



## AN ANALYSIS OF THE OIL AND GAS INDUSTRY'S COMPETITIVENESS USING PORTER'S FIVE FORCES FRAMEWORK

Mohammed A. Hokroh\*

MBA in Finance, University of Leicester, UK.

### Abstract

The purpose of this paper is to analyse the oil and gas industry's competitiveness using Porter's Five Forces framework. The paper starts with an overview of the oil and gas industry and proceeds with analysing its competitiveness with implications to new firms that are considering entering into the industry. Then, it discusses strategy literature assumptions about future certainty and approaches to strategic decision making. Finally, it concludes with key points and recommendations.

### 1. Introduction

The purpose of this paper is to analyse the oil and gas industry's competitiveness using Porter's Five Forces framework. The paper starts with an overview of the oil and gas industry and proceeds with analysing its competitiveness with implications to new firms that are considering entering into the industry. Then, it discusses strategy literature assumptions about future certainty and approaches to strategic decision making. Finally, it concludes with key points and recommendations.

### 2. Industry Overview

One of the most important industries that has a rich and fascinating history is the oil and gas industry. This history spans thousands of years and has played a significant role in structuring this business.

#### A. Early History

Underground oil was first discovered by the Chinese who used bamboo pipelines to transport oil and gas drawn from wells to be used for lighting. During the 13<sup>th</sup> century, Azerbaijan inhabitants developed various methods to collect oil seeps on the surface. By the mid 1590's, they were able to dig pits that reached a depth of 115 feet in order to facilitate the collection of oil. (Library of Congress 2010).

Producing companies were mainly from Italy and Germany before the Indonesia entered into the European oil market in 1643. In 1650, the first European commercial oil well was discovered in Romania, about 200 years later, the world's first oil refinery was established there. The 1850's witnessed the birth of the first oil company in the world, the Pennsylvania Rock Oil Company. (Antill and Arnott 2000).

The first major oil company, the Standard Oil Company, was established in 1870 by John Rockefeller, which proceeded to dominate the next decades (1870-1895) despite fierce competition. (Library of Congress 2010).

#### B. From 1895 to 1950

In 1895, an increase in worldwide oil demand was offset by a corresponding increase in supply; most of these increases came from the United States as it exported 44% of its crude oil production. Subsequently, the consumption of oil increased by 16% per annum whereas production increased by 12% per annum in the period from 1900 to 1910. (Antill and Arnott 2000).

During 1909, Standard Oil was divided into 34 separate companies due to the enactment of antitrust laws (Library of Congress 2010). In 1933, an affiliation of Standard Oil named California Arabian Standard Oil Company was created and obtained the concession to explore Saudi Arabia for oil, and after five years of extensive exploration, commercial oil was finally discovered in Saudi Arabia. (Datamonitor 2009).

This period of the oil and gas industry history ended in 1950 with the United States as the dominant player accounting for more than half the world's production (Library of Congress 2010).

#### C. Modern History

As market globalization began to emerge, more competitors appeared across Europe, Russia and Asia, such as Royal Dutch, Shell and Anglo-Persian (British Petroleum). (Library of Congress 2010)

Enormous discoveries of oil around the world, particularly in the Middle East, led to a decreasing U.S. dominance of the oil industry as Middle Eastern production reached 5.2 million barrels of oil a day (about 24% of the world's total production) by 1960. (Antill and Arnott 2000).

These discoveries were followed by rapid increases in oil consumption at a rate of 7 percent per annum. This significant increase of consumption was primarily driven by the expansion of automobile industry and was compounded by economical and political instability in the Middle East during the 60's and 70's. This resulted in increased oil prices, a situation exacerbated by embargos by the oil producing counties leading to a reduction in the world's total oil production. Due to this oil supply shortage, the International Energy Agency (IEA) was established.

Moves by competitors to influence the Middle East oil prices led the oil producing countries to establish the Organization of Petroleum Exporting Countries (OPEC). IEA and OPEC play several roles in forecasting economical growth rates and petroleum supply and demand scenarios. (Library of Congress 2010).

