DEVELOPING A FRAMEWORK FOR OVERSEAS EQUITY OIL ACQUISITION IN INDIAN SCENARIO

A thesis submitted to the
University of Petroleum and Energy Studies

For the Award of
Doctor of Philosophy
in
Management

BY
Dulal Halder

September 2020

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DECLARATION

I hereby declare that this thesis **"Developing a framework for overseas equity oil acquisition in Indian scenario"** has been prepared by me under the guidance of Dr. Anshuman Gupta, Professor of Department of Economics and International Business, School of Business, University of Petroleum and Energy Studies, Dehradun. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

Dulal Halder

New Delhi, June 2021

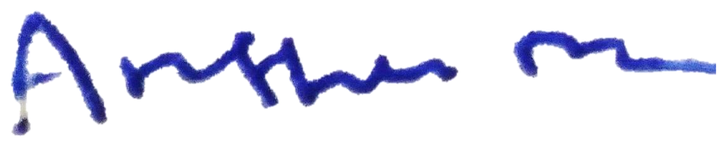
UPES
UNIVERSITY WITH A PURPOSE

June 2021

CERTIFICATE

This is to certify that Dulal Halder has prepared his thesis entitled "**Developing a Framework for Overseas Equity Oil Acquisition in Indian Scenario**" for the award of PhD degree of the University of Petroleum and Energy Studies, under my guidance. He has carried out the work at the Department of Economics and International Business, School of Business, University of Petroleum and Energy Studies.

Internal Supervisor



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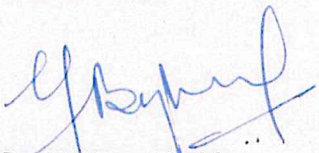

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ABSTRACT

Economic vitality requires prices of energy resources to be stable and sureties of uninterrupted supply. Because hydrocarbon resources are asymmetrically distributed, majority of the developed and developing economies dependent on fossil fuel increasingly pursue international partnerships to secure long term energy access. With economic development, the state controlled national oil companies, particularly from the Asian region have focussed more aggressively to expand globally driven by both their own economic interest and geo-political considerations of its host governments. As a result of the rapid globalization of NOCs, the world energy scenario has become both complex and intensely competitive. Given that India is endowed with a relatively low share of hydrocarbon resources, India's energy cooperation has gained pace, however, there is need to put in place a robust strategy and mechanism for securing long term supplies of 'equity oil' though investments in oil and gas acreages abroad.

This study explores the issues of equity oil development strategy for augmenting energy security and attempts to analyse the factors influencing cross border equity oil development With less than one percent of world's oil and gas reserves, India's imports have reached more than 82% of its oil and 50% of gas requirement. India's high import dependence has called for adoption of energy security policy containing multi-pronged strategies, which comprises enhancing domestic exploration, supply diversification, demand side management, and securing long term supplies through overseas equity oil acquisition. Any one of the strategies shall not work in isolation and therefore the component of equity oil development assumes significance to India's energy security ecosystem.

The research project employs a mixed approach of quantitative and qualitative methodologies taking into account the output of literature review and questionnaire survey to analyse the determinants influencing equity oil

development from theoretical and practical perspectives and finally towards developing a framework for equity oil development in Indian scenario.

Chapter one of the report provides an overview of the hydrocarbon sector: of India and the world, with special emphasis on demand supply situation and provides the perspective of energy security linkage to the sector. Chapter two delves deep into the concept of equity oil towards augmenting energy security, progress made by India and brings out the issues and challenges in equity oil development. Chapter three brings out the business problem while in chapter four, the theme based literature review has been outlined along with identification of the research gaps. Chapter five and six delves deep into the research problem, research questions, research objectives as well as research designs in the realm of world views & methodologies. The chapter six provides the justification for employing the chosen research design that encompass a quantitative techniques to find the factors that influence overseas equity oil acquisition, using the output from the factors analysis and analysis of literature from energy importing advanced economies of China, Japan and South Korea to help develop a conceptual lens for overseas equity oil development and thereafter testing the conceptual framework through a grounded theory approach.

