344	.332	.000

	Mean	3.93	4.96	1.35
Total	N	80	80	80
	Std. Deviation	1.123	.191	.480

Table 3 shows the 80 respondents based on length of service in the company rated the statement, “The decreasing prices of Crude Oil affect the supply and demand of Naphtha”. The 15 respondents below five years have a mean average of 5.0 that corresponds to STRONGLY AGREE. The 20 respondents whose length of service was 6 to 10 years have 4.40 which mean SIMPLY AGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 3.2 mean average or NEITHER DISAGREE NOR AGREE and ten respondents who have serviced in the company for 16 years and above have an average of 3.70 or NEITHER DISAGREE NOR AGREE.

The respondents, based on length of service in the company, rated the statement, “The high price of Naphtha affects the production quantity of the organization”. The 15 respondents below five years have a mean average of 5.0 that corresponds to STRONGLY AGREE. The 20 respondents whose length of service was 6 to 10 years have 5.0 which mean STRONGLY AGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 5.0 mean average or STRONGLY AGREE and ten respondents who have serviced in the company for 16 years and above have a mean of 4.70 or simply AGREE.

The respondents, based on length of service, in the company rated the statement, “The high demand for Crude Oil stabilizes the supply and demand for Naphtha”. The 15 respondents below five years have a mean average of 1.0 that corresponds to STRONGLY DISAGREE. The 20 respondents whose length of service was 6 to 10 years have 1.0 which means STRONGLY DISAGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 1.5 mean average or DISAGREE and ten respondents who have serviced in the company for 16 years and above have a mean of 2.0 or simply AGREE.

Table 3: Competitiveness Based on Length of Service in the Company

Length of Service		Decreasing Prices	High Price of Naphtha	High Price of Crude Oil
Below five years	Mean	5.00	5.00	1.00
	N	15	15	15
	Std. Deviation	.000	.000	.000
6 to 10	Mean	4.40	5.00	1.00
	N	20	20	20
	Std. Deviation	.503	.000	.000
11 to 15	Mean	3.26	5.00	1.51
	N	35	35	35

16 and above	Std. Deviation	.950	.000	.507
	Mean	3.70	4.70	2.00
	N	10	10	10
Total	Std. Deviation	1.703	.483	.000
	Mean	3.93	4.96	1.35
	N	80	80	80
	Std. Deviation	1.123	.191	.480

The sum of the average mean for competitiveness based on GENDER, CIVIL STATUS and LENGTH OF SERVICE IN THE COMPANY is 3.41 or NEITHER DISAGREE NOR AGREE.

Table 4 reveals how the 80 respondents, based on GENDER, rated the statement about liquidity, “The increased amount of cash allotted for the cost of Crude Oil lowers the company’s liquidity.” The 65 male respondents have a mean average of 4.63 that corresponds to simply AGREE while the 15 female respondents have 5.0 that means them STRONGLY AGREE.

The respondents, based on GENDER, rated the statement, “Increasing prices of petrochemical products do not guarantee sufficient money for the organization”. The 65 male respondents have scored 4.88 on average that corresponds to simply AGREE while the 15 female respondents rated the statement with a 5.0 mean average or STRONGLY AGREE.

The respondents, based on GENDER, rated the statement, “The lower the price of Crude Oil, the higher is the cost of Naphtha”. The 65 male respondents have a 3.08 mean average that corresponds to NEITHER DISAGREE NOR AGREE while the 15 female respondents rated the statement with a 5.0 mean average or STRONGLY AGREE.

Table 4: Liquidity based on Gender

Gender		Amount of Cash	Increasing Prices	Lower price of Crude Oil
Male	Mean	4.63	4.88	3.08
	N	65	65	65
	Std. Deviation	.486	.331	1.384
Female	Mean	5.00	5.00	5.00
	N	15	15	15
	Std. Deviation	.000	.000	.000
Total	Mean	4.70	4.90	3.44
	N	80	80	80
	Std. Deviation	.461	.302	1.457

Table 5 represents how the 80 respondents, based on CIVIL STATUS, rated the statement, “The increased amount of cash allotted for the cost of Crude Oil lowers the company’s liquidity”. The 55 respondents WITH FAMILIES have a mean average of 5.0 that corresponds to STRONGLY AGREE while the 25 respondents WITHOUT A FAMILY have a 4.04 which means they AGREE.