### 3. Major Oil Companies

In the early 19<sup>th</sup> century, the oil and gas industry was dominated by what was known as “the seven sisters”. These were: Standard Oil of New Jersey (Esso) then (Exxon), Standard Oil of New York (Mobil), Standard Oil of California (Chevron), Royal Dutch Shell, Texaco, Gulf, and British Petroleum (BP). However, massive discoveries of oil and gas fields in Saudi Arabia, Kuwait and Persia led to the creation of conglomerates. (Library of Congress 2010).

According to Energy Intelligence (2010), the major 10 oil companies in the world today are as follows:

Rank	Company Name	Country	State Ownership %
1	Saudi Aramco	Saudi Arabia	100
2	National Iranian Oil Company	Iran	100
3	Exxon Mobil	US	N/A
4	Petroleos De Venezuela	Venezuela	100
5	China National Petroleum Corporation	China	100
6	British Petroleum	UK	N/A
7	Royal Dutch Shell	UK/Netherlands	N/A
8	ConocoPhillips	US	N/A
9	Chevron	US	N/A
10	TOTAL	France	N/A

### 4. Industry Competitive Analysis

Porter’s Five Forces framework points out that the state of competition in any industry depends on five competitive forces: (a).threat of entrants, (b).threat of substitutes, (c).power of suppliers, (d).power of buyers and (e).rivalry among industry’s firms. However, a company’s success in an industry depends on how it is related to that industry and how the industry is structured. (Porter, 1980).

Industry structure (manifested in the five competitive forces) drives competition and profitability. In order to reveal the roots of an industry’s current profitability and anticipate future trends, a company has to understand the underlying causes of the five competitive forces. (Porter, 2008).

#### Assessment of the Five Forces

##### A.1. Threat of potential entrants:

Porter (2008) indicates that new entrants bring with them new capacity and the desire to gain market share. This desire, Porter suggests, puts pressure on costs, prices and the rate of investment that is necessary to compete. As he indicates, threat of entry depends on two factors: the height of entry barriers and the incumbents’ reaction to new entrants.

According to Jones *et al.* (1978) the major barriers to entry in the oil and gas industry are:

1. Patents
2. Large capital requirements
3. Economies of scale
4. Governments regulations
5. Product differentiation
6. Predatory behavior by cartels
7. Ownership of resources

Patents of technology and innovation work as driving forces of cost reduction and differentiation (Santos *et al.* 1999). For example, in early 2010, Exxon Mobile introduced advanced technology to reduce cost while increasing production capacity, enabling the company to boost its production capacity by 5.8 million barrels of oil and extend the life of its oil and gas fields. (Datamonitor 2010) However, in refining, technical patent barriers are minimized as the technology involved in refinery’s construction is widely known. The barriers for entry rising from large capital requirements and economy of scale are also minimized and sometimes do not serve as barriers to entry in efficient oil and gas markets such as the U.S. market. For instance, if an industry cartel sought to monopolize the refinery sector, it has to restrict refinery input and output until the cartel marginal cost equals the marginal revenue. At this point, the refinery outputs would exceed marginal cost allowing a potential entrant to earn greater profit. Economies of scale do not prevent entry from occurring in an efficient oil market. For example, it is possible for an industry with large economies of scale to experience a limit-pricing situation. In this case, a potential entrant must achieve a high level of output to operate in an efficient scale. This is going to lower market price below the break-even level of costs if the existing rivals maintained their level of output. (Jones *et al.* 1978).

In the marketing sector, barriers to entry arising from government regulation have influenced the competitive strategies of the oil and gas companies. For example, the U.S. oil and gas companies have always succeeded in product differentiation because of many years of advertising and development. However, this success did not prevent independent markets from selling similar products at lower cost. Nonetheless, government regulations have shut out such independent markets. (Jones *et al.* 1978).