Research methodology employed for the research objective one including data collection, interpretation and analysis are described in chapter seven. Following a systematic review of the literature, sixteen factors were selected and five additional factors emerged through a survey conducted through a 5-point Likert scale questionnaire. A total of 268 participant's responses to the survey were analysed. Each factor column was scanned for identifying variables with significant high loadings, and from each factor column, the variables having a factor loading of more than 0.5 were selected. The findings conclude that equity oil development in the Indian energy security context are influenced by long term stable policy, concessional state funding, resource pooling, decentralisation, and knowledge and technology transfer.

The researcher felt that the question, identifying a conceptual framework for equity oil acquisition, fitted with both contextual and strategic category since we are interested in finding out the form and nature in which such conceptual framework exists and help evolve new theories. Chapter eight describes the development of the conceptual lens by application of framework analysis. Since our objective is to map the equity oil development in Indian scenario towards strengthening energy security we have tabulated and indexed the data in energy importing mature and advanced consumer countries of China, South Korea and Japan, which would provide lessons through the emerging themes. The concluding chapter ten describes the discussions on the findings culminating in the development of the framework for equity oil development in Indian scenario based on the modified conceptual lens, and taking into consideration the new categories brought forward by qualitative analysis using the grounded theory. The chapter describes the major contributions of the research project to the literature, practice and business; in delineating the factors to be addressed for overseas equity oil development in Indian scenario as well as describing the timelines and sequence. The eclectic framework postulates that occurrence of cross-border mergers and acquisitions emerges from the existence of ownership of assets, globalisation benefits and the dynamic relation between home country's structural changes and the economic development. While describing the quality of research, validity, limitations and future work, the chapter brings out the reasons that the present work qualifies as good research as it follows the characteristics and properties that the research work is, as far as possible, controlled, rigorous, systematic, empirical, critical, and relevant.

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First and foremost, I humbly and devoutly pay my ode to Goddess Maa Saraswati, the Almighty, for showering Her blessings throughout my life and during the research work to complete the project successfully.

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CHAPTER 1

INTRODUCTION AND OIL AND GAS SECTOR OVERVIEW

1.1 Introduction

Affordable and reliable energy supplies are essential to economies for increasing industrial production of goods and services and to enhance economic and social wellbeing of its citizens. Empirical studies have demonstrated energy consumption to be positively correlated with indices of economic growth and living standard improvement. Given the significance, energy resources are treated strategic in nature and host nations curtail its unencumbered access. Securing long term supplies of energy has thus turned into priority concerns for energy importing emerging economies like India and China. India's average annual economic growth during 2015 to 2018 was 7.3 percent, the fastest among the major economies in the world. Notwithstanding the global flu pandemic starting at the last quarter of financial year 2020 that impacted economies across the world, overall improvements in the macroeconomic and fiscal indicators suggest India's GDP growth to continue accelerate, driven by higher consumption and improved living standards of its billion-plus population. With rising economic growth and enhanced energy needs the task of securing uninterrupted energy supplies poses greater strategic challenges.

India is endowed with oil and gas resources within its territories in the quantity grossly inadequate to its consumption requirements. Its share of proved oil and gas reserves is less than one percent of the world's total. India's fossil fuel energy imports have risen historically at steady rate and its import of crude oil has surpassed the level of 82 percent and gas imports exceeded 50 percent of the

domestic requirement in financial year 2020. Ensuring uninterrupted energy supplies thus has emerged the prime focus area of economic planners through interventions in energy access, supplies, sustainability and affordability. India's energy policy has become multi-dimensional encompassing the targets for boosting domestic exploration activities, moderating consumption, diversifying supplies, and securing long term fossil fuel supplies through overseas equity oil development. Any one of the strategies shall not work in isolation, which brings out the significance of developing equity oil overseas as a pillar of energy security ecosystem. The need for planning to make arrangements for long term assured supply of energy resources is imperative to India's endeavors towards strengthening its energy security and economy.

