

Growth and evolution of petroleum industry management essay



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The petroleum industry includes the global processes of, extraction, exploration, refining, transporting often by pipelines and oil tankers, and marketing petroleum products. The largest volume products of the industry are gasoline (petrol) and fuel oil. Petroleum (oil) is also the raw material for many chemical products, including solvents, pharmaceuticals, pesticides, fertilizers, and plastics. The industry is usually divided into three main components: Upstream, Midstream and Downstream. Midstream operations are usually included in the downstream category.

Governments such as the US (United States) government provide a heavy public subsidy to petroleum companies, with major tax breaks at virtually every stage of extraction and oil exploration, including for the costs of oil field leases and drilling equipment.

Indian Oil Industry:-

As in the China, US and Iran, oil seeped out of the soil in India as well; British travelers in Assam reported such pools from 1825 onwards. Once fractionation technology was proved in the US, industrial refining of oil became feasible. Assam Railways & Trading Company Limited was registered in London in 1881 to exploit Assam's natural resources. It struck oil in exploitable volume near Digboi in 1889; at that point it transferred its oil interests to a separate company, Assam Oil Company. AOC built a refinery in Digboi in 1901. AOC was taken over in 1917 by Burmah Oil Company, which later became Burmah Shell and then Shell. Expanded and modernized a number of times, the Digboi refinery continues to function till today.

In 1938, AOC took a prospecting license for 6, 290 square miles in Assam; it ceded the Concession after the War started in 1939, and resumed it in 1947. AOC struck oil in Naharkotia in 1953. By that time, however, the government of India had become paranoid about foreign ownership of business; there was a long standoff between it and AOC over the exploitation of the new oilfield. Finally in 1959, AOC and the government set up Oil India Limited, a 67: 33 joint ventures, to exploit the Naharkotiya oilfield; in 1961 it became a 50: 50 joint ventures.

Standard Vacuum had access to cheap crude from the Gulf; if it found oil in India, the government would force it to exploit it. Its cost was likely to be higher, and the company would either have earned lower profit margins or the government would have had to protect domestic refining; Standard Vacuum would have had to negotiate the level of protection.

Growth of petroleum refining industry in India

India's refining capacity has more than trebled in the last 13 years. From a 62. 4 million tpa capacity in April 98, just before the commissioning of Reliance Industries' first refinery in Jamnagar in 1999, India has an installed capacity of around 193. 5 million tpa in April, 2011. This leap in a short period was significant, considering that the industry is more than a century old in India. The growth is likely to continue with refining capacities expected to touch 255 million tpa by 2012-13 and 302 million tpa by 2017-18, with a slew of projects announced by both the private and public sector.

Today, private sector accounts for 76. 5 million tpa (around 39. 5 per cent) and public sector oil companies account for close to 117 million tpa (around

60.5 per cent). There has been a healthy growth in India's petroleum refining capacity in the last five years, as described by the given table below:-

Domestic crude oil production [million tpa]

2005-06

2006-07

2007-08

2008-09

2009-10

(Provisional)

Total consumption

113.2

120.7

128.9

133.6

138.2

Products from indigenous crude

26.6

28.4

28.2

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27. 0

27. 2

Indigenous crude processing

28. 3

30. 2

30. 0

28. 8

28. 9

Products from fractionators

4. 2

4. 0

4. 1

4. 2

4. 4

Total indigenous production

30. 8

32. 4

32.3

31.2

31.6

Import dependence (%)

72.8

73.2

75.0

76.7

77.2

Self-sufficiency (%)

27.2

27.0

25.0

23.3

22.8

India's refining capacity is slated to touch 225 million with the commissioning of the 6-million refinery of Bharat Oman Refinery Ltd, 15-million refinery of Indian Oil at Paradip and 9-million refinery of Hindustan

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Mittal Energy Ltd. The capacity utilization of Indian refiners for the last few years is described in the table. Indian refiners have also operated at higher operating rates or capacity utilization compared to their regional/global peers implying efficiency in operations.