Jones *et al.* (1978) suggest that governments have conferred upon themselves some form of cartel power over the industry due to their regulations. This supports Amarcher (1976) who points out that OPEC's success in influencing oil prices demonstrates the power such cartels have on primarily commodities. Although OPEC does not set oil prices, its decisions play a major part in pricing, because the OPEC countries produce 40% of the world's oil supply (Library of Congress 2010). Consequently, these governmental policies and regulations work as a barrier for new firms to enter the industry (Porter 2008). Natural resources obviously play the biggest barrier to entry as new entrants must have the secure and competitive resource to risk entry into the industry as rivals have to acquire a comparable amount of secured resources (oil and/or gas) to compete (Jones *et al.* 1978).

### **B.1. Threat of substitutes:**

Porter distinguishes between rivalry (the fifth force) and substitution (the third force). The term rivalry describes competition between companies that provide similar products while substitution refers to products that are not in direct competition. (Strategy, Business Information and Analysis 2009) Substitutes affect the industry through limiting its anticipated profit by placing a ceiling on price (Porter 1980).

With the use of advanced technology, major oil and gas companies are looking for alternative sources of energy as possible substitutes. For example, in April 2009, TOTAL formed a partnership with Gevo, a US company developing transportation biofuels and chemical products. (Datamonitor 2010) Porter (2008) indicates that a substitute's threat is high when it offers an attractive price trade-off to the industry's products or when the buyer's cost of switching to substitute is low. For instance, the Chinese government aims to have biofuels account for 15% of its total transportation fuel consumption by 2020, and in comparison, the European Union has set a target of 20% for the same period. China National Petroleum Corporation is already taking steps to leverage this expected increase in demand in China and Europe. (Datamonitor 2010) If biofuels offer an attractive price trade-off, it would provide competitive substitutes, thus threatening crude oil products (Porter 2008).

### **C.1. Power of suppliers:**

Porter (2008) illustrates that powerful suppliers affect the market through charging higher prices, limiting production, and/or integration. The first two elements were made obvious during the 70's when embargos by the oil producing countries led to reducing the world's oil production and this oil supply shortage led to a dramatic increase in the nominal price of a barrel of oil (Library of Congress 2010) from \$2.7 to \$11.2 during the period from 1973 to 1974 (Backus *et al.* 2000). This reveals the power oil and gas suppliers have over the industry. Any move by a competitor to influence prices will be followed by changes in competitors' strategies. For example, the move of Esso (Exxon Mobile today) in 1959 to influence Middle East oil prices led to the creation of OPEC, whose decisions play a part in oil prices today. (Library of Congress 2010).

As suppliers, oil and gas companies bring power to the recipient countries through international vertical integration. Cash can be injected into the refining industry to foster competition and enhance supply security to consumers. (Terzian *et al.* cited in Al-Moneef 1998) For example, Petroleos de Venezuela S. A. (PDVSA) controls its refining and marketing operations in the U.S. through CITGO Corporation, in which it owns 100 percent through PDV America. (Datamonitor 2009) Vertical integration reduces risk and maximizes profitability at every stage of the chain from wellhead to gasoline station. It helps the oil companies balance their operations and protect themselves from markets instability. For instance, when crude oil price goes down, the refining and marketing margins would generally be expected to be positive. (Al-Moneef 1998)

#### **a. Power of buyers:**

Powerful buyers have the ability to reduce prices, demand better quality or more service (thereby increasing costs) and play industry participants off against each other, at the expense of industry profitability (Porter 2008). Major oil companies outsource much of their field operations to oil and gas service companies. As buyers, oil companies are in a powerful position to bargain prices, demand better quality or additional service.

Oil and gas companies seek to obtain rights to invest in exploration and production areas internationally. These rights are acquired through buying a percentage of another company's right or through participating in licensing rounds. In this highly competitive environment, oil and gas companies join together and form a Joint Venture. (Tavares 2000)

According to Berg *et al.* (cited in Kent 1991), Joint Ventures are formed primarily for three reasons:

1. Gain more market power (buyer)
2. Reduce or share risk
3. Acquire or share information

Moreover, oil and gas companies form Joint Ventures to overcome political and/or legal impediments or to meet host country requirements (Chu *et al.* cited in Kent 1991). ConocoPhillips for example, has 50% equity investment in Joint Venture with Spectra Energy a natural gas infrastructure company in North America (Datamonitor 2010). A 50:50 Joint Venture between Shell and Exxon Mobil (Infinium) manufactures and markets high-quality additives used in fuel, lubricants, and specialty additives (Datamonitor 2010). This, as Porter (2008) suggests, increases the buyer's negotiating leverage relative to competitors which leads to increasing the buyer's power.

