NORGES HANDELSHØYSKOLE
Bergen, Fall 2008

Strategic challenges facing international oil companies

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Master Thesis in International Business

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PREFACE

This paper was written by Işıkcan Aysev, an M.Sc. student at NHH, under the supervision of Professor Rögnvaldur Hannesson. The aim of the study is to identify ways in which international oil companies (IOCs) can stay relevant and competitive in their industry the light of the challenges posed by the changing business environment.

The paper consists of three sections and six chapters. The paper draws conclusions from the available data and makes recommendations in this light.

Section A is titled 'Research Design' and discusses the nature of the study.

Chapter 1, Research Question, highlights the objectives, relevance and main concepts of the study.

Chapter 2, Literature Review & Research Methods, discusses the different lines of reasoning employed in the paper and reviews the literature it is based upon and explains the scientific method used in the research process, as well as the tools used in the process.

Section B is titled 'Background Information' and gives an overview of the information available on the subject and identifies the issues of concern.

Chapter 3, Energy Outlook, discusses the dynamics of the oil & gas industry and the future energy outlook.

Section C is titled 'Strategic Issues and Case Study' and analyzes the issues faced by IOCs in depth.

Chapter 4, Fortunes of International Oil Companies, serves as an introduction to the aforementioned companies, their operations, histories, current activities, strengths and weaknesses.

Chapter 5, Strategic Challenges Facing IOCs, takes an in-depth look into the challenges faced by IOCs, exemplified through case studies.

Chapter 6, New strategic directions for IOCs, offers recommendations for IOCs to deal with the challenges mentioned in chapter 5 by drawing upon the lessons from the previous chapters.

Abstract

The study argues that the greatest challenge facing the international oil companies at the moment is how to replace their reserves in the face of declining access to resources, and to solve this issue, they will have to adopt new strategic directions to remain relevant, viable and profitable in the future. This argues for greater investment in technology development that will enable a long-term drift towards renewable sources and greater extraction of unconventional oil; in the short term, increasing investment in conventional E&P programs, partnering with NOCs in 3rd countries and reconsidering positions in high risk countries.

Section A - Research Design

Chapter 1 - Research Question

As mentioned in the abstract, the question of how the world will fuel its future economic growth is a crucial one, but it is also a multi-faceted issue with economic, social and political dimensions. This paper shall concentrate on the economic dimension, and the scope will be limited to the oil & gas sector, specifically on the competitive dynamics between the companies in the sector.

The research paper shall be concentrated on the worldwide operations of international oil companies (IOC), strategic issues facing the IOCs and suggestions for a new strategic paradigm for IOC operations. Following Section A regarding research design, the paper shall first introduce background information regarding the world energy outlook, IOCs and NOCs, in Section B. Thereafter, in Section C, strategic challenges facing IOCs will be analyzed with the help of a case study, and potential remedies will be discussed. Finally, in Section D, the author will build potential scenarios that may unfold in the industry with regards to the actions taken, draw conclusions from the research and the analysis, and offer recommendations based on these conclusions.

1.1. Research Objective:

The main objective of the paper is to identify ways in which IOCs can stay relevant in their industry in the light of the challenges posed by the changing business environment. The main challenge to IOCs' business model is their lack of access to new oil reserves. As upstream operations typically have the greatest added value in the value chain and are its most profitable parts, this calls into question the long-term profitability, even the *raison d'être* of IOCs. There are numerous questions to be answered to achieve this objective to a satisfying degree. These can be described as the following:

1. *What are the competitive advantages and disadvantages of IOCs?*
2. *What is the impact of the following on the strategic direction of IOCs?*
    a. *Principal challenge: Reserves*

b. *Resource nationalism: Venezuelan Case*
c. *Lack of incentives for long-term investment: BP Case*
d. *Competition from NOCs in 3rd countries*
e. *High geopolitical risks*
f. *Commoditizing technology*

3. *How can the current competitive climate be described within a game theoretical context?*
4. *What are the prevailing rules of the 'game'?*
5. *How can IOCs play it better?*
6. *How can IOCs 'change the game'?*

Throughout the paper answers to these questions will be sought in order to achieve the set objective. By doing so, the author hopes that this study will shed light on the recent industry developments. Understanding the business prospects and the challenges faced by IOCs is crucial to understanding the long-term trends in oil & gas supplies. The study will have taken into account occurrences from June 2007 until September 2008. Hence, the study is important due to its relevance to recent industry developments and its observation of an key issue to future energy supply.

The study will take a 'global' approach to the issue and the industry rather than singling out regional or country specific concerns. As oil & gas industry is a globe-spanning one and IOCs typically operate in over 100 countries, this approach is required to have a more complete understanding of the subject. The line of argument will suggest that the developments regarding the fortunes of IOCs and the emergence of NOCs as major players in the industry will have global implications, however within the confines of this study the concentration shall be on the IOCs on the corporate level.

It is also important to address one issue that may seem to get tangled in the debate regarding IOCs and NOCs. This paper will not discuss the question of where the next barrel of oil should come from, as from the consumer's point of view this makes little difference. From a public policy maker's point of view, this may be different. The main question for the consumer should be if there will be enough barrels per day (b.p.d.) production for fuel prices to remain affordable. Whether this oil is produced by an IOC or an NOC makes little

difference. In this case, the challenge to IOCs is to bring forth the supplies that market is craving for, as they have a better record of efficiency compared to NOCs. This paper shall not discuss whether the IOCs are serving the world population as well as they possibly can, but instead shall focus on how the IOCs can improve their competitive position to serve their shareholders' long-term interests.

It is the author's sincere hope that the study will produce relevant and interesting results for industry practitioners, policy makers and industry observers. The methods used and the analysis itself may be of interest to the students of the subject of strategy as well.

Main trends that need to be addressed:

1- As large-scale, energy intensive industrial development takes places in much of the developing world, the energy industry will gain in importance. The world will have an increased need for secure, affordable and abundant energy resources.

2- The business climate and prospects for large, international oil companies is worsening.

3- Balance of power between international and national oil companies is permanently shifting to the benefit of the latter.

4- The international oil companies need a new strategic paradigm to successfully compete with national oil companies and stay relevant in the new competitive environment.

Chapter 2 – Literature Review & Research Methods

2.1. The theoretical line of reasoning:

Models & Theories

The basic line of reasoning was supported by primary and secondary data, and the findings were analyzed through models acquired from strategic management literature. In order to illustrate some points, such as the effects of nationalization on the companies or the management's lack of incentive for long-term investments, case study approach was also taken.

The theoretical line of reasoning is built on understanding the fundamentals of the industry, the business, the environment, the competition and contemplating on how strategic decisions affect the competitive standing of the firm in this environment. In order to do so, several models were used, such as Porter's Five Forces, Value Chain Analysis, Foundations of Strategic Capability, PESTEL framework, and PARTS.

Porter's Five Forces was a good place to begin with external analysis, as it allows one to take a snapshot of the competitive situation in the industry. This allowed us to see the competitive situation that has been unfolding around the firm and its effects.

The internal dynamics of these companies were investigated by using value chain analysis, in this case focused on Shell's value chain, to see where the real value lies in the business and understand the overriding interests of the firm.

Then, the author concentrated on the internal devices the firm has to pursue these interests, namely its resources and competencies, by using the foundations of strategic capability model. This way, it was possible to see the strong and weak points the firm had in its strategic capability.

Hence the question became how weak, or how strong. In order to answer this question, data from the five chosen companies were reviewed and compared, with the aim of pinpointing the competitive standing of each company.

Following the broad analysis of the companies and their environment, several of the strategic challenges that face the industry were addressed. While addressing these trends, the PESTEL framework was used to understand the firm's interaction with its environment throughout the Venezuelan case.

In the final stage, a more game theoretic approach was taken. The PARTS model was used to evaluate the strategic decisions that face the firms. This model was suitable in particular because it allows one to see the game the firm is engaged in and which action it may take to succeed in the game or alter the game. Following the game theoretic line of thought, Axelrod's suggestions for changing the game were built upon the implications of the PARTS model. The result is a prescriptive answer to the challenges mentioned earlier.

Literature & Secondary Data

In order to follow this theoretical line of thought, several academic publications were utilized. These were mainly of two subjects: literature on strategy & game theory subjects and literature on oil & gas subjects. This literature served as a source for theoretical subjects and as a source of secondary data.

Strategy and game theory literature, such as Axelrod, Brandenburger & Nalebuff, Hofstader, Johnson, Scholes & Whittington books or articles were used to build a theoretical grounding for the paper. Johnson, Scholes & Whittington textbook provided most of the basic theoretical grounding used in the paper, such as Five Forces or value chain analysis. On the other hand, Axelrod, Brandenburger & Nalebuff and Hofstader articles were used to build on this grounding with concepts from game theory.

Research publications on oil & gas subjects were also used, such as Baker Institute Policy reports on oil companies, some of them from Hartley, Medlock & Eller, Jaffe, a book by Hannesson on petroleum economics with many insights on the workings of the oil & gas markets and an article by Mommer on Venezuelan oil industry. These publications provided a better understanding of the industry, the challenges the firms face and also insights about the particular cases, such as Venezuela. Several institutional publications, such as those from BCG, Ernst & Young, and PriceWaterhouseCoopers were also used for their analysis and insights into the oil & gas industry.

2.2. The empirical line of reasoning:

News articles

A good deal of the primary data gathered for the paper have come from news articles in reputed newswires, newspapers, magazines and other media sources. Also, annual reports published by the oil companies investigated were a valuable source for primary data. Primary data from institutional publications, such as studies from IEA, IMF and UNEP, and data from CIFP were also instrumental.

Data from news articles form an important part of the primary data used for the paper. Articles going as far back as 2004, but mostly from 2007 and 2008, were used. The time frame is relevant in discussing the developments that have taken place in the industry. This paper is mainly focused on developments from mid 2007 until late 2008. The sources for the news articles that were used were reputed publications such as Associated Press, Reuters, Financial Times, Bloomberg, the Guardian, CNN, The New York Times, Forbes, The Times, Business Week, and Newsweek. This primary data is considered to be accurate and trustworthy to a large degree.

Company annual reports

The largest part of the primary data used in the paper comes from the companies themselves. By reading and extracting data from the annual reports of BP, Shell, Exxon Mobil, Chevron, and ConocoPhillips, the author was able to understand some of the internal dynamics of the firms and their competitiveness. This source of primary data can be considered as entirely accurate and reliable, as it is also submitted to stock exchanges and shareholders.

Institutional publications

The last part of the primary data that was used comes from institutional publications such as CIFP, IEA, IMF or UNEP. This data is also highly reliable, and most of this data was used to fill in the gaps with regards to the industrial dynamics, oil and gas sectors or assessments of geopolitical risks.

Section B - Background

Chapter 3 - Energy Outlook

3.1. Introduction

With the massive ongoing industrialization of populous developing economies such as China and India, the world has never needed as much as energy as it does today. The question of how energy is supplied, produced and consumed, moreover, by whom this is done, has become a crucial one. Not least because of concerns regarding how human activity at large is impacting the planet, but also because of an array of political, economic and environmental interests, the debate on energy issues has become the number one issue of interest for the international community.

At the epicenter of the issue is oil, its price, supply, demand, production, exploration and the sustainability questions regarding all these elements. In 2005, world oil reserves stood at 1,148 billion barrels, with international oil companies (IOCs) controlling a less than 10% share and a 77% share being commanded by national oil companies (NOCs).[1] This number was up from 72% in 2004[2], suggesting a market environment that is rapidly being dominated by NOCs. While the global oil industry continues to have an oligopolistic structure, the importance of IOCs with regard to NOCs in the field of production has significantly eroded over the course of the last four decades through nationalization of domestic oil industries in many key oil exporting countries.

Key to this debate is the oil, gas and power industries that are now involved in developing a variety of energy sources. At the forefront of the issue, there are the IOCs, some of them who have styled themselves as 'energy' companies. This study will commonly refer to IOCs, and by this it will be describing the 'Big Five'[3]. The IOCs over the course of 2007 have had several setbacks in their overseas operations stemming from disputes with the domestic government and the NOC. Shell in Sakhalin II, Russia, and Exxon Mobil, amongst others, in

1 Baker Institute Policy Report 2007, The changing role of national oil companies in international energy markets, James A. Baker III Institute for Public Policy of Rice University, Houston, p. 1.

2 International Monetary Fund 2006, IMF World Economic Outlook 2006, International Monetary Fund, p. 38.

3 Exxon Mobil Corporation, Royal Dutch Shell p.l.c., BP p.l.c., Chevron Corporation and ConocoPhillips Company.

Venezuela, as discussed in Chapter 5, have suffered setbacks due to the host country's political climate. The increased frequency of such disruptions of IOC operations in such a manner suggests a hostile institutional climate in the several of the important countries IOCs are operating in.

Then there are the increasingly important and assertive NOCs, once regarded as the 'rent collector for the landlord states'[4], playing a noticeably more significant role in exploration and production of oil and gas. For the purposes of this study, several NOCs[5] will be discussed in detail. Not only do some of these NOCs have a monopoly on oil reserves at home, but are also assuming a more assertive role abroad. This greater role played by NOCs has brought new challenges to IOCs, but not without the potential opportunities.

The central question raised in this paper is how international oil companies (IOCs) can adjust their corporate strategies to both compete and cooperate with national oil companies in a distinctly hostile climate.

Let us now discuss the four main claims that form the background of the analysis in this paper.

a. Developments in the energy industry is becoming increasingly important to the world economy. The world will have an increased need for secure, affordable and abundant energy resources.

Energy, more specifically oil, has been crucial to the industrial development of the 20th century. How the economic growth is being powered has always been a question for policy makers, on one hand. On the other hand, the question of who has the means to supply the required energy source (coal in the past, oil and gas today) remains as an important one for politicians. The energy crises in 1970s and 1980s compounded the fears that a curb in the world oil supply could severely hurt the world economy. They also underlined how oil dependent the industrial world had become.

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4 Mommer, B. 1994, The political role of national oil companies in exporting countries: the Venezuelan Case, Oxford Institute for Energy Studies, Oxford, p. 7

5 Saudi Aramco (Saudi Arabia), OAO Gazprom (Russia), CNPC (China), StatoilHydro (Norway).

The current state of affairs is not very different. According to the International Energy Agency estimates 35% of world's primary energy supply came from oil, and this share is unlikely to change over the next 25 years according to the agency's main scenario projections.[6] This scenario also projects that share of natural gas in the global energy supply mix will increase from 21% in 2003 to 25% in 2030. According to PriceWaterhouseCoopers' estimates, the world's primary energy consumption will go up from 10 billion tonnes of oil equivalent (btoe) to 15 btoe by 2025, and 21 btoe by 2050.[7] According to these projections, we may conclude that the share of oil & gas in the world energy mix, as well as their use in absolute terms, is only going to increase over the next 25 years. This reflects the still significant influence of oil & gas supplies and their prices to the world. Therefore the activities of the suppliers of these commodities, IOCs and NOCs, will be as relevant as ever to the world economy.

However, the challenges today are even more complex than those of the past. As the Economist[8] points out, the world is facing two different types of energy anxiety: one is the concern about affordable fuel, while the other is the panic over global warming. The issue of energy, how it is supplied and the sustainability of this supply looms large in the public eye. The developments in the industry therefore will become more important to world economy and the lifestyles of the world's inhabitants in the coming decades.

b. The business climate and prospects for large, international oil companies is worsening.

According to the Petroleum Intelligence Weekly (PIW) annual survey, quoted by Jaffe, only three out of the Big Five IOCs make it into the top 20 upstream oil & gas companies in the world, ranked on the basis of oil and gas reserve holdings[9], these being Exxon Mobil, BP and Chevron. This underlines the reduced role IOCs will have to assume in the future of world oil supply as second-tier suppliers, a far cry from the days of the 'Seven Sisters'. Reserve

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6 IEA (2005), World Energy Outlook (Paris: International Energy Agency/OECD Publications).

7 PriceWaterhouseCoopers 2006, The World in 2050: Implications of global growth for carbon emissions and climate change policy, , p. 33.

8 Rachman, G. 2007, "The paradoxical politics of energy", The Economist, December 2007, p. 95.

9 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 10.

holdings are a crucial indicator for the long-term prospects of an oil company, and the data suggest that the IOCs prospects are rather bleak in this respect in comparison to the NOCs. Less than one quarter of world's proven oil reserves are available to IOCs for development, and only about 10% is currently under IOC control[10]. The prospects for replacement of these reserves does not appear to be bright either, with the Big Five depleting their reserves with a replacement ratio of 82% from 1999 to 2007[11]. Meanwhile the exploration activities, which are meant to counter this decline and increase reserve holdings, have suffered a decline in real terms due to increasing exploration costs. This particular trend suggests lower future production rate for IOCs.

In addition to the decline in reserve holdings, several major oil producing countries have virtually made the business climate uninhabitable for IOCs, through institutional entanglements and outright nationalization, such as Russia and Venezuela. These developments suggest worsening prospects for the viability, profitability and ultimately the relevance of the IOCs as we know them.

c. Balance of power between international and national oil companies is permanently shifting to the benefit of the latter.

The current situation in terms of reserve holdings suggest a shift in the relative importance of NOCs with regards to IOCs. Most NOCs have a monopoly on their home oil reserves, and are becoming increasingly more active on the international stage, for example StatoilHydro or PetroChina, a subsidiary of CNPC. NOCs have increasingly better access to managerial, technical and financial expertise, which they lacked in the past. This raises the question if NOCs actually need to deal with IOCs at all, if the technology is being commoditized and the required capital is abundant, as they already possess the reserves? Even if they do, is there any reason to give them a role larger than that of a service contractor? IOCs ultimately have to deal and negotiate with host governments and NOCs to get access to the reserve holdings in a country, and the current situation suggest that they are dealt a rather bad hand when they get

10 Baker Institute Policy Report 2007, The changing role of national oil companies in international energy markets, James A. Baker III Institute for Public Policy of Rice University, Houston, p. 1.

11 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 24.

to the table. Therefore, there is a shift in the balance of power and in the terms of negotiation to the detriment of IOCs. Is it permanent? There are many variables that lead to the answer of this particular question, amongst them the relevance of oil as the major energy source, political climate in the host countries, technological advances.

d. The international oil companies need a new strategic paradigm to successfully compete with national oil companies and stay relevant in the new competitive environment.

As the study will show, IOCs have worsening fortunes and unless they employ a significant shift in the way they do business, these companies will have progressively smaller roles in the future of world energy. The new realities of the industry suggest that these companies need to learn how to compete and cooperate with their nationally-owned counterparts in order to stay relevant to the industry.

By starting off from these main trends, the study will be exploring the oil & gas industry, IOCs, NOCs, strategic issues that surface and explain these issues through the application of several theoretical frameworks to real case studies.

3.2. Introduction to the business environment

3.2.1. Increasing price of crude oil

According to BP Annual Review, the world primary energy consumption increased by 2.4% in 2006, with the oil consumption growing by 0.7%. Oil continues to claim the largest share in the world energy mix.[12] Please see the figure 3.1 below:

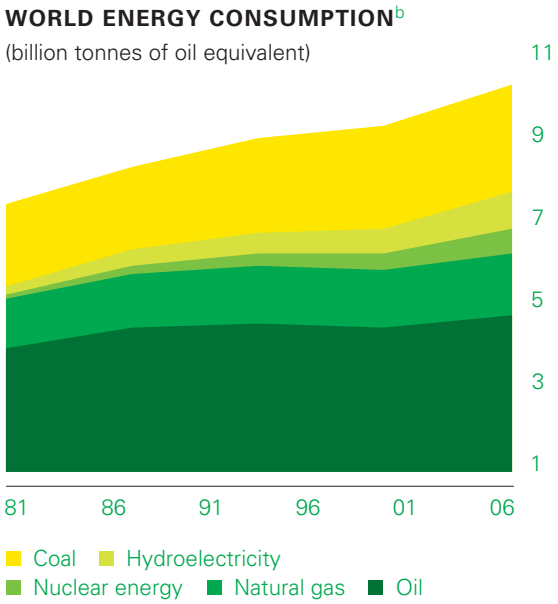

Figure 3.1, Source: BP p.l.c. 2007, BP Annual Review 2007 [online], p. 6, Available from: www.bp.com/annualreview [Accessed: 24.03.2008].

Year of 2007 saw the yearly average crude oil price reach a new record of $72.39/bbl, increasing 11% from the previous year. According to BP Annual Review 2007, the prices rose from $58.62/bbl in the beginning of the year to $96.02/bbl at the end.[13] By March 2008, within the space of ten years, from 1997 to 2008, the prices for Brent crude had reached to over $100/bbl.[14] BP accorded the drastic increase during 2007 mainly to OPEC production cuts early in the year, continuing growth in consumption and end of summer drop in inventories as a result.[15] A graph taken from the publication can be seen below, in figure 3.2:

12 BP p.l.c. 2007, BP Annual Review 2007 [online], p. 6, Available from: www.bp.com/annualreview [Accessed: 24.03.2008].

13 BP p.l.c. 2007, BP Annual Review 2007 [online], p. 6, Available from: www.bp.com/annualreview [Accessed: 24.03.2008].

14 Bloomberg Marketdata: Energy Prices 2008 [online], Available from: http://www.bloomberg.com/energy/ [Accessed: 24.03.2008].

15 BP p.l.c. 2007, BP Annual Review 2007 [online], p. 6, Available from: www.bp.com/annualreview [Accessed: 24.03.2008].

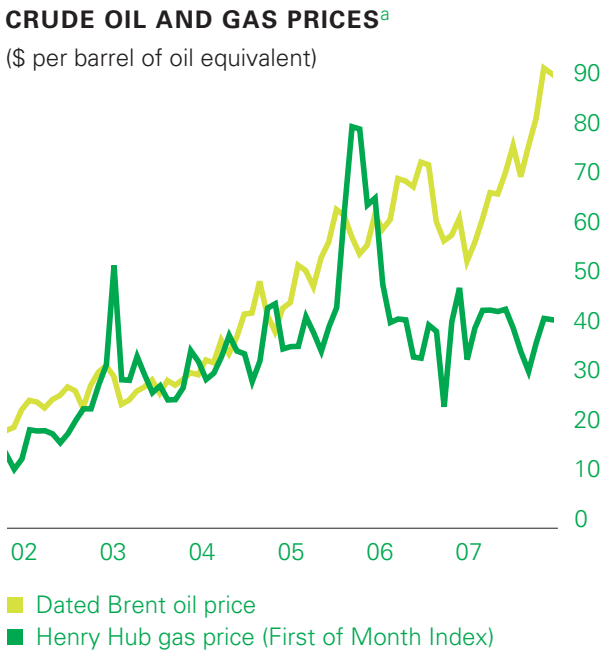

Fig. 3.2, Source: BP p.l.c. 2007, BP Annual Review 2007 [online], p. 6, Available from: www.bp.com/annualreview [Accessed: 24.03.2008].

It is argued that the oil market has moved from a supply-driven market to a demand-driven one.[16] The spare oil production capacity has decreased from 10 m.b.d. to 2.5 m.b.d., which represents a significant decrease in the suppliers' capability to respond to drastic, short-term changes in supply and demand.

The high oil prices make previously uneconomical fields financially viable for development, which in turn drives greater investment in these fields, resulting in a increase in supply and eventual decline of the oil price. A very high oil price would permanently establish new suppliers, for instance fringe producing countries, as large oil investments are not rolled back in the face of declining prices. This would result in a permanent increase in the oil supply, an unattractive proposition for the current suppliers. It could also cause a slowdown in the global economy due to decreasing demand as consumers switch the alternatives, hence lowering the prices in the longer-term.

Meanwhile, the development drive for these new resources will put a strain on the supply of all the goods and services required to undertake oil & gas production. These costs involve everything from charter rates for rigs and supply vessels, field service and project management costs, to raw material costs and technical personnel costs.[17] Complicating things

16 Zakaria, F. 2008, Why we can't quit [online], Newsweek, Available from: http://www.newsweek.com/id/123482?tid=relatedcl [Accessed: 27.03.2008].

17 Boston Consulting Group 2007, BCG Focus: Maximizing value in upstream oil and gas, Boston Consulting Group, Inc.

even more, these costs are not directly linked to the oil price, but are affected by it, meaning that the costs fluctuate regardless of oil price fluctuations.

So what do permanently higher oil prices mean for IOCs? Higher prices for oil will certainly be followed by more investment in development of oil reserves, both by IOCs and NOCs. The question is how much of these reserves will be developed by IOCs and how much by NOCs. The rising oil prices will have three primary effects on IOCs, firstly, they will make development of higher cost reserves affordable, secondly, they will strengthen the capital positions of NOCs, thirdly will drive up the costs of exploration due to rising costs of drilling equipment and personnel. Therefore, the higher prices can be described as a mixed blessing for the IOCs, as the net effect will be to increase competition.

3.2.2. Changes in natural gas markets

Natural gas represents close to a quarter of the world energy consumption. It is a key fuel in electric production, for its relative efficiency, but above all in the industrial sector, which accounted for 44 percent of the world consumption in 2004. It is also present in domestic uses, such as heating or cooking. Gas attractiveness has been accentuated in the past few years by a steady increase in oil prices, as well as a rising concerns about climate change. Thus, consumption is expected to keep growing in the future; according to a projection of the IAE (International Agency for Energy), it should increase by 63 % by 2030.[18]

Gas use is increasingly seen as an alternative to oil use, yet its physical properties are obviously very different from oil characteristics, and this determines the structure of the gas market. First, gas is bulky: 1000 m^3 of natural gas have approximately the same energy content as 1m^3 of oil; secondly, natural gas is quite difficult to handle, which is reflected by its high costs transportation. High economies of scale and high investments (needed to extract and transport gas) are the main characteristics of natural monopoly. Furthermore, owing to the transportation problem, gas market is organised in regional markets. In most of the cases, production and consumption areas match each other, but this is not so for Europe, ex-USSR and Africa. Western and Central Europe in particular is largely dependent to Russian gas, with

18 IEA (2005), World Energy Outlook (Paris: International Energy Agency/OECD Publications).

its reserves less than 4% of world reserves, and its consumption nearly twice as high as its production.

Russia is the country that particularly interests us here. It has huge energy resources, among them the biggest gas reserves in the world, and it produces a third of the world total output of natural gas. Russian gas provides more than a quarter of European gas demand. Gas sector in the country has remained largely state-controlled since communist times, export pipelines remaining entirely under state control. Russia largest energy company is the government-controlled Gazprom, which possesses tremendous natural-gas reserves. Its share in the global and Russian gas production is nearly 20 and 90 per cent, respectively. Gazprom's ambition, as can be read on its website, is to take “leading positions in the global energy market, and to increase the Company’s authority and influence in the world community”.

The recent trends in the natural gas markets have shown a certain form of natural gas, liquified natural gas (LNG), taking a more prominent role. This may mean that the future trajectory of the market may be towards an integrated global market, rather than fragmented regional ones. It is possible to ship LNG around the globe, in similar fashion to crude oil, which would create a global marketplace for natural gas

3.2.3 Renewable energy

Energy that comes from self-renewing sources, such as solar, wind and hydro power is defined as ‘renewable energy’. According to the IEA, more renewable energy will increase the diversity of energy sources, replace diminishing fossil fuels in the long-term, and will help decrease carbon emissions.[19] The main barrier for these energy generation methods has been the cost associated with them. IEA argues that further market penetration by renewable sources is possible with the application of economic, market and regulatory instruments, while noting that some forms of renewable energy are already competitive, due to the high prices of conventional fuels.

The question for IOCs is how they should relate to renewable energy. BP has begun considering itself ‘beyond petroleum’ since late 1990’s, but the reality is that the company has made token investments in the field and its renewable division does not generate large

19 IEA 2008, Renewable energy [online], iea.org, Available from: http://www.iea.org/Textbase/subjectqueries/keyresult.asp?KEYWORD_ID=4116 [Accessed: 09.09.2008].

revenues. Shell has silently divested itself from renewables in the recent years. Meanwhile, Exxon Mobil, ConocoPhillips and Chevron do not have any investments in renewables. The question is: should they? It is unclear whether it is wise for oil companies to invest in less profitable renewables than highly profitable oil & gas developments. From a financial point of view, the answer is clear; capital should follow the highest returns, which lie, at the moment, in oil & gas investments. The picture may be murkier from a strategic point of view. Later on in the paper, it will be argued that for IOCs that struggle to replace their reserves due to a number of reasons, but still have capital to invest, renewables could very well be option.

Before going in detail, let us briefly look at the current state of renewables and the types of renewable sources available. Please see figure 3.3.