But, import dependency of India's refining industry is growing, as the domestic crude oil production is stable at around 30 million tpa for the last few years. With slated refining capacity additions and stable domestic crude oil production, the import dependency is expected to rise further in the coming years, putting strain on balance of payments and trade deficits. Coming to consumption side, India's petroleum product consumption has also shown a rapid growth in the last several years.

Generally, GDP growth rates and petroleum product consumption are linked. But, in our case, factors like availability of better roads, more fuel efficient vehicles, improvements in mass urban transport modes and increased availability of natural gas for industrial sector contributed to more moderate growth in recent times.

India has certainly arrived in the global refining space as some of the largest and most complex refineries with matching allied infrastructure like terminal, ports and pipelines, to name a few, operate out of here.

Also, our refining industry has performed creditably by modernizing its complexes to meet the stringent fuel or emission norms. Indian refineries are clocking higher Gross Refining Margins (GRMs) compared to regional benchmarks (Singapore GRMs), a clear sign for competitiveness in refining operations. The growth is so much that foreign exchange earned by <https://assignbuster.com/growth-and-evolution-of-petroleum-industry-management-essay/>

petroleum products exports is the now highest amongst all merchandise exports. If all the planned projects materialize, India will have an exportable surplus petroleum product of around 100 million by 2012 and 140 million by 2017.

Growth in petroleum refining capacity [million]

April 2006

April 2007

April 2008

April 2009

April 2010

April 2011

PSUs

99.47

105.47

105.47

105.47

111.9

116.9

Private sector

33

43. 5

43. 5

72. 5

72. 5

76. 5

Total

132. 47

148. 97

148. 97

177. 97

184. 4

193. 4

India's has several competitive and market related advantages and strengths as far as the refining industry is concerned:-

Cash operating costs and Low capital compared to developed countries.

Access to large and technically skilled manufacturing base and workforce.

Old refineries in Europe and USA are shutting down due to un-competitiveness, costly carbon abatement actions and reduced demand.

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Favorable FDI environment, cheaper labor, and economics of scale besides skill sets, capital and operating costs prove favorable.

The industry faces several challenges:-

To be competitive, the industry needs to use gas as fuel but supply constraints continue to deprive refineries of gas. Gas also poses challenge to refineries in another manner. Gas will displace petroleum products being consumed in the automobile and industries sector, to name a few, thus reducing the demand. It is, however, observed that the demand is growing at a much higher pace and that gas will be deployed in Greenfield projects more than for liquid fuel displacement.

Refinery hubs will need all-weather port and infrastructure development for export and imports, necessitating development of infrastructure that is not available now. Refining business is relatively a low margin business and the need for integration with power plants and petrochemical for higher value additions is required. Growing environmental concerns is also expected to make operating refineries a challenge.

Evolution of the Indian oil and Gas Industry

The origin of the Indian oil & gas industry can be traced back to the late 19th century, when oil was first struck at Digboi in Assam in 1889. At independence, production activities and oil exploration were largely confined to the North-Eastern region, particularly Assam and the daily crude oil production averaged just 5, 000 barrels per day. In the downstream sector, the first refinery was set up at Digboi in 1901. In view of the significance of the gas & oil sector for overall economic growth, the Government of India,

under the Industrial Policy Resolution of 1954, announced that petroleum would be the core sector industry. In pursuance of the Industrial Policy Resolution, 1954, petroleum exploration & production activity was controlled by the government-owned National Oil Companies (NOCs), namely Oil India Private Ltd (OIL) and Oil & Natural Gas Corporation (ONGC).

With the discovery of the Bombay offshore basin (in 1974) and Cambay onshore basin (in 1958), the domestic oil production increased considerably. As a result, in the early 70s, almost 70% of the country's oil requirement was met domestically. However, by the end of the 1980s, some of the existing oil & gas fields were experiencing a decline in their production since they had already been in production for few years and were past their 3 plateau phase. At the same time, there was a steady increase in consumption of gas & oil, leading the two NOCs to meet only about 35% of the domestic oil requirement.