#### **b. Rivalry amongst competitors:**

High rivalry between existing competitors can limit industry profitability depending on the competition intensity and basis (Porter 2008). Major oil and gas companies are relatively equal in size, power and capabilities (Datamonitor 2009 and Datamontor 2010). This increases the intensity of rivalry (Porter 2008) which can manifest itself in a price war if a competitor tries to influence prices (Menghini 1997).

According to Porter, (2008) slowdown in production such as experienced by oil and gas companies combined with declining net liquids production and reserves (Datamonitor 2010), could increase the intensity of rivalry in this industry.

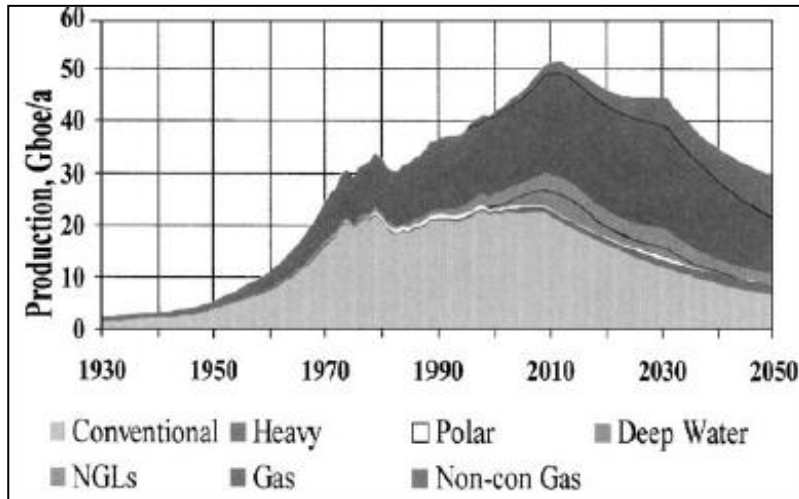


Figure 2: Possible industry future production of “All Hydrocarbons” Bentley (2002).

Rivalry in any industry is intense if rivals have goals that go beyond economic performance (Porter 2008). According to Bernstein *et al.* (cited in Kent 1991), one purpose of Joint Venture in the oil and gas industry is to manage rivalry through turning potential competitors into allies. This is particularly critical in the oil and gas industry where there is little to distinguish rivals (Hennart *et al.* cited in Kent 1991).