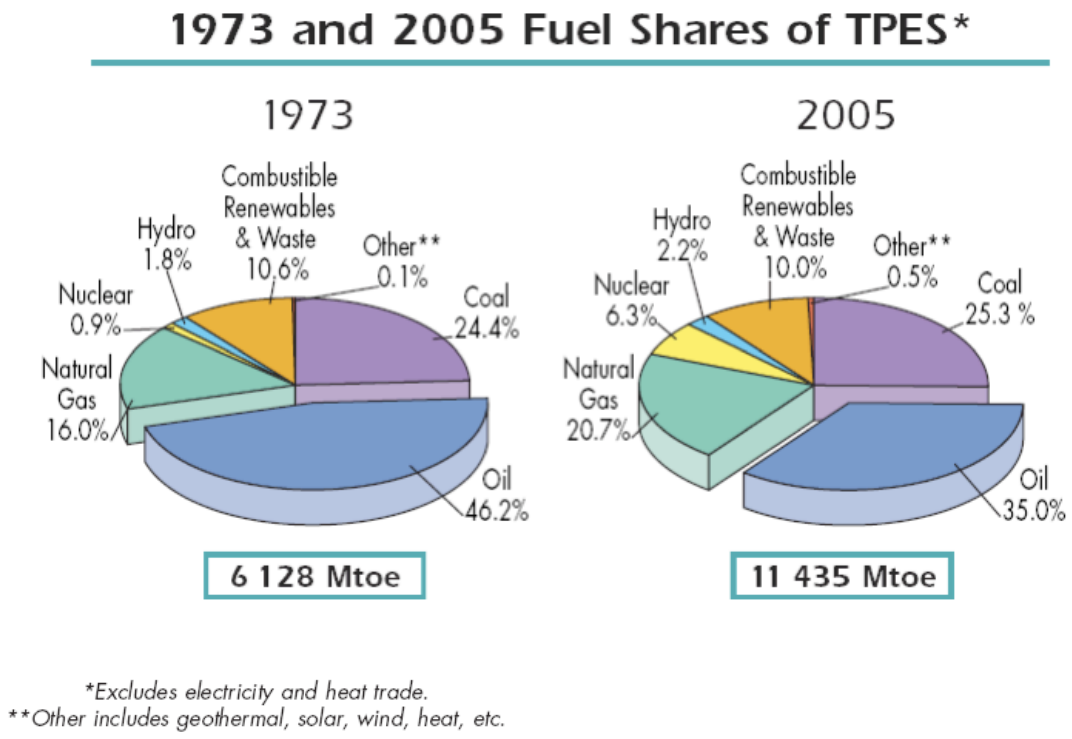

Figure 3.3, Source: International Energy Agency http://www.iea.org/textbase/nppdf/free/2007/key_stats_2007.pdf

As one can see, the renewables in the sense that is described earlier do not make up a significant part of the world energy supply mix. In fact, in three decades, it has only increased from 0.1% in 1973 to 0.5% in 2005. It is a large increase, but from a small base. While the world energy supply as a whole has doubled, renewables' contribution increased ten-fold, yet remained insignificant to the energy equation. This may be changing, as a UNEP report in

2007 found that the investment in the renewable energy sector worldwide increase from $80 billion in 2005 to $100 billion in 2007.[20]

Indicator	Existing Capacity End of 2004	Comparison Indicators
Power generation	**(GW)**	
Large hydropower	720	World electric power capacity=3,800
Small hydropower	61	
Wind turbines	48	
Biomass power	39	
Geothermal power	8.9	
Solar PV, off-grid	2.2	
Solar PV, grid-connected	1.8	
Solar thermal power	0.4	
Ocean (tidal) power	0.3	
Total renewable power capacity (excluding large hydropower)	160	
Hot water/space heating	**(GWth)**	
Biomass heating	220	
Solar collectors for hot water/heating (glazed)	77	
Geothermal direct heating	13	
Geothermal heat pumps	15	
Households with solar hot water	40 million	Total households world-wide=1,600 million
Buildings with geothermal heat pumps	2 million	
Transport fuels	**(liters/yr)**	
Ethanol production	31 billion	Total gasoline production= 1,200 billion
Biodiesel production	2.2 billion	

Figure 3.4, Source: International Energy Agency, http://www.iea-retd.org/files/Barriers%20Challenges%20and%20Opportunities.pdf

This number soared to $148 billion in 2008. This so-called 'Gold Rush' was led by wind energy investments, which, at around $50 billion, accounted for one-third of the total investment. This was followed by solar energy investments, at $28.6 billion. UNEP expects investment in renewable energy to top $450 billion by 2012, and $600 billion by 2020.[21]

20 UNEP 2007, Investors flock to renewable energy efficiency technologies [online], unep.org, Available from: http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=512&ArticleID=5616&l=en [Accessed: 09.09.2008].

21 Szabo, M. 2008, Renewable energy is "green gold rush": U.N. report [online], reuters.org, Available from: http://www.reuters.com/article/environmentNews/idUSL0167778920080701 [Accessed: 09.09.2008].

3.3. Structural analysis of the oil & gas industry

3.3.1. Industry outlook

The global oil industry remains an oligopoly with about twenty national and international oil companies controlling 80% of the world production.[22] There is also an extreme concentration in the industry on a global scale, with largest 25 private oil firms accounting for 92% of profits and 94% of reserves in the hands of the private sector, according to the Oil and Gas Journal.[23]

As mentioned earlier, 77% of the world's remaining conventional oil reserves are closed to IOCs.[24] In addition, IOCs face greater demands from host governments in terms of royalties, resource rent and profit taxes in the locations they are allowed to operate in. Due to the nationalization of oil companies in the Middle East, these resources are off-limits to IOCs.[25] In fact, according to ConocoPhillips' analysis, seen below in detail, only 7% of the reserves can be classified 'fully' accessible to IOCs.[26]

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22 International Monetary Fund 2006, IMF World Economic Outlook 2006, International Monetary Fund, , p. 38.

23 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 19.

24 Boston Consulting Group 2007, BCG Focus: Maximizing value in upstream oil and gas, Boston Consulting Group, Inc.

25 Hannesson, R. 1998, Petroleum economics: issues and strategies of oil and natural gas production, Quorum Books, United States.

26 Lowe, J.E. 2008, Testimony before the Select Committee on Energy Independence and Global Warming [online], conocophillips.com, 21, Available from: http://www.conocophillips.com/NR/rdonlyres/B4168205-5A4E-473E-A78D-8F561FC4BD25/0/Markey_Testimony_written.pdf [Accessed: 24.08.2008].

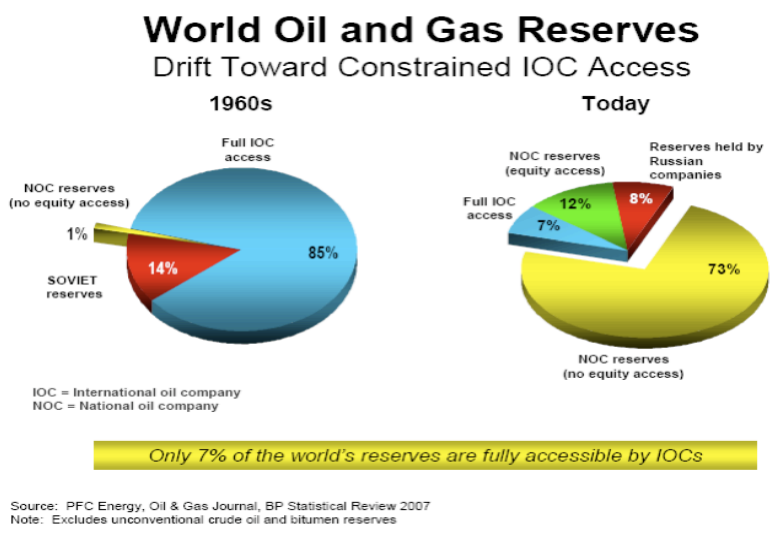

Figure 3.5, Source: ConocoPhillips, Markey testimony for U.S. Congress, http://www.conocophillips.com/NR/rdonlyres/B4168205-5A4E-473E-A78D-8F561FC4BD25/0/Markey_Testimony_written.pdf

There also appears to be a drive towards greater national and state control of natural resources such as oil and gas in countries that have traditionally been hospitable towards IOCs. One example of this is Venezuela, the world's fifth-largest oil exporter, which increased the state's control over the oil production in the country substantially. Venezuelan state tightened its grip over its domestic oil industry, compelling oil companies to give a higher share of profits to the state. One of the majors operating in Venezuela, Exxon Mobil, declined to do so. The company's control over its oil production facilities in Venezuela was subsequently relinquished. Behind the scenes, the Venezuelan government was seeking to engage oil & gas projects with NOCs from friendly countries to replace the IOC presence in the country. In 2005, Venezuela issued exclusive exploration licenses to seven NOCs, among them CNPC (China), ONGC (India) and Petropars (Iran).[27]

3.3.2. Porter's Five Forces analysis for IOCs

In order to have an accurate overview of the market conditions faced by IOCs we shall subject the oil industry to qualitative analysis through Porter's Five Forces framework.[28] Within this framework, we shall take the point of view of an IOC and examine its relations to its buyers and suppliers, as well as threats of entry and of substitutes. The model can be seen in Appendix 4.a. Throughout this analysis, we assume the firm in question is an integrated oil

27 Associated Press 2006, Venezuela takes on Exxon Mobil [online], msnbc.com, Available from: http://www.msnbc.msn.com/id/12085050/ [Accessed: 24.02.2008].

28 Johnson G., Scholes K., Whittington, R., (2005) Exploring corporate strategy: text and cases, exhibit 2.5, p. 80, 7th edition, Prentice-Hall, London

major, which handles the oil&gas from the reservoir and takes it all the way to the gas tank or power station.

Bargaining power of the buyers

Let us first observe the power of the buyers. The buyer are defined as the purchasers of the firm's products, in this case these would be either power companies, airlines or individual car owners. We shall estimate the buyer power by looking at their concentration, costs of switching away from the supplier and possibility of backward integration.

In terms of concentration, it is reasonable to claim that there is no significant buyer power in this regard; as buying power is dispersed among many firms and individuals, none of them hold enough buying power to affect the competitive situation in the market.

The costs of switching, however, are quite low for some buyer segments, and high for others. For individual consumers, there is usually the choice of choosing one or the other when it comes to purchasing gasoline in an area. However, power plants or airlines tend to be more locked-in with their supplier, usually due to long-term contracts or distribution channels, such as one fuel supplier being available at an airport.

The possibility of backward integration by the buyers is rather low, as no individual consumer or airline would start an oil company just to have access to fuels. As a result, it can be concluded that the power of buyers is rather low within the Five Forces framework, and they have limited effect on the competitive dynamics.

Bargaining power of suppliers

Secondly, let us assess the power of the integrated oil major's suppliers. The suppliers would almost certainly be the owners of the natural resource reserves that the firms seek to exploit, namely nation states with oil & gas resources or their NOCs.

According to ENI S.p.A.'s World Oil and Gas Review 2007, the top ten oil reserve holders hold 84.5% of all known oil reserves, which does represent a high supplier concentration.[29]

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29 ENI S.p.A First ten countries in the world (reserves) 2007 [online], Available from: http://www.eni.it/en_IT/attachments/publications/economic-energy-analyses/eni-publishes-seventh-world-oil-gas-review/OG_unico_def.pdf [Accessed: 24.01.2008].

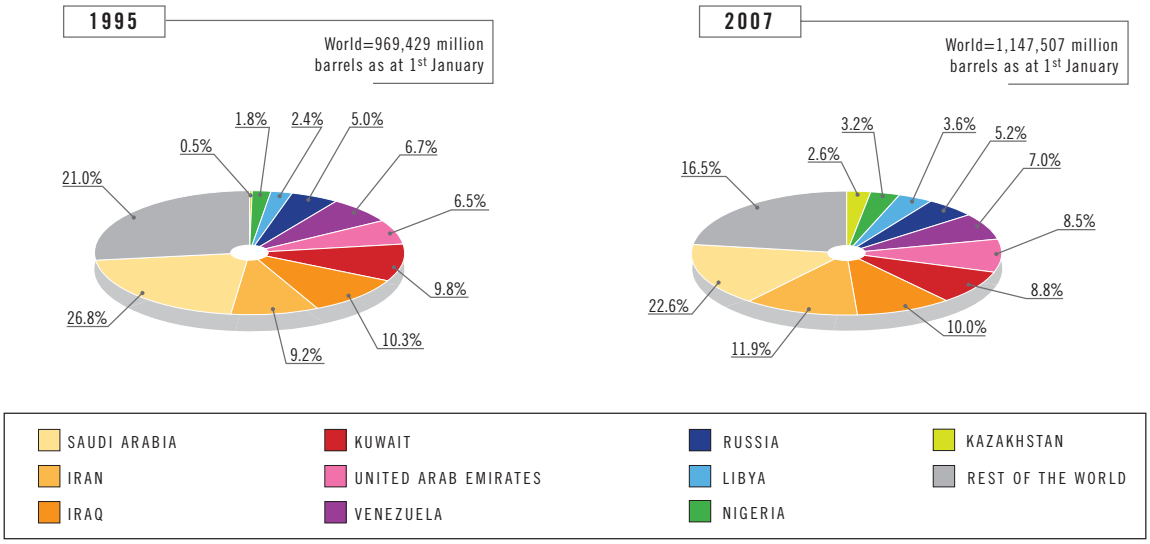

Figure 4.7, Source: ENI S.p.A First ten countries in the world (reserves) 2007 [online], Available from: http://www.eni.it/en_IT/attachments/publications/economic-energy-analyses/eni-publishes-seventh-world-oil-gas-review/OG_unico_def.pdf [Accessed: 24.01.2008].

Costs of switching for suppliers is only significant in the contracts they have with the IOCs for the developed fields, but it is virtually none for undeveloped fields.

The possibility of forward integration by the suppliers is high, and it is a common occurrence. The very theme of this paper deals with this issue, in fact. The reserve holding countries increasingly prefer to exploit their resources through NOCs, as seen in the Middle East [30], Russia[31], and Venezuela[32].

Therefore, we conclude that the bargaining power of the suppliers, namely reserve holding states, is high towards the IOC, due to high supplier concentration, low costs of switching and possibilities for forward integration.

Barriers to entry

30 Hannesson, R. 1998, Petroleum economics: issues and strategies of oil and natural gas production, Quorum Books, United States, p.9.

31 Belton, C. 2007, BP under pressure over Kovykta [online], Financial Times, Available from: http://www.ft.com/cms/s/0/9fc062cc-c6d1-11db-8f4f-000b5df10621.html [Accessed: 27.03.2008].

32 Wilson, P. 2008, Venezuela bites back at Exxon Mobil [online], Business Week, Available from: http://www.businessweek.com/bwdaily/dnflash/content/feb2008/db2008028_610672.htm?chan=top+news_top+news+index_businessweek+exclusives [Accessed: 24.02.2008].

Thirdly, we shall examine the threat of potential entrants to the market. The oil & gas industry almost certainly favours those firms with economies of scale, as oil & gas companies need access to reserves and production streams while exploring for new reserves.[33]

The capital requirements for entry are significant, as most exploration efforts for oil do not result in worthwhile finds and the capital costs of setting up a production facility are tremendous.[34] A different dynamic is at work in gas production, as the storage and transportation, as well as production, involve high capital costs.[35]

Access to supply channels could certainly constitute a threat, as supply is scarce and suppliers are able to forward integrate, as argued earlier. Access to distribution channels is not a significant point, as IOCs are in fact the firms with access to distribution channels on an international scale. Their hold on international distribution channels in downstream constitutes an entry barrier for new entrants, while the same does not apply in upstream operations. However, it should be noted that in some markets competition is not as intense as in the others.

It is reasonable to claim that there is little supplier loyalty to the IOCs, unless the supplier, a sovereign country, in question is the home country of the IOC, therefore this lack of loyalty does constitute a threat of potential entrants. As most significant entrants to the market are NOCs, it is hard to see how IOCs can hold a credible claim of expected retaliation. One way could be legal challenges if there is a breach of contract, as in Exxon Mobil - Venezuela case,[36] however other than this case, it is difficult for the IOC to retaliate in the host country of the emerging NOC. It is a different story in the IOC home country or third-countries, of course, as it will be discussed later on.

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33 Hannesson, R. 1998, Petroleum economics: issues and strategies of oil and natural gas production, Quorum Books, United States, p.97.

34 Hannesson, R. 1998, Petroleum economics: issues and strategies of oil and natural gas production, Quorum Books, United States, p.109.

35 Hannesson, R. 1998, Petroleum economics: issues and strategies of oil and natural gas production, Quorum Books, United States, p.39.

36 Wilson, P. 2008, Venezuela bites back at Exxon Mobil [online], Business Week, Available from: http://www.businessweek.com/bwdaily/dnflash/content/feb2008/db2008028_610672.htm?chan=top+news_top+news+index_businessweek+exclusives [Accessed: 24.02.2008].

Government action or legislation certainly promotes the threat of entry towards the firm, as 'landlord' states will typically move to exploit their natural resources through the state-owned NOC.[37] The latest incidence exemplifying the case is the nationalisation of oil industry in Venezuela. Experience constitutes a barrier to entry for potential entrants, as the capabilities for oil exploration and production are built up over time and require specific technological resources. Differentiation is not a relevant dimension as the products in question are commodities.

All in all, we conclude that while the IOCs have certain barriers to entry set up against private potential entrants, such as experience, access to supply and distribution, high capital costs and economies of scale, these barriers do not apply to emerging NOCs, as these firms typically are backed by their home country government politically and financially. Therefore, we conclude that NOCs pose a threat as potential competitors in third-country markets. For instance, in the form of Chinese NOCs investing in Angola and crowding out IOC investment in the country.

Threat of substitutes

Fourthly, we shall observe the threat of substitutes to the IOC operations. IOCs provide the world with mainly oil & gas products, and in addition to other means of energy production, such as BP, which as investments in wind power.[38] However, it is worth noting that these investments are rather limited in size and scope. In essence, there are three types of substitution that could conceivably take place: substitution of need, generic substitution and product-for-product substitution.

One may eliminate the substitution of need out of hand, as the world will always need some form of energy, unless the peoples of the world decide to revert back to the pre-industrial evolution period by drastically reducing their living standards, something that is quite unlikely to happen. The need for energy is unlikely to be rendered redundant.

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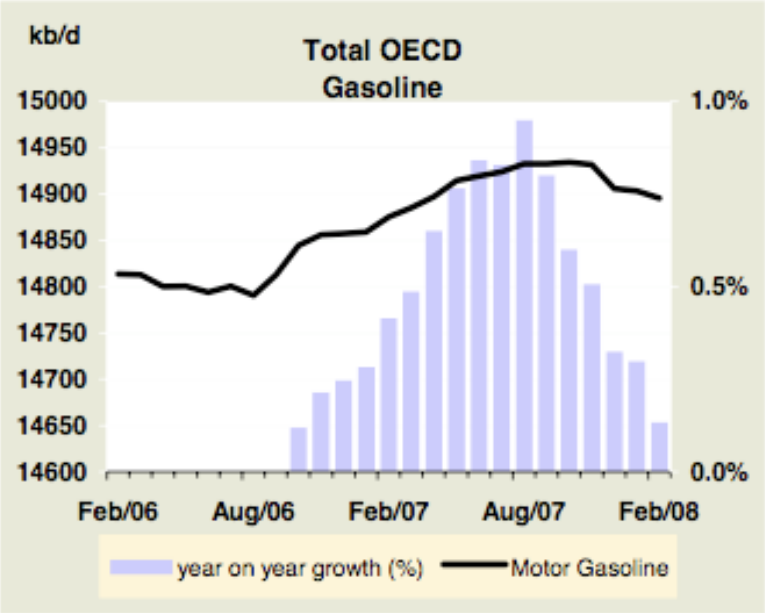
37 Mommer, B. 1994, The political role of national oil companies in exporting countries: the Venezuelan Case, Oxford Institute for Energy Studies, Oxford, p. 7.

38 BP p.l.c. 2007, BP Annual Review 2007 [online], p. 3, Available from: www.bp.com/annualreview [Accessed: 31.03.2008].

Generic substitution is more likely, as the consumers will tend to lower their consumption in the face of high prices, such as the prevailing prices in 2008 of over $100 per barrel, by switching to more fuel-efficient cars or bicycles.[39] However, it is also argued that the share of energy spending of consumer income has dropped significantly over the last 20 years, therefore consumers are less likely to curb their consumption in the face of price increases. The share of energy expenditure of consumer income was recorded 6%, down from 8% two decades ago, meaning that consumer incomes have grown faster than the oil prices.[40] It is worth mentioning that this share only reflects direct consumer spending on energy, such as gasoline for transportation and natural gas for heating, but not indirect spending. The demand for gasoline is increasing within the OECD countries,[41] as can be seen in in figure 4.6.



Source: IEA 12 Month Moving Average Demand vs. Year/Year growth (%) - Total OECD Gasoline Demand 2008 [online], Available from: http://omrpublic.iea.org/demand/demdg_oc.pdf [Accessed: 27.03.2008].

39 Sharma, R. 2005, The Oil Shock With No Pain [online], Newsweek, Available from: http://www.newsweek.com/id/50670 [Accessed: 27.03.2008].

40 Zakaria, F. 2008, Why we can't quit [online], Newsweek, Available from: http://www.newsweek.com/id/123482?tid=relatedcl [Accessed: 27.03.2008].

41 IEA, 12 Month Moving Average Demand vs. Year/Year growth (%) - Total OECD Gasoline Demand 2008 [online], Available from: http://omrpublic.iea.org/demand/demdg_oc.pdf [Accessed: 27.03.2008].

Transportation fuels such as gasoline accounts for 50% of world oil demand[42] Therefore, competition for disposable income of the consumers is not intense, and as the share of energy prices in consumer income is not very large, a high increase in per barrel price of oil does not reflect that strongly in consumer incomes, preventing a drop in demand.

Product-for-product substitution means a switch away from oil & gas as means of energy generation. Although over time this switch will take place, as oil & gas, non-renewable resources, are depleted or their production is rendered uneconomic, this is unlikely to happen any time soon. There are many other potential sources of energy available, such as solar, wind, hydroelectric, tidal, biological, hydrogen, nuclear or geothermal, the key word here is 'potential'. Potentially, these sources hold great promise, but each comes with their own drawbacks. Therefore, it is reasonable to assume that fossil fuels will continue to be the primary sources of energy, as predicted by the IEA projections.[43] Therefore a switch away from fossil fuels, the main products of the IOC, do constitute a threat of substitutes, albeit in a very long-term perspective.

Overall, the threat of substitutes for IOC's main product offerings are not significant in the short to medium term, as the demand is very strong and alternatives not yet economical.

Competitive rivalry

Finally, let us see how these forces affect the competitive rivalry within the industry by turning towards the intra-industry dynamics. Five dimensions will be considered, balance, growth rates, fixed costs, exit barriers and differentiation.

With regard to competitive balance, it is important to define the confines of the comparison. If the Big Five IOCs are compared to independent or smaller IOCs, then certainly their only sizeable competitors are each other, as the Big Five account for 72.9% of all profits and 73.8% of all proven crude oil reserves in the private sector.[44] However, when compared to

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42 Zakaria, F. 2008, Why we can"t quit [online], Newsweek, Available from: http://www.newsweek.com/id/123482?tid=relatedcl [Accessed: 27.03.2008].

43 BP p.l.c. 2007, BP Annual Review 2007 [online], p. 6, Available from: www.bp.com/annualreview [Accessed: 24.03.2008].

44 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 18.

NOCs, the story is different. With regard to NOCs, the Big Five companies hold less than 10% of the world's oil and gas resource base, making them comparatively small players.[45] Therefore, competitive balance is tilted against the IOC at the moment, as they are relegated to being second-tier players in terms of reserves and production by NOCs. In terms of relative size, the Big Five are similar to each other and have access to similar resources, intensifying the rivalry.

There is high growth in the market for oil products, especially in developing countries. According to IEA, the global oil demand growth will be around 2% in 2008, with significantly higher growth rates in the Middle East, (6.1%) and China, (5.6%).[46] The increasing demand for oil products suggests that the rivalry will not intensify due to low market growth.

High fixed costs continue to be a feature of the global oil and gas industry, as both exploration and production activities have high fixed costs. Exit barriers in individual countries could arguably be low, as there are always rival companies looking to buy acreage, however, it is inconceivable that the firms could exit from oil & gas business altogether. The products are commodities, so there is little room for differentiation, perhaps in the downstream operations.

Overall, the competitive rivalry in the industry is high, due to the competitive balance, high fixed costs, high exit barriers and lack of product differentiation. High supplier power of landlord states and threat of potential NOC entrants represent additional difficulties for IOCs, while buyers have little bargaining power and few substitutes. This analysis suggests that upstream operations of the firm are affected more than the downstream ones.

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45 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 1.

46 Murray, B. 2008, IEA cuts oil demand forecast as global growth slows [online], Bloomberg.com, Available from: http://www.bloomberg.com/apps/news?pid=20601072&sid=adoWoSECAOQ4&refer=energy [Accessed: 27.03.2008].

Section C - Strategic Issues and Analysis

Chapter 4 - Fortunes of International Oil Companies (IOCs)

4.1. Introduction to the integrated oil major

As of 2008, only four of the so-called Seven Sisters of the oil industry remain, these being Exxon Mobil, BP, Shell and Chevron. These firms, as well as US-based ConocoPhillips, French Total, and Italian ENI, which have emerged through privatisation and consolidations, form the group of 'super-majors' that account for 72.9% of all profits and 73.8% of all proven crude oil reserves in the hands of the private sector globally, according to data from Oil & Gas Journal Data Book 2006[47]. Out of these seven companies, Exxon Mobil, Shell, BP, Chevron and ConocoPhillips, as defined by Jaffe & Soligo as 'Big Five', will be referred to as IOCs for the purposes of this paper, as mentioned earlier. These five companies make up 82% of the top 25 reserve holding private companies globally.[48] Although one may argue that Total and ENI, as well as other companies which have a large international presence also are 'international' oil companies, and rightfully so. However, as these two companies were relatively recently privatised, therefore made a transition from an NOC to an IOC, compared to the other five who have been IOCs for a longer period of time, the author feels that the Big Five represent a better sample of companies to contrast with NOCs. The companies in this sample are rather similar to each other in terms of their ownership type, global scope, historical background and strategy, which allows for a generic IOC to be subjected to analysis rather than each company individually.

In their study related to IOC investment & spending patterns, Jaffe & Soligo argue that the IOCs main futures 'depend on their ability to develop giant oil and gas fields around the world'.[49] Out of the three general types of oil companies, international, national and independent, it is especially the IOCs have the critical mass to realise efficiency and scale

47 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 18.

48 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 25.

49 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 11.

economies of large oil fields. In fact, their size dictates that they do so, as most independents are better fit to develop smaller fields as they are not restrained by the high overhead costs that IOCs have. In fact, IOCs perform better in terms of operational efficiency than NOCs as well, in fields of similar size.[50] It is precisely the lack of this type of oil prospects, where IOCs can be the most effective, that raises doubts about their ability to replace their current reserves and stay viable in the industry in the future.

In fact, the Big Five have an average reserve replacement ratio that is much lower than that of the next biggest 20 oil independents, 82% to 147%. This highlights the scarcity of profitable exploration prospects for IOCs. Jaffe & Soligo also argue, however, that the low replacement ratio also has a lot to do with how they use their profits, as IOCs under-invest in exploration of new reserves, instead using the profits mainly on development of current reserves and market operations such as share buybacks and dividends.[51]

50 Hartley, P.; Medlock, K.B.; Eller, S.L. 2007, "Empirical Evidence on the Efficiency of National Oil Companies", The Changing Role of National Oil Companies in International Energy Markets, March 2007, James A. Baker III Institute for Public Policy, Rice University, Houston.

51 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 19.

4.2. Value Chain of the IOC

Let us now begin to dissect the elements that make up an oil company. In simplest terms, most oil companies segment their businesses in terms of the nature of the activity and where the activity takes place on the value chain. Although the business segments vary from company to company, depending on their reporting standards or the range of activities, a widespread terminology appears to be as such: Upstream, Downstream, Gas & Power, Chemicals, Corporate. However, due to the differences in the reporting standards, it is not always straightforward to compare aggregated data of one company to the other. For the sake of simplicity, we have used the segmentation standard used by Shell Plc (figure 4.1) while looking at the IOC business model.