The dominance of oil and gas in meeting the energy requirements has remained consistently primal inspite of the renewables and emerging alternative energy sources. Even with the policy thrust to go big for renewables and measures being undertaken in advanced countries in support of low-carbon energy sources, the role of oil and gas shall remain prime in coming decades through 2040. Robust demand growth for crude oil is predicted to 2025 and an overarching role of natural gas and renewable resources thereafter.

Given asymmetrical distribution of hydrocarbon resources, all energy deficient economies have pursued collaborative approach and joint venture strategies for securing long term supplies. Russia, world's top producer, adopted global joint ventures through its national oil companies towards supplementing its domestic resources while at the time considering the need for Chinese investment in its strategically important but remote Siberian region (**Nicole & Stronski, 2018**). State-controlled national oil companies from Asian region expanded its footprints in partnerships with international entities, driven by the political goals of its host nations. Share of oil and gas revenues of major national oil companies have increased after global partnerships started producing and marketing of oil and gas. On globalisation spree the national oil companies of China, India, Malaysia, Japan

and Korea from the Asian hemisphere acquired participating interests in joint venture oil and gas projects in multiple countries across the world, their entry turned the global energy scenario geo-politically complex and transactions competitive.

Strategies for securing energy in India have evolved over a period of time and changed more intensely during the last two decades. The strategies on broader landscape have followed on energy securing strategies of China, which, inter-alia, comprises spreading out imports, enhancing domestic production, energy efficiency, equity oil investment abroad, trans-national pipelines and constructing oil storages as strategic reserves. The energy strategies match on account of both countries having a billion-plus population, low per capita energy consumption, growing economies driving energy demand, improved standard of living, rapid urbanization, and inadequate oil and gas deposits within its boundaries. Government of India published its first energy policy through the Planning Commission in 2000. The hydrocarbon vision document enumerated steps for ensuring India's energy security through increasing indigenous production hydrocarbons and investing in equity oil abroad.

1.2 Defining Energy Security

The universal topic of energy security encompass and reshape the strategies and action plans related to sourcing and usage of energy resources. This has larger implications for the nation towards seeking energy independence and the state becoming stronger in economy and military, along with offering better life of its citizens. While social scientists tend to frame energy security through knowledge-driven technology intervention, consumer groups prefer referring energy security as affordably-priced energy that does not have threats of abrupt disruptions. While bringing out universal dimensions of energy security in a global context, the World Bank emphasizes on energy intensity and energy efficiency while minimizing

volatility of prices. Energy security also contain political dimensions in that it emphasizes securing nation's energy infrastructure from war and civil unrest.

Emergence of oil security as a national security concern emanated from the time of oil supply disruptions in 1956 on account of the Suez Crisis (**Kazutomo, 2017**). Subsequently, there were two major oil shocks which altered the global energy security landscape. In 1973 the oil embargo related to the Yom Kippur War caused global crises, and the 1979 revolution in Iran triggered another world-wide scarcity of commodities and economic upheavals. Countries across the world re-oriented their action agenda and narrowed it down to first ensuring supply of energy, mainly oil, to hedge against geopolitical unrests and conflicts. The multilateral institution International Energy Agency was established in 1974 as an inter-governmental agency with the objective of minimizing supply disruptions and oil price shocks.

In 2006 the Government of India formulated its comprehensive energy policy encompassing a systematic phase-wise analysis of demand for primary and secondary energy resources. The policy stated the broad narratives of energy security in the Indian context and explored demand supply imbalance going forward, alternative technologies, and system efficiency (**Integrated Energy Policy, 2006**).

Energy security as components of energy systems include population, technologies, research institutions; and depends on their inter-related interactions. Energy systems are dynamic and changes due to periodical transitioning. There are systematic threats that energy systems are subjected to. The threats occur due to a variety of reasons like regional conflicts, contractual issues, logistics disruptions, expropriation, change of regime, and infrastructure breakdown. There is no single strategy to address all the issues of energy security.