**Five Forces Summary:**

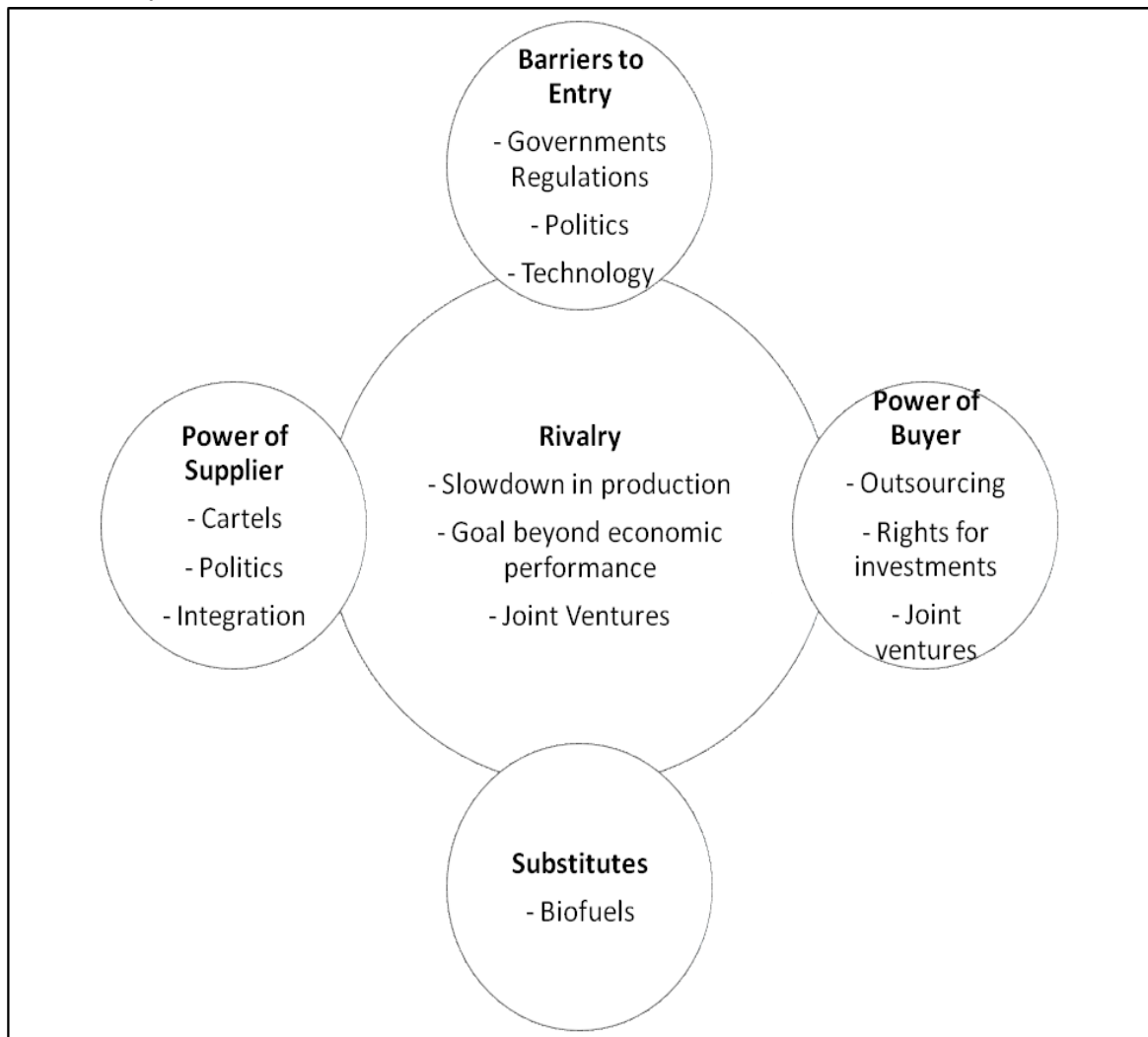


Figure 2: Five force model (Porter 2008).