The respondents, based on CIVIL STATUS, rated the statement, “Increasing prices of petrochemical products do not guarantee sufficient money for the organization”. The 55 respondents WITH FAMILIES have 5.0 average that corresponds to STRONGLY AGREE while the 25 respondents WITHOUT A FAMILY rated the statement with a 4.68 mean average or just AGREE.

The respondents, based on CIVIL STATUS, rated the statement, “The lower the price of Crude Oil, the higher is the cost of Naphtha”. The 55 respondents with families have 4.31 mean average or simply AGREE while the 25 respondents without a family rated the statement with 1.52 mean average or DISAGREE

Table 5: Liquidity based on Civil Status

Civil Status		Amount of Cash	Increasing Prices	Lower price of Crude Oil
With Family	Mean	5.00	5.00	4.31
	N	55	55	55
	Std. Deviation	.000	.000	.717
Bachelor	Mean	4.04	4.68	1.52
	N	25	25	25
	Std. Deviation	.200	.476	.510
Total	Mean	4.70	4.90	3.44
	N	80	80	80
	Std. Deviation	.461	.302	1.457

Table 6 shows how the 80 respondents, based on length of service in the company, rated the statement, “The increased amount of cash allotted for the cost of Crude Oil lowers the company’s liquidity”. The 15 respondents below five years have a mean average of 5.0 that corresponds to STRONGLY AGREE. The 20 respondents whose length of service was 6 to 10 years have 5.0 which mean them STRONGLY AGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 4.60 mean average or AGREE and ten

respondents who have serviced in the company for 16 years and above have a mean of 4.0 or simply AGREE.

The 80 respondents, based on length of service in the company, rated the statement, “Increasing prices of petrochemical products do not guarantee sufficient money for the organization”. The 15 respondents below five years have a mean average of 5.0 that corresponds to STRONGLY AGREE. The 20 respondents whose length of service was 6 to 10 years have a 5.0 mean average which mean them STRONGLY AGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 4.60 mean average or AGREE and ten respondents who have serviced with the company for 16 years and above have a mean of 4.20 or simply AGREE.

The 80 respondents, based on length of service in the company, rated the statement, “The lower the price of Crude Oil, the higher the cost is of Naphtha”. The 15 respondents below five years have a mean average of 5.0 that corresponds to STRONGLY AGREE. The 20 respondents whose length of service was 6 to 10 years have 4.5 which mean them STRONGLY AGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 2.8 mean average or AGREE and ten respondents who have serviced with the company for 16 years and above have a mean of 1.0. Or STRONGLY DISAGREE.

The sum of the average mean for LIQUIDITY based on GENDER, CIVIL STATUS, and LENGTH OF SERVICE IN THE COMPANY is 4.34 or AGREE.

Table 6: Liquidity based on Length of Service in the Company

Length of Service		Amount of Cash	Increasing Prices	Lower price of Crude Oil
Below five years	Mean	5.00	5.00	5.00
	N	15	15	15
	Std. Deviation	.000	.000	.000
6 to 10 years	Mean	5.00	5.00	4.50
	N	20	20	20
	Std. Deviation	.000	.000	.513
11 to 15 years	Mean	4.60	5.00	2.86
	N	35	35	35
	Std. Deviation	.497	.000	.974
16 years and above	Mean	4.00	4.20	1.00
	N	10	10	10
	Std. Deviation	.000	.422	.000
Total	Mean	4.70	4.90	3.44

N	80	80	80
Std. Deviation	.461	.302	1.457

Table 7 reveals how the 80 respondents, based on GENDER, rated the statement about profitability, “The organization survives in today’s market if its profitability reaches its maximum target.” The 65 male respondents have a mean average of 4.63 that corresponds to simply AGREE while the 15 female respondents have 5.0 that means them STRONGLY AGREE.