1.3 Oil and Gas sector overview

1.3.1 Primary Energy Mix

Fossil fuels comprising oil and natural gas and coal together supply more than 90% of India's energy demand. India consumed 809 Million Metric Ton (MMT) of primary energy in 2018 which was about 5.8% of total primary energy consumption globally. Coal commands more than 50% share, the next by oil at 30% and natural gas at 6%. A comparative depiction of primary energy basket of India vis-à-vis the world's energy mix is shown in **Figure 1.1** (British Petroleum Statistical Review, 2019).

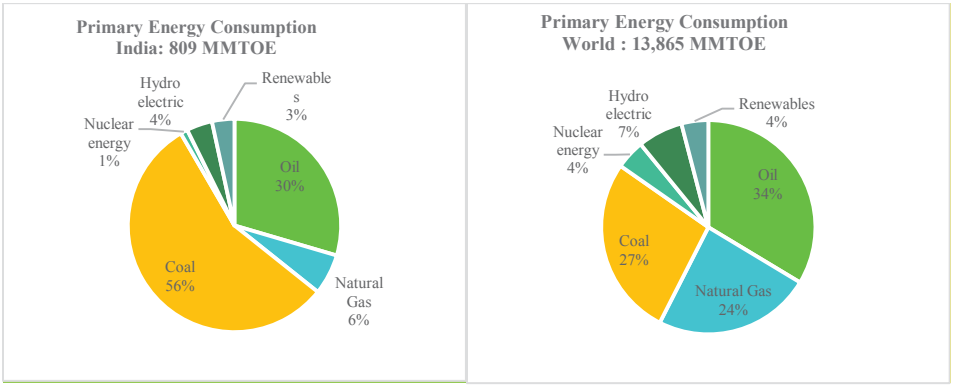


Figure 1.1: Primary energy mix of India and the World, Jan.2019

Analysts forecast that amongst the top consumers of the world India, China and Japan would continue to have coal dominating their primary energy requirements, and other fossil fuels of oil and gas shall constitute the next big share of fuels (**Figure 1.2**). Coal is the dominant fuel source of India whereas in case of Japan crude oil provides the largest source of energy. Coal and natural gas occupies the next dominant shares. With successful commercial exploitation of shale and tight oil and gas resources the U.S has altered the global energy supplier's ecosystem and has become the foremost producer of oil and gas. Crude oil and natural gas forms the largest component of its primary energy mix (**British Petroleum Statistical Review, 2020**). Japan, a large consumer from the Asia has been

historically dependent on imports from the around the world, particularly from the Middle Eastern countries. After natural disasters of 2011, Japan became more dependent on imports as it had to replace its nuclear power generation capacity. Japan imported additional cargoes of crude oil from Nigeria, Angola, Indonesia, Malaysia and Vietnam. Data provided by the Ministry of Economy, Trade and Industry of Japan indicate that Japan was able to spread out its high import dependency from the Middle East region to the Unites States after the United States for the first time permitted limited oil export in 2014.

During the period January to September 2019 China's total crude oil import increased by 9.7 percent from the preceding year to 369 million ton. About 44.1 percent of crude oil imported by China originated from nine Middle Eastern

