Reservoir Management – Theory

Reservoir Management Requirements

➢ Introduction

The oil industry is divided into three main sectors: *upstream, midstream, and downstream*. *The upstream* sector involves activities relating to Exploration and Production (E&P). *The midstream* sector includes transportation by road, rail, and sea. It also includes the storage, marketing, and distribution of crude oil and its products. *The downstream* industry comprises crude oil refining, where crude oil is refined into more useful products such as naphtha, gasoline, diesel fuel, kerosene, liquefied petroleum gas, jet fuel, and so forth. All three sectors define the entire supply chain of petroleum, starting from its exploration to the sale/distribution.

Upstream, midstream, and downstream industries are subject to **operational and market risks**. Operational risks are typical of a particular industry. However, market risks are common to all sectors. They may arise from social unrest, political turmoil, fluctuations in interest rates, natural disasters, terrorist attacks, and geopolitical events or conflicts at a local, regional, or international scale. Any national or international incidents that can affect the global balance of demand and supply can trigger market risk.

Because oil is such a vital commodity today, an oil producing or consuming nation must be aware of the environment to maximize benefits. Oil producing nations focus not only on controlling the cost of indigenous oil production; they also look for opportunities to seal the long-term cheap oil deals in the international market. An oil company’s performance is affected by internal and external factors discussed in the below section.

Using analysis methods such as SWOT (Strengths, Weaknesses, Opportunities, Threads) and PESTLE (political, economic, sociocultural, technological, legal and environmental) is essential component to ensure successful implementation of the planned activities.

An Example of PESTLE Analysis Tool:

Political factors – the evolution of the political environment, policy changes occur in the country, tax increase or decrease impact on the activities of the company.

Positive impact

- The amount of international investment to oil and gas sector was increase after signing of the "Contract of the Century" in 1994.

- OPEC political decisions decreased oil production so the oil prices have increased.

Negative impact

- Tax increase affects the income and revenue, as well as results in decrease of company's expenses, and it impacts negatively to some degree on its development.

Economic factors – both macro and micro economic factors can impact on the activities of the company. It might entail inter and intra company economic relations, inter-company financial accountings, common projects with partners and customers, economic changes that occur on state level.

Positive impact. Common projects with big oil and gas companies, digging new wells result in the increase of company's revenue.

Negative impact. Decreasing oil prices influence to the income of leading oil companies. For example, companies start reduce cost and head cutting after oil price dropped from 141 USD per barrel to 33 USD.

Sociocultural factors – Sociocultural factors influencing the company encompass age division, swelling number of people, migration, culture, religion and demographics.

Positive impact. Diverse abilities and disparate experience exchange of employees from different countries result in the efficiency of the company.

Negative impact. The accommodation and adaptation of the foreigners in Azerbaijan, the registration of their documents, as well as differences in cultures cause disagreements and difficulties.

Technological factors – unlike other factors, the impact of the technological environment on the company is much faster and more tangible. Since we use new technologies both in the platforms and offices or bases, the changes affect us as well.

Positive impact. Both in drilling and other services, the continuous application of new technology results in increase of customers' interest and subsequently the development of the company.

Negative impact. The new technology applied by rival company may decrease the interest to the company.

Legal factors – the legislation applied both in domestic and international domain may always impact on the activities of the company.

Positive impact. New decisions oriented towards the development of oil-gas drilling industry result in the progress of the company.

Negative impact. New decisions sometimes cause extra workload and result in changes of processes and procedures within the company.

Environmental factors – the protection of the environment is implemented through the application of appropriate enlightenment programmes within the framework of both domestic legislation and international standards.

➢ Internal and External Factors

- **Internal Factors**

Internal factors mostly deal with **organizational capability and resources** and are addressed by the company management. Some of these factors are:

1- Expertise

Expertise relates to skills and knowledge in a particular field. It is a game changing attribute that has a telling effect on problem-solving and winning the competition. Expertise exists in a company in the form of the employees' knowledge and experience about their reservoirs, company strategy, business guidelines, short- and long-term plans, sources, digital and analog databases, workflows, processes, and so forth.

2- Performance

Performance means converting a plan into action and deliver results. Clear and precise communication is the key to achieve performance targets. The management must align the organizational vision, mission, values, and aspirations to create a sound performance culture. The organization must prepare a personnel development plan for all staff members based on identifying their training needs. It will benefit both the organization and the employees with improvements in the quality of service and results.