The respondents, based on GENDER, rated the statement, “Cost saving can boost the company’s profitability”. The 65 male respondents have 4.85 mean average that corresponds to simply AGREE while the 15 female respondents rated the statement with 5.0 mean average or STRONGLY AGREE.

The respondents, based on GENDER, rated the statement, “Product diversification is another source of profitability”. The 65 male respondents have 4.91 average that corresponds to simply AGREE while the 15 female respondents rated the statement with 5.0 mean average or STRONGLY AGREE.

Table 7: Profitability based on Gender

Gender		Survival of the Organization	Cost Saving	Product Diversification
Male	Mean	4.63	4.85	4.91
	N	65	65	65
	Std. Deviation	.486	.364	.292
Female	Mean	5.00	5.00	5.00
	N	15	15	15
	Std. Deviation	.000	.000	.000
Total	Mean	4.70	4.87	4.93
	N	80	80	80
	Std. Deviation	.461	.333	.265

Table 8 reveals how the 80 respondents, based on CIVIL STATUS, rated the statement about profitability, “The organization survives in today’s market if its profitability reaches its maximum target.” The 55 respondents with family have a mean average of 5.0 that corresponds to STRONGLY AGREE while the 25 bachelor respondents have 4.04 that means they only AGREE.

The respondents, based on GENDER, rated the statement, “Cost saving can boost the company’s profitability”. The 55 respondents with family have 5.0 average that corresponds to STRONGLY

AGREE while the 25 bachelor respondents rated the statement with 4.60 mean average or simply AGREE.

The respondents, based on GENDER, rated the statement, “Product diversification is another source of profitability”. The 55 respondents with family have 5.0 average that corresponds to STRONGLY AGREE while the 25 female respondents rated the statement with 4.76 mean average or AGREE.

Table 8 Profitability based on Civil Status

Civil Status		Survival of the Organization	Cost Saving	Product Diversification
With Family	Mean	5.00	5.00	5.00
	N	55	55	55
	Std. Deviation	.000	.000	.000
Bachelor	Mean	4.04	4.60	4.76
	N	25	25	25
	Std. Deviation	.200	.500	.436
Total	Mean	4.70	4.87	4.93
	N	80	80	80
	Std. Deviation	.461	.333	.265

Table 9 shows how the 80 respondents, based on length of service in the company, rated the statement, “The organization survives in today’s market if its profitability reaches its maximum target”. The 15 respondents below five years have a mean average of 5.0 that corresponds to STRONGLY AGREE. The 20 respondents whose length of service was 6 to 10 years have 5.0 which mean them STRONGLY AGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 4.60 mean average or AGREE and ten respondents who have serviced with the company for 16 years and above have an average of 4.0 or simply AGREE. The 80 respondents, based on length of service in the company, rated the statement, “Cost saving can boost the business’s profitability”. The 15 respondents below five years have a mean of 5.0 that corresponds to STRONGLY AGREE. The 20 respondents whose length of service was 6 to 10 years have 5.0 which mean STRONGLY AGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 4.20 mean average or AGREE and ten respondents who have serviced with the company for 16 years and above have an average of 4.0 or AGREE. The 80 respondents, based on length of service in the company, rated the statement, “Product diversification is another source of profitability”. The 15 respondents below five years have a mean 5.0 that corresponds to STRONGLY AGREE. The 20 respondents whose length of service was 6 to 10 years have 5.0 which mean STRONGLY AGREE. The 35 respondents whose duration of service in the company was 11 to 15 years have 4.20 mean or AGREE and ten respondents who serviced for 16 years and above have an average of 4.40 or AGREE.

The sum of the average mean for profitability based on GENDER, CIVIL STATUS, and LENGTH OF SERVICE IN THE COMPANY is 4.8 or AGREE.