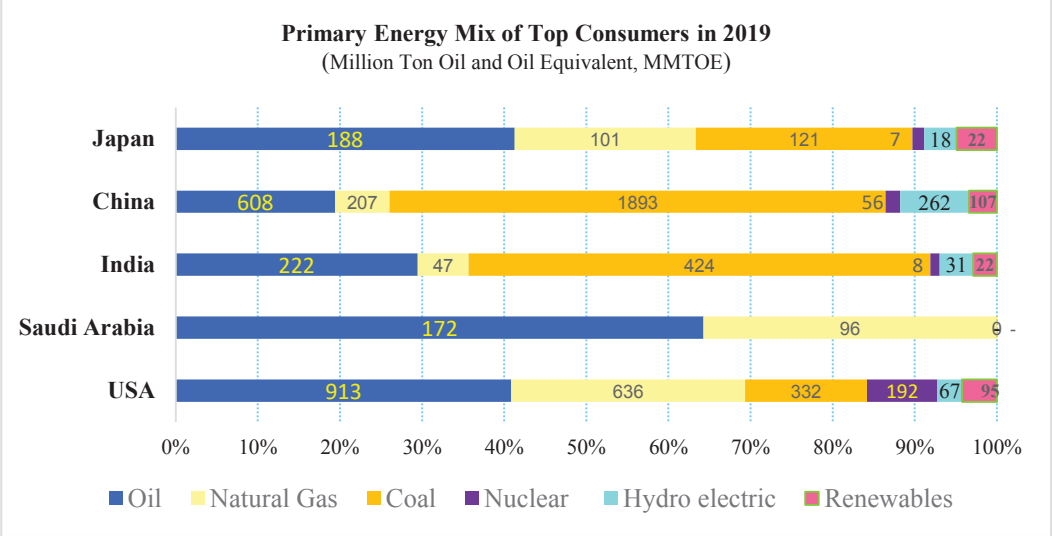


Figure 1.2: Primary Energy mix of major consumers

nations, mainly Qatar and Saudi Arabia. During 2019 the crude oil imported by China has been estimated at 10.12 million barrels per day, an increase of 9.5 percent from the previous year. With this the Chinese oil imports have shown record increase for the 17th straight year. The incremental increase in 2019 worked out to be 882,000 barrels per day. The increase was triggered by demand from private refining companies in China to fill up its annual quota of imported oil. China's

crude oil imports have been setting record growth from 2003 onwards. (**Reuters, 2020**).

1.3.2 Oil and Gas Demand Supply Overview

Distribution of proved reserves of crude oil amongst the world's top resource holding countries is shown in figure 1.4 and that of proved natural gas is shown in figure 1.5. As can be seen from the data, India is endowed with a low share of proven hydrocarbon resources and its resources were discovered and put on production during 1970s. The level of oil and gas production has plateaued during the 1990s and has remained stagnant over decades (**Figure 1.3**). India produced 34.2 million ton of oil and 32.9 million ton of oil and oil equivalent gas during financial year 2019. Within the country and in its adjoining offshore areas the oil and gas exploration and production of India is carried out by its national oil company Oil and Natural Gas Corporation [ONGC] either on standalone basis or in joint venture with other companies. Based in North East region of India, a smaller public sector oil company Oil India Limited annually produces about 3 million ton of oil and oil equivalent of gas. Both the national oil companies jointly account for nearly 70 percent domestic production whereas the remaining 30 percent of oil and gas production comes from fields operated in joint consortium by the national oil companies and private companies like Vedanta, Reliance Industries, etc. India's major discoveries are in the Mumbai High fields, Gujarat, Krishna-Godavari, Assam Arakan, Cauvery and

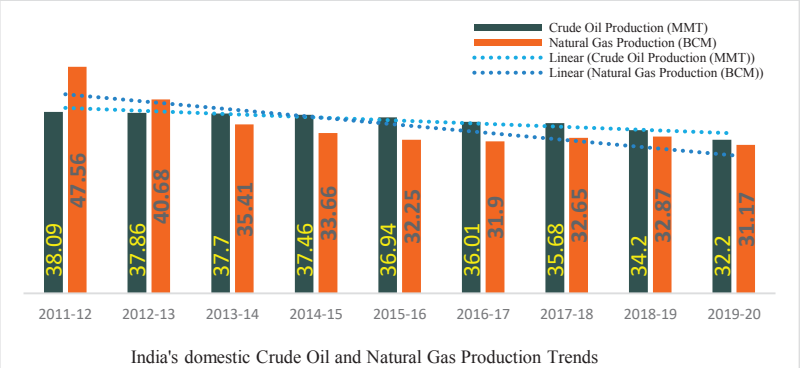


Figure 1.3: Domestic oil and gas production trends

Rajasthan sedimentary basins. With old discoveries maturing with age and natural decline, domestic production has been stagnant, and on declining trend.