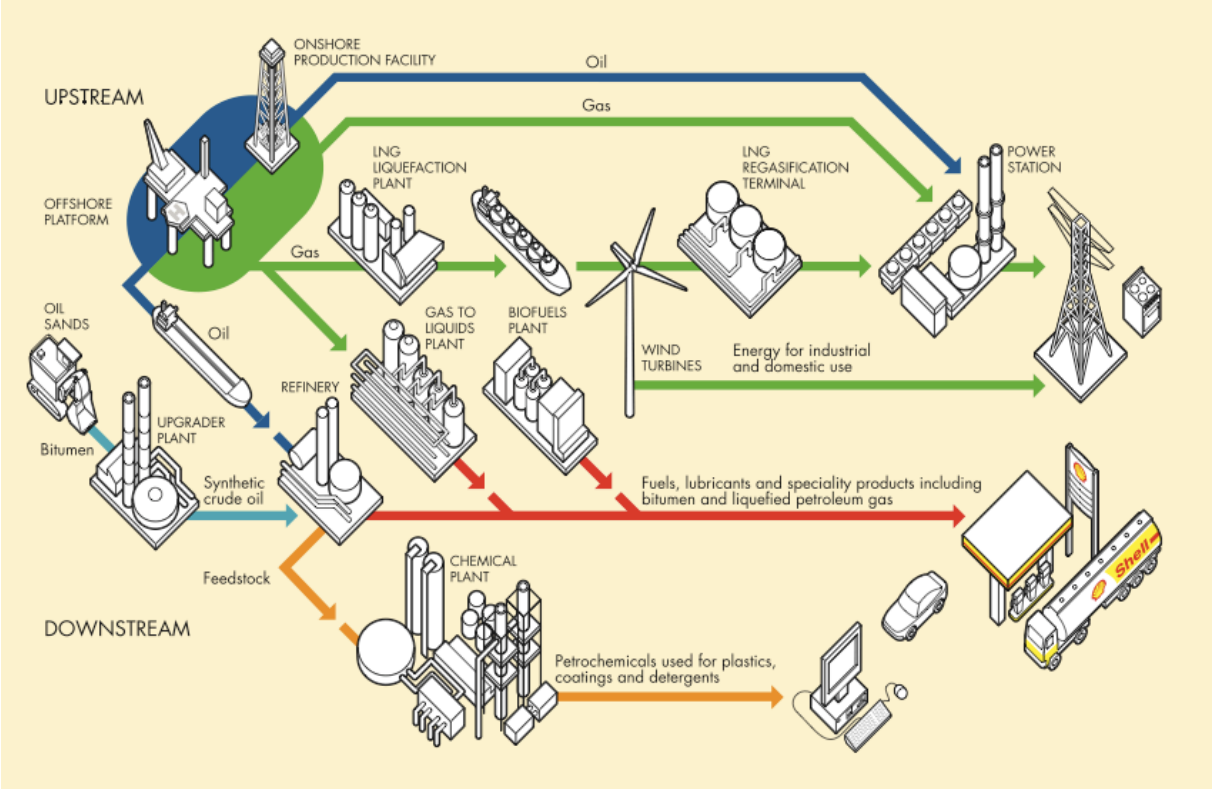


Figure 4.1, Source: Royal Dutch Shell Plc 2007, Annual Report and Form 20-F for the year ended December 31, 2007 [online], www.shell.com, p. 2, Available from: www.shell.com/annualreport [Accessed: 29.06.2008].

The firm is essentially an interplay of five broad segments. Exploration, development of oil resources and the production of crude oil is a part of Upstream, while transportation, refining and marketing of these resources constitutes the Downstream. In addition to these line business segments, there are also business segments that deal with the by-products, such as

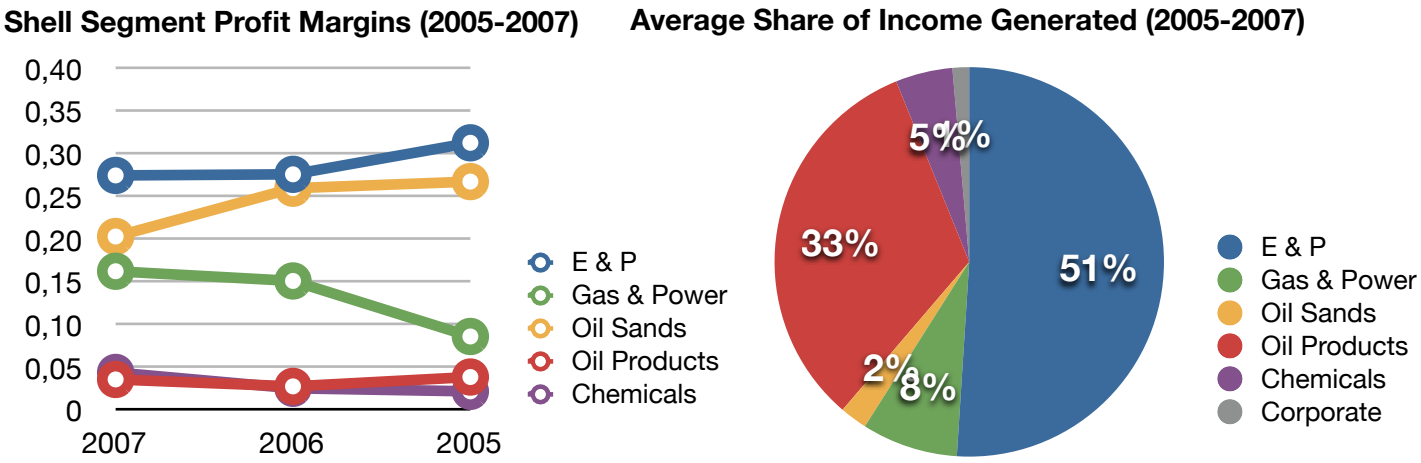


Figure 4.2, 4.3, Source: Royal Dutch Shell Plc 2007, Annual Report and Form 20-F for the year ended December 31, 2007 [online], www.shell.com, p. 2, Available from: www.shell.com/annualreport [Accessed: 29.06.2008]. Margins and shares of income are 3-year averages between 2005-2007.

Gas & Power and Chemical. Finally, there is the Corporate segment which essentially gives support services to the line businesses.

While the profit margins and shares of income of each business segment can be seen in Appendix 4.b, what is worth noting here is the high margins in Upstream, reaching 29% between the years 2005-2007, and generating 52.5% of the net income for Shell Plc, compared to the Downstream operations, with a profit margin of 3.5% and generating 33% share of the net income, as illustrated in figures 4.2 and 4.3. Looking at these numbers, and similar numbers from other IOCs such as BP and Exxon Mobil, we may conclude that while Downstream is a low-margin, high-volume business, Upstream generates high margins and drives revenue growth. Supporting data may be found in the Appendix, 4.c to 4.d.

Oil sands, included in the Upstream, while insignificant in revenue terms, appears to be a highly profitable business with an average 24% profit margin. It is important to note that the Upstream profits are buoyed by significant increases in the price of its output, crude oil, while Downstream essentially passes on the oil price increases to the consumer through the price of the gasoline. It is foreseeable that Upstream operations become even more profitable in the future as greater refining capacity is established around the world and the prices remain high.

From this analysis, we may conclude that the real profit potential for oil companies, especially when crude oil prices are high, lies in upstream operation. Downstream operations merely serve as conduits for crude supply to meet consumer demand in the shape and form which the consumer demands. Hence, it would not be audacious to say that if IOCs stick with their

current business model, they would have to find ways to expand their upstream operations. Please see figure 4.4 for an illustration of the value chain. This is not happening right now. Some IOCs have seen prized, giant oil fields taken away from them by national governments to be handed to their respective NOCs, exemplified in the cases in Venezuela and Russia, and there are signs that fewer of these large contracts are coming their way. One exception to this trend may be Iraq, where the government has invited 36 oil companies to bid for contracts. Iraq holds the third largest oil reserves in the world, so it would certainly be a boon for IOCs, but it continues to be a challenging place to operate.

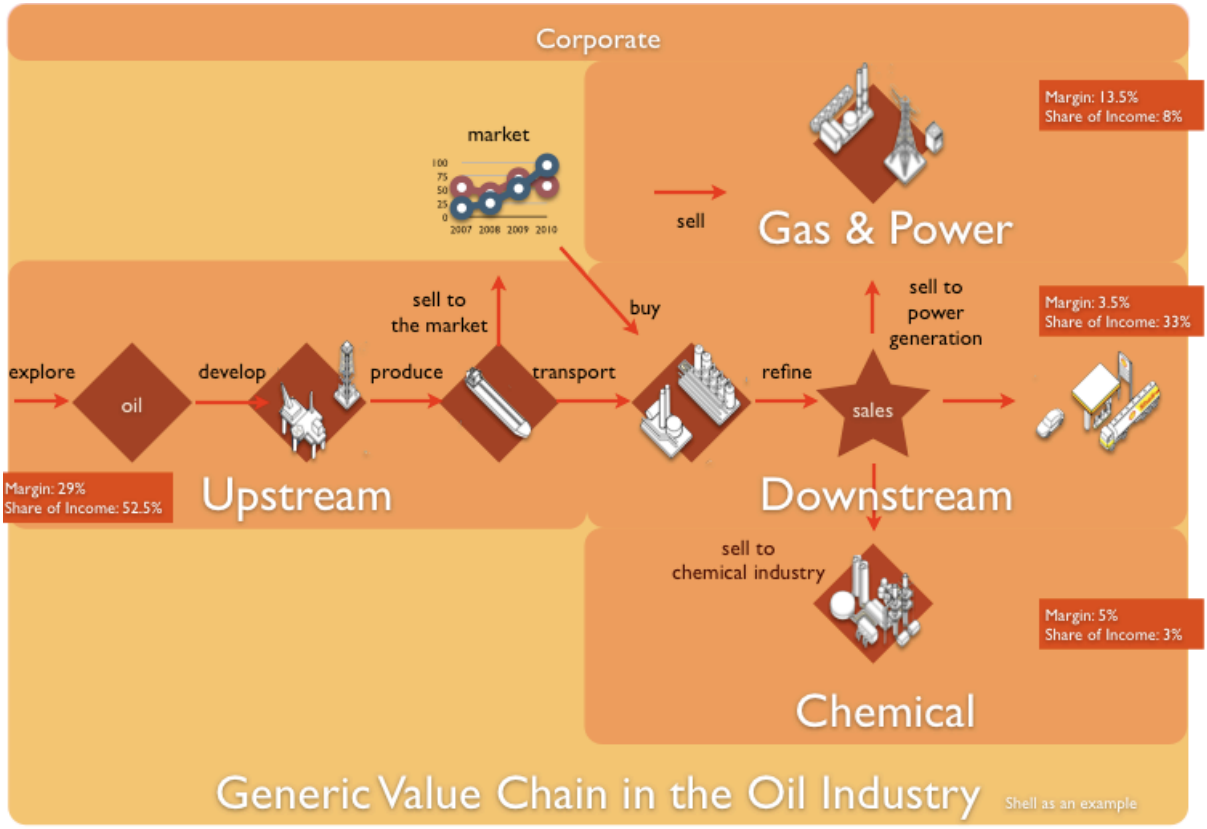


Figure 4.4, Source: Royal Dutch Shell Plc 2007, Annual Report and Form 20-F for the year ended December 31, 2007 [online], www.shell.com, p. 2, Available from: www.shell.com/annualreport [Accessed: 29.06.2008]. Margins and shares of income are 3-year averages between 2005-2007.

How, then, will the IOCs extract themselves out of this bind in their business model? There are different ways of coping with this issue. The companies will certainly keep pushing to replace their oil reserves, while pursuing opportunities in LNG. It is possible that they will accept lower stakes in joint-ventures (JVs) with NOCs, or act as contractors for big oil & gas projects without equity stakes. It is almost paramount that all IOCs invest heavily in

technology development, in oil & gas extraction and refining technologies as well as perhaps alternative energy. This goes to the core of the issue, and these options will be laid out later on in the paper.

4.3. Foundations of strategic capability

Strategic capability is defined as 'the adequacy and suitability of the resources and competencies of an organisation, for it to survive and prosper'[52]. We shall distinguish between 'threshold resources/competencies', which are required for the organisation to survive, and 'unique resources/competencies', which give a competitive advantage to the organisation. Another dimension for resources is tangible/intangible divide, referring to the nature of the resource. Let us first take a look at the resources and competencies oil companies in general could have.

While it is possible for oil companies get access to some competencies through outsourcing, to oil services companies, for example, this would merely be compensating for a lack of strategic capability in that particular area. The analysis is done on the basis of the foundations of strategic capability framework described by Johnson, Scholes and Whittington, which can be seen in Appendix 4.e.

In this section, we aim to define the resources and the competencies that lead to strategic capabilities for oil companies in general.

Resources

Access to the natural resource base

Access to resource base is perhaps the most crucial resource for an oil company. Exploration and production of crude oil is the most lucrative part of the business, with margins as high as 29% for Shell. Without access to the resource base, the oil & gas reserves in the ground, E&P is not a possibility. Hence, access to the natural resource base is perhaps the most crucial resource for an oil company. Access to the natural resource base is a tangible threshold resource for the company, meaning that without it, operating would not be possible.

Access to financial capital

Although a company may have access to oil & gas reserves, it also needs to have access to the financial resources to extract these reserves. Oil & gas exploration is a high risk and capital

52 Johnson G., Scholes K., Whittington, R., (2005) Exploring corporate strategy: text and cases, 7th edition, Prentice-Hall, London

intensive activity, therefore it is difficult to raise enough debt at acceptable interest rates from financial markets. Hence, oil companies often need to on re-invest their profits to the business, or raise equity capital, and finance the projects themselves. An oil company without financial resources or the means to raise these resources simply can not perform E&P operations. Enough financial muscle is often a tangible threshold resource for the company, especially in E&P projects.

Access to human capital: recruiting for managerial and technical expertise

While the oil company may have the reserves in the ground and the cash in the safe, without the right expertise, both managerial and technical, operations may not be very profitable or sometimes even possible at all. Yet, most oil companies have human capital above the threshold level, even if not, the threshold level can be reached through recruitment of managerial and technical expertise. Hence, human capital can be considered an intangible unique resource for an oil company, as exceptional people can be a unique resource.

Political support from home country government

Political support from the home country is not a threshold resource, as oil companies often operate internationally without explicit support from their home country governments, however it can be an intangible unique resource if it exists. An example of this is the Chinese government's support of its NOC, China National Petroleum Company (CNPC), via aid deals linked to oil contracts, as seen in Nigeria.[53]

Access to markets

Although margins in downstream distribution networks, such as gas station networks, at 3.5% for Shell, for example, are not very significant, presence in this area gives IOCs a strategic resource. After all, these distribution networks are the access channels to the market. The financial value of market access may not be particularly high, due to low margins, but it could be a strategic asset. After all, rolling out new fuels, such as biofuels or even hydrogen, would be much easier when the company already has access to the market. As the existence of

53 Mathani, D. & White D. 2006, China in move to gain foothold in Nigerian oilfields [online], Financial Times, Available from: http://www.ft.com/cms/s/0/bc85fc3e-d58a-11da-93bc-0000779e2340.html [Accessed: 08.09.2008].

independent oil companies show, access to markets is not a threshold resource, but it could be a tangible unique one.

Competencies

Conventional oil development technologies

Being apply to utilise conventional oil development technologies is a threshold competency for any oil company. If the company is unable to extract the conventional reserves it owns, it is difficult to say that it has operations in the first place. Oil services companies can be hired to enable newly formed oil companies to begin production, and move them above the required threshold.

Deep water drilling technologies

Deep water drilling technologies can be considered a unique competency, except for oil companies who only own deep water reserves, which is a rarity in itself. As the review of Exxon Mobil, Shell and BP's resource bases in section 4 will demonstrate, most oil companies own some conventional oil fields to produce from already. Therefore, at the moment, we may consider deep water drilling as a unique competency which may lead to a competitive advantage. However, in the distant future, if oil companies were only able to make deep water finds, this could become a threshold competency.

Unconventional oil production technologies

Currently, unconventional oil production, such as oil production from oil sands or oil shale, can not be considered a threshold competency, as it is not a necessity for most oil companies to survive. As long as the oil prices remain high enough to justify the cost of this type of production, such technologies will provide a unique competency to the companies.

Renewable energy technologies

Having competency in some sort of renewable energy technology, such as solar, wind or biofuels is not a threshold competency, at the moment, however, it could be described as a unique competency. Competencies in this area are being developed by some of the IOCs, such as BP and Shell, but these projects are yet to show concrete business benefits for these companies. This does not mean, however, that this will be the case in the long-term, since

R&D is a long-term activity and building up technological competence in a new area will not create immediate value in the short-term.

Operational efficiency

Operational efficiency can be defined in many levels in an integrated oil company, in upstream, midstream or downstream operations, which all impact the bottom line. Efficiency, in every part of the value chain, has a different meaning. In upstream operations it is a question of exploration & production costs, for instance what are the costs associated extracting one barrel of oil - exploring, developing and exploiting the reserves at the lowest possible cost. As they are unable to significantly affect the crude oil price, the costs are the only variable under IOCs' control to increase upstream profits. According to Boston Consulting Group[54], two main factors upstream companies can control are improving recovery efficiency and reducing costs. Cost is a function of workload, productivity and factor costs. As it is possible for an inefficient organisation to survive during periods of high prices, as is the case for some NOCs, operational efficiency becomes a unique competency. Hence, higher operational efficiency, is a threshold competency while crude oil prices are low, and a unique competency while crude oil prices are high.

Project management expertise

Oil and gas development projects require a high level of project management expertise. Without such expertise, it is virtually impossible to develop large oil & gas fields, hence it should be considered a threshold competency for oil companies.

Strategic capabilities and competitive advantage

The following framework offers a comprehensive view of the strategic capabilities derived from the resources and the competencies the company has. The threshold capabilities are indispensable to oil companies simply for survival reasons, while capabilities for competitive advantage would allow them to outpace their peers. How the IOCs that are evaluated in this paper fare on these terms will be taken up in the IOC scorecard in section 5, Chapter 4.

54 Boston Consulting Group 2007, BCG Focus: Maximizing value in upstream oil and gas, Boston Consulting Group, Inc.

	Resources	Competencies
Threshold capabilities	***Threshold resources (Tangible)** Access to natural resource base Access to financial capital Access to markets	**Threshold competences** Conventional oil development competency Operational efficiency (low crude oil price) Project management expertise
Capabilities for competitive advantage	***Unique resources (Intangible)** Access to human capital Political support from home country government	**Core competences** Deep water drilling technologies Renewable energy technologies Operational efficiency (high crude oil price)

Figure 4.5, Source: Johnson G., Scholes K., Whittington, R., (2005) Exploring corporate strategy: text and cases, 7th edition, Prentice-Hall, London

4.4. Review of the resource base and finances

A look at the resource base, finances, production, operational performance, geographical spread of operations and investment patterns of the IOCs is helpful in assessing recent performance and predicting future growth trends.

There are multiple way of looking at the issue. How much in hydrocarbon reserves does the IOC have? At what rate are they producing and bringing these to the market? How profitable is the operation? Can they replace the yearly reserves they deplete, through exploring new ones?

Firstly, let us begin by comparing the five companies in a rather uncomplicated way, through financial indicators. These numbers can be seen in the figure 4.5. Exxon Mobil leads the pack with nearly $390 billion in revenues in 2007, followed by Shell and BP. All companies experienced revenue growth, with Shell reporting over 11% growth in revenues in 2007, from the previous year. Exxon remained as the most profitable IOC, with $40 billion in profits.

Financial performance	Overall revenue, $ million (2007)	Revenue growth from the previous year (2007)	Net income $ million (2007)	Net income % change (2007)
2007				
Exxon Mobil	390328	6,80%	40610	2,81%
Shell	355782	11,60%	31926	21,3%
BP	288951	6,78%	21169	-5,0%
ConocoPhillips	194495	3%	11891	-24%
Chevron	214091	4,49%	18688	9,04%

Figure 4.5, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

Despite these impressive numbers, crude oil production growth was negligible, Chevron was the only IOC to have increased production by 1.3%, to 1,75 million barrels per day, as can be seen in figure 4.6. The rest of the Big Five actually suffered declines in rate of production, ranging from -2.4% (Exxon Mobil) to -12% (ConocoPhillips). This is testament to the impact Venezuelan nationalisation has had on IOCs, as most of the decline was due to production lost in Venezuela, even as the companies added production elsewhere. Natural gas production growth was just as disappointing, with only ConocoPhillips reporting a significant growth of

5% in 2007. When oil & gas production are lumped together in barrels of oil equivalent terms, overall production of all IOCs seem to have taken a hit, ranging from -1% (ConocoPhillips) to -5% (Shell).

	Production MBD, crude oil (2007)	Production % change, crude oil (2007)	Production MMCFD, natural gas (2007)	Production % change, natural gas (2007)	Overall thousands BOED production (2007)	Overall production % change (2007)
2007						
Exxon Mobil	2616	-2,42%	9384	0,54%	4180	-1,35%
Shell	1818	-6,7%	8214	-1,8%	3234	-5%
BP	2414	-2,5%	8143	-3,3%	3771,00	-3%
ConocoPhillips	854	-12%	2292	5%	2324	-1%
Chevron	1756	1,39%	5019	1,27%	2619	-1,80%

Figure 4.6, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

Hence the disconnect between the companies' record breaking financial performances and their operational performances. What accounts, then, for this disconnect? The answer is the crude oil price. Despite the existence of spot and futures gas markets in the U.S. and the U.K., the gas prices are closely correlated with the oil prices. As the crude oil price rocketed from around $20 per barrel in 2002 to over $140 per barrel in 2008, before falling to around $100 per barrel in September 2008, and the IOCs raked in windfall profits. As a result, in 2007, all of the Big Five posted record profits despite a less-than-stellar operational performances.

Let us also take a look at the resource base, see figure 4.7. All of the Big Five have over 10 billion boe in reserves, with Exxon Mobil standing out with 22.7 billion. Exxon Mobil has the biggest proved reserves, and the company has nearly 15 years of production left at the current rate despite producing more than any other IOC. One important measure indicating the health of the resource base is reserve replacement rate. That is the percentage of the newly added reserves to the reserves that are depleted during a year. ConocoPhillips did exceptionally well, with a replacement rate of 177%, while the other companies averaged around full replacement (100%). Companies with higher production rates will of course have to explore more reserves than the smaller ones to appear successful in this metric, hence Exxon Mobil's 101% reserve

replacement appears still rather impressive compared to ConocoPhillips' performance, as Exxon Mobil produces twice as much hydrocarbons as ConocoPhillips.

	Proved reserves, BBOE (2007)	Proved reserves MB, fully-owned, crude oil (2007)	Years of production left at current rate of production (2007)	Proved reserves BCF, fully-owned, natural gas (2007)	Reserve replacement rate (2007)	Upstream capital investment, $ million (2007)
2007						
Exxon Mobil	22,7	11074	14,9	68262	101,0%	15724
Shell	11,9	6686	10,1	31284	79,1%	14838
BP	12,5	5492	9,08	41130	98%	13906
ConocoPhillips	10,6	3104	12,5	22499	29%	11791
Chevron	10,78	7087	11,3	22140	11%	15538

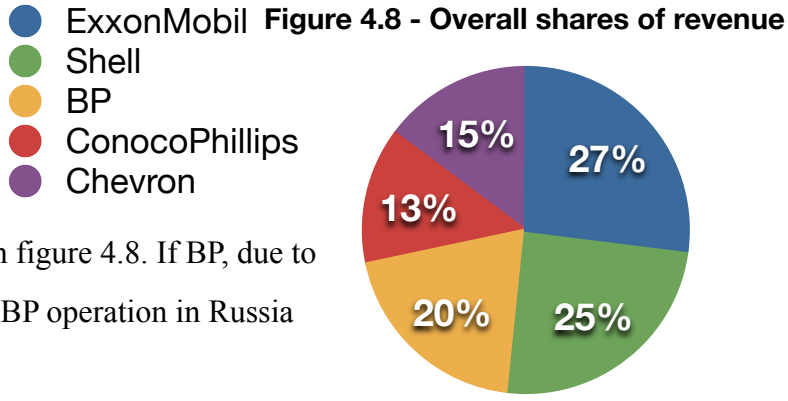
Figure 4.7, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

The new reserves that are added are directly dependent on how much investment is made in upstream capital investment. This includes exploration, development and production. Exploring new reserves can be financially risky, however it is the best way for sustainable production growth. In 2007, Exxon Mobil invested the most capital in upstream, followed by Chevron and Shell. This is not surprising, since the company has added the most reserves. Jaffe & Soligo[55] have noted that the IOCs are not investing enough in new reserve exploration and development.

Revenue & Net Income

When their shares of revenues are compared, the biggest, Shell and Exxon Mobil account for more than half of all Big Five revenue, as seen in figure 4.8. If BP, due to its difficulties with regard to its TNK-BP operation in Russia

Figure 4.8 - Overall shares of revenue



55 Jaffe, A. M.; Soligo R. 2007, "The international oil companies", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 19.

which makes up about 25% of its production,[56] loses its stake in this joint-venture, one may expect them to lose their third position.

In terms of revenue growth, Shell has well outpaced its peers in 2007, with over 11% revenue growth, while ConocoPhillips has the most modest growth, at about 3%. It is also notable that the biggest revenue growth came from the three IOCs with the highest revenues. Figure 4.9 shows the relative positions of the companies.

Figure 4.9 - Revenue growth

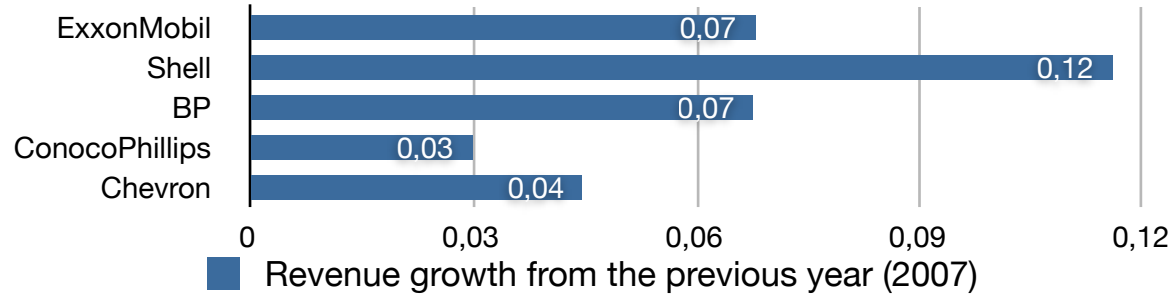
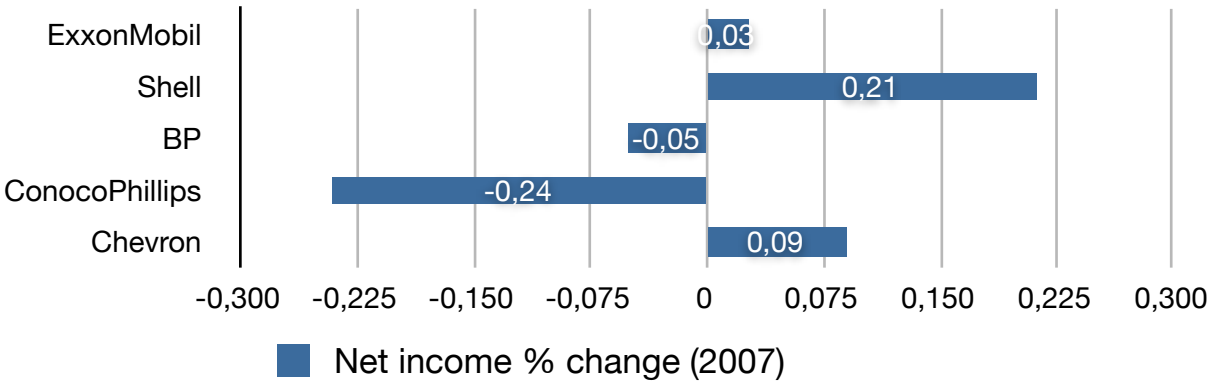


Figure 4.9, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

While all of the Big Five reported growth in revenues, BP and ConocoPhillips actually suffered negative growth in their net incomes. Exxon Mobil also reported a small increase in net income. Both ConocoPhillips and Exxon Mobil had lost reserves and production in the nationalization in Venezuela, which explains their poor performance.

Figure 4.10 - change in net income



56 Webb, T. 2008, Battle for TNK-BP turns into all-out war [online], The Guardian, Available from: http://www.guardian.co.uk/business/2008/jul/27/bp.oil [Accessed: 17.08.2008].

Figure 4.10, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

On the other hand, BP, despite over 6% increase in revenues, reported a decrease in its net income, which can be explained mostly by its poor profit-per barrel figures. While the revenues grew in line with the oil prices, the profits declined relative to the previous year, due to increasing E&P costs and lower profit-per barrel for BP.

Figure 4.11 - crude oil production

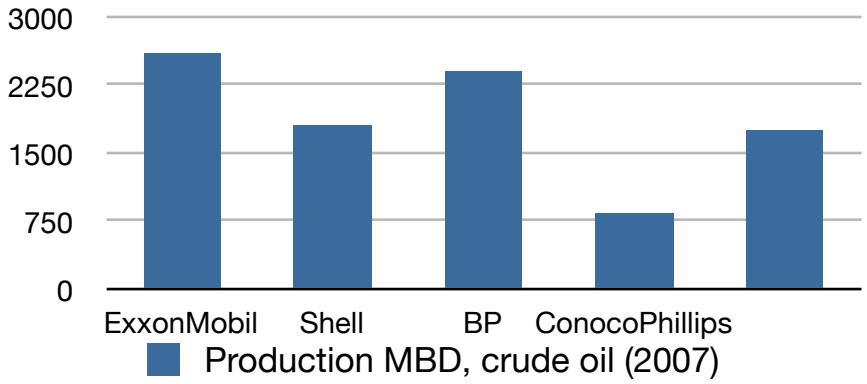


Figure 4.11, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

In terms of crude oil production, Exxon Mobil and BP clearly led the field in 2007, as it can be seen in figure 4.11. ConocoPhillips reported the lowest production numbers among the Big Five, again due to the Venezuelan dispute. In fact, only Chevron has managed to increase its crude oil production in 2007, by 1%, while the rest of the Big Five suffered production declines between 2-12%, as seen in figure 4.12. In short, it is fair to say that none of the IOCs performed well on oil production metrics in 2007.