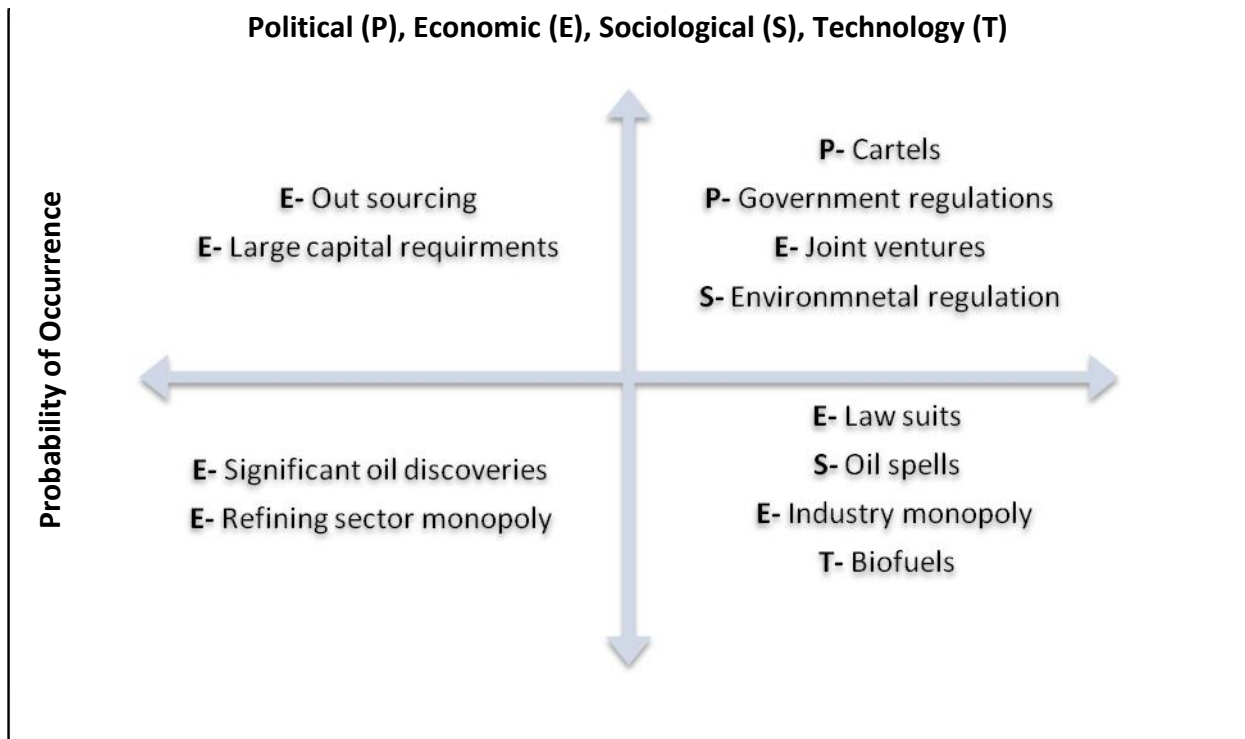
**Other Analysis:**

**a. SWOT Analysis:**



Figure 3: SWOT analyses (Strategy, Business Information and Analysis 2009).

**b. PEST Analysis:**



**Literature Assumptions**

**Future Certainty and Strategic Decision Making:**

A company’s external environment is a source of uncertainty. Because it is uncontrollable, the external environment influences the structure, decisions and performance of organizations. Therefore, organizations have to adapt to the external environment by restructuring themselves. (Jauch *et al.* 1986).

Milliken (1987) points out that the term “environment uncertainty” is a source of confusion since it has been used to describe the state of the organization’s environment as well as the state of the organization when lacking critical information about the environment. This has caused scholars to argue whether environment uncertainty should be measured as a perceptual phenomenon or as a property of organizational environments (Child *et al.* cited in Milliken 1987). Rational planning and analysis are the means to combat external uncertainty of the environment (Whittington 2001). Organizations that spend more time and resources in scanning and forecasting the environment will have more ability to understand the probabilities of various events or changes in the environment. However, organizations operating

in an unstable market will perceive more environmental uncertainty than organizations operating in more stable one. Since effect uncertainty is the inability to predict what future environmental changes will be on the organization, any increase or decrease in uncertainty impacts the organization's ability to function in future states of the market. (Milliken 1987).

Hofer *et al.* (cited in Milliken 1987) pointed out that it is difficult for organizations to go through all the steps outlined in the rational planning model to identify opportunities and threats in an environment with a high degree of uncertainty. Even if they did, the outcome would resemble the “garbage can approach” (Milliken 1987). The Evolutionary theorists realize the limited capacity of organizations to anticipate future changes in the environment and respond to it. Thus, Evolutionary theorists suggest that the best strategy is the one that is selected directly by the environment. (Whittington 2001) However, in the oil and gas industry, organizations may try to influence the external environment (rather than adapting it) to create uncertainty for competitors thereby enhancing its own competitive position. The embargo of oil in the late 70s is one example. (Jauch *et al.* 1986).