After the oil shock of 1970s, the nationalization of both downstream & upstream sectors was initiated and was completed in 1981, 14th October. This resulted into the exit of the international oil companies from the Indian oil & gas industry. Moreover, the resource crunch in the beginning of the 1990s that held up the NOCs from developing some of the then newly discovered gas & oil fields (like Neelam, Gandhar, Tapti, Heera Phase-II & III, Ravva, Mukta, Lakwa Phase-II, Panna, Geleki and Bombay High Final Development scheme), had adversely impacted domestic oil production. Apart from this, controls were imposed by the Government on the pricing and distribution of petroleum products and crude oil in India. Factors like the

administered oil prices and non-availability of appropriate technology logistics augmented the problems.

Up to 1990s, there were three rounds of exploration bidding with no success in finding new oil or gas deposits by the foreign companies who only were allowed to participate in the bidding process. This led the government to initiate Petroleum Sector Reforms in 1990, under which the fourth, fifth, sixth, seventh and eighth rounds of exploration bidding were announced during 1991-1994.

For the first time, Domestic (Indian) companies with or without prior experience in production and exploration activities were allowed to participate in the bidding process during these rounds. In 1995, the Government announced the Joint Venture Exploration Programmed. However, this was viewed as a deterrent by major private sector oil companies. This led the government to announce New Exploration Licensing Policy (NELP) in 1997 (operationalised in 1999) as part of its Hydrocarbon Vision 20251, a landmark 25-year planning document. Under NELP, licenses for exploration are being awarded only through a competitive bidding system and NOCs are required to compete on an equal footing with Indian and foreign companies to secure Petroleum Exploration Licenses. In addition to NELP, other efforts were made to address the need for achieving energy security.

These include such as:

Acquisition of Gas and oil assets abroad;

Developing the strategic storage facilities at identified locations;

Exploring alternate sources of Energy, including gas hydrates and Coal Bed Methane

Improving the recovery of gas and oil from existing fields through methods such as Enhanced Oil Recovery (EOR) and Increased Oil Recovery (IOR) etc.

Demand determination of the Industry

Demand for Petroleum Products:-

Various groups have estimated long-term demand projections for oil for the country from time to time. Some of the main projections are contained in:

Energy Information Administration (EIA) and

International Energy Agency (IEA)

India Hydrocarbon Vision 2025

India Vision 2020

Approach Adapted to Estimate Future Demand:-

There are two approaches for assessing the oil requirements for future:-

Top-down Approach:- Overall energy requirements with share of different fuels in the primary commercial energy basket (considered by Planning Commission and reported in IEP) by linking GDP with energy elasticity.

Bottom-up Approach:- End use approach considering the impact of different parameters. While assessing the requirements factors like vehicle population

growth, impact of gas, technological improvements in engine designs, improved fuel efficiency, impact of auto LPG, impact of Metro rail, CNG expansion, impact of high oil prices, conservation/efficiency improvement issues, aviation policy of the Government, Railways freight policy, growth of passenger and cargo traffic, fleet expansion plan of airlines, National Highways Authority of India (NHAI) road construction projects, construction of freight corridor, electrification plans of railway tracks etc. have been considered.

The most important reasons for declining elasticity is far higher contribution of services sector compared to past while contribution from the manufacturing sector has more or less remained the same, but it too has improved its efficiency.

It may be mentioned that since the oil prices are expected to remain at a high level in the future, alternate sources of energy are likely to become increasingly economically viable. In projections impact of such alternatives has not been considered and the actual materialization may be different from the one projected now. In addition, policy initiatives, which encourage energy efficiencies, could lower the oil demand growth even further.

Demand of Natural Gas:-

Demand for gas in India continues to be affected by the cost economics vis-à-vis alternative fuels pertaining to each of the end use sectors, primarily fertilizer and power, as also the dynamics of these sectors. The current natural gas consumption is primarily shared by the fertilizer and power sector to the tune of 40% and 29% respectively.