Figure 4.12 - change in crude oil production

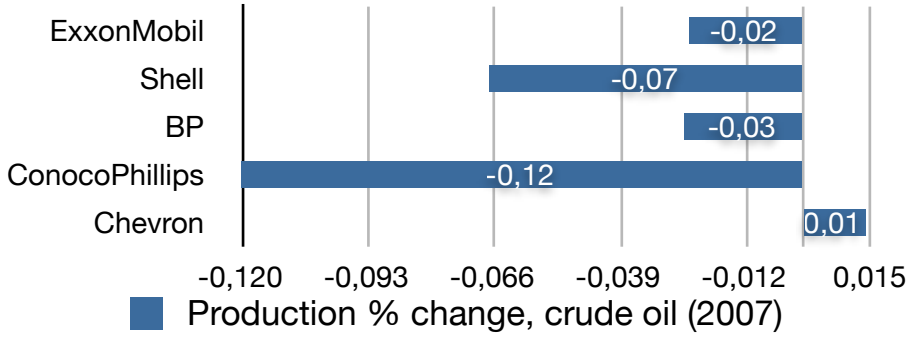


Figure 4.12, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

On the natural gas front, Exxon Mobil again leads in terms of total production, while ConocoPhillips has the lowest production - less than a quarter of Exxon Mobil's 2007 production.

Figure 4.13 - natural gas production

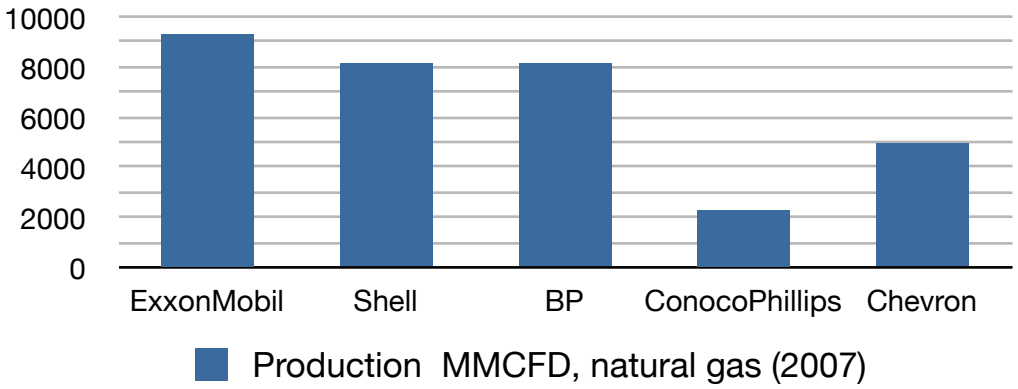


Figure 4.13, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

Despite having the highest production, hence the largest base to increase from, Exxon Mobil increased its gas production by less than 1%, compared to the previous year in 2007. ConocoPhillips recorded the best growth numbers, albeit from a much smaller base, with 5% increase. Meanwhile, Shell and BP had declining gas production, along with declining oil production, with declines of -2% and -3%.

Figure 4.14 - change in natural gas production

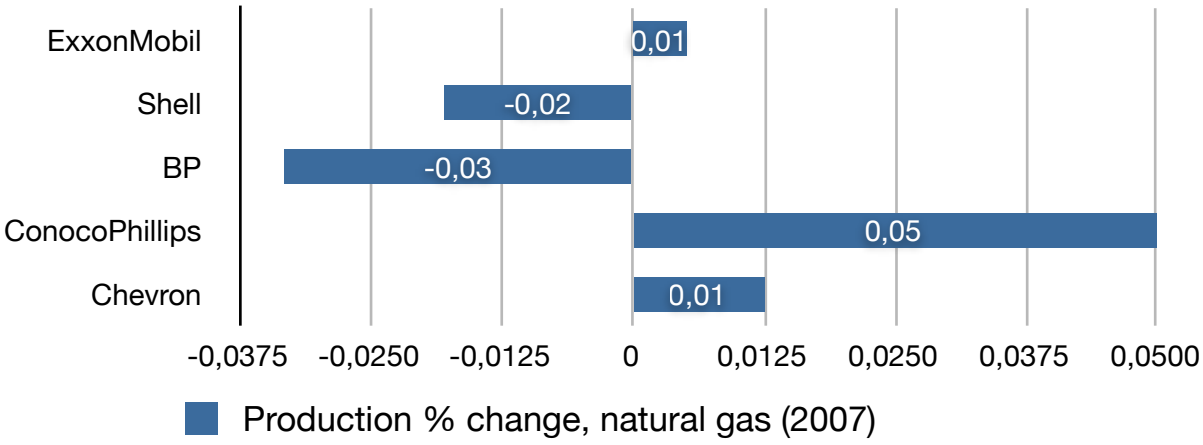


Figure 4.14, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

When the oil and gas numbers are put together in barrels oil equivalent terms, we get a glimpse of the overall production situation the Big Five is faced with. Exxon Mobil and BP have the highest production rates in BOE terms, followed by Shell, while Chevron and ConocoPhillips are ranked 4th and 5th, respectively.

Figure 4.15 - oil equivalent production

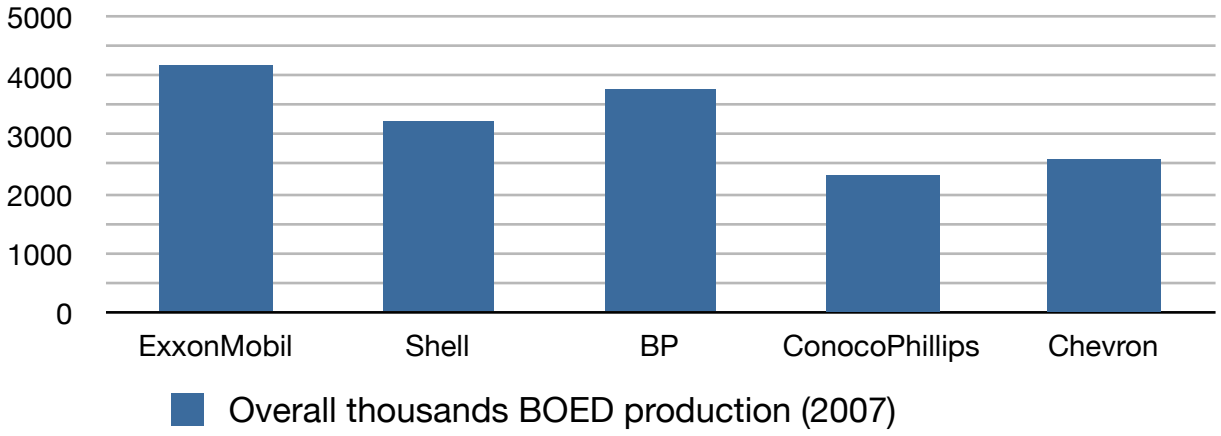


Figure 4.15, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

When the change in total production of the Big Five in 2007 compared to the previous year is analyzed, the results are hardly satisfactory. All of the Big Five had declining oil&gas production in 2007, with the declines ranging from -5% for Shell to -1% for ConocoPhillips.

Figure 4.16 - change of oil equivalent production

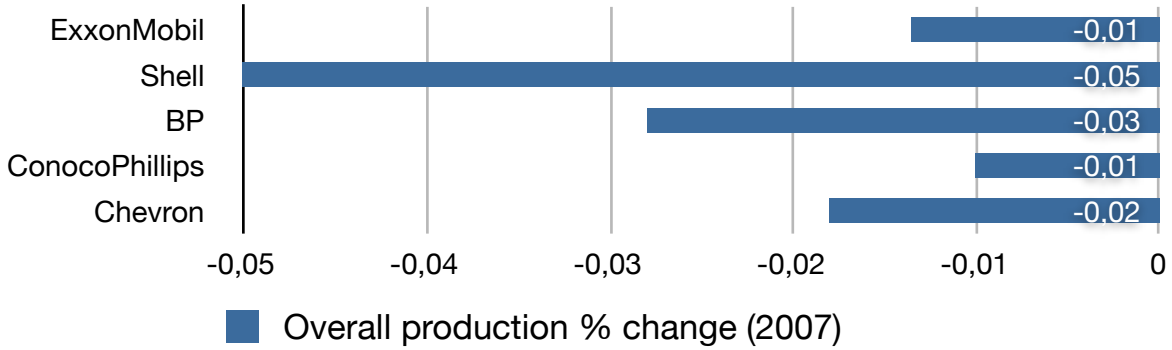


Figure 4.16, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

While revenue growth has been impressive for all of the five IOCs, the fundamentals of their business, production numbers, remained weak. Of course, there were factors such as the Venezuelan dispute that affected some of the companies, and one could argue that this is

merely a short-term disruption. However, the long-term view is not more appealing either. Except for Exxon Mobil, Big Five companies do not have oil equivalent reserves to put them on par with NOCs.

Figure 4.17 - oil equivalent proved reserves

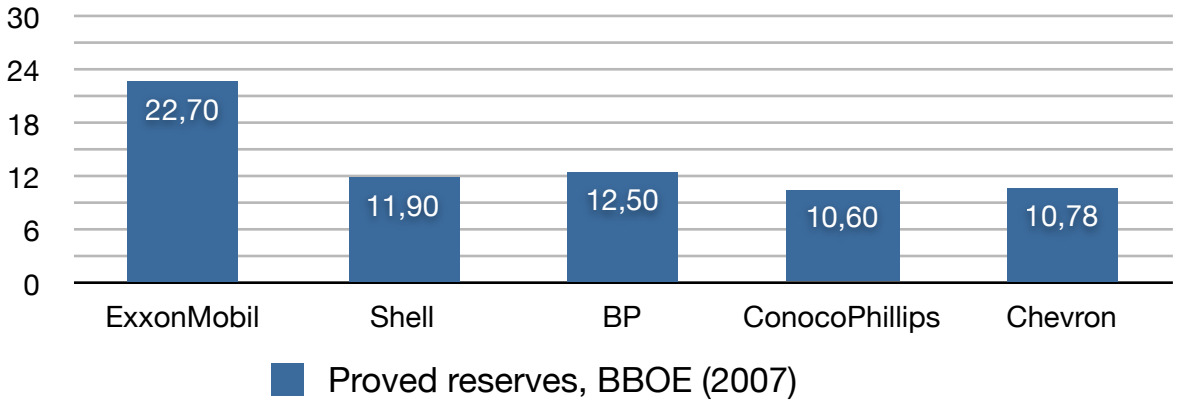


Figure 4.17, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

Neither are they successfully replacing their reserves. Below are the reserve replacement rates for the Big Five, calculated by looking at the difference between 2007 reserves and 2006 reserves, adjusting by the production number and finding the annual reserve additions. The reserve replacement rate then reflects how much of the yearly production is replaced by new reserve additions. By this metric, Chevron appears to be the worst performer in 2007. The company's total reserves in barrels oil equivalent terms declined to 10,7 billion barrels in 2007 from 11,6 billion barrels in 2006. This decline, when the fact that the company produced 946 million barrels of oil equivalent in 2007 is factored in, means that Chevron added reserves of 147 million barrels of oil equivalent in 2007. This corresponds to a reserve replacement rate of 11%, as seen in the table below.

Figure 4.18 - reserve replacement rates

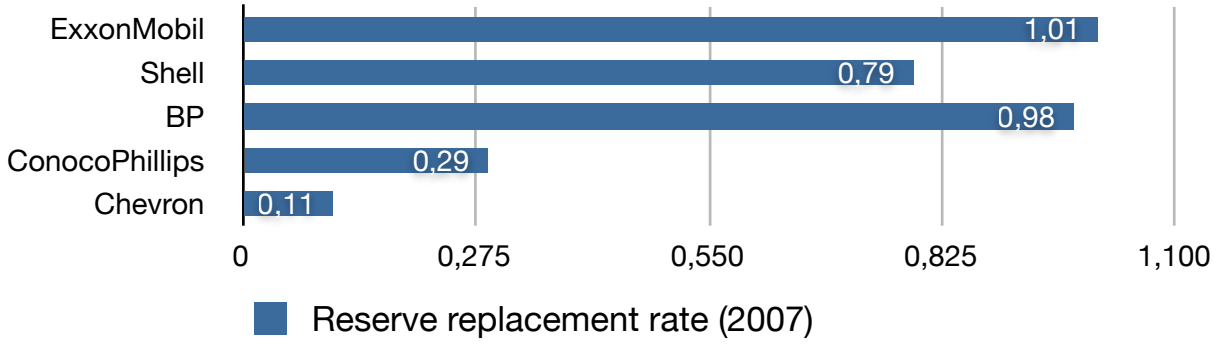


Figure 4.18, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

Shortly, the replacement rates suggest stagnant reserve growth for Exxon Mobil and shrinking reserve bases for the other four companies. If companies stopped adding reserves in 2008, their current reserves would sustain their production at current levels for between 9 to 15 years. The figure for individual companies can be observed in figure 4.19. Of course the companies will continue to add reserves, but it is highly questionable if they will add enough

RANKING	Operational											
	Oil				Gas				Overall (BOE)			
	Production	Rank	Growth (%)	Rank	Production	Rank	Growth (%)	Rank	Production	Rank	Growth	Rank
Exxon Mobil	2616	1	-2,42%	2	9384	1	0,54%	3	4180	1	-1,35%	2
Shell	1818	3	-6,7%	4	8214	2	-1,8%	4	3234	3	-5%	5
BP	2414	2	-2,5%	3	8143	3	-3,3%	5	3771,00	2	-3%	4
Conoco Phillips	854	5	-12%	5	2292	5	5%	1	2324	5	-1%	1
Chevron	1756	4	1,39%	1	5019	4	1,27%	2	2619	4	-1,80%	3
Average	1892		-4,4%		6610		0,34%		3226		-2,4%	
	Financial											
	Revenue				Profits				Upstream CAPEX			
	Total ($ million)	Rank	Growth (%)	Rank	Total ($ million)	Rank	Growth (%)	Rank	CAPEX	Rank		
Exxon Mobil	390.328 US$	1	7%	2	40.610 US$	1	3%	3	15724	1		
Shell	355.782 US$	2	12%	1	31.926 US$	2	21%	1	14838	3		
BP	288.951 US$	3	7%	3	21.169 US$	3	-5%	4	13906	4		
Conoco Phillips	194.495 US$	5	3%	5	11.891 US$	5	-24%	5	11791	5		
Chevron	214.091 US$	4	4%	4	18.688 US$	4	9%	2	15538	2		
Average	288.729 US$		7%		24.857 US$		0,80%		14359,4			
	Reserves											
	Oil	Rank	Gas	Rank	Overall (BOE)	Rank	Replacement (%)	Rank	Years of production left	Rank	Average Ranking (1-5)	
Exxon Mobil	11.074	1	68.262	1	22,7	1	101	1	14,9	1	1,4	
Shell	6.686	3	31.284	3	11,9	3	79	3	10,1	4	3	
BP	5.492	4	41.130	2	12,5	2	98	2	9,08	5	3,2	
Conoco Phillips	3.104	5	22.499	4	10,6	5	29	4	12,5	2	4,2	
Chevron	7.087	2	22.140	5	10,78	4	11	5	11,3	3	3,3	
Average	6.689		37.063		13,696		63,6		11,576			

Figure 4.20, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

reserves to replace their yearly production. This reality should be the harbinger of change for IOCs' way of doing business.

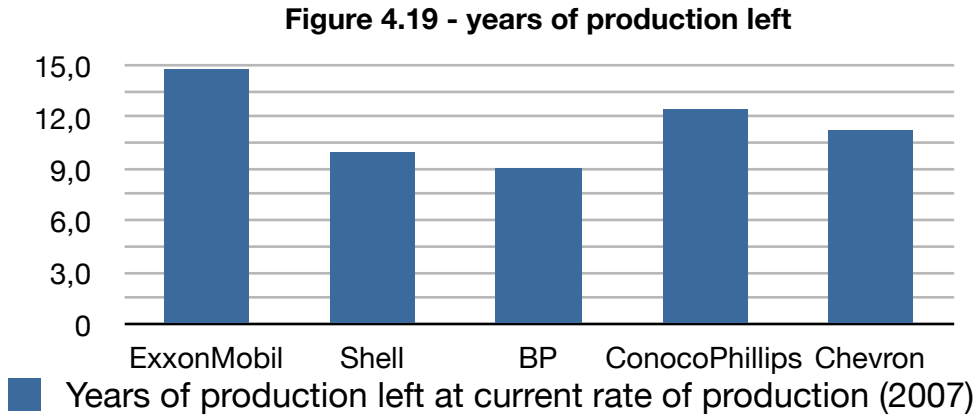


Figure 4.19, Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

In conclusion, we may say that although IOCs are doing well in financial terms at the moment, due to the high prices, but on the operational side their production rates are stagnant and reserve replacement rates are not impressive. Exxon Mobil does stand out as the best performer in the group, with the highest revenues, highest profit margin, highest net income, highest production, largest reserves, highest reserve additions and highest upstream capital investment. The numbers are somewhat skewed due to the production some companies (Exxon Mobil, ConocoPhillips) have lost in Venezuela, however nationalisation is an unfortunate reality of the oil industry that needs to be taken into account as a risk factor.

4.5 IOC Scorecard

After a review of the operational, financial and resource-related aspects of IOCs' performance, we may rank these five IOCs in by taking the most important of these aspects into account. By taking such a holistic view, we may arrive at conclusions with regard to the competitiveness of Big Five IOCs compared to one another. Below is the IOC scorecard which ranks these five IOCs in terms of operational competency, financial results and resource base.

The results of such a ranking present us with a few conclusions. First of all, Exxon Mobil is the undisputed leader in the field, with an average ranking of 1,4. If one were to consider that 2007 has been an unlucky year for the company due to Venezuelan nationalisation, it is quite possible that the company would be better placed in 2008. Exxon Mobil is undisputedly occupies the first tier in the group of Big Five.

After Exxon Mobil, the other three companies are rather close to one another, Shell, BP, and Chevron, ahead in some areas but not others. With average rankings of 3, 3,2 and 3,3 respectively, these companies form the second tier in the Big Five.

Lastly, there is ConocoPhillips. As it is smaller in size compared to the others, and it was highly affected by the nationalisation in Venezuela, the company comes out as the weakest IOC on the scorecard. Despite the poor showing in 2007, it is highly likely that ConocoPhillips would be a part of the second tier in a better year.

Chapter 5 - Strategic challenges of IOCs

5.1. The principal challenge: Reserve replacement

The principal challenge that faces the IOCs today is reserve replacement. As discussed earlier, only a small fraction of the available oil resources is available for exploitation by IOCs, and their production in mature regions, such as the North Sea, is in decline.[57] As IOCs are most competent in managing large scale exploration and production projects, the fact that they are getting locked out of these prospects will reduce their competitiveness. According to Jonathan Stern of Oxford Institute for Energy Studies, the IOCs' main value proposition has been their capacity to handle large projects, large financial resources and technological edge. This value proposition is called to question today, as NOCs are able to finance projects themselves thanks to high oil prices, they can hire oil service companies such as Schlumberger for the technological expertise required and they have begun to build project management capabilities themselves.[58]

Therefore the main challenge is in reserves. IOCs have a mature reserve portfolio that is in decline, and they lack the means to add new reserves.

The Big Five reported a decline of 614,000 barrels a day in their oil output for the second quarter of 2008, despite a large profit of $44 billion. This decline was the steepest of the five consecutive quarters where output declined.[59]

This decline is only a symptom of the larger problem, lack of reserve access. The oil industry explains this as a trend called 'resource nationalism',[60] as more and more nations exert direct control over their resources, they shut out IOCs from promising oil prospects. The Exxon

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57Mouawad, J. 2008, As oil giants lose influence, supply drops [online], The New York Times, Available from: http://www.nytimes.com/2008/08/19/business/19oil.html?_r=1&oref=slogin [Accessed: 02.09.2008].

58Crooks, E. 2007, International oil companies: big shift in balance of power [online], Financial Times, Available from: http://www.ft.com/cms/s/1/97577ef8-8d15-11dc-a398-0000779fd2ac,dwp_uuid=4bf66816-8c39-11dc-b887-0000779fd2ac.html[Accessed: 02.09.2008].

59 Mouawad, J. 2008, As oil giants lose influence, supply drops [online], The New York Times, Available from: http://www.nytimes.com/2008/08/19/business/19oil.html?_r=1&oref=slogin [Accessed: 02.09.2008].

60 Mouawad, J. 2008, As oil giants lose influence, supply drops [online], The New York Times, Available from: http://www.nytimes.com/2008/08/19/business/19oil.html?_r=1&oref=slogin [Accessed: 02.09.2008].

Mobil CEO and chairman, Rex W. Tillerson, has said that the problem with the supply is in essence a problem with accessing the resources on the ground for exploration and development. He refers to this as 'a political question where governments have made choices'.[61] Some companies, such as BP, ENI of Italy, and Total of France have put more emphasis on building good relationships with the governments of the countries they operate in. An example of this was ENI's willingness to renegotiate its contracts in Libya.[62]

The IOCs themselves are not free of blame, however. As will be argued later on in the BP case, where this particular company's record for the last 10 years is examined with regard to the relation of its share price to dividends & share buybacks, oil prices, reserve replacement, profits and other metrics, the IOCs have not been beyond the short-sightedness of boosting short-term share prices to the expense of investments. In 1994, the Big Five spent 3% of their 'free-cash' on share buybacks and dividends, and 15% on E&P projects. By 2007, the picture was very different, with the companies spending 34% on share buybacks and dividends, and 6% on E&P investment.[63] As the case study will show, dividends are the biggest influence on the share price, and the IOCs, such as BP, have used them as tools, to a great effect. The opportunity cost in this case was diversifying into other areas, extracting more or technology development. In essence, IOCs efforts to keep their share prices high have damaged their future viability as businesses. Below is a comparison of the reserve life of the IOCs, both those within Big Five and others:

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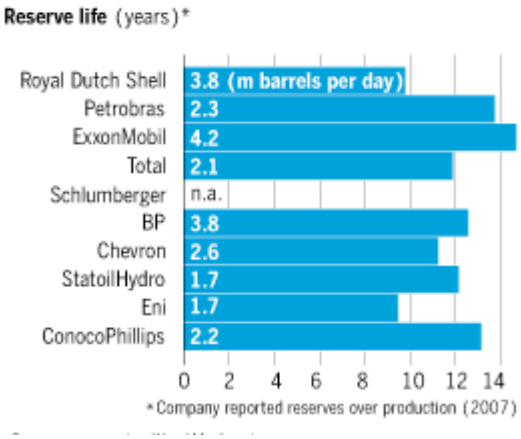
61 Mouawad, J. 2008, As oil giants lose influence, supply drops [online], The New York Times, Available from: http://www.nytimes.com/2008/08/19/business/19oil.html?_r=1&oref=slogin [Accessed: 02.09.2008].

62Crooks, E. 2007, International oil companies: big shift in balance of power [online], Financial Times, Available from: http://www.ft.com/cms/s/1/97577ef8-8d15-11dc-a398-0000779fd2ac,dwp_uuid=4bf66816-8c39-11dc-b887-0000779fd2ac.html [Accessed: 02.09.2008].

63Mouawad, J. 2008, As oil giants lose influence, supply drops [online], The New York Times, Available from: http://www.nytimes.com/2008/08/19/business/19oil.html?_r=1&oref=slogin [Accessed: 02.09.2008].



Source: Crooks, E. 2008, Oil innovation after years of caution [online], Financial Times, Available from: http://www.ft.com/cms/s/0/d39b8088-5cc9-11dd-8d38-000077b07658.html [Accessed: 02.09.2008].

From a purely financial point, there may be justification for this. If the company can not find prospects with higher rates of return than their own shares, they opt for share buybacks and paying dividends. However, from a strategic point of view, this is not a sustainable option. With declining reserves and production rates, the IOCs may be contributing to the high prices they enjoy at the moment, but their future business prospects become highly questionable.

This principal challenge is compounded by issues that exacerbate its effects.

5.2 Resource nationalism and nationalisation – The Venezuelan case

As IOCs witnessed after the Yom Kippur War in 1973 and many times since then in Nigeria, Saudi Arabia, Iran, and finally in Venezuela, the threat of nationalisation is a very real threat to the international operations of these companies. The oil embargo of the 1973 paved the way for nationalisation of oil operations in many countries, as it did for Saudi Arabia.[64] These nationalisation of IOC operations was the catalyst in the rise of NOCs, as companies such as Saudi Aramco inherited the physical infrastructure, technical and professional expertise from the former IOC and coupled these with direct backing from their national governments.

During the 1960s oil exporting countries had sought to exert more control over their oil resources. Some countries, among them Iraq and Venezuela, forced out the IOC-consortiums through swift nationalisation processes, while others, such as Saudi Arabia, employed a process of gradual nationalisation.[65]

Mommer identifies three stages in the process of nationalisation.[66] In the first stage, which is mainly associated with colonialism, the rent levels were low, oil concessions were extensive and contracts were as long as 60 years in duration. This represented an ideal situation for 'the international tenant', the IOC, and a less-than-ideal one for the landlord, the state. The contracts between the landlord and tenant were subject to international arbitration. The second stage is characterised by a gradual increase of the host country's bargaining power, as the contracts were revised to bring their conditions in line with the standards applied in the United States. The effect of this revision was in fact a 50-50 split of the profits between the landlord and the tenant. This ratio was still unacceptable to oil exporting countries, as they were required to give up some sovereignty on fiscal matters, such as setting the tax rates, by fixing it to the contracts. Mommer argues that the 'colonial spirit' of the contracts remained intact in this case. Consequently, the third stage of the process began with the foundation of OPEC. As Mommer points out, the actions of the oil-exporting countries were becoming just as

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64 Hannesson, R. 1998, Petroleum economics: issues and strategies of oil and natural gas production, Quorum Books, United States, p.9.

65 Jaffe, A. M.; Elass J. 2007, "Saudi Aramco: National flagship with global responsibilities", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 29.

66 Mommer, B. 1994, The political role of national oil companies in exporting countries: the Venezuelan Case, Oxford Institute for Energy Studies, Oxford, p. 7.

internationally co-ordinated as those of the IOCs operating in those countries. With the OPEC Policy Declaration of 1968, the countries declared their sovereign right to extracting the maximum resource rent, also declaring nationalisation as the final objective. While the declaration welcomed foreign capital, it asserted that the activities would be under the supervision of the national government. Now let us look into two examples of nationalisations, first of Aramco in Saudi Arabia, and second the dispute between Venezuela and Exxon Mobil.

The Arabian-American Oil Company (Aramco) was founded in 1944 as a venture between Texas Oil Company (Texaco) and Socal, both U.S. majors of the time.[67] Following the 1973 embargo, Kingdom of Saudi Arabia pursued a policy of 'increased participation' in the Aramco venture, firstly through the increase of its minority stake in the company and later on through the placement of Saudi nationals to key positions within the organisation. Rather than engaging in an overnight nationalisation of the company, the government undertook a process of 'incremental nationalisation'. According to the 1972 general agreement between Saudi Arabia and Aramco consortium, the state's share of the company increased from 25% in the beginning to 51% by 1983. The final agreement was reached under the conditions that the kingdom would own a 60% share in the company, but would sell most of its oil back to the consortium partners to be marketed worldwide.[68] This approach, undeniably due to the close relations of the company and the kingdom to the U.S., could be described as a more 'accommodating' style of nationalisation.

In other cases, the transition process has not been as smooth. The example used here is U.S. based Exxon Mobil in Venezuela. In July 2007, Venezuelan government decided to embark upon the nationalisation of its oil industry by annexing foreign oil companies' assets to its NOC, PDVSA.[69] The president of Venezuela, Hugo Chavez, has largely tapped into PDVSA's

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67 Jaffe, A. M.; Elass J. 2007, "Saudi Aramco: National flagship with global responsibilities", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 24.

68 Jaffe, A. M.; Elass J. 2007, "Saudi Aramco: National flagship with global responsibilities", James A. Baker III Institute for Public Policy, Rice University, Houston, p. 34.

69 Wilson, P. 2008, Venezuela bites back at Exxon Mobil [online], Business Week, Available from: http://www.businessweek.com/bwdaily/dnflash/content/feb2008/db2008028_610672.htm?chan=top+news_top+news+index_businessweek+exclusives [Accessed: 24.02.2008].

cash flow to finance his social programs, spending over $13.3 billion in 2006, compared to the previous year's $6.9 billion. The 2007 figure is in fact double the amount of investment PDVSA has made in oil and gas projects. Meanwhile, PDVSA planned to expand the country's oil production from 2.4 million barrels a day to 5.8 million barrels a day. Most of the increase is due to come from heavy crude oil, which is not as profitable as lighter blends. The plan requires $77 billion investment, a third of it coming from foreign companies. It is unclear to outside observers how the company will achieve this goal as it lacks the financial means and has been in the epicentre of a difficult nationalisation.