This illustrates the Transition view in that sources of uncertainty are both external and internal and organizations have the ability to influence the environment (Milliken 1987). Processual theorists, on the other hand, argue that the best strategy should also encompass profit maximization in addition to environmental factors, while the Systemic theorists argue that strategies must be socially sensitive in order to understand the internal and external environment (Whittington 2001). Thus, it is important to identify the sources of uncertainty as well as the type of uncertainty being experienced. Organizational attempts to respond to environmental uncertainty are associated with understanding the response options that are available to the organization and what the value or utility of each might be. Accordingly, response uncertainty is likely to be high when there is a perceived need to act because a pending event or change is perceived to create a threat or to provide an opportunity to the organization. (Milliken 1987) Thus, the Systemic perspective on strategy indicates that the internal contest of organization is not only individuals or departments, but the social groups' interest and the surrounding resources (Whittington 2001).

## Conclusion

Based on this analysis, investing in the oil and gas industry is neutral to a negative proposition (Menghini *et al.* 1997). A new firm considering entering the industry first has to assess the competitiveness of the industry using the five forces (Porter 2008). This assessment is even made more difficult due to the high degree of uncertainty in the oil and gas industry (Hofer *et al.* cited in Milliken 1987). Thus, we need to rethink our approach to strategic decision making by analyzing both the internal and external sources of uncertainty as well as identifying the type of uncertainty being experienced (Milliken 1987).

## Recommendations

1. To be able to enter into this industry, new entrants have to assess barriers to entry (natural resources, government regulations, politics and technology) cautiously (Jones *et al.* 1978).
2. To anticipate future trend of this industry, new entrants have to analyze the industry's past trends and performance (Menghini *et al.* 1997).
3. To outperform rivals, new entrants have to establish a difference that can be preserved (Porter 1996).
4. To invest or diverse into different market segments, oil and gas companies have to select the right market segment carefully (Garcia *et al.* 2000).

## References

1. Al-Jubran H. H. and Bu Hassan, S. A. (2009) ‘Safety and operations measures taken by one company to conduct onshore rigless critical well intervention operations in water, oil and gas wells’ paper presented at *the 2009 SPE/ICoTA coiled tubing and well intervention conference and exhibition* held in Woodlands, Texas 31 March-1 April 2009, U.S.A.
2. Al-Moneef, M. A. (1998) ‘Vertical integration strategies of the national oil companies’ *The development economics* 36(2):203-222
3. Amarcher R. C. and Sweeney, R. J. (1976) ‘International commodity cartels and the threat of new entry: implications of ocean mineral resources’ *Kyklos* 29(2):292-309
4. Antill, N. and Arnott, R. (2000) *Valuing oil and gas companies* Cornwall, England: T J International Ltd
5. Backus, D. K. and Crucini, M. J. (2000) ‘Oil prices and the term of trade’ *Journal of international economics* 50(1):185-213
6. Bentley, R. W. (2002) ‘Global oil and gas depletion: an overview’ *Energy policy* 30(3):189-205
7. Datamonitor (2009) ‘China National Petroleum Corporation company profile’ Available from: Business Source Premier. (26 September 2010)
8. Datamonitor (2009) ‘Petroleos de Venezuela S.A. company profile’ Available from: Business Source Premier. (27 September 2010)
9. Datamonitor (2009) ‘Saudi Aramco company profile’ Available from: Business Source Premier. (18 September 2010)
10. Datamonitor (2010) ‘ConocoPhillips company profile’ Available from: Business Source Premier. (27 September 2010)
11. Datamonitor (2010) ‘Exxon Mobile Corporation company profile’ Available from: Business Source Premier. (19 September 2010)
12. Datamonitor (2010) ‘Royal Dutch Shell plc company profile’ Available from: Business Source Premier. (26 September 2010)
13. Datamonitor (2010) ‘TOTAL S.A. company profile’ *Datamonitor* Available from: Business Source Premier. (24 September 2010)
14. Deam, R. J., Leather J. and Hale J. G. (1975) ‘World petroleum energy model’ paper presented in at *the 1975 SPE 9<sup>th</sup> world petroleum congress* held in Tokyo 11-16 May 1975, Japan
15. Energy Intelligence (2010) ‘PIW ranks the world's top oil companies’ Available online at: [http://www.energyintel.com/documentdetail.asp?document\\_id=137158](http://www.energyintel.com/documentdetail.asp?document_id=137158) (26 September 2010)
16. Gracia, P. (2000) ‘Market segmentation and pricing strategies in the North American natural gas market’ paper presented at *the 2000 SPE annual technical conference and exhibition* held in Dallas, Texas 1-4 October 2000, U.S.A.
17. Hira, A. and Oliveira, L. G. (2009) ‘No substitute for oil? How Brazil developed its ethanol industry’ *Energy policy* 37(6):2450-2456