Different agencies have made assessments in the past regarding natural gas. For arriving at the future demand for natural gas, sector wise analysis has been carried out as under:

Table of Sector Wise Gas Demand Projections [2007-2012]

2007-08

2008-09

2009-10

2010-11

2011-12

Power

79. 70

91. 20

102. 70

114. 20

126. 57

Fertilizer

41. 02

42. 89

55. 90

76. 26

76. 26

City gas

12. 08

12. 93

13. 83

14. 80

15. 83

Industrial

15. 00

16. 05

17. 17

18. 38

19. 66

Petrochemicals/ Refineries/Internal Consumption

25. 37

27. 15

29. 05

31. 08

33. 25

Sponge iron/Steel

6. 00

6. 42

6. 87

7. 35

7. 86

Total

179. 17

196. 64

225. 52

262. 07

279. 43

Product profile:-

Products and Refinery Technology

This section provides a brief description of the technology and production process. An understanding of these issues is critical as it helps understand industry structure.

Crude oil is a liquid mixture of hydrocarbons – chemical compounds consisting roughly of six parts of carbon and one of hydrogen, both of which are fuels; it generally also carries small quantities of salts sulphur, oxygen, metals and nitrogen.

Crude oil is containing hydrocarbons that vary in their boiling point; refining is a process in which crude oil is heated in a vacuum until it evaporates and then allowed to rise up a column. Various hydrocarbons liquefy at various temperatures and can be collected at various heights in the distillation column.

In the basic refinery process, crude is heated to 600°C by injection of superheated steam and pumped in at the bottom of a vertical distillation column. As the vapour rises up the column, it cools. The column has trays at different heights with holes. As the vapour cools, fractions with different boiling points liquefy, collect in the trays and are drained off; products with high boiling points rise to the top, while products with low boiling points collect on lower trays. The principal Products, with their approximate boiling points, are petroleum gas (20°C), petrol (70°C), naphtha (40°C), diesel (200°C), kerosene and jet fuel (120°C), lubricant (300°C), and furnace oil (370°C); solid petroleum coke collects at the bottom after the liquid fractions are removed.

The proportions in which these products come out vary to an extent with the crudes; crudes are classified as heavy or light according to the proportion of light products. But the balance of demand and supply for the products is such that the prices of furnace oil are much lower than those of light products such as kerosene, petrol, and diesel oil. In August 2008, international prices of residual fuel oil ranged from \$2.29 to \$2.48 a gallon; the corresponding range was \$2.68-3.05 for petrol, \$3.18-\$3.38 for jet fuel and \$3.06-\$3.29 for diesel oil. So other technologies are employed to crack, alter or recombine molecules and make lighter hydrocarbons from residual fuel oil.

The principal products obtained from the primary refining and cracking processes are:-

Liquefied petroleum gas (LPG):-

LPG is mostly a combination of propane and butane. It is heavier than air, and liquefies under pressure. It is used as a household cooking fuel, vehicular fuel and refrigerant; 4 million vehicles are estimated to be powered by LPG in the world.

Petrol:-

Petrol is used to fuel internal combustion engines, mainly vehicular. It is early use as a killer of lice and their eggs has completely disappeared.

Naphtha:-

Naphtha is used to make additives for high-octane petrol, and to make polymeric plastics and urea, a nitrogenous fertilizer.

Aviation turbine fuel (ATF):-

ATF is the fuel used in propeller planes. It is akin to petrol.

Kerosene:-

Kerosene is also known as paraffin, is used as an illuminant and cooking fuel in India and other poor countries, and as a space heating fuel in industrial countries.

Jet fuel:-

It is used in jet planes, is closely akin to kerosene.

High-speed diesel oil:-

It is used in engines running at 750 revolutions per minute (rpm) or more. It is mostly used in diesel-powered vehicles.

Light diesel:-

It is used in the diesel engines running at lower speed – mainly irrigation pumps and generation sets.

Furnace oil:-

It is made by diluting residual fuel oil from refining with middle distillates such as diesel oil. It is used in bunkers, boilers, furnaces, heaters, or as fertilizer feedstock.

Lubricating oil:-

It consists of greases and viscous oils used to lubricate moving parts in automobiles, industry, railway engines and carriages and marine engines.

Paraffin wax:-

It is used as an electrical insulator, for heat storage and in thermostats.

Asphalt:-

It is a black thermoplastic product that is used to make roads and sometimes for waterproofing. It is similar to tar, which is made from coal. Asphalt is also found in natural form; it was used to waterproof Egyptian mummies.

Petroleum coke:-

It is mostly used as fuel, but is also used to make dry cell batteries and electrodes.