President Chavez took office in 1998 and since then the country's oil and gas regime has changed substantially. The imperative in these changes was to 'reaffirm the national sovereignty over petroleum resources' and, in essence, re-nationalise the sector. With legislation regarding hydrocarbons in 2001, foreign participation in oil exploration & production (E&P) activities is restricted to a minority stake.[70]

Since 1999, the Venezuelan oil output has declined 25%, as President Chavez has fired 20,000 PDVSA employees, mainly experienced engineers and executives.[71] In the 1990s, IOCs were welcomed into Venezuela to increase the extraction of the extra-heavy crude in the Orinoco Belt, a basin with estimated reserves of 235 billion barrels, and facilitate its refinement into lighter and more profitable blends.

In 2004, Venezuelan government began revising its contracts with IOCs, first raising the royalty rate from 1% of the value of oil extracted to 16.67%, and then to 33.3%. The income taxes have increased from 34% to 50% in the meantime.[72] Since 1999, the Chavez government has implemented several changes in national legislation, requiring a majority government stake in all oil projects and began collecting large sums in taxes that were deemed

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70 Ernst & Young LLP UK 2007, Partnerships in the oil & gas sector [online], p. 14, Available from: http://www.ey.com/Global/assets.nsf/International/Industry_Oil_and_Gas_PartnershipOGSector/$file/Industry_Oil_and_Gas_PartnershipOGSector.pdf [Accessed: 25.02.2008].

71 Wilson, P. 2008, Venezuela bites back at Exxon Mobil [online], Business Week, Available from: http://www.businessweek.com/bwdaily/dnflash/content/feb2008/db2008028_610672.htm?chan=top+news_top+news+index_businessweek+exclusives [Accessed: 24.02.2008].

72 Associated Press 2006, Venezuela takes on Exxon Mobil [online], msnbc.com, Available from: http://www.msnbc.msn.com/id/12085050/ [Accessed: 24.02.2008].

unpaid. In July 2007, the government compelled five IOCs operating in the country and Norway's StatoilHydro to transfer equity stakes of 60% or more in four oil developments to the country's NOC, PDVSA. Four companies complied, Chevron, BP, Total and StatoilHydro. The nationalisation of these assets also included two of Exxon Mobil's ventures.[73] While the others accepted, Exxon Mobil rejected the new deal and sold off one of its stakes to its partner Repsol YPF of Spain. At that point, Exxon Mobil continued to hold 41.7% stake in the Cerro Negro project, 120,000 bpd, and a 50% stake in the La Ceiba field.[74] As these assets were also nationalised, the company pulled out of Venezuela instead of accepting the new terms. Following its exit, it began pursuing compensation from the Venezuelan government filing for international arbitration with the International Centre for Settlement of Investment Disputes in 2007 over the amount of the compensation. The arbitration process is deemed to be a long one, lasting for 5 years before a final decision has been handed. The company also filed lawsuits in the U.S., the U.K., and the Netherlands to freeze PDVSA assets.[75] Following Exxon Mobil, ConocoPhillips also filed for arbitration. The conflict between the companies and Venezuela is focused on whether the companies should accept the book value of the seized assets or the market value, which could be higher. The companies claim to have invested more than $3.5 billion in Venezuela

In January 2008, Exxon Mobil won its lawsuits in the U.K. and the U.S., where the courts froze PDVSA's assets of over $12 billion. It was argued that Exxon Mobil took this course of action to make sure PDVSA would pay the compensation.[76] In response, Venezuela cut off oil supplies to Exxon Mobil. IEA and U.S. Energy department dismissed the influence of the

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73 Wilson, P. 2008, Venezuela bites back at Exxon Mobil [online], Business Week, Available from: http://www.businessweek.com/bwdaily/dnflash/content/feb2008/db2008028_610672.htm?chan=top+news_top+news+index_businessweek+exclusives [Accessed: 24.02.2008].

74 Associated Press 2006, Venezuela takes on Exxon Mobil [online], msnbc.com, Available from: http://www.msnbc.msn.com/id/12085050/ [Accessed: 24.02.2008].

75 Bodzin, S. 2008, Exxon Mobil "isolated" by tactics, Venezuela says [online], Available from: http://www.bloomberg.com/apps/news?pid=20601086&sid=aGnnQ7LnJHtA&refer=latin_america [Accessed: 24.02.2008].

76 Wilson, P. 2008, Venezuela bites back at Exxon Mobil [online], Business Week, Available from: http://www.businessweek.com/bwdaily/dnflash/content/feb2008/db2008028_610672.htm?chan=top+news_top+news+index_businessweek+exclusives [Accessed: 24.02.2008].

move, arguing that the cuts were very limited and Exxon would certainly be able to replace them from other sources.[77]

The nationalisation of their assets in Venezuela has affected the performances of both Exxon Mobil and ConocoPhillips. In February 2008, ConocoPhillips announced that its replacement rate for 2007 was only 29%, while Exxon Mobil reported 76%. When its expropriated assets in Venezuela are discounted, the company had added 249 million barrels of oil equivalent (boe) in 2007 over a production of 842 million boe. ConocoPhillips had lost over one billion boe in reserves in the Venezuela nationalisation. On the other hand, Exxon Mobil's reserve replacement rate was 76%, as the company added 1.2 billion boe to its reserves in 2007.[78] These numbers clearly indicate that neither company can claim to be growing, as their replacement ratios are below 100%, but they also suggest that the impact of nationalisation on the companies has been substantial.

The recent example of the nationalisation of the Venezuelan oil industry is in stark contrast to the first example of Saudi Arabian nationalisation. In the latter case the foreign companies have been forced into accepting the new terms in a rather short period of time, through unilateral actions by the government. The host government was also not friendly with the companies' home country governments, in contrast to the U.S. - Saudi relationship. The first case shows a more conciliatory and gradual approach to shifting the balance of power in the domestic industry away from IOCs, while the second case shows a radical shift in the political landscape of the host country, effectively pulling the rug under the foreigners' feet. Both types of nationalisation pose a threat to IOCs operating in politically-risky countries, although the second type involves a much higher level of uncertainty.

When both cases are examined under the PESTEL framework, as seen in Appendix 5.d, it is clear to see in both cases the organisations have been affected by solely political factors in the countries they operate in. Aramco was outright nationalised, while Exxon Mobil and ConocoPhillips have taken substantial hits in terms of sunk investment costs and reserves lost.

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77 Baltimore, C. 2008, Venezuela oil halt to Exxon "very limited" [online], Available from: http://www.reuters.com/article/rbssEnergyNews/idUSN1559123920080215 [Accessed: 24.02.2008].

78 Daily, M. & Erman, M. 2008, Conoco takes Venezuela hit on reserve replacement [online], The Guardian, Available from: http://www.guardian.co.uk/feedarticle?id=7321515 [Accessed: 24.02.2008].

The Saudi case mainly involved social welfare priorities, taxation policy and foreign trade regulations, as Saudi Aramco became a social actor after its take-over, it returned a larger share of the petroleum rent to the host country and the nationalisation was a part of long-term government policy in changing the regulations governing the oil industry. On the other hand, Venezuelan case appears to also possess a governmental stability dimension in addition to the factors mentioned earlier. Chavez government has radically altered the course of the country and has rapidly changed the regulatory environment. However Venezuela also suffers from political instability, marked by the highly contested election of 2006,[79] declining oil production by PDVSA,[80] and a lack of corporate transparency in the company's affairs. Other examples such as changes in hydrocarbon regulations in Algeria and Bolivia[81] should bring IOCs to a sobering realisation over the returns they should expect to make over investments in volatile countries.

To conclude, nationalisation is one of the big political factors that pose very real risks for IOCs in the countries they operate. How the companies may cope with that will be discussed further in chapter 6.

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79 Oxford Analytica 2006, Post-election conflict likely in Venezuela [online], Forbes, Available from: http://www.forbes.com/business/2006/11/28/venezuela-election-chavez-biz-cx_1129oxford.html [Accessed: 24.02.2008].

80 Wilson, P. 2008, Venezuela bites back at Exxon Mobil [online], Business Week, Available from: http://www.businessweek.com/bwdaily/dnflash/content/feb2008/db2008028_610672.htm?chan=top+news_top+news+index_businessweek+exclusives [Accessed: 24.02.2008].

81 Ernst & Young LLP UK 2007, Partnerships in the oil & gas sector [online], p. 14, Available from: http://www.ey.com/Global/assets.nsf/International/Industry_Oil_and_Gas_PartnershipOGSector/$file/Industry_Oil_and_Gas_PartnershipOGSector.pdf [Accessed: 25.02.2008].

5.3. Competition from NOCs

As mentioned previously, national oil companies present a part of the challenge to the future business prospects of IOCs. By definition, a NOC is a company in which a state or a state-owned entity holds a controlling equity share.

NOCs can be divided into two groups: resource holding NOCs and resource seeking NOCs. The first group, resource holders, consists of NOCs from countries with large hydrocarbon reserves, such as Saudi Aramco of Saudi Arabia, Rosneft of Russia, or PDVSA of Venezuela. The second group, resource seekers, is formed by companies such as CNPC and CNOOC of China, Petrobras of Brazil and StatoilHydro of Norway.

The resource holders enjoy clear advantages over IOCs, such as having easy access to reserves at home, which are often off limits to IOCs, such as the fields in Saudi Arabia or Venezuela. These NOCs come from producing nations, such as Saudi Arabia, Venezuela or Russia. This is due to the political support they have in their home country, where most of their reserves and production is located. As these 'walled-gardens' are closed to competition from other companies, the resource holding NOCs can operate without competitive pressures on reserve acquisition. The presence of these NOCs and governments that support them often make it impossible for IOCs to gain access to the resources in the respective countries, as it was pointed out earlier in the case of Venezuela. However, this production monopoly is limited by the reserves present in the home country. As these reserves are depleted, resource holders tend to become resource seekers, as is the case with StatoilHydro of Norway.

The resource seeking NOCs, on the other hand, have relatively little hydrocarbons in their home country, therefore they seek to acquire reserves abroad. These NOCs come from mainly consuming nations, and the best example for this type of NOCs is perhaps CNPC of China. Backed by the Chinese government, CNPC has made investments in over 20 countries, such as Azerbaijan, Ecuador, Sudan, and Angola.[82] These are countries that are also potential investment locations for IOCs.

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82 Hoyos, C. 2007, The new Seven Sisters: oil and gas giants that dwarf western rivals [online], Financial Times, Available from: http://www.ft.com/cms/s/2/471ae1b8-d001-11db-94cb-000b5df10621,dwp_uuid=0bda728c-ccd0-11db-a938-000b5df10621.html [Accessed: 08.09.2008].

According to a model by PFC Energy, a consultancy, the NOCs can be mapped in terms of their technological competence and resources. Within this framework, several groups of NOCs emerge in the picture. These are groups such as national resource holders (Saudi Aramco, Gazprom), entrepreneurial NOCs (Petrobras), and strategic resource seekers (CNPC). The diagram can be seen below:

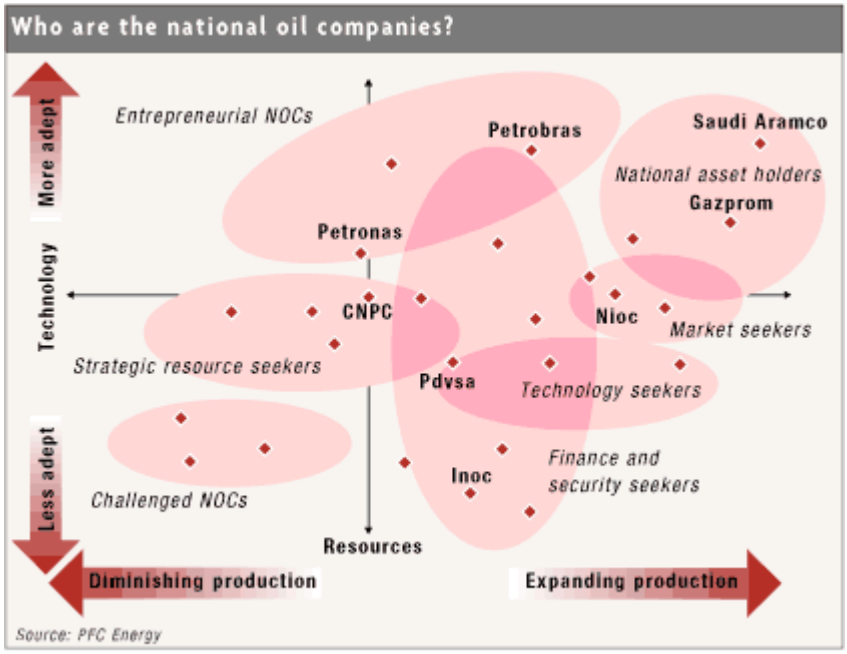

Figure 5.1, Source: Hoyos, C. 2007, The new Seven Sisters: oil and gas giants that dwarf western rivals [online], Financial Times, Available from: http://www.ft.com/cms/s/2/471ae1b8-d001-11db-94cb-000b5df10621,dwp_uuid=0bda728c-ccd0-11db-a938-000b5df10621.html [Accessed: 08.09.2008].

The business newspaper Financial Times argues for the signs of the emergence of a new class of oil companies, not unlike the original 'Seven Sisters', the seven Anglo-Saxon oil companies that once dominates the oil industry, remembered by a phrase coined by Enrico Mattei, the founder of the Italian oil company Eni.[83] The argument goes that seven NOCs will be overtaking the role of oil industry's 'rule-makers', and relegate the IOCs to being 'rule-takers'. The new 'Seven Sisters' apparently would consist of Saudi Aramco (Saudi Arabia), Gazprom (Russia), CNPC (China), NIOC (Iran), PDVSA (Venezuela), Petrobras (Brazil) and

83 Hoyos, C. 2007, The new Seven Sisters: oil and gas giants that dwarf western rivals [online], Financial Times, Available from: http://www.ft.com/cms/s/2/471ae1b8-d001-11db-94cb-000b5df10621,dwp_uuid=0bda728c-ccd0-11db-a938-000b5df10621.html [Accessed: 08.09.2008].

Petronas (Malaysia). While selecting these companies, the metrics that were used were the size of resource base, size of the company's output, its ambition, the involvement of the state in company's affairs, and the impact of its deal-making and investments on other players in the industry.[84]

As the CPF framework shows, these companies are hardly the same in terms of resources and competencies. In fact, some of these companies would be unable to operate without support from an IOC or an oil service company. Such variety among the NOCs makes room for partnership opportunities for IOCs.

What, then, are the competitive effects of NOC activity on IOCs? It is argued that NOCs limit investment opportunities for IOCs in their home countries, drive up the cost of investment in third-countries, push oil service prices higher, disregard geopolitical barriers IOCs face, and cooperate amongst each other, leaving IOCs out of lucrative developments.

Firstly, one result of an active resource holding NOC would be limited investment opportunities for IOCs in NOC home country. The best examples of this are Venezuela, recently, and Saudi Arabia, beginning from the 1970s, as discussed in the section about nationalization.

Secondly, resource seeking NOC activity in third-countries that are potential investment locations for IOCs increases competition for resource access. An example of this was China's CNPC getting preferential rights to four drilling licenses in Nigeria, the world's eighth largest oil exporter, a deal linked with $4 billion worth of infrastructure investments by China in the country.[85] This is a clear example of how government backing would benefit the NOC in getting access to resources.

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84 Hoyos, C. 2007, Selecting the Seven Sisters [online], Financial Times, Available from: http://www.ft.com/cms/s/0/f0d04560-cd8e-11db-839d-000b5df10621,dwp_uuid=0bda728c-ccd0-11db-a938-000b5df10621.html [Accessed: 08.09.2008].

85 Mathani, D. & White D. 2006, China in move to gain foothold in Nigerian oilfields [online], Financial Times, Available from: http://www.ft.com/cms/s/0/bc85fc3e-d58a-11da-93bc-0000779e2340.html [Accessed: 08.09.2008].

Thirdly, increased NOC activity pushes up the prices for oil services, such as renting drilling rigs, tankers, as well as the E&P personnel costs. As NOC demand for these services increase, the prices in the short term will follow. The changes in the client portfolio of Schlumberger, the biggest of the oil services companies, give an idea of the scale of the demand increase for its services by the NOCs. While the biggest portion of its clients is independent oil companies, the second largest – and the fastest growing – portion is NOCs.[86] As a result, cost inflation for E&P activities has been an annual average of 25% from 2003 on a per-barrel basis until 2007, when the rate dropped to 15%.

NOCs are unhindered by barriers that apply to IOCs, such as sanctions or public outrage, as they are supported by the home country governments. An example of this is again CNPC. The company has invested in Sudan in 1995 when the country was still ravaged by a civil war, and IOCs were absent from the country due to the U.S. sanctions.[87] While western companies, such as OMV, Talisman of Canada, and Lundin of Sweden pulled their investments from Sudan in the face of campaigns from human rights groups in 2002.[88] CNPC has continued its activities there, and Sudan has gone on to become one of the large crude exporting countries to China. Financial Times argues that China's willingness to accommodate regimes that are vilified by the West, such as Sudan's, has given its NOCs access to reserves they would not have had otherwise.[89]

NOCs often cooperate amongst themselves, sometimes in deals brokered by home country governments, leaving IOCs out of the equation. Hence, NOCs investment decisions influence

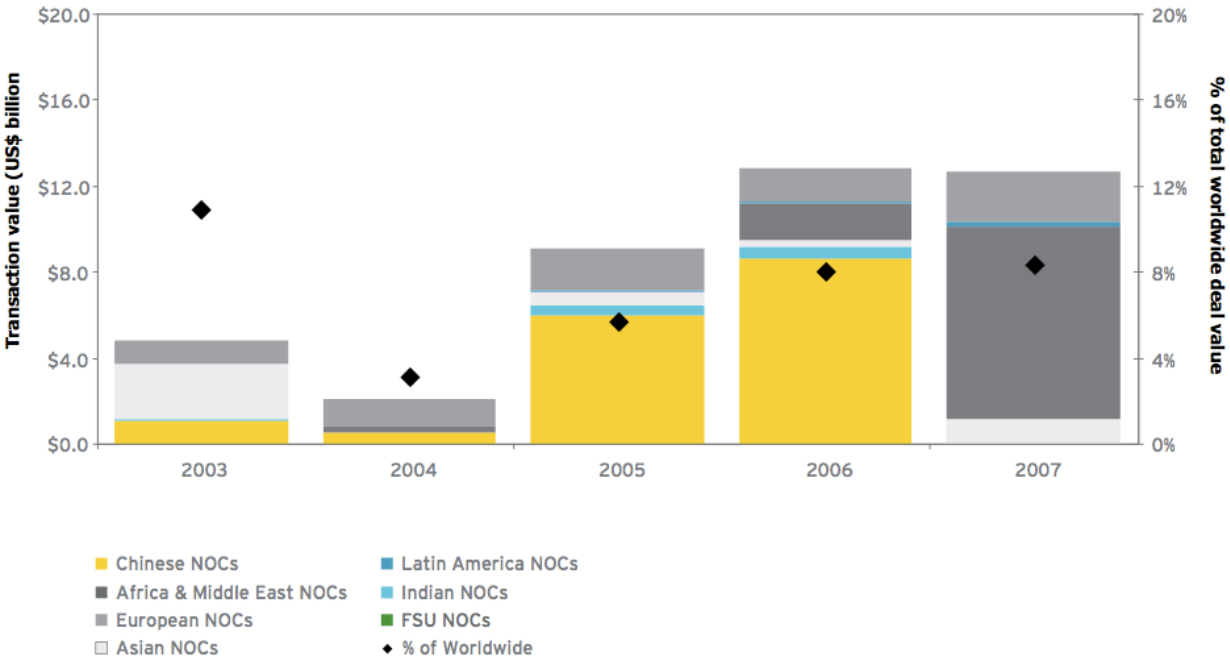
86 Hoyos, C. 2008, Nationals' champion [online], Financial Times, Available from: http://www.ft.com/cms/s/0/3417e64a-5dce-11dd-8129-000077b07658.html [Accessed: 08.09.2008].

87 Clark, M. 2008, Willing to go where western companies fear to tread [online], Financial Times, Available from: http://search.ft.com/ftArticle?queryText=willing+to+go+where+others+fear+to+tread&y=0&aje=true&x=0&id=080128000136&ct=0 [Accessed: 08.09.2008].

88 White, D. 2008, Oil companies urged to hold back on Sudan investment [online], Financial Times, Available from: http://search.ft.com/ftArticle?queryText=oil+companies+urged+to+hold+sudan+investment&y=0&aje=true&x=0&id=031125000901&ct=0 [Accessed: 08.09.2008].

89 Clark, M. 2008, Willing to go where western companies fear to tread [online], Financial Times, Available from: http://search.ft.com/ftArticle?queryText=willing+to+go+where+others+fear+to+tread&y=0&aje=true&x=0&id=080128000136&ct=0 [Accessed: 08.09.2008].

the availability of investment opportunities for IOCs. In fact, a recent Ernst&Young report suggests that national oil companies may not be inclined to remain national at all.[90] In fact, the value of transactions made by NOCs between 2003 and 2007 show a stark increase, with



definite signs of the aforementioned Chinese investments. The chart below shows the NOC transactions outside of the NOC's home market.

Figure 5.2, Source: Brogan, A. 2008, Are national oil companies the new international oil companies? [online], Ernst & Young, Available from: http://www.ey.com/Global/assets.nsf/International/Industry_Oil_and_Gas_Are_NOCs_the_new_IOCs/$file/Industry_Oil_and_Gas_Are_NOCs_the_new_IOCs.pdf [Accessed: 09.09.2008].

According to the same analysis, over half of the NOCs in the world have overseas operations, with the chart below demonstrating the extent of the companies' operations, in number of countries operated in and size of reserves terms.

90 Brogan, A. 2008, Are national oil companies the new international oil companies? [online], Ernst & Young, Available from: http://www.ey.com/Global/assets.nsf/International/Industry_Oil_and_Gas_Are_NOCs_the_new_IOCs/$file/Industry_Oil_and_Gas_Are_NOCs_the_new_IOCs.pdf [Accessed: 09.09.2008].

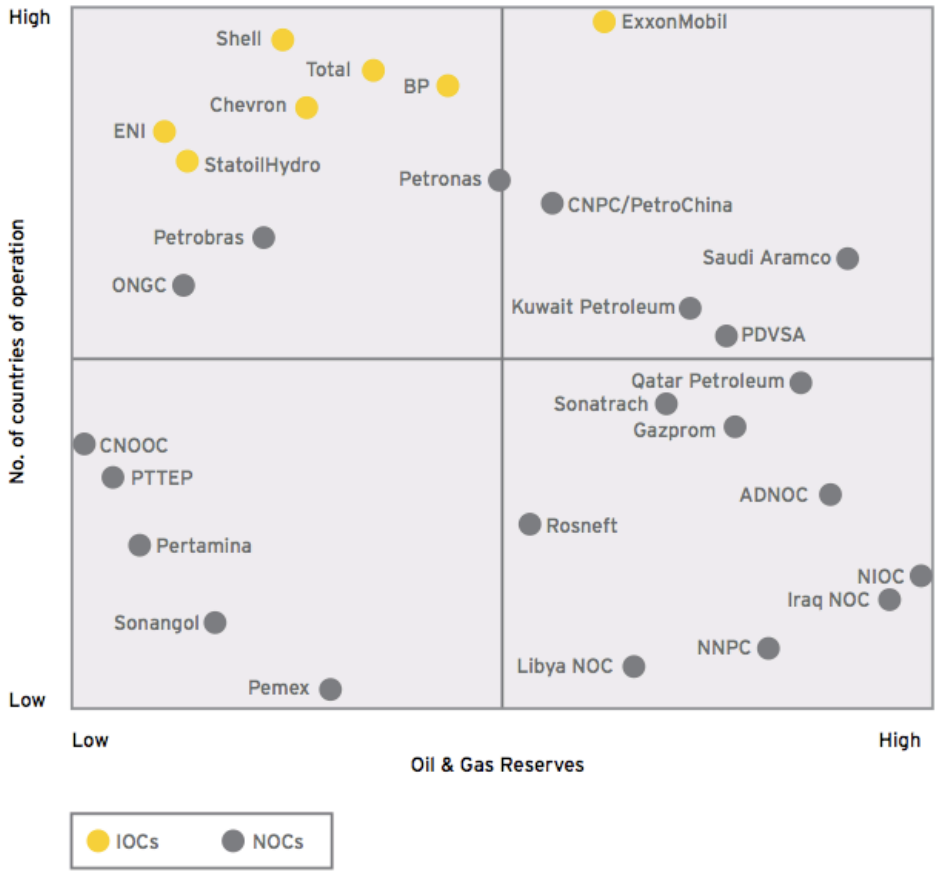


Figure 5.3, Source: Brogan, A. 2008, Are national oil companies the new international oil companies? [online], Ernst & Young, Available from: http://www.ey.com/Global/assets.nsf/International/Industry_Oil_and_Gas_Are_NOCs_the_new_IOCs/$file/Industry_Oil_and_Gas_Are_NOCs_the_new_IOCs.pdf [Accessed: 09.09.2008].

One weakness of some NOCs is their lack of managerial and technical expertise, although this can not be said about companies such as StatoilHydro, Petrobras, Saudi Aramco or Petronas. Apart from these NOCs, almost all the others require some degree technical and managerial expertise, which they partly receive from oil services companies.[91]

91 Hoyos, C. 2008, Nationals" champion [online], Financial Times, Available from: http://www.ft.com/cms/s/0/3417e64a-5dce-11dd-8129-000077b07658.html [Accessed: 08.09.2008].

5.4. Lack of incentive for long-term investment – BP Case

In this section, we will take a look at which factors affect the performance of the IOCs. As this paper argues for certain actions to be taken to improve performance, it is important to define what the performance is and how various variables contribute to it. The line of argument is: what directly decides company performance is not the oil price, which is an external factor, but how successful it is in adding new reserves. To demonstrate this point, a study of BP's performance over the years 1999 – 2007 was done. As a starting point, we will take the share price of the company as the main measure of performance.

Why is share price an important measure of performance? In essence, it is the value the market assigns for the company, and the changes in this value over time tells us how well the company is doing. It is the 'wisdom of the crowds' that indicates how the investors collectively believe the company is performing.

The oil industry is notorious for having a clear cut boom-bust cycle. Oil prices increase, company profits soar, hiring increases, E&P equipment price increases follow. When the oil price begins to decrease, all these movements are reversed. It is unknown when the recent boom that began in 2002, when the crude oil price was at below $20/barrel, will end. Conventional wisdom would suggest that an increase in the price of crude oil would be coupled with an increase in the share prices of oil companies. The oil price is essentially the most important driver for the oil industry. Let us put these assumptions to test by analyzing how one of the big five IOCs, BP, fared over the course of the last nine year, from 1999 to 2007.

From the outset, it appears that conventional wisdom is wrong in this case. When the trend of BP's share price during the years 1999 to 2007 is compared to the development of the oil price during this period, we witness a steep increase in the oil price and yet a rather flat development in BP's share price (see Appendix 5.a). In fact, when the data is more closely examined, one may see 'odd' years, such as 2004 and 2007, where the oil price is soaring (from $29/b to $38/b and from $54/b to $85/b, respectively) and the BP share price is drastically falling (from $529 to $439 and from $605 to $536, respectively).

Net income per BOE (barrel oil equivalent), which sums up how well the company is doing on a per barrel basis. What is important about *net income per BOE* measure is that it takes the current oil price and distills it through the organization machinery of the IOC, in the end showing only the value the machinery itself has created.

Therefore we can claim that the conventional wisdom of an assumed correlation between the share price and the oil price is not correct. If there is an effect, it is not very large. Variables such as *dividends*, which have an immediate benefit for the investors, and *net income per BOE*, as a measure of performance, appear to have the biggest positive impacts on the share price. Out of these two variables, one of them is under direct control of the management – dividends. The management may decide to increase dividends to boost the share performance, regardless of the actual performance of the company. Net income per BOE, however, can not be increase on the whim of the management team. Therefore, net income per BOE is a reliable performance measure that we can use when measuring IOC performance in terms of E&P, certainly more so than the share price. As the oil price is different each year, let us see what the profit margin is and how it changes over time. This is done by calculating what percentage of the oil price equals the net income per boe.