Table 9 Profitability based on Length of Service in the Company

Length of Service		Survival of the Organization	Cost Saving	Product Diversification
Below five years	Mean	5.00	5.00	5.00
	N	15	15	15
	Std. Deviation	.000	.000	.000
6 to 10 years	Mean	5.00	5.00	5.00
	N	20	20	20
	Std. Deviation	.000	.000	.000
11 to 15 years	Mean	4.60	5.00	5.00
	N	35	35	35
	Std. Deviation	.497	.000	.000
16 years and above	Mean	4.00	4.00	4.40
	N	10	10	10
	Std. Deviation	.000	.000	.516
Total	Mean	4.70	4.87	4.93
	N	80	80	80
	Std. Deviation	.461	.333	.265

### 9. Discussion of the findings from the survey

The survey aimed essentially to generate information to answer the following question: “What is the effect of Crude Oils’ declining prices on the profitability, competitiveness, and liquidity of Saudi petrochemical industry?” The respondents rated the statement that focused on the impact of Crude Oil on Naphtha as feedstock of petrochemical product.

The sum of the average of the effect of Crude Oil’s declining prices to the company’s COMPETITIVENESS based on gender, civil status and length of service in the company is 3.41 or NEITHER DISAGREE NOR AGREE. The sum of the average mean for LIQUIDITY based on gender, marital status, and length of service in the company is 4.34 or AGREE. The sum of the average mean for PROFITABILITY based on gender, civil status, and duration of service in the company is 4.8 or AGREE.

The 80 respondents agreed that Crude Oil's declining prices affected Naphtha as feedstock for the production of petrochemicals. The effect may not be substantial in terms of competitiveness but on liquidity and profitability the effect can be considered critical. Though the international market regulates the price of Naphtha, the movement of oil prices may cause the rise and fall of chemical industries.

The prices of petrochemical products sold by Saudi Companies were based on international Crude Oil prices. The respondents were aware that the price of their primary feedstock was fixed. Saudi Arabia's ethylene capacity based ethane as the most significant feedstock obtained at a fixed and discounted rate of US dollar from the government. Petrochemical companies based elsewhere in the world mostly use Naphtha as a feedstock and procure it at international prices. It implies essentially that increasing Crude Oil prices raise the feedstock cost of marginal producers in the Western and Asian regions, exposing them to the risk of volatility in earnings.

The Saudi Arabia's petrochemical sector was affected by the Crude Oil price increase. However, the petrochemical industry in Saudi Arabia recorded high revenues during the economic downturn in 2009 and had been continuing its competitiveness and liquidity until the fourth quarter of 2014. Saudi Arabia's petrochemical companies believed the profitability attributed in the restocking of inventories by customers with higher demand in the midst of the increase of macroeconomic activities in the world's market.

## 10. Conclusion and Recommendations

The focal research question of this current study was, "How do the Saudi Arabia Petrochemical industries solve the issue of declining price of Crude Oil to Naphtha that may affect the profitability, competitiveness, and liquidity of the companies in the petrochemical sector?" The objectives of this research study are to determine the effect of Crude Oil's declining prices to Naphtha that may affect profitability, competitiveness, and liquidity of Saudi petrochemical industry. The second objective is to identify the factors influencing Naphtha's supply and demand. The third goal is to determine alternative strategies for the petroleum companies during Naphtha's price fall, and to identify the petrochemical companies' performance using feedstock diversification.

In 2010 to 2014, the exporting values of upstream, intermediate, and downstream petrochemical products were computed to be \$107,694, \$241,729, \$325,468, \$326,765, and \$220, 235 billion dollars, respectively. Also, the country also saves billions of dollars per year on importing goods.

According to Fayez Al Muthker (personal communication, May 2015), "I know that the volume of the Saudi petrochemical industry is expected to triple in spite of the financial condition of the oil price in the world's market. Saudi Arabia has new plants under development. In the future, Saudi Arabia is going to spend billions of dollars to keep the industrial projects moving and

earnings for the country. The government is planning to combine refineries and existing refineries to improve the production of petrochemicals and plastics. In spite of government ownership, the petrochemical industry, the private sector remains opportunistic in capturing a portion of the chemical market, either in partnership with SABIC or on its means."