Players in the Industry

The gas and oil industry is composed of a number of various companies and organizations that contribute to supplying natural gas and refined products.

The industry is composed of fully-integrated gas and oil companies, independent gas and oil producers, refiners and marketers, service companies, pipeline operators, trade associations and government agencies.

Operating companies are those organizations that perform core functions along the value chain such as refining and exploration.

Fully Integrated:-

Fully integrated companies are engaged in all aspects of the gas and oil industry from exploration to marketing. The average customer is well-acquainted with these companies by virtue of their branded gasoline stations. The fully-integrated companies or majors explore for and produce gas and oil around the world, own pipelines and tankers to transport this gas

and oil, have refineries to process the crude oil into refined products, and sell these products through a global network of wholesale and retail outlets.

Typical fully-integrated companies are BP, ChevronTexaco, ExxonMobil Corporation, Royal Dutch/Shell and ConocoPhillips Company.

Independent Marketers:-

Independent marketers are companies that purchase refined products, usually gasoline, and sell them at retail outlets. These companies would buy product from independent refiners or majors. This classification would include organizations whose primary business is gasoline sales such as QuikTrip and RaceTrac and major retailers such as Costco, Albertson's and Wal-Mart who sell gasoline in addition to other merchandise. The Society of Independent Gasoline Marketers of America and the Petroleum Marketers Association of America represent this group.

Pipeline Companies:-

Pipeline companies transport refined products, crude oil, natural gas and natural gas liquids using networks of pipes and pumping or compressor stations. Pipeline companies may be independent operations or joint ventures of operating companies.

Colonial Pipeline Company is a major interstate pipeline that moves from refined products from the Gulf Coast to the East Coast. Each day, it delivers an average of 80 million gallons of kerosene, gasoline, and home heating oil's, diesel fuels and national defense fuels to shipper terminals in 12 states and the District of Columbia.

Service Companies:-

These companies can range from organizations that rent drilling rigs to firms that build refineries. These organizations support the primary functions of the value chain. They can also include financial institutions, accounting and information management firms, and law firms. Representatives from this group are companies like Schlumberger and Halliburton Company.

Trade and Professional Organizations:-

Trade and professional organizations support the industry and its employees. Trade organizations collect hold meetings, industry data, and advocate public policy beneficial to the industry. They generally have offices in Washington, DC where they conduct their lobbying activities. American Gas Association and American Petroleum Institute, and Independent Petroleum Association of America are leading oil and gas trade organizations.

Professional organizations are focused on the industry's core technical skills. Organizations such as the American Association of Petroleum Geologists and the Society of Petroleum Engineers conduct training seminars and technical conferences to keep their members up-to-date on the latest technical developments.

Government Agencies and Research Organizations:-

Government agencies regulate industry operations to ensure compliance with state and Federal laws and compile industry statistics. The Environmental Protection Agency (EPA) sets and enforces standards on water and air quality. The Federal Energy Regulatory Commission (FERC) regulates interstate pipeline operations and tariffs. The Department of Energy (DOE)

collects industry data/information and conducts energy research. Individual states have regulatory agencies, such as Railroad of Commission of Texas, that oversee the safe operation of gas and oil production.

National Oil Companies:-

These companies are the gas and oil organizations of sovereign nations.

They are part of the government and are typically found in major oil producing nations. National companies are among the largest in the world and include Patrollers Mexicans and Saudi Arabian Oil Company.

Countries are also major players in the world oil market

In addition to affecting the operation of NOCs, governments can also dictate the terms by which other oil companies must abide in their country. Access to a country's reserves may fall into four categories:-

Full access (15 percent of world reserves):-

All companies must abide by the laws of the government, but no domestic company is given preferential treatment. Examples include Canada, the United States, and United Kingdom.

Equity access (1 percent of world reserves) :-

A NOC exists, but doesn't get preferential treatment over outside oil companies. Examples include Indonesia, Colombia, and Denmark.

Limited equity access (37 percent of world reserves) :-

The NOC is given priority access to reserves while outside oil companies' access may be limited through shared production with the NOC, minimum domestic ownership requirements, or other methods. Examples include Angola, China, and Russia.