	Net income per BOE	Range of other oil majors		Avg. Oil Price	Cost of supply	Margin
Year	BP	Minimum	Maximum			
1999	4,17	2,80	3,91	17,01	6,40	24,51%
2000	8,61	5,85	7,99	27,13	6,40	31,74%
2001	7,51	5,31	6,82	22,73	6,40	33,04%
2002	6,04	5,07	6,26	23,49	7,30	25,72%
2003	7,95	6,32	8,24	26,92	8,68	29,53%
2004	8,4	7,31	10,81	34,54	9,54	24,32%
2005	12,51	9,74	15,32	49,60	10,44	25,22%
2006	11,91	11,24	16,96	60,32	12,51	19,74%
2007	12,62	12,35	17,14	69,19	11,91	18,24%

Figure 5.4, Source: BP Annual report (2007)

As a result, we may see the movements in BP's E&P margin on a per barrel basis over the period of 1999-2007. The biggest margin is in 2001, but this is not a result of increase in the oil price, rather an internal issue, such as an increase in efficiency or cost cutting. From 2002 on, it is possible to observe the substantial increase in the oil prices, while the net income per BOE stays almost the same. This may be due to increases in the tax burden placed on the company based on the oil price, or the increase in exploration and development costs,

summed up as ‘cost of supply’, which comprised of exploration costs, lifting costs and depreciation. In any case, it is clear that the company’s net income per BOE has not followed the increase in the oil price in lockstep.

Before clearing BP of charges of underperforming due to increasing costs, however, let us look at the rest of the oil majors. If there are some costs that are increasing industry wide and are unavoidable, such as taxes, this affects the other majors as well. The minimum and maximum net incomes per BOE amongst other oil majors are also available during this period. Between the years 1999-2001, BP appears to lead the industry in terms of net income per BOE, however, this does not continue from 2002 on, as the oil prices rise while BP’s net income per BOE stagnates. BP’s net income per BOE compared to other majors decreases over the years and converges towards the industry minimum. Aggregate net profits hide one reality. The company is not producing the same barrel of oil in a better way, it is producing just more of the same barrel. The result is that oil price does not correlate with the operational (or internal) performance of the IOC.

In conclusion, oil price, as an external factor, hardly has any direct impact on the company performance, whether it is the internal performance, which was measured by looking at the E&P value created, or external performance, which was measured by looking at the share prices of the company. However, there is an indirect impact of the oil prices on share performance, as windfall profits allow the management the option to increase the dividends and pass over the profits to the shareholders, hence boosting the share price. In fact, the periods where the share price decreased in the face of increasing oil prices, as in 2004 and 2007, simply suggests that the investors did not expect any dividend increases as a result. We argue that the company’s performance is determined ultimately by how much of its reserves it can replace, or, in other words, how successful it is in adding new reserves.

Valuation of IOCs by simply looking at the shareholder returns is a short-term view that will endanger the long-term profitability of these companies, however it appears to be the chief concern of the market at the moment. This reduces re-investment into the business via capital expenditure on E&P activities, as well as R&D and renewable energy development.

5.5. Commoditizing technology

The oil industry is a technically complex industry, hence one would assume that the level of technology of a company can be a competitive advantage. Here, we will suggest that in the oil industry, technology has increasingly become a good that one can buy or outsource, rather than develop in a proprietary way, hence became commoditized. In the past, IOCs have benefited from being the sole entities that have the technology and capabilities to extract oil and gas, as host countries had to rely on their expertise to develop these natural resources. Today, IOCs no longer have a monopoly on this kind of technology and the technology has become commoditized to the point that significant competitive advantages can not be derived from it any longer.

Two trends have played a major part in this process. The first trend is the NOCs' becoming more prominent, capable and competitive on the competitive landscape.[92] The second trend is the oil service companies, such as Schlumberger, closing the technology gap and becoming capable of performing many tasks IOCs used to perform themselves.[93] As a result of these trends, IOCs today do not have competitive advantages derived from technological capabilities in extraction of conventional oil, as most technology that they possess but the most cutting edge has become commoditized.

Let us examine the first trend. When IOCs used to have the exclusive know-how that the host countries needed for exploitation of their oil & gas resources, the NOCs were dependent on their services. If these services came with production sharing contracts, that was a price that had to be paid. Some NOCs have simply become more adept at extraction themselves, such as Petrobras of Brazil[94] or StatoilHydro of Norway in deep-water and offshore drilling, for example.

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92 Crooks, E. 2007, International oil companies: big shift in balance of power [online], Financial Times, Available from: http://www.ft.com/cms/s/1/97577ef8-8d15-11dc-a398-0000779fd2ac,dwp_uuid=4bf66816-8c39-11dc-b887-0000779fd2ac.html [Accessed: 02.09.2008].

93 Hoyos, C. 2008, Nationals" champion: how the energy-rich rely on Schlumberger [online], Financial Times, Available from: http://www.ft.com/cms/s/0/a2499aa6-5d9b-11dd-8129-000077b07658.html [Accessed: 02.09.2008].

94 Hoyos, C. 2007, The new Seven Sisters: oil and gas giants dwarf western rivals [online], Financial Times, Available from: http://www.ft.com/cms/s/2/471ae1b8-d001-11db-94cb-000b5df10621.html [Accessed: 02.09.2008].

This trend is supported by a second trend, the oilfield services companies becoming more prominent, performing a wide range of drilling services with an international scope[95], and closing the technological gap they have with IOCs during mid-1990s.[96] The technological gap between likes of Schlumberger and likes of BP closed as IOCs invested less in technological innovation over the years and hired oil service companies, such as Schlumberger, to do the work.

The research and development (R&D) spending by IOCs was slashed from its high levels in 1980s due to stock market pressure, and the companies began focusing on the short-term. Short term shareholder return goals were emphasized at the expense of long-term production goals.[97] The case study on BP shows that the market values dividends and return to the shareholders over the other variables. In such a situation, the company may decide, as it has in the IOCs in question, to prop up share prices in the short term through share buybacks and dividends. When it comes to long-term strategic decisions, such as R&D investment, the picture is not very complicated. Over the decades, IOCs responded to periods with low oil prices simply by shedding their oil services divisions and reducing R&D investment. The investment in R&D simply followed the boom-bust cycle associated with the oil prices. Due to job cuts in 1980s during the period of low oil prices, IOCs have severed ties with a generation of engineers and geologists.[98] As a result, the median age of IOCs workforce is around mid-50s, according to the American Petroleum Institute.[99]

As a result, R&D spending by IOCs is lagging in percentage of revenue terms, compared to other industries. The three biggest of the Big Five, Shell, Exxon Mobil and BP respectively

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95 Hoyos, C. 2008, Nationals" champion: how the energy-rich rely on Schlumberger [online], Financial Times, Available from: http://www.ft.com/cms/s/0/a2499aa6-5d9b-11dd-8129-000077b07658.html [Accessed: 02.09.2008].

96 Crooks, E. 2008, Oil innovation after years of caution [online], Financial Times, Available from: http://www.ft.com/cms/s/0/d39b8088-5cc9-11dd-8d38-000077b07658.html [Accessed: 02.09.2008].

97 Hoyos, C. 2004, Tough choices for oil companies [online], Financial Times, Available from: http://www.ft.com/cms/s/1/855f3778-0c34-11d9-8318-00000e2511c8.html [Accessed: 02.09.2008].

98 Hoyos, C. 2008, Nationals" champion: how the energy-rich rely on Schlumberger [online], Financial Times, Available from: http://www.ft.com/cms/s/0/a2499aa6-5d9b-11dd-8129-000077b07658.html [Accessed: 02.09.2008].

99 McNulty, S. 2007, Crude economics: how the price of oil drives technology [online], Financial Times, Available from: http://www.ft.com/cms/s/0/cc038964-4f7e-11dc-b485-0000779fd2ac.html [Accessed: 02.09.2008].

spent $1.2 billion, $0.8 billion and $0.6 billion on R&D in 2007.[100] While this was an average 16% increase from the previous year, the amount remains miniscule, compared to the revenues of these companies, at 0.3%, 0.2% and 0.2% respectively. Please see the R&D expenditures in absolute and relative to revenue terms below:

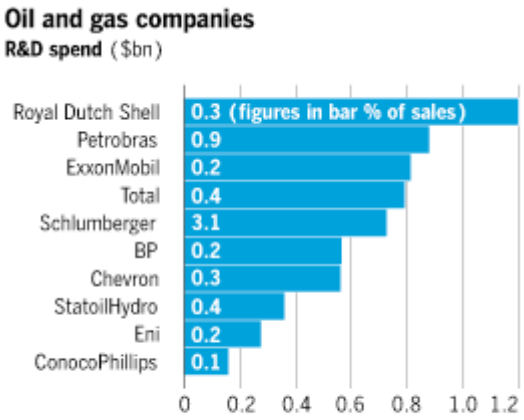

Figure 5.6, Source: Crooks, E. 2008, Oil innovation after years of caution [online], Financial Times, Available from: http://www.ft.com/cms/s/0/d39b8088-5cc9-11dd-8d38-000077b07658.html [Accessed: 02.09.2008].

These rates of R&D spending are hardly comparable to the levels in other companies, such as technology companies (15%) and even automotive companies (4%).[101] Schlumberger, the largest oilfield services company, spent 3.1% of its revenues, or $0.7 billion, on R&D in 2007, outspending all IOCs except for Exxon Mobil, Shell and Total in absolute terms.

Clearly, IOCs do not have a strong record as innovators, and individually, the picture is also bleak. In fact, as IOCs tended to cooperate in R&D in areas such as drilling technologies, they do not have distinctive technologies from one another. Hence, both in absolute terms and relative to one another, IOCs hardly have a technological edge. As companies such as Schlumberger begin to possess more advanced drilling and extraction technologies than IOCs, these companies will lose one of their competitive advantages.

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100 Crooks, E. 2008, Shell leads as big oil raises R&D by 16% [online], Financial Times, Available from: http://www.ft.com/cms/s/0/1d474d10-5ccb-11dd-8d38-000077b07658.html [Accessed: 02.09.2008].

101 Crooks, E. 2008, Oil innovation after years of caution [online], Financial Times, Available from: http://www.ft.com/cms/s/0/d39b8088-5cc9-11dd-8d38-000077b07658.html [Accessed: 02.09.2008].

5.6. Geopolitical risks associated with geographical spread of operations

An important factor for oil companies, as in all businesses, is where they choose to invest their money. In the resource extraction business, this becomes even more critical. The landlord states have de facto sovereign rights over the companies' raw materials, and they possess the ability to make life quite difficult for IOCs, as experienced by almost all IOCs. Examples of this are BP's troubles in Russia with their TNK-BP venture, Shell's experience in Sakhalin II in Russia, again, and Exxon Mobil, ConocoPhillips and StatoilHydro in Venezuela. The last case is examined later on in the paper, in Chapter 6. Therefore we shall examine the geographical spread of the IOCs' production, reserves and capital expenditure. Our main concerns will be whether the mix is diversified enough, and to a greater degree, how much of this mix is in higher risk countries. While current production, or the loss of it, for that matter, affects the IOC in the shorter term, having reserves in a certain country indicates a longer term commitment, hence with longer term effects.

While assessing the risk associated with the respective regions, the data from Country Indicators for Foreign Policy (CIFP) with regards to governance quality will be used.[102] This methodology uses data from sources such as the World Bank, Freedom House, UNESCO and Fraser Institute, among others, and compiles it to rank countries with regards to Democratic Participation, Government and Economic Efficiency, Accountability, Human Rights, Political Stability and Rule of Law. As the ranks in each area tend to be correlated, we shall use the averages of these numbers to assess the risk associated with the operations of the IOC in a particular region. CIFP ranking scores countries between 1 and 8, with a high score of +6.5 indicates that a country is performing comparatively poorer, while a score between 1 and 1.35 indicates that the country is performing well. Scores between 3.5 and 6.5 suggest varying degrees of performance around the global mean. The averages derived from country based analysis of CIFP can be seen in Appendix 5.b.

Following is an assessment of the geographical spread of the three largest of the Big Five IOCs activities, Exxon Mobil, Shell and BP:

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102 Country Indicators for Foreign Policy (CIFP) 2007, Country ranking table 2007 [online], Available from: http://www.carleton.ca/cifp/app/gdp_ranking.php [Accessed: 06.08.2008].

5.6.1 Exxon Mobil

According to Exxon Mobil's annual report for 2007, the company has its largest share of production from Africa, narrowly followed by the Americas region, each region contributing about 27% of the oil production. Europe and Asia Pacific/Middle East regions follow, with approximately 18% each.

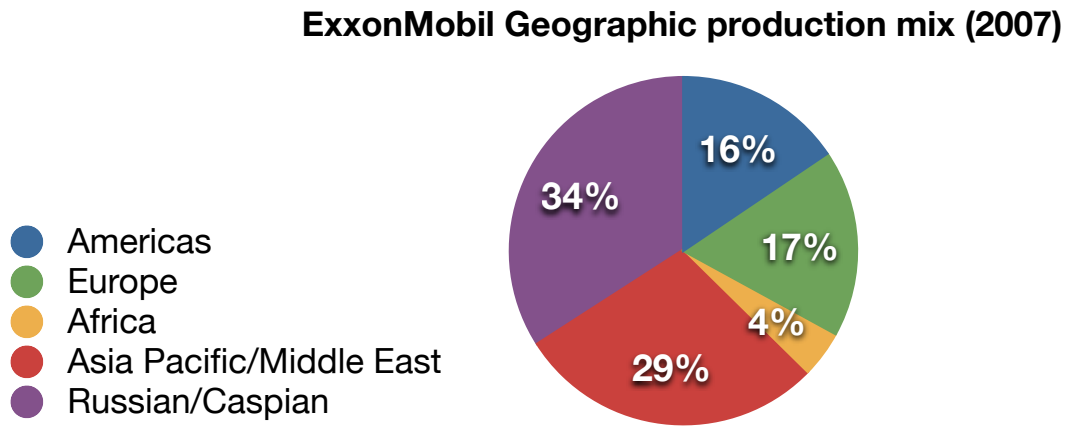

Figure 5.7, Source: Exxon Mobil annual report (2007)

Meanwhile, company's largest reserves are in Asia Pacific/Middle East and the Americas accounting for 36.5% and 27.3% of the company's reserves respectively. Overall, both the company's oil production and oil reserves are sufficiently diversified in a geographical sense, with no region accounting for more than 30% of the entire mix. Top two regions in terms of crude oil production constitute over 55% of the total production. In terms of gas production and reserves, the story is different. Russia/Caspian region dominates the gas reserves held by the company, with almost 38% of holdings being in this region. It is followed by Asia Pacific/ Middle East region, with almost 30%.

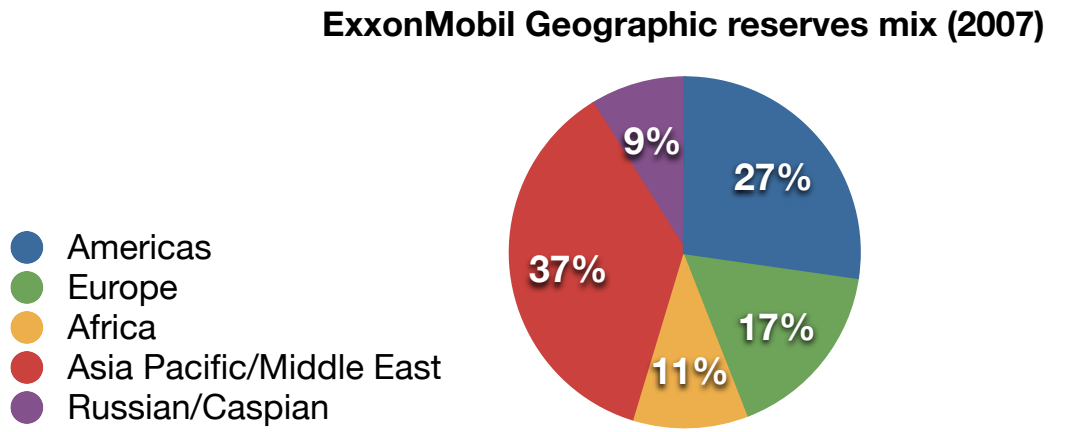

Figure 5.8, Source: Exxon Mobil annual report (2007)

We may conclude that although Exxon Mobil's oil production and reserves are well diversified, its gas operations are heavily reliant on two regions, Russia/Caspian and Asia Pacific/Middle East.

So, how relevant are these degrees of diversification relevant in terms of business risk? By using the CIFP data, let us look at the country risk Exxon Mobil carries due to its geographic production and reserves mix.

Exxon Mobil	Risk rating (1-6)	% production	Short-term risk	% reserves	Long-term risk
Europe	3,52	0,18	0,63	0,16	0,56
Americas	4,21	0,27	1,14	0,27	1,14
Asia Pacific/Middle East	5,29	0,19	1,01	0,36	1,91
Africa	5,91	0,27	1,60	0,10	0,59
Russia/Caspian	6,15	0,07	0,43	0,08	0,49
Total risk			**4,80**		**4,69**

Figure 5.9, Source: Country Indicators for Foreign Policy (CIFP) 2007, Country ranking table 2007 [online], Available from: http://www.carleton.ca/cifp/app/gdp_ranking.php [Accessed: 06.08.2008].

With a simple calculation that takes into account what proportion of the company portfolio corresponds to what risk rating, we arrive at a short hand for the degree of geopolitical risk the company is exposed to. As the CIFP data is on a per country basis, if there is a high variation between ratings, for instance the U.S. having a lower risk rating compared to Venezuela, the countries have been weighted by the total oil production in the region. In other cases, such as Europe or Africa, where the variation is little, simple averages have been taken. Since changes in production affect the company in the short term, this forms the basis for short term risk calculation, while changes in reserves, which will be extracted in the future, forms the basis for long term risk calculation. A similar analysis was made for the other two companies, Shell and BP as well.

Russia, due to Exxon Mobil's high dependency on the country for its gas reserves, and the country's relatively high risk status, could pose risks for the company. The company has already suffered the loss of its export rights to Asia Pacific from Sakhalin I project due to

pressure from Gazprom and the Russian government.[103] In the long-term, its portfolio's dependency on Russian gas reserves may spell further problems for Exxon Mobil's gas production.

It is important to note that the company has also suffered the loss of its assets in Venezuela, which is discussed in Chapter 5, which could suggest that its reserves and production in the Americas, and Africa, may pose risks as well. However, when compared to both BP and Shell, Exxon Mobil has lower short-term and long-term risks, but not to a substantial degree.

In 2007, Exxon Mobil invested over $6 billion in Asia Pacific/Middle East, and $5.2 billion in the Americas, which suggest that these regions will lead production and reserve growth.

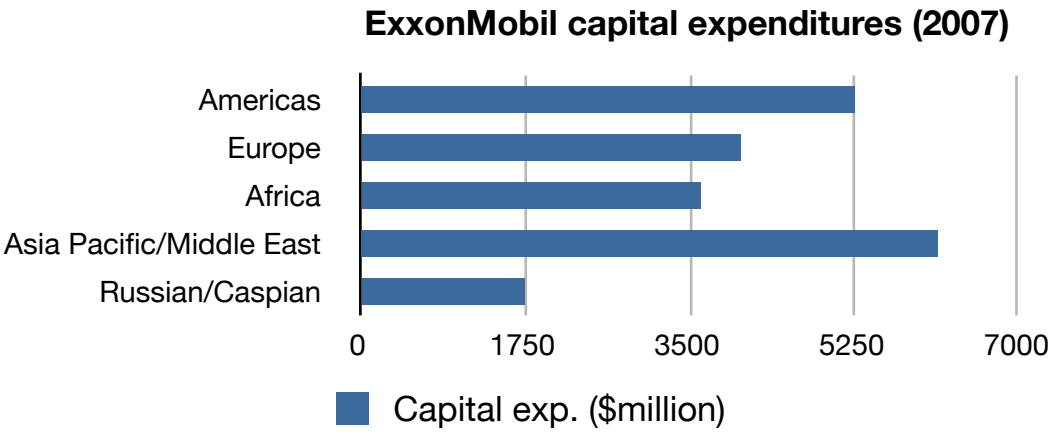

Figure 5.10, Source: Exxon Mobil annual report (2007)

Although there are some restrictions to this analysis due to the company's grouping of its global regions, for instance putting Venezuela and the U.S., two very different countries, in the same region, overall it provides for a useful review of the resource portfolio and the country risks associated. Please see figure 5.13 for details.

5.6.2 Shell

The geographical spread of Shell operations can be found in Appendix 5.c. Shell classifies its regions differently than Exxon Mobil, separating the U.S. and non-U.S. Americas, while lumping together Middle East, Russia and CIS countries. Venezuela is also reported separately, although the company had to leave the country due to nationalisation.

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103 Ram, V. 2007, Gazprom takes on Exxon [online], Forbes, Available from: http://www.forbes.com/markets/2007/12/27/exxon-sakhalin-gazprom-markets-equity-cx_vr_1227markets02.html?feed=rss_markets [Accessed: 06.08.2008].

One curiosity of the Shell reporting system is that the company does not distinguish between oil and gas production, but lumps them together in billion barrel oil equivalent (BBOE) terms. Middle East, Russia & CIS leads the pack with 24,23% of the crude oil & natural gas production, followed by Europe with 23,14%. Together the top two regions account for 47% of total Shell crude oil production.

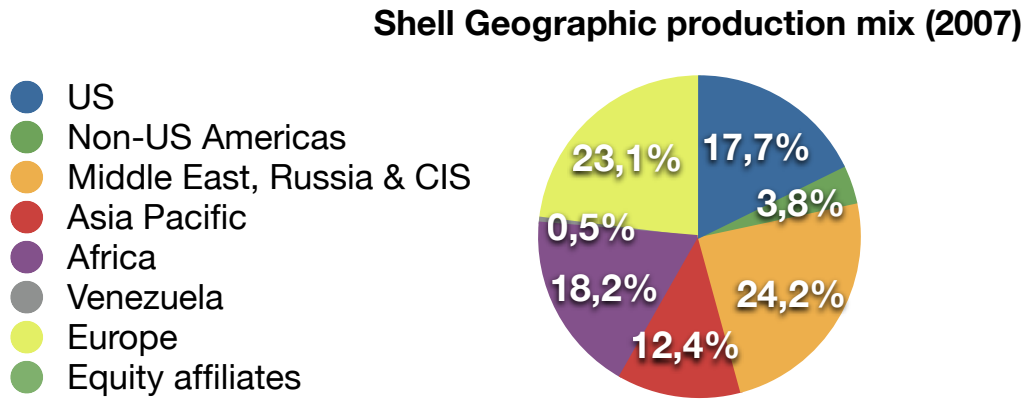

Figure 5.11, Source: Royal Dutch Shell annual report (2007)

In terms of reserves, one-fifth of Shell crude oil & natural gas reserves lie in Middle East, Russia & CIS, and 38% is jointly owned with other entities (equity affiliates), the rest of the reserves are equally dispersed. All in all, Shell has a geographically well diversified portfolio, both in production and reserve terms, although the size of the reserve portfolio that is held by equity affiliates may be cause for concern, as these may be under greater risk than a fully-owned subsidiary, as BP has found out in its TNK-BP joint venture in Russia.[104]

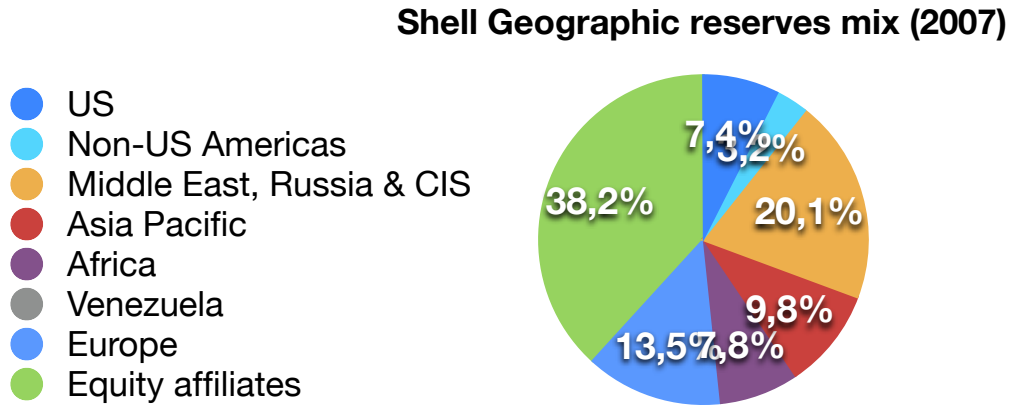

Figure 5.12, Source: Royal Dutch Shell annual report (2007)

104 Pagnamenta, R. 2008, TNK-BP chief Robert Dudley quits Russia [online], The Times, Available from: http://business.timesonline.co.uk/tol/business/markets/russia/article4393103.ece [Accessed: 10.08.2008].

How about the country risks associated, then? When CIFP data is reconfigured to fit Shell's regional reporting structure, we see that the most important region for Shell, holding 24% of its production and 20% of its reserves, is a composite of some of the riskiest countries in the world, Middle East, Russia & CIS. Yet the company also has large interests in Europe, and a large production in the U.S., which is beneficial for the overall portfolio. Venezuela was high up on the risk scale, and Shell had to leave the country in 2007 due to the nationalisation of the oil industry there.

Shell	Risk rating (1-6)	% production	Short-term risk	% reserves	Long-term risk
The U.S.	3,18	0,17	0,54	0,70	2,23
Europe	3,52	0,23	0,81	0,13	0,46
Asia Pacific	4,62	0,12	0,55	0,09	0,42
Non-U.S. Americas	4,76	0,03	0,14	0,03	0,14
Africa	5,91	0,18	1,06	0,07	0,41
Venezuela	6,02	0,04	0,24	0,00	0,00
Middle East, Russia, CIS	6,23	0,24	1,49	0,20	1,25
Total risk			**4,85**		**4,90**

Figure 5.13, Source: Country Indicators for Foreign Policy (CIFP) 2007, Country ranking table 2007 [online], Available from: http://www.carleton.ca/cifp/app/gdp_ranking.php [Accessed: 06.08.2008].

Shell makes its biggest capital expenditures in the U.S., followed by Middle East, Russia & CIS. It should be noted that these capital expenditures include not on E&P but also on downstream operations such as refining.

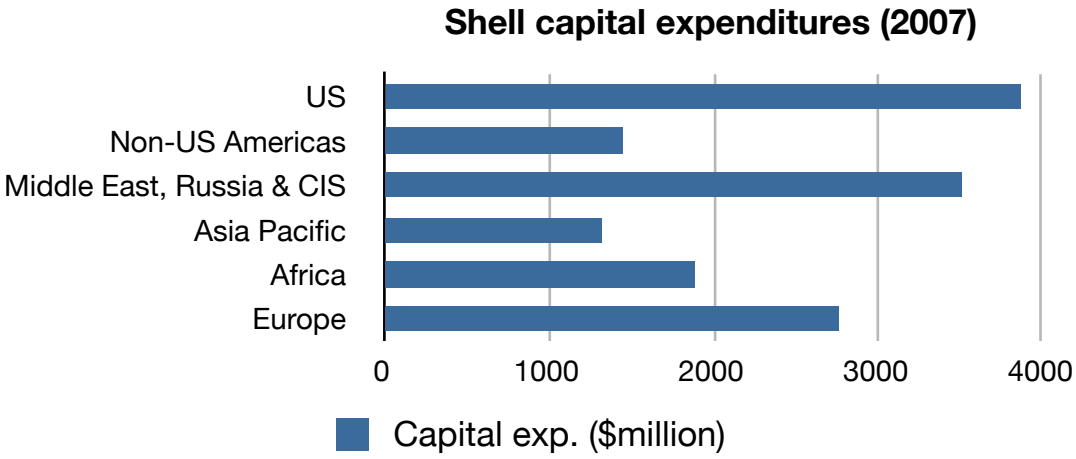

Figure 5.14, Source: Royal Dutch Shell annual report (2007)

Overall, Shell is better positioned in terms of risk than Exxon Mobil, as it has more diversified production and reserves, with a substantial part of its investment portfolio in low-risk regions, such as the U.S. and Europe. Also, it is worth noting that despite higher total risk, the company's better diversification alleviates the risk burden. However, the company's rather large share of reserves are held jointly with equity affiliates, which may be cause for concern.

5.6.3 BP

Please see Appendix 5.c for the details of BP's geographical operations spread. According to the analysis, the biggest 'region' in terms of production is equity affiliates, which are BP's joint ventures in a number of countries, most prominent of them being TNK-BP in Russia, with a quarter of BP's production and a third of its reserves coming from this venture.[105] This is followed by the U.S., with over 21% share of production, and Asia Pacific, with just under 10%. From this picture, it is clear to see that BP does not have a very diversified production portfolio, with nearly 50% of the production coming from two sources: the U.S. subsidiary and TNK-BP in Russia.