In solving the issue of declining price of Crude Oil, the unprecedented number of new upstream projects launched by the private sector reduced the prices of resins. It makes the downstream operation attractive to several downstream investors. The sustained partnership between Saudi Aramco and SABIC has bolstered Saudi Arabia's petrochemical industry in a more competitive situation of development in the years to come.

The development of plastics industry is part of the country's overall economic diversification program away from hydrocarbons and the prevention of the impact of declining Crude Oil in the global market. The Petrochemical industry has started with a polymer processing facility that is considered a significant turning point for the Saudi Plastics sector. SABIC produced synthetic resins for plastics manufacturing units in the Saudi Arabia. SABIC is now the source of raw materials for numerous national and international chemical and plastics processing companies. In Saudi Arabia's diversification plan, the government is increasingly focusing on building value-added industries based on energy derivatives aimed at exploiting its rich hydrocarbon reserve base. The Saudi Arabian government is also offering several incentives to petrochemical projects in the form of tax holidays and project financing through specialized credit institutions. As a result, Saudi petrochemical producers are progressing with significant expansion plans despite the risk of an expected increase in feedstock prices for the next year.

The main recommendations that we could draw from this study are:

- Expanding the capacity of higher value added products would mean that the country's wild position can shift from lighter feedstock to heavier feedstock (Naphtha), a labor-intensive process. It is likely to generate more employment in the country, which further finds strong support from the government.
- SABIC petrochemical industry should work tirelessly to extend and diversify its product portfolio and accelerate the development of new products using the newly approved chemical and avail the polymer value chains to meet customers' needs. The petrochemical companies should intensify its relationship with suppliers and customer base by maintaining high quality and useful products and services. The security of feedstock ensures value, drives growth, and drives innovation.
- SABIC and all its aggregate should work closely with global auto manufacturers to develop innovative materials that, by substituting for metal, offer designers greater scope for styling complexity while also delivering improved fuel-efficiency and substantial reductions in greenhouse gas emissions.

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## Appendix: Definition of Terms

### LIQUIDITY

This term implies in this mixed research as the level in which the security or the asset or security do not affect the market price even in selling and buying off the chemicals. When the buying and selling of petrochemicals turn high, it characterizes the liquidity of the business. The liquid assets are assets easily bought or sold. The liquidity ratios determine the liquidity because no particular formula calculates cash (Investopedia, 2015).

### CRUDE OIL

On this project, the term Crude refers to the unrefined mineral deposits such as hydrocarbon deposits. Diesel, gasoline, and different types of petrochemicals are the refined Crude Oil. Crude Oil or the “black gold” has several variations from viscosity to various colors of black, or yellow based on the composition of hydrocarbons. Distillation heats and separates the heated oil separately and distributed it to the different component. Oil is heated and separated into various parts. These are chemical products derived from petroleum. Some petrochemical compounds are the results of the combination of other fossil fuels.

### OLEFINS

These are the two most common petrochemicals. Olefins involve ethylene and propylene. The aromatics consist of benzene, the toluene, and the xylene isomers. By using the oil refineries, the firm can produce olefins and aromatics using as fluid catalytic cracking derived from the fraction of petroleum. Ethane and propane Chemical plants produce olefins by steam cracking of natural gas liquids like ethane and propane. Aromatics came from the catalytic reforming of Naphtha. Olefins and aromatics are the building blocks for solvents, adhesives, and even detergents. Plastics, resins, fibers, elastomers, lubricants, and gels are the bases in producing polymers and oligomers (Saudi Arabia Basic Industries Corporation, 2015).

### PROFITABILITY

It refers to the capability of the organization to gain substantial profit. Profit is the outcome of the firm's inner after the whole day works. After determining the cost of the company operations, the profit describes the efficiency of the enterprise's business process. (Dictionary.com, 2015).

### COMPETITIVENESS

It refers to the prices of merchandise and services in the market may change either a very slowly change or do not change at all. Factors affecting this include employment and inflation (Dictionary.com).