No equity access (47 percent of world reserves) :-

The NOC has sole access to reserves. No foreign ownership of oil fields is permitted in these countries, and any outside participation is limited to operation through a domestic affiliate. Examples include Iraq, Iran, and Saudi Arabia.

By limiting outside access and imposing targets, governments of oil-rich countries can directly affect world oil supplies. Limited access to oil can force commercially-oriented companies to change production plans or form strategic alliances with NOCs, further establishing the importance of these oil-rich countries as major players in the world oil market.

Major Petroleum & Oil Companies:-

Petroleum companies, also known as Oil & Gas companies or Oil companies have formed a key part of the global economy for the last decade, since crude oil or Petroleum has become our main fuel source.

Not only have these petroleum companies become amongst the biggest companies in the world, but thanks to the fundamental importance of this limited resource, they have also become embroiled in a complex political world of national and government objectives, international relationship – and all too often, outright war.

Petroleum and Oil companies, among the employers in the world cater to global energy demand. Their areas of functioning can be grouped into the following below:-

Production:-

Production involves the extraction of crude oil from reserves, followed by its refinement in processing plants.

Distribution:-

The regular distribution quota is delivered to different sectors (e. g. agriculture, automobiles, and residential). This is followed by the commercialization of the oil products.

List of Oil Companies

Different petroleum companies are of the world:-

Assam Oil Company Ltd. (ACL), India

Abu Dhabi National Oil Company (ADNOC), United Arab Emirates

Alon USA, United States

Amerada Hess Corporation, United States

Anadarko Petroleum Corporation, United States

Apache Corporation, United States

Arbusto Energy, United States

Atlantic Petroleum, Faroe Islands

BG Group, United Kingdom

Bharat Petroleum Corporation Limited, India

BHP Billiton, Australia

Buzachi Petroleum Operating, Kazakhstan

BP, United Kingdom

Cairn Energy, India

Distribution channel of the industry:—

Abstract:-

The petroleum distribution segment is rapidly adopting different kinds of supply chain solution. From crude oil selection to petroleum product distribution at the retail outlet it is chain with many links. The refining margins, the lead time associated with vital functions like product trading and crude buying unpredictability in oil prices make the entire process challenging. Implementation of these solution on a wide spread installations, however, is what the world is watching, as huge petroleum companies struggle to “ chain” the business. The petroleum industry has a pressing need for both integration and implementation skills for taking the best value out of the differ distribution channel available.

Introduction:-

Underground, the gas station is quite modern. The tanks for super unleaded and for regular (the midgrade fuel) are larger than the normal tanks. Each tank is equipped with an electronic level monitor that conveys real time

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information about its status through a cable to the station's management system and then to the main inventory management system for the oil company whose products the gas station markets.

The movements from the distribution channel push to demand pull is taking place in the segment, where once the challenge was in getting the best deals on buying crude, the focus is shifting to give customer what he wants.

The petroleum business is divided into refining and distribution segments. The focuses more on the distribution segment.

There is a definite shift in focus in the industry toward the distribution segment. The big oil companies have started monitoring the inventories of crude oil or any other petroleum products. The issues at the refining level are: which products to make in what quantity? Which crude to use? Which units to run? While the issues at the customer facing end or at the gas station are basic, namely run outs & refines.

The important functions within the distribution channel are optimization across alternative means of transportation, demand forecasting, replenishment method to avoid retains/run outs & finally scheduling, which sequences the dispatch.

Marketing and Distribution of Petroleum Products in India

Overview:-

The public sector oil marketing companies (OMCs) which include Hindustan Petroleum Corporation Ltd. (HPCL), Indian Oil Corporation Ltd. (IOCL) and Bharat Petroleum Corporation Ltd. (BPCL) are primarily responsible for the

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marketing and distribution of petroleum products in India. With the opening of retail sector for the private players, Shell, Essar and Reliance Industries Ltd. (RIL) have also entered the retail marketing related to petroleum products.

The marketing and distribution infrastructure in the petroleum sector include - liquefied petroleum gas (LPG) distributorships, petrol/diesel stations, lubricants and greases ou