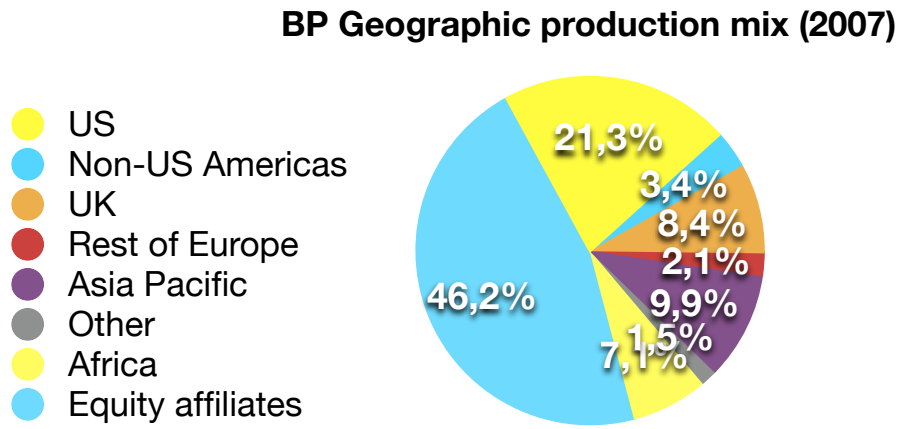

Figure 5.15, Source: BP annual report (2007)

The picture is quite similar in terms of reserves, with 31% oil and 34% of the gas reserves in the U.S. and about 45% of oil and 9% of gas in equity affiliates. Non-US Americas region also holds one quarter of the gas reserves, but the portfolio overall is rather lopsided.

105 Webb, T. 2008, Battle for TNK-BP turns into all-out war [online], The Guardian, Available from: http://www.guardian.co.uk/business/2008/jul/27/bp.oil [Accessed: 17.08.2008].

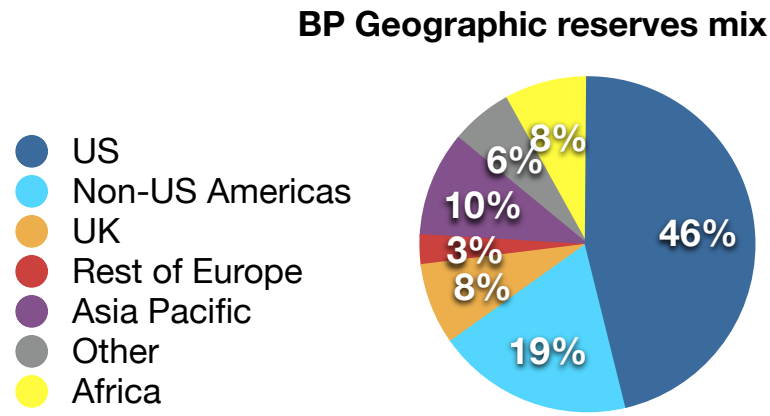

Figure 5.16, Source: BP annual report (2007)

The large portion of BP's portfolio that is held jointly with other parties is definitely cause for concern, especially in light of the episode that has unfolded with TNK-BP in Russia. Let us now look at the risk profile of BP's regions according to the CIFP rankings:

BP	Risk rating (1-6)	% production	Short-term risk	% reserves	Long-term risk
UK	2,76	0,08	0,22	0,05	0,14
US	3,18	0,21	0,67	0,31	0,99
Rest of Europe	3,50	0,02	0,07	0,02	0,07
Asia Pacific	4,62	0,10	0,44	0,10	0,46
Non-US Americas	4,76	0,03	0,16	0,03	0,14
Africa	5,91	0,07	0,41	0,06	0,35
Russia - JV	6,16	0,49	3,02	0,43	2,65
Total risk			**4,99**		**4,80**

Figure 5.17, Source: Country Indicators for Foreign Policy (CIFP) 2007, Country ranking table 2007 [online], Available from: http://www.carleton.ca/cifp/app/gdp_ranking.php [Accessed: 06.08.2008].

While the large portion of production and reserves in the U.S. and in Europe reduce BP's exposure to political and institutional risk, their engagement with many joint ventures, especially TNK-BP in Russia, increases their risk. Out of all the Big Five, BP is the only one that has staked so much of its production and reserves in equity ventures, and those in especially risky regions such as Russia. Compared to BP's 45% of oil reserves and production being in equity affiliates, these numbers are 5% and 28% for ConocoPhillips, 12% and 34% for Chevron respectively. Shell only reports percentage of oil reserves held jointly, not production, which is rather high as well, 38%. Exxon Mobil does not report an equity affiliates segment.

Overall, BP's reserve portfolio is not very diversified. Despite having low-risk regions such as the U.S. and Europe substantially contribute to its portfolio, BP is exposed to business risks due to having staked almost half of its production to equity affiliates. This risk is compounded by the fact that some of these affiliates are in regions that are far from applying the rule of law, such as Russia. In fact, if BP loses its stake in TNK-BP due to the shareholder dispute, some of this risk would be realised, which would indeed be a serious blow to the company.

Although all three companies, on average, carry similar amounts of risk, their portfolio compositions are different, which suggests that the risks they are exposed to will be different. While BP is vulnerable in Russia with its equity affiliates, Exxon Mobil has risks related to instability in Africa, while Shell also assumes a high risk burden in Africa and CIS. Overall risks might not appear very different, but Shell has diversified its stakes to a larger degree than the other two.

Chapter 6 – New strategic directions for IOCs

Changing the game

The concluding chapter of this paper will borrow concepts of game theory to propose a new strategic paradigm for international oil companies. While doing so, the industry and its dynamics will be described as 'a game', and the actors in it, as 'players'. The value of this approach is to lay bare the dynamics of the industry and IOCs' role in it.

In the previous chapters, a game where odds were mostly stacked against IOCs was described. The oil industry is an extractive one, and by nature, those who have access to the resource will prevail. As this paper has demonstrated, IOCs no longer have extensive access. What is a multi-billion dollar enterprise to do, then, if it is to be deprived of the very resource that brought it to being? By borrowing insights from game theory, Chapter 6 will seek to answer this question.

An insight from studying game theory is that, in a game, it often can be difficult or impossible to act rational and attain satisfactory results at the same time. The prisoner's dilemma is an example where perfectly rational decisions lead only to second-best results. In order to improve its results, the game as a whole has to be changed. The results of changes in a game can be substantial. For instance, turning the one-round prisoner's dilemma into a repeated game, therefore increasing the interaction between players, can lead to much better results.[106]

According to Brandenburger & Nalebuff [107], it is possible for a company to improve its competitive position in a game by changing the elements that make up the game. In order to find ways for changing a game, the *value net* is suggested as a tool for the analysis of interdependencies and various roles of players in a game. After this analysis, the five elements of the game should be examined. These are *players*, *added values*, *rules*, *tactics*, and *scope*, or short *PARTS*. These describe all the interactions in a game. In order to change the game, one or several of these elements have to be changed. In the element *players,* all the players in the

106 Hofstadter, D. 1983, Metamagical themas: Computer tournaments of the Prisoners Dilemma suggest how cooperation evolves, p. 14, Scientific America.

107 Brandenburger, A.M. & Nalebuff, B.J. 1996, The right game: using theory to shape strategy, p.59, Harvard Business Review.

game with their particular roles are examined. *Added values* analyses how own added values in the game can be increased and/or those of other players can be decreased. *Rules* in a game may possibly be changed or adapted. What *tactics* are applied by the players in the game and what are the underlying motivations and effects on perception? *Scope* discusses what are the boundaries of the game could be. The assessment of these elements should unearth ways in which a game may be changed, to the benefit of the player in question, and sometimes, to the benefit of all players. The assessment may suggest a need for substantial change and even include drastic solutions such as industry exit.[108]

Let us now borrow from another game theorist. Axelrod[109] also approached the problem of changing games and suggested a three step approach which aims at transforming a game such that for other players co-operation becomes more desirable than defection. He suggests that co-operation can be promoted by making the future more important relative to the present, changing the payoffs of the players and teaching the players values, facts and skills that promote co-operation.

Enlarging the shadow of the future is one way to increase the incentives to co-operate. If the future is important relative to the present, a player can use an implicit threat of retaliation in case another player defects. The TIT FOR TAT strategy, for example, where the player begins with co-operation and thereafter simply mirrors the actions of his opponent, to handle the prisoner's dilemma is an example for how this approach works. In practice, there are two basic ways in which the shadow of the future can be enlarged. First, by making interactions more durable, e.g. when two firms engage in a strategic alliance, and second, by making interactions more frequent and thereby making future retaliation more relevant for the present. This is the case when two firms are doing business other on a regular basis. [110]

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108 Brandenburger, A.M. & Nalebuff, B.J. 1996, The right game: using theory to shape strategy, p.59, Harvard Business Review.

109Axelrod, R. 1984, The evolution of cooperation: how to promote cooperation, pp. 124, New York Basic Books / (2006) Revised edition Perseus Books Group.

110Axelrod, R. 1984, The evolution of cooperation: how to promote cooperation, pp. 126, New York Basic Books / (2006) Revised edition Perseus Books Group.

Another way of promoting co-operation in a game is to *change the payoffs* of the game. In a changed prisoner's dilemma in which the cost of defection is higher than its payoff, prisoners would not defect. In order to increase the incentives for players to co-operate it is necessary to increase the payoffs in the long-run such that short-run defection does not pay off. For example, a firm might coax another firm into co-operation by announcing the possibility of future business.[111]

Teaching players to care for each other is another way Axelrod suggests in order to promote co-operation. Through co-operation firms can attempt to transfer their values and attitudes to other firms. Also altruistic behaviour may be beneficial as such behaviour tend to be reciprocated by others. However, the risk of being exploited has to be handled carefully. Axelrod also mentions teaching reciprocity as a key element for promoting co-operation. In practice, firms could e.g. embark on exchange programs or team building activities and the like.[112]

Therefore we are now in possession of two related tools to make suggestions towards how IOCs can change the game in their favor. Firstly, let us analyze IOCs' *value net* and make suggestions based on *PARTS*. Afterwards, building on this analysis, we shall conclude with linking back to Axelrod's suggestions for changing the game.

6.1. The value net for IOCs

According to Brandenburger & Nalebuff's value net[113], a map representing all the players in the game and the interdependencies between them, there are five main groups of players in a game of business. These are customers, substitutors, complementors, suppliers and of course the company that connects all these. The schema of the value net can be seen in Appendix 6.1. Then, step by step, let us now create the value net of the IOC.

111Axelrod, R. 1984, The evolution of cooperation: how to promote cooperation, pp. 133, New York Basic Books / (2006) Revised edition Perseus Books Group.

112Axelrod, R. 1984, The evolution of cooperation: how to promote cooperation, pp. 134, New York Basic Books / (2006) Revised edition Perseus Books Group.

113 Brandenburger, A.M. & Nalebuff, B.J. 1996, The right game: using theory to shape strategy, p.59, Harvard Business Review.

Firstly, let us begin with the company. The game of business is all about value, so what is the value that the IOC represents? The value added by the company is carried via the products the firm produces, as the technology, resources and competencies of the company are used to create these *products*. These products are mainly in five categories, for five distinct types of customers. These are gasoline, for vehicle owners and drivers, crude oil, for refineries, jet fuel, for aviation, fuel for power generation and oil-based chemicals for industrial businesses. By defining these products, we have also defined some of the *customers* IOC has. Examples are drivers, refineries, airlines, manufacturers and utilities companies. These customers of course have the option of buying the mentioned products from others that supply them. These are the *substitutors* of the IOC, that either sell to the same groups of customers, hence substitutors with respect to customers, or buy from the same groups of suppliers, hence substitutors with respect to suppliers.[114] Amongst these substitutors are other IOCs, NOCs, independent oil companies, renewable energy start ups, and nuclear energy companies. The *suppliers* group, on the other hand, is made up of players that supply goods or services to the IOC. This group is made up of players such as oil services firms, resource holding states, other IOCs, NOCs, independent oil companies, or shipping companies. The last group of players in the game are the *complementors*, players which either sell products complementary to those of the IOC to the same groups of customers, or which buy complementary goods or services from the same groups of suppliers. In this group are other IOCs, NOCs, independent oil companies, auto manufacturers, aerospace manufacturers or utilities. Some of these, such as auto manufacturers, are complementary with respect to the customers, they build and sell the cars which use the gasoline produced by the IOC. Some others, such as other IOCs, substitutors in other cases, are complementary with respect to the suppliers, for example towards tanker owners or oil services firms that they employ.

Building on these insights, the *value net* for the IOCs can be seen in figure 6.1. Meanwhile, in the green boxes on the diagram, one can see the changes that can be made to the game to make the competitive situation more favorable towards the IOCs. These will be discussed next, after which these insights will be brought together with Axelrod's suggestions for changing the game.

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114 Brandenburger, A.M. & Nalebuff, B.J. 1996, The right game: using theory to shape strategy, p.60, Harvard Business Review.

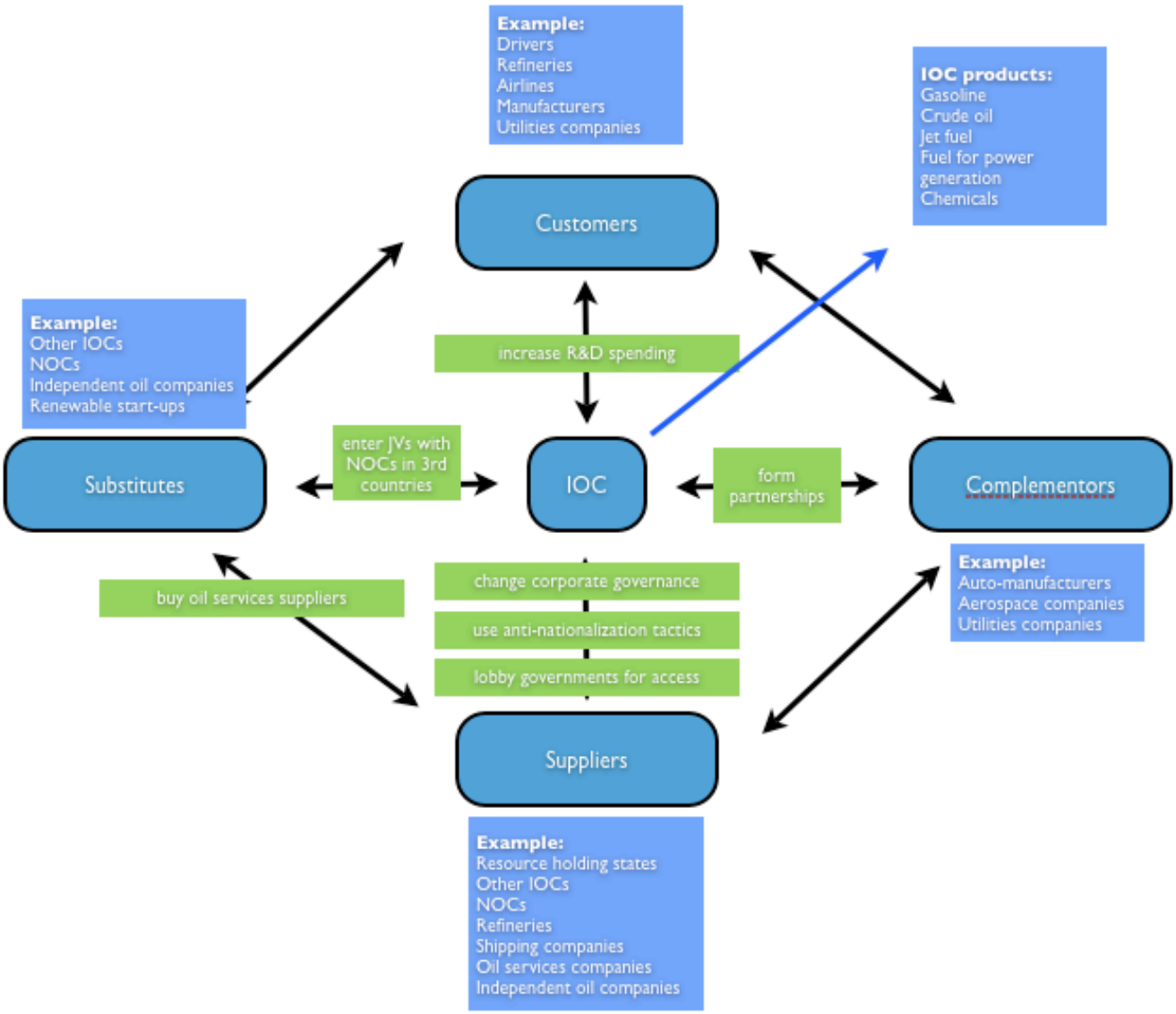
Example:
Drivers
Refineries
Airlines
Manufacturers
Utilities companies
IOC products:
Gasoline
Crude oil
Jet fuel
Fuel for power generation
Chemicals
Customers
Example:
Other IOCs
NOCs
Independent oil companies
Renewable start-ups
increase R&D spending
Substitutes
enter JVs with NOCs in 3rd countries
IOC
form partnerships
Complementors
Example:
Auto-manufacturers
Aerospace companies
Utilities companies
buy oil services suppliers
change corporate governance
use anti-nationalization tactics
lobby governments for access
Suppliers
Example:
Resource holding states
Other IOCs
NOCs
Refineries
Shipping companies
Oil services companies
Independent oil companies

Figure 6.1, Source: Brandenburger, A.M. & Nalebuff, B.J. 1996, The right game: using theory to shape strategy, p.59, Harvard Business Review.

Now that the value net has been established, now the question is how does one change it? The PARTS framework suggests that one can either change the players in the net, their added values, the rules of the game that is being played, the perceptions of the players (via tactics) or the scope of the game. Let us begin with players.

6.1.1. Players

Partner with complementors, such as auto manufacturers, aerospace industry or utilities companies. This will pool R&D resources of IOCs and their complementors, therefore enhancing their unique competencies in the field of new fuel technologies. Examples of this were seen when BP partnered with General Motors to develop a hydrogen fuel cell, discussed in more detail later on.[115]

Another option with regards to players is to acquire suppliers, such as oil services companies, therefore increase IOCs' added value in the value net as well as their leverage over NOCs who use oil services companies. This will create new E&P competencies for IOCs, reversing the long trend to outsource oil services. It is also conceivable that several IOCs jointly buy an oil services firm, in order to lock up its services exclusively. Exxon Mobil, BP and Shell jointly buying an oil services firm such as National Well could increase their added value as players, both due to additional competencies and due to the fact that NOCs can no longer avoid them while drilling. Joint ownership would mean that all the owners have access to the services, but it would make the financing of such a deal easier.

6.1.2 Added Value

The surest way to increase IOCs' added value is through increasing spending on research and development in two areas, developing new competencies in resource extraction and creating new resource options, through renewable energy development.

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115 Hargreaves, S. 2008, BP, GM see hydrogen in their future [online], cnn.com, Available from: http://money.cnn.com/2008/05/27/news/companies/exxonmobil_shareholder_meeting/index.htm?postversion=2008052816 [Accessed: 08.09.2008].

Unconventional oil

Firstly, these firms should cultivate unique competences on unconventional oil production and deep-water drilling. This will allow IOCs to increase their added value in the value net. Firstly, let us look into the ways of unconventional oil production.

The oil sands in Canada, according to a report by Ernst&Young, may represent 50% of the accessible reserves in the world for IOCs. Besides the obvious ease of access to the resource, other benefits include proximity to the world's biggest oil consumer, the U.S. and the size of the reserves, estimated to last between 30 to 50 years.[116] Drawbacks, however, are the high capital and operating costs, and the risk of the oil price going down, as well as a large carbon footprint and need for technological advances. Hence, oil sands present IOCs with high economic and technological risks, and their development is dependent on the oil price remaining high. In the long-term, the development costs may go down due to technological advances, however, a sustained period of high prices is first necessary.

Reduce costs

Reducing costs is another way of increasing the added value of the IOC. Having lower costs overall would allow IOCs to be better positioned to operate in high-cost environment like those of unconventional oil & gas and deep water drilling. According to a report by BCG, the cost for the E&P division of an oil company is in essence a function of workload, productivity and factor costs. Internal process improvement and efforts to reduce factor costs will allow IOCs to increase their added value in this respect.

Pull the right levers to reduce costs						
Cost	=	Workload	x	Productivity	x	Factor costs
Examples	=	# of wells drilled # of visits to the platform # of well jobs done # of perforation runs		Material Manpower Equipment		Manpower Goods Services Equipment

116 Munro, B. 2007, Canadian oil sands: a new frontier in global energy [online], Ernst & Young, Available from: http://www.ey.com/global/content.nsf/International/Dynamic_Library_Results?OpenDocument&&Site=International&T_Industry=Oil%20and%20Gas [Accessed: 15.05.2008].

Pull the right levers to reduce costs				
Levers	=	Eliminate unnecessary activities Prioritize work Conduct post-mortems Institutionalize feedback loops	Redeploy resources Reduce rework Automate Simplify Work in parallel	Delegate Outsource Broaden supplier base Broaden design specs 'Down-spec'

Source: Boston Consulting Group 2007, BCG Focus: Maximizing value in upstream oil and gas, Boston Consulting Group, Inc.

Developing renewable energy sources

Another way to increase the added value of the IOC is to develop alternative, renewable energy sources. It will also reduce IOCs' strategic dependency on oil & gas reserve access in the long-term.In this respect, how is the activity by IOCs in this field? By 2006 numbers, the investment is not significant. A quick rundown of the IOCs' activities is given below:

Company	CAPEX (2006)	Renewable energy investment	Period	Policy focus
Exxon Mobil	$19.9 billion	$100 million	N/A	Does not consider it commercially viable. Investment in Stanford University.
Shell	$23.1 billion	$1.25 billion	1999-2006	Wind power biofuels
BP	$16.9 billion	$900 million	1999-2006	Solar power biofuels, wind power
Chevron	$16.6 billion	$200 million	1999-2006	Geothermal power
ConocoPhillips	$10 billion	Not available	N/A	Biofuels

Figure 6.1, Sources: The Guardian 2008, Heavyweight investors join Rockefeller rebellion at ExxonMobil [online], The Guardian, Available from: http://www.guardian.co.uk/business/2008/may/22/exxonmobil.oil [Accessed: 08.09.2008].

Reuters 2007, Oil majors" investments in renewable energy [online], Available from: http://www.signonsandiego.com/news/business/20070403-0403-environment-oilmajors-renewables.html [Accessed: 08.09.2008].

In recent years, shareholders of IOCs have begun to call on the companies to invest more in renewables, but this has not produced visible results. One example of this is was the Rockefeller family, who are the longest standing shareholders of Exxon Mobil, calling on the other shareholders to support a shareholder resolution that separates the roles of CEO and chairman, so that the chairman may focus on the long-term, strategic questions that face the

company, primarily the issue of diversifying into alternative energy sources. The resolution also called for Exxon Mobil's adoption of a 'Renewable Energy Policy' to focus on renewable energy development, research and sourcing.[117] However, this resolution was defeated at the annual shareholders meeting, with the management arguing its case that the company has had its best year so far with $40 billion in profits.[118]

It is often argued that IOCs do not have the skills or the will to invest and succeed in the renewable energy business, as they are too large, not responsive enough and lack the entrepreneurial flair that is necessary in this sector.[119] Shareholders, on the other hand, emphasize the need for evolution of these companies, due to concerns about climate change and sustainable long term returns. Statements by the Exxon Mobil chairman, Rex Tillerson, suggest that the company sees fossil fuels making up still 80% of global energy by 2030.

Shell, the IOC which has made the biggest investment into renewables between 1999 and 2006, has sold off its solar module production business in 2007, in a rather low-key fashion.[120] The Shell statement on the subject was that the solar operation was not making enough money, and that it could be more profitable in other hands. Meanwhile, the company maintained that it was committed to developing renewable energy sources, while concentrating on wind power and bio-fuels.

The IOC with the biggest renewable operations, BP, is also considering spinning off the renewable energy division, due to concerns over its value not being reflected in BP's share

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117 Reuters 2008, Rockefeller family members urge ExxonMobil to "Reconnect with founder"s vision" [online], Reuters, Available from: http://www.reuters.com/article/pressRelease/idUS171687+30-Apr-2008+PRN20080430 [Accessed: 08.09.2008].

118 Rooney, B. 2008, Exxon investors Rockefeller proposals [online], cnn.com, Available from: http://money.cnn.com/2008/05/27/news/companies/exxonmobil_shareholder_meeting/index.htm?postversion=2008052816 [Accessed: 08.09.2008].

119 Erman, M. & Bergin, T. 2008, Heavyweight investors join Rockefeller rebellion at ExxonMobil [online], International Herald Tribune, Available from: http://www.iht.com/articles/2008/05/29/business/rtrgreen02.php [Accessed: 08.09.2008].

120Macalister, T. 2007, Big Oil lets sun set on renewables [online], The Guardian, Available from: http://www.guardian.co.uk/business/2007/dec/11/oil.bp [Accessed: 08.09.2008].

price.[121] As the case study on BP earlier has shown, the biggest impact on the share price in fact has to do, simply, with dividends.

Investing in renewable energy could be the most potent answer challenge posed by decreasing IOC access to oil in the long-term. Oil companies will have to change into energy companies, but would that not put them into direct competition with power companies in a field that they have little expertise in? It is a far-fetched notion that Shell will become a power-generating company, simply because power generation is not one of their competence areas. Oil companies are most competent in bringing fuel products to the market. Power generation through renewables is not the way to go for IOCs, but rather offering a way to store that energy and offer it in a way that is convenient to the consumer. That, in essence, is what a fuel is. Gasoline is a conduit to store the energy generated by the sun millions of years ago. Rather than building wind farms to sell electricity to the grid, IOCs should concentrate their renewable energy efforts to research, finance and launch 'the next fuel'. This fuel should, in the long-term, be produced by using renewable energy, since the usage of fossil fuels in the process would bring up the resource access problem to surface again, along with concerns regarding the environmental benefits of the new fuel compared to hydrocarbons. Although more research is needed to increase its efficiency and reduce its cost, hydrogen could be a viable long-term option.[122] According to a report by Exxon Mobil[123], the costs of creating hydrogen from different primary energy sources, compared to gasoline would be as such:

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121 Hargreaves, S. 2008, BP, GM see hydrogen in their future [online], cnn.com, Available from: http://money.cnn.com/2008/05/27/news/companies/exxonmobil_shareholder_meeting/index.htm?postversion=2008052816 [Accessed: 08.09.2008].

122 Jha, A. 2008, Cheap way to "split water" could lead to abundant clean fuel [online], The Guardian, Available from: http://www.guardian.co.uk/environment/2008/jul/31/energyefficiency.energy [Accessed: 08.09.2008].

123 Exxon Mobil 2006, Tomorrow"s energy: a perspective on energy trends, greenhouse gas emissions and future energy options [online], exxonmobil.com, Available from: http://www.exxonmobil.com/Corporate/Files/Corporate/tomorrows_energy.pdf [Accessed: 09.09.2008].

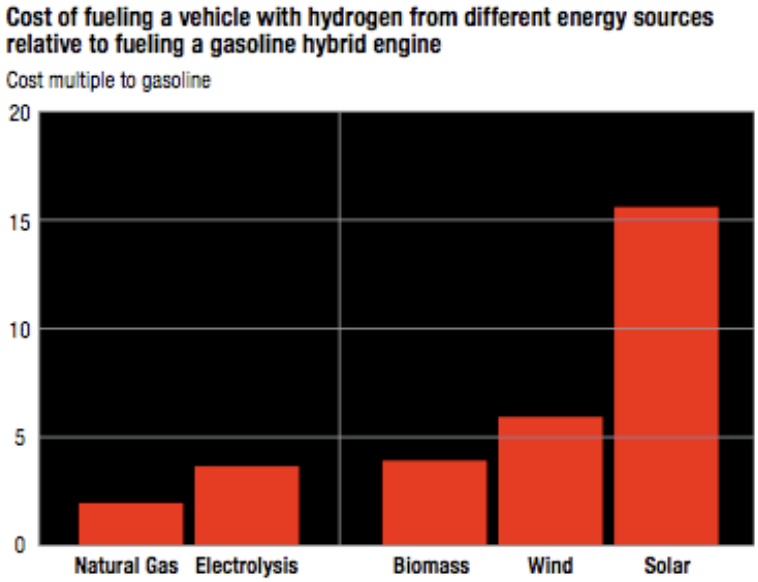

Figure 6.2, Source: Exxon Mobil 2006, Tomorrow"s energy: a perspective on energy trends, greenhouse gas emissions and future energy options [online], exxonmobil.com, Available from: http://www.exxonmobil.com/Corporate/Files/Corporate/tomorrows_energy.pdf [Accessed: 09.09.2008].

It can be seen that producing hydrogen from actual renewable sources, such as wind or solar, is still prohibitively expensive. While new research may be ground breaking in this aspect, in the mean time other options should not remain unexplored.

It is hotly debated whether this fuel will be in the form of hydrogen, natural gas, or electricity stored in lithium-ion batteries. The end result might very well be a mix of these. In any case, IOCs should be careful not to be sidelined in the value chain of the next generation of transport fuels. With their large retail distribution networks, they are in a strong position to introduce the end consumers with the new transportation fuel.