3- Cost

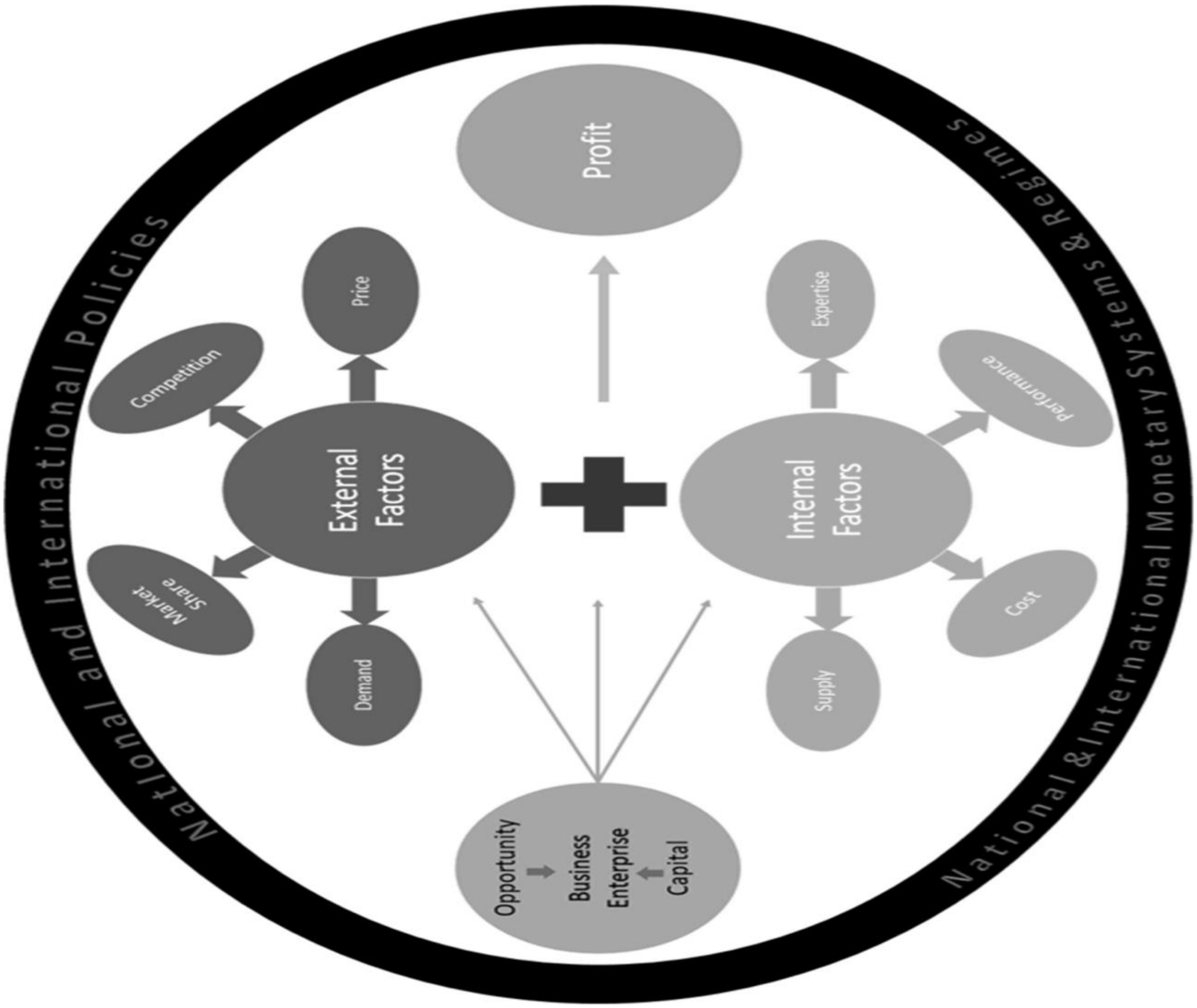
Oil and gas development is expensive, and a net positive cash flow may take several years. The company must have sound financial credentials to sustain these operations and resilience to absorb setbacks. Cost is an amount of money that has to be paid or spent to produce oil and gas. However, the word "cost price" also includes other outlays necessary to produce oil and gas, such as property costs, materials, power, worker wages, etc.

4- Supply

The word supply of oil and gas is an overarching function that includes oil and gas production at the in-country point of export/sale and then further transportation to the consumer country by rail, road, ships, or pipeline. Under the internal factors, the reference is made only to the in-country supply. Oil and natural gas are extracted from individual reservoirs and wells. It is then brought to gathering centers, processed to separate oil from gas and water, and other impurities. Both oil and gas are saleable. Crude oil should conform to agreed specifications of bottom sediment and water (BS&W), crude API, and sulfur content at the export/sale terminal. Natural gas should be free from heavier hydrocarbons and meet the heating value specifications. Heavier hydrocarbons removed from the gas, also known as natural gas liquids (NGL), can be sold separately or mixed with crude oil. The natural gas supply must comply with emissions regulations and pipeline gas specifications in terms of water content, H_2S, CO_2, O_2, N_2, gross heating value, and delivery temperature and pressure. Oil processing at the gathering centers can achieve the target specifications for delivery. Free or associated natural gas may require additional processing to bring it to the desired specifications.

- **External Factors**

External factors are beyond the control of the organization and its management. Therefore, the organization must continually monitor national and international events to decide its business strategy and action.



1- <u>Demand</u>

Price plays a significant role in the profitability of an oil and gas company. It is controlled by several factors that include demand and supply, production cost, world crises arising out of political events, pandemics, and natural calamities.

2- Market Share

Market share is a big deal for the oil- and gas-exporting countries. It is also in the interest of the importing countries that wish to make long-term arrangements for energy supplies.

3- Competition

Businesses cannot escape competition-the competition forces organizations to innovate and be more cost-effective. The objectives of energy security and profitability drive both NOCs and IOCs to compete for acquiring oil and gas properties in foreign countries and integrating their operations across the supply chain.

4- Oil Price

It is essential to understand the microeconomic and macroeconomic im-plications of oil prices. Microeconomics is a study of the behaviors and interactions of individuals and companies as scarce resources get re-allocated under the new price regime. The common man feels the first impact of higher oil prices in the form of increased gasoline prices. Gasoline prices affect the supply cost because transportation and distribution of goods become costly. That leaves a significantly smaller share of the budget for other household activities. On the other hand, higher oil prices tend to increase production costs because operations and services become expensive. It has been observed that oil and gasoline prices are closely linked, and therefore, a surge in oil prices affects the common man and businesses alike. Macroeconomic factors deal with the health of national or regional economies defined by gross domestic product (GDP), inflation rate, un-employment rate, and so forth. An increase in oil price is generally associated with a higher inflation rate due to an increased cost of goods and services. It reduces economic activity and growth. Based on the experience of the oil shocks of the 1970s, it can be concluded that a sustained increase in oil prices suppresses the economy.

End of Lecture