18. Jasimuddin, S. M. (2001) 'Analyzing the competitive advantages of Saudi Arabia with Porter's model' *Business and industrial marketing* 16(1):59-68
19. Jauch, L. R. and Kenneth K. L. (1986) 'Strategic management of uncertainty' *The academy of management review* 11(4):777-790
20. Jones, R. O., Mead, W. J. and Sorensen, P. E. (1978) 'Free entry into crude oil and gas production and competition in the U.S. oil industry' *Natural resources journal* 18(1):859-876
21. Kent, D. H. (1991) 'Joint ventures vs. non-joint ventures: an empirical investigation' *Strategic management journal* 12(5):387-393
22. Library of Congress (2010) 'Industry Cartels and Organizations' Available online at: <http://www.loc.gov/rr/business/BERA/issue5/cartels.html> (12 September 2010)
23. Library of Congress (2010) 'The oil and gas industry' Available online at: [http://www.loc.gov/rr/business/BERA/issue5/issue5\\_main.html](http://www.loc.gov/rr/business/BERA/issue5/issue5_main.html) (12 September 2010)
24. Milliken, F. J. (1987) 'Three types of perceived uncertainty about the environment: state, effect and response uncertainty' *The academy of management review* 12(1):133-143
25. Porter, M. E. (1980) 'Industry structure and competitive strategy: keys to profitability' *Financial Analysts Journal* 36(4):30-41
26. Porter, M. E. (1996) 'What is strategy?' *Harvard business review* 74(6):61-78
27. Porter, M. E. (2008) 'The five competitive forces that shape strategy' *Harvard business review* 86(1):78-93
28. Santos, E. M. (1999) 'Competitive strategies and competitive strategies and strategic positioning of oil companies in the international oil Business: theory and practice in perspective' paper presented at the 1999 SPE annual technical conference and exhibition held in Houston, Texas 3-6 October 1999, U.S.A.
29. Saudi Aramco. (2008) *Setting New Standards Our Legacy, Our Future Annual Review 2008* Dhahran: Al Jazeera Printing Co.
30. Saudi Aramco. (2009) *Saudi Aramco Annual Review '09* Dhahran: Al Jazeera Printing Co.
31. Strategy, Business Information and Analysis (2009) *Master of business administration, Strategy, Business Information and Analysis* Great Britain: 292 High St, Cheltenham GL50 3HQ
32. Tavares, M. J. D. (2000) 'Bidding strategy: reducing the "money-left-on-the-table" in E&P licensing opportunity' paper presented at the 2000 SPE annual technical conference and exhibition held in Dallas, Texas 1-4 October 2000, U.S.A.
33. Whittington, R. (2001) *What is strategy and does it matter?* Cornwall, England: T J International Ltd

**\* Corresponding Author**

*Mohammed A. Hokroh is a corresponding author and business system analyst in Saudi Aramco, Ras Tanura, Saudi Arabia. He is a PhD candidate at the University of Bolton, Manchester, United Kingdom. He holds Master of Business Administration (MBA) in Finance degree from the University of Leicester, Leicester, United Kingdom and Bachelor of Science in Management Information Systems (MIS) from King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia. He has published several papers in international journals like Research in Applied Economics, Asian Journal of Finance and Accounting, International Journal of Accounting and Financial Reporting.*