The effort would require the financial and human capital of more than a single IOC. It is also important that the next fuel becomes an industry standard, rather than a patchwork of different fuels being sold by each company. An industry-wide launch of such a fuel would eliminate the so-called chicken and egg problem related to, for instance, hydrogen. There are not enough hydrogen-fueled cars on the road; hence there are not enough hydrogen fuel stations. However, the consumers will not invest in a hydrogen-fueled car if there is no universal access to hydrogen fuel stations. This is not unlike the efforts to establish a new standard for digital discs, as Sony-led and Toshiba-led parts of the electronics industry came to a stand-off over whether it was Blu-ray or HD-DVD that was the ‘disc of the future’. This can be

avoided, by IOCs collaborating on the creation of the new fuel and setting it as an industry-wide standard, with the cooperation of car makers. This way, IOCs will be able to kick-start a new product segment in the face of decreasing access they will have to upstream hydrocarbon resources.

It is important to note that there is no silver bullet for IOCs' woes. They will have to employ all the moves suggested in this paper, and probably more, to create a new strategy that will allow them to address the challenges that they face. There is the now-mainstream argument that oil companies need to become diversified energy companies because of environmental concerns. Unfortunately, environmental concerns have seldom affected the corporate strategy of IOCs in a meaningful way. However, there is a much more economically-grounded reason to become a diversified energy company. That is because the most profitable part of the IOC value chain is crude oil, and it will only become more difficult for IOCs to have access to it. The industry's long term profitability will be affected from the lack of access. To face this challenge, developing renewable technologies and a new transport fuel is one of the solutions.

6.1.3. Scope

Another strategic action IOCs can take to change the game is to expand the scope of the game. Currently, the game consists of NOCs acting as gatekeepers to their home country resources, and IOCs vying to get access to these. If the NOC or its sponsor state forces the IOC into reducing its stake or leaving the venture, there is little the IOC can do but accept. Hence, IOCs need leverage. This leverage can be gained by giving the NOCs something to lose. If IOCs and NOCs are engaged in joint ventures in countries other than the home country of the NOC, they will be equal in terms of power. As the chances of future interaction will have increased, the partners' temptation to defect will be dampened, due to enlarged shadow of the future. By expanding the scope of their interaction with NOCs, IOCs may increase their leverage, enlarge the shadow of the future and give NOCs a stake in the success of the IOC in question. Therefore, IOCs should actively seek to partner with NOCs they would like to build working relationships with in 3rd countries.

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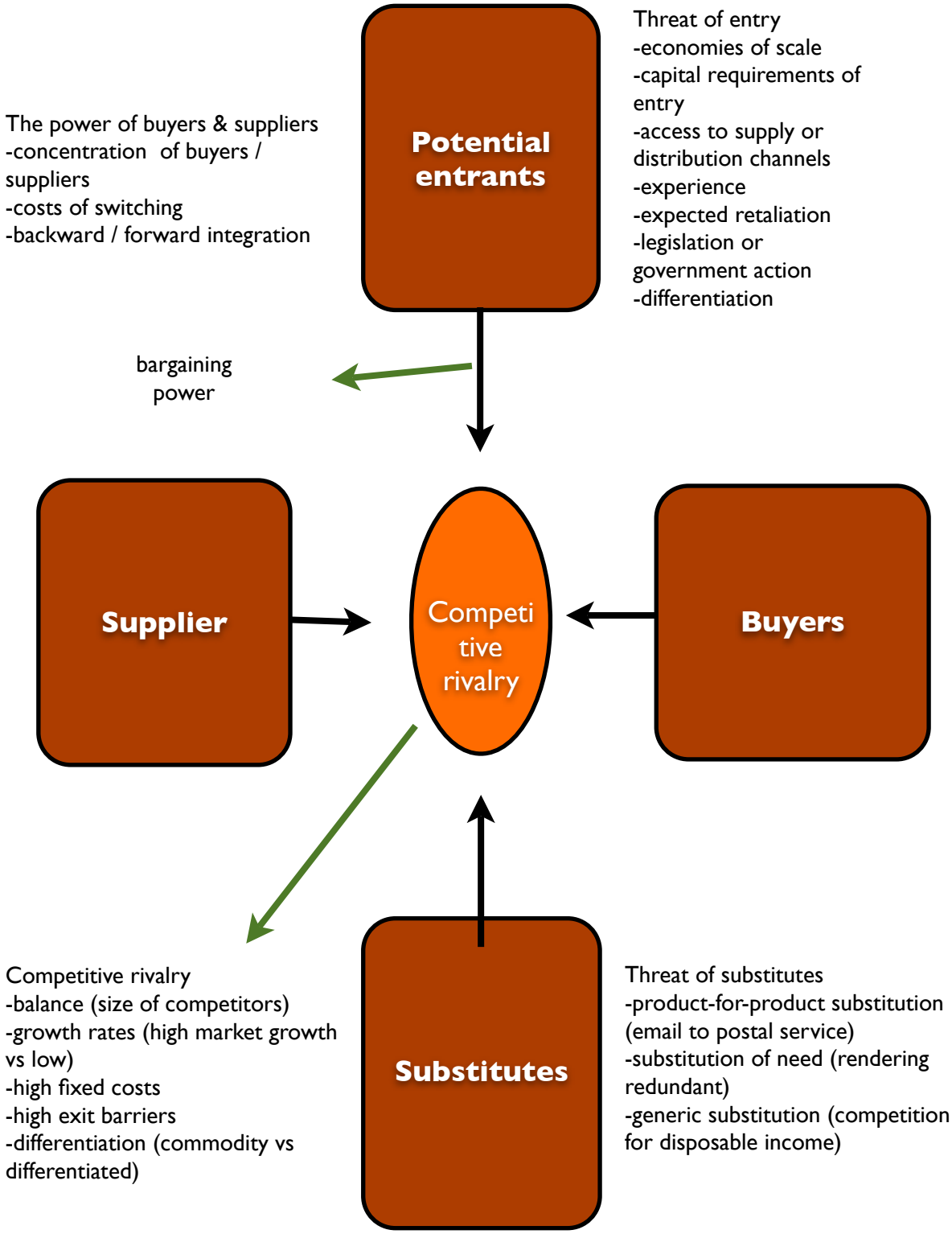
Appendix

Appendix 4.a - Porter's Five Forces Framework



Source: Johnson G., Scholes K., Whittington, R., 2005, Exploring corporate strategy: text and cases, exhibit 2.5, p. 80, 7th edition, Prentice-Hall, London

Appendix 4.b - Royal Dutch Shell Income, Revenue, Capital Expenditure and Profit Margins (2005-2007)

Shell	2007		2006		2005		
Capital Investment	27.072	100%	24.896	100%	17.436	100%	**100,00%**
E & P	15.919	58,80%	17.079	68,60%	11.772	67,52%	**64,97%**
Gas & Power	3.532	13,05%	2.351	9,44%	1.656	9,50%	**10,66%**
Oil Sands	1.931	7,13%	865	3,47%	274	1,57%	**4,06%**
Oil Products	3.856	14,24%	3.457	13,89%	2.844	16,31%	**14,81%**
Chemicals	1.419	5,24%	877	3,52%	599	3,44%	**4,07%**
Corporate	415	1,53%	267	1,07%	291	1,67%	**1,42%**
Income By Segment	31.331	100%	25.442	100%	25.311	100%	**100,00%**
E & P	14.686	46,87%	14.544	57,17%	13.577	53,64%	**52,56%**
Gas & Power	2.781	8,88%	2.633	10,35%	1.378	5,44%	**8,22%**
Oil Sands	582	1,86%	651	2,56%	661	2,61%	**2,34%**
Oil Products	10.439	33,32%	7.125	28,00%	9.982	39,44%	**33,59%**
Chemicals	2.051	6,55%	1.064	4,18%	991	3,92%	**4,88%**
Corporate	1.387	4,43%	294	1,16%	-328	-1,30%	**1,43%**
Minority Interest	-595	-1,90%	-869	-3,42%	-950	-3,75%	**-3,02%**
Revenue by Segment	405.240	100%	364.456	100%	359.985	100%	1
E & P	53.308	13,15%	52.546	14,42%	43.281	12,02%	**13,20%**
Gas & Power	17.038	4,20%	17.338	4,76%	15.872	4,41%	**4,46%**
Oil Sands	2.854	0,70%	2.499	0,69%	2.464	0,68%	**0,69%**
Oil Products	286.072	70,59%	251.309	68,95%	253.853	70,52%	**70,02%**
Chemicals	45.911	11,33%	40.750	11,18%	43.996	12,22%	**11,58%**
Corporate	57	0,01%	14	0,00%	519	0,14%	**0,05%**
Profit Margins							
E & P	27,5%		27,7%		31,4%		**28,87%**
Gas & Power	16,3%		15,2%		8,7%		**13,40%**
Oil Sands	20,4%		26,1%		26,8%		**24,42%**
Oil Products	3,6%		2,8%		3,9%		**3,47%**
Chemicals	4,5%		2,6%		2,3%		**3,11%**

Source: Royal Dutch Shell Plc 2007, Annual Report and Form 20-F for the year ended December 31, 2007 [online], www.shell.com, p. 2, Available from: www.shell.com/annualreport [Accessed: 29.06.2008]. Margins and shares of income are 3-year averages between 2005-2007.

Appendix 4.c

Exxon Mobil Income, Capital Expenditure (2005-2007)

Exxon	2007		2006		2005		
Capital Investment	20.809	100%	19.716	100%	17.619	100%	**100,00%**
Upstream	15.724	75,56%	16.231	82,32%	14.470	82,13%	**80,00%**
Downstream	3.303	15,87%	2.729	13,84%	2.495	14,16%	**14,63%**
Chemical	1.782	8,56%	756	3,83%	654	3,71%	**5,37%**
Corporate		0,00%		0,00%		0,00%	**0,00%**
Income By Segment	40.610	100%	39.500	100%	36.130	100%	**100,00%**
Upstream	26.497	65,25%	26.230	66,41%	24.349	67,39%	**66,35%**
Downstream	9.573	23,57%	8.454	21,40%	7.992	22,12%	**22,37%**
Chemical	4.563	11,24%	4.382	11,09%	3.943	10,91%	**11,08%**
Corporate	-23	-0,06%	434	1,10%	-154	-0,43%	**0,21%**

Appendix 4.d

BP Income, Revenue, Capital Expenditure and Profit Margins (2005-2007)

BP	2007		2006		2005		
Capital Investment	20.641	100%	17.231	100%	10.237	100%	**100,00%**
E & P	13.906	67,37%	13.118	76,13%	10.237	100,00%	**81,17%**
Refining & Marketing	5.586	27,06%	3.144	18,25%		0,00%	**15,10%**
Gas, Power & Renewables	874	4,23%	688	3,99%		0,00%	**2,74%**
Corporate	275	1,33%	281	1,63%		0,00%	**0,99%**
Income By Segment	21.169	100%	22.286	100%	22.632	100%	100%
E & P	26.938	127,25%	29.629	132,95%	25.502	112,68%	**124,29%**
Refining & Marketing	6.072	28,68%	5.041	22,62%	6.926	30,60%	**27,30%**
Gas, Power & Renewables	674	3,18%	1.321	5,93%	1.172	5,18%	**4,76%**
Corporate	-1.128	-5,33%	-1.069	-4,80%	-569	-2,51%	**-4,21%**
Adjustment	-11.387	-53,79%	-12.636	-56,70%	-10.399	-45,95%	**-52,15%**
Revenue by Segment	284.365	-89%	265.906	100%	252.168	100%	37%
E & P	54.550	19,18%	52.600	19,78%	47.210	18,72%	**19,23%**
Refining & Marketing	250.866	88,22%	232.855	87,57%	213.326	84,60%	**86,80%**
Gas, Power & Renewables	21.369	7,51%	23.708	8,92%	25.696	10,19%	**8,87%**
Corporate	843	0,30%	1.009	0,38%	21.295	8,44%	**3,04%**
Adjustment	-43.263	-204,37%	-44.266	-16,65%	-55.359	-21,95%	**-80,99%**
Profit Margins							
E & P	49,4%		56,3%		54,0%		**53,24%**
Refining & Marketing	2,4%		2,2%		3,2%		**2,61%**
Gas, Power & Renewables	3,2%		5,6%		4,6%		**4,43%**

Source: BP Plc, www.bp.com,BP Plc Financial and operating information archive 2008 [online], Available from: http://www.bp.com/downloadlisting.do?categoryId=9010726&contentId=7021135 [Accessed: 14.08.2008].

Appendix 4.e

Foundations of strategic capability

Strategic capabilities and competitive advantage	Resources	Competencies
Threshold capabilities	Threshold resources *Tangible *Intangible	Threshold competences
Capabilities for competitive advantage	Unique resources *Tangible *Intangible	Core competences

Source: Johnson G., Scholes K., Whittington, R., (2005) Exploring corporate strategy: text and cases, p.118, exh. 3.1, 7th edition, Prentice-Hall, London

Appendix 4.f

Comparison of financial and operational metrics of the Big Five

	Overall revenue, $ million (2007)	Revenue growth from the previous year (2007)	Net income $ million (2007)	Net income % change (2007)
2007				
Exxon Mobil	390328	6,80%	40610	2,81%
Shell	355782	11,60%	31926	21,3%
BP	288951	6,78%	21169	-5,0%
ConocoPhillips	194495	3%	11891	-24%
Chevron	214091	4,49%	18688	9,04%

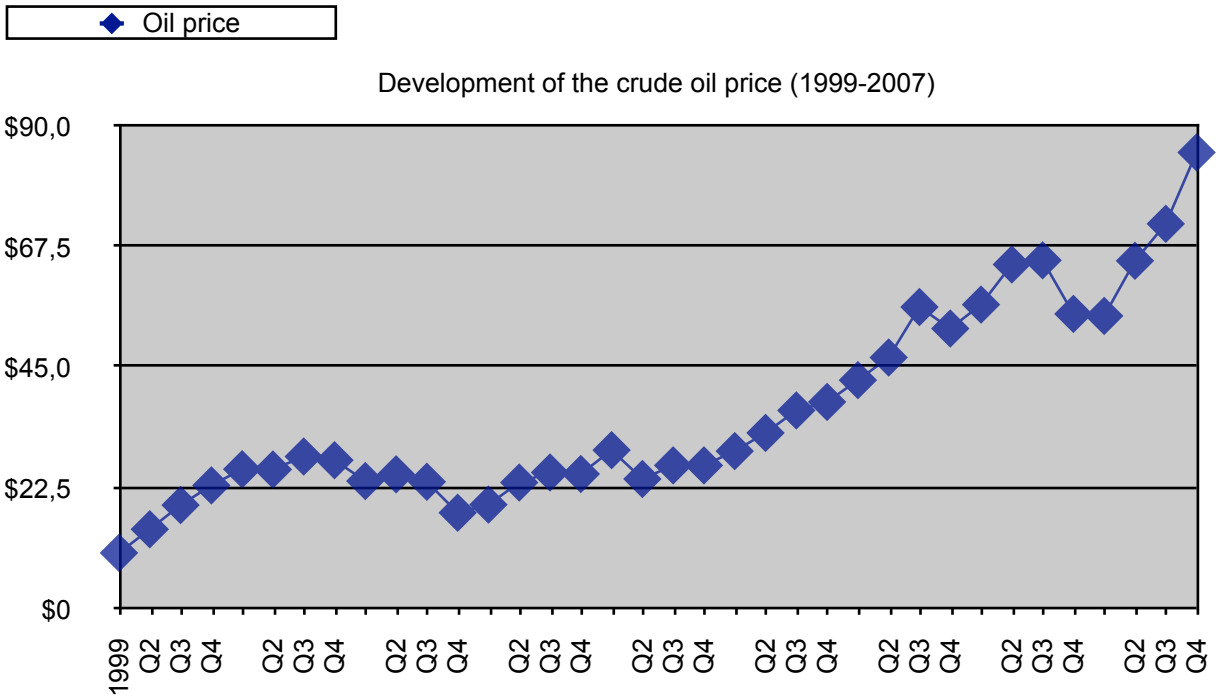
	Production MBD, crude oil (2007)	Production % change, crude oil (2007)	Production MMCFD, natural gas (2007)	Production % change, natural gas (2007)	Overall thousands BOED production (2007)	Overall production % change (2007)
2007						
Exxon Mobil	2616	-2,42%	9384	0,54%	4180	-1,35%
Shell	1818	-6,7%	8214	-1,8%	3234	-5%
BP	2414	-2,5%	8143	-3,3%	3771,00	N/A
ConocoPhillips	854	-12%	2292	5%	2324	-1%
Chevron	1756	1,39%	5019	1,27%	2619	-1,80%

	Proved reserves, BBOE (2007)	Proved reserves MB, fully-owned, crude oil (2007)	Years of production left at current rate of production (2007)	Proved reserves BCF, fully-owned, natural gas (2007)	Reserve replacement rate (2007)	Upstream capital investment, $ million (2007)
2007						
Exxon Mobil	22,7	11074	14,9	68262	101,0%	15724
Shell	11,9	6686	10,1	N/A	79,1%	14838
BP	12,5	5492	9,08	41130	112%	13906
ConocoPhillips	10,6	3104	12,5	22499	177%	11791
Chevron	10,78	7087	11,3	22140	N/A	15538

Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

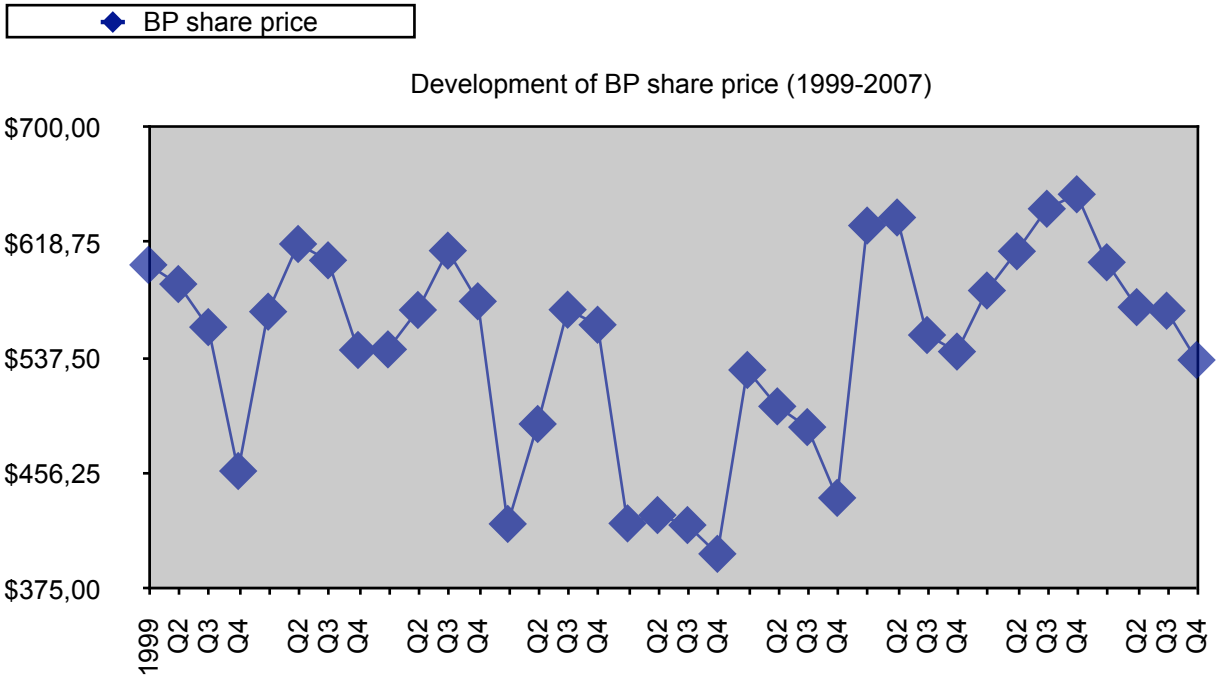
Appendix 5.a.

Development of the crude oil price between 1999-2007



Source: inflationdata.com 2008, Historical crude oil prices (table) [online], Inflationdata.com, Available from: http://inflationdata.com/inflation/Inflation_Rate/Historical_Oil_Prices_Table.asp [Accessed: 14.08.2008].

Development of BP share price between 1999-2007



Source: BP Plc, www.bp.com,BP Plc Financial and operating information archive 2008 [online], Available from: http://www.bp.com/downloadlisting.do?categoryId=9010726&contentId=7021135 [Accessed: 14.08.2008].

Appendix 5.b

Region Scores	
Western Europe	2,52
North America	3,35
Pacific	3,81
East Asia	4,51
Carribean	4,51
Eastern Europe	4,51
South America	4,76
Southeast Asia	5,54
Africa	5,91
Middle East	5,94
Caspian	6,14
Russia	6,16
Central Asia	6,67

Source: Country Indicators for Foreign Policy (CIFP) 2007, Country ranking table 2007 [online], Available from: http://www.carleton.ca/cifp/app/gdp_ranking.php [Accessed: 06.08.2008].

Appendix 5.c

Assessment of the geographical spread of IOC operations

Exxon Mobil

Geographic spread	Americas	Europe	Africa	Asia Pacific/ Middle East	Russian/ Caspian
EM Share of oil Production	27,37%	18,35%	27,41%	19,80%	7,07%
EM Reserves %	27,31%	16,74%	10,57%	36,56%	8,81%
EM reserves MB (total)	6200	3800	2400	8300	2000
EM '000s of BD (oil) prod.	716	480	717	518	185
EM reserves BCF (gas)	14802	18539	1006	32143	40720
EM gas reserves %	13,81%	17,29%	0,94%	29,98%	37,98%
EM total production	3183,0	3569,8	884,7	5875,1	6971,6
Capital exp. ($million)	5266	4042	3639	6156	1750

Shell

Geographic spread	US	Non-US Americas	Middle East, Russia & CIS	Asia Pacific	Africa	Venezuela	Europe	Equity affiliates
Shell Share of Production	17,72%	3,83%	24,23%	12,42%	18,16%	0,49%	23,14%	
Shell Reserves %	7,40%	3,18%	20,10%	9,83%	7,77%	0%	13,49%	38,24%
Shell reserves BBOE	0,801	0,344	2,176	1,064	0,841	0	1,46	4,14
Shell reserves MB (oil & gas)	801	344	2176	1064	841		1460	4140
Shell '000s of BD (oil&gas) prod.	324	70	443	227	332	9	423	N/A
Shell Production costs/BOE	8,35	14,35	8,79	4,31	7,85	0	9,15	
Capital exp. ($million)	3873	1462	3515	1326	1895		2767	

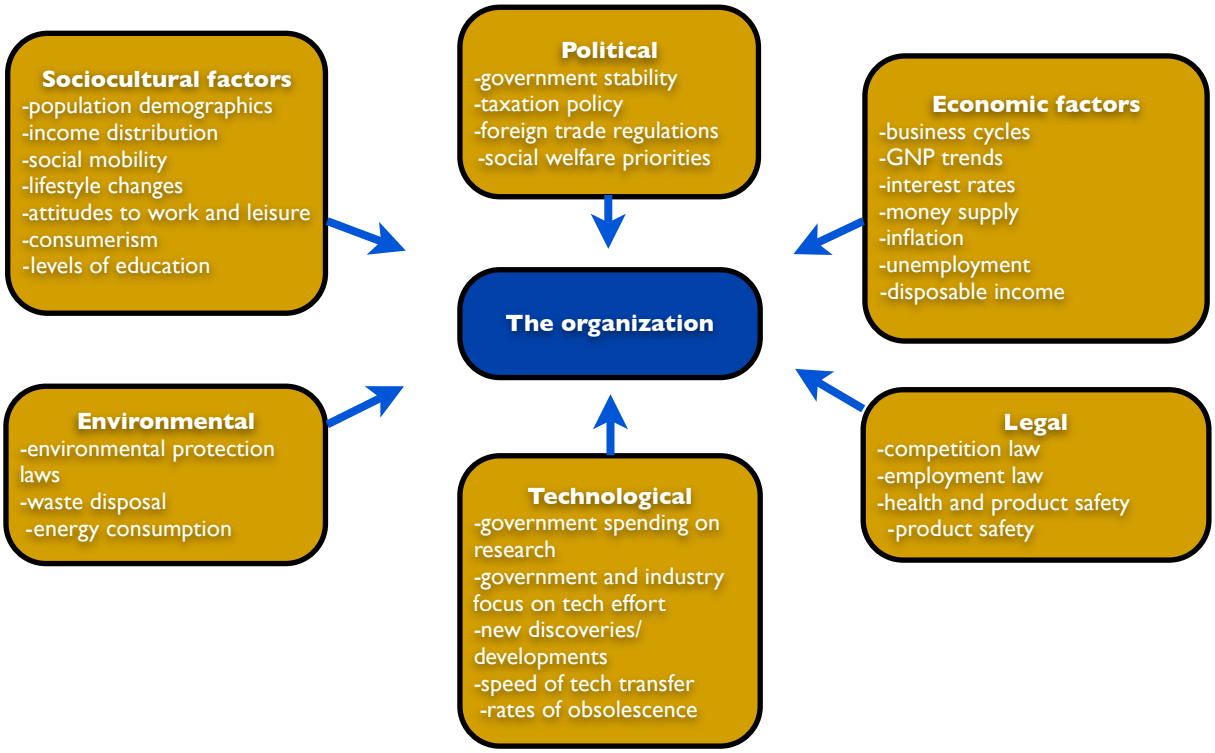
BP

Geographic spread	US	Non-US Americas	UK	Rest of Europe	Asia Pacific	Other	Africa	Worldwide
BP Share of oil Production	21,35%	3,41%	8,36%	2,12%	9,95%	1,50%	7,12%	46,19%
BP oil Reserves %	31,24%	3,16%	5,33%	2,72%	1,37%	4,69%	6,02%	45,48%
BP reserves MB (oil)	3147	318	537	274	138	472	606	4581
BP reserves BCF (gas)	15375	12077	2602	473	6639	1564	2400	3770
BP gas reserves %	34,24%	26,90%	5,80%	1,05%	14,79%	3,48%	5,35%	8,40%
BP '000s of BD (oil) prod.	513	82	201	51	239	36	171	1110
BP BBOE reserves	5709,5	2330,83	970,67	352,833	1244,5	732,667	1006	5209,33

Source: Royal Dutch Shell annual report (2007), Exxon Mobil annual report (2007), BP annual report (2007), Chevron annual report (2007), ConocoPhillips annual report (2007)

Appendix 5.d

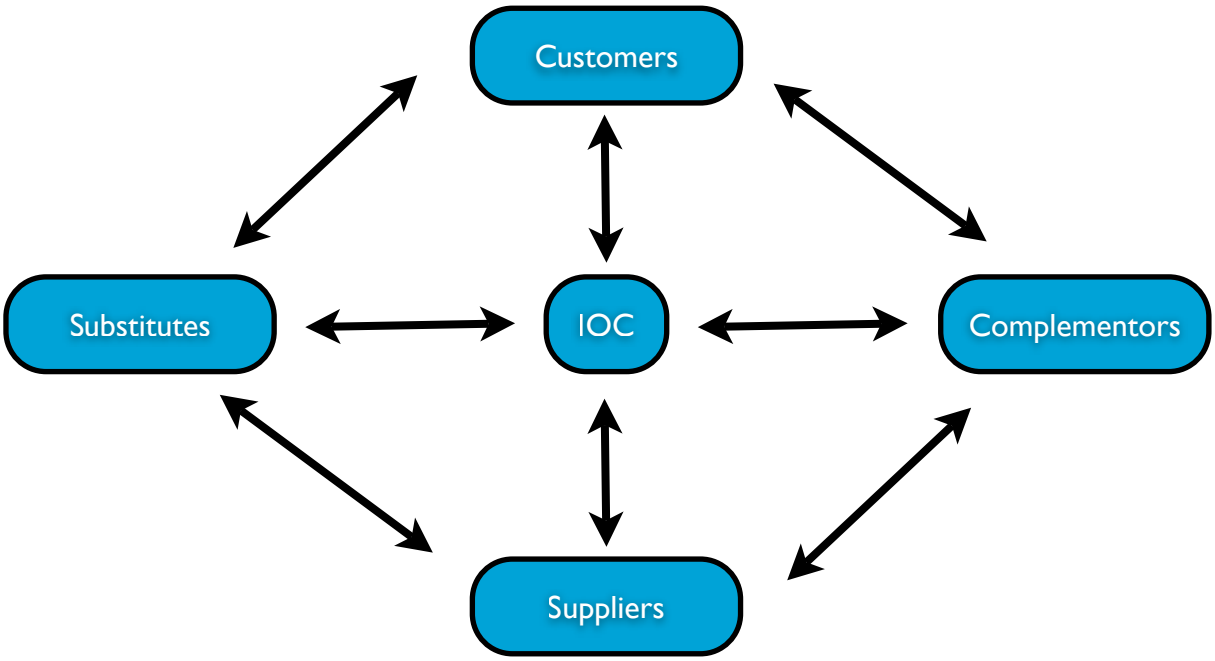
PESTEL framework - Macro-environmental influences analysis



Source: Johnson G., Scholes K., Whittington, R., 2005, Exploring corporate strategy: text and cases, exhibit 2.2, p.68-69, 7th edition, Prentice-Hall, London

Appendix 6.1

The value net



Source: Brandenburger, A.M. & Nalebuff, B.J. 1996, The right game: using theory to shape strategy, p.59, Harvard Business Review.