As per the latest figures published by the British Petroleum Statistical Review in June 2020, India contains 4.66 billion barrels of proven oil reserves which amounts to a small 0.27 per cent share of proven oil reserves of the world (**Figure 1.4**). To enhance the prognostication and volume of proven oil and gas reserves, the government of India embarked on regulatory reforms in exploration and production and came out with new reformed guidelines in 1991 for reforms in the exploration sector auctioning policy. Later newer versions of reformative guidelines were issued for facilitating exploration, appraisal, development, production and marketing of oil and gas. India has recently introduced new auctioning policy for round-the-year bidding wherein companies are permitted to bid on the acreage of its interest after data purchase from government repository.

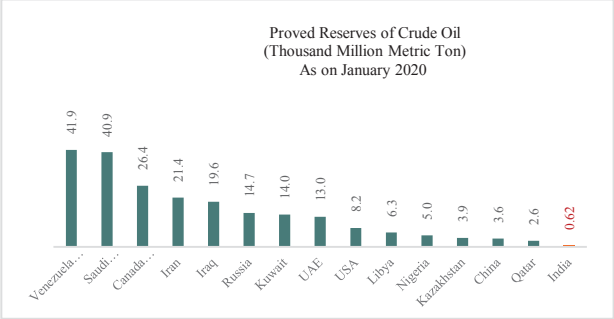


Figure 1.4: Proved Oil Reserves of Top Producer Countries, 2020

The proven natural gas deposits in India has been estimated to be about 47 Trillion Cubic Feet as on January 2020, amounting to 0.67 percentage of the world's proven gas reserves. The distribution of proved gas reserves in top producer countries of the world is shown in **Figure 1.5.** Even though the share of proven gas reserves in India is estimated at a fraction of the world, Indian government

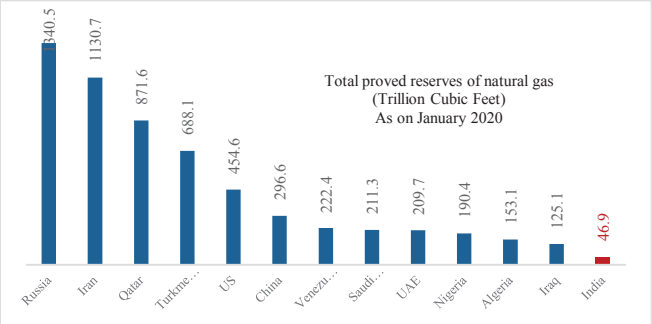


Figure 1.5: Proved Gas Reserves of Top Producers, 2020

desires to transition towards a gas based economy and increase the share of natural gas in its primary energy basket from 6 percent to 15 percent by 2030.

During FY 2018-19 India imported 226.5 million ton crude oil, and domestically consumed 211.6 million ton whereas the production of crude oil largely remained stagnated at about 34 million ton level. India's crude oil import in FY 2017-18 was 220.40 million ton against domestic oil production of 35.64 million ton (**Figure 1.6**). The trend of negative growth of oil and natural gas produce of India has remained a major concern for policy makers as India's oil output reduced to 34.2 million ton in FY 2018-19 and thereafter further reduced to 32.2 million ton in the fiscal year FY 2019-20 [PPAC, 2020]. India's annual spend on crude oil import during 2018-19 was USD 111.9 billion. Owing to lower oil prices in 2014, crude oil import bill had dropped to USD 64 billion in 2015-16. For the current fiscal of FY 2019-2020 crude oil imports have increased to 227 million ton and the corresponding foreign exchange spending at USD 101.4 billion, a decrease from level of USD 111.9 billion incurred in FY 2018-19.

India's increasing crude oil import makes it more vulnerable to price volatility. There are different kinds of oil price movements that has affected India's welfare economy. Global oil prices were historically largely administered by a select group of oil majors and subsequently by the Organization of Petroleum Exporting Countries [OPEC]. The price pattern of global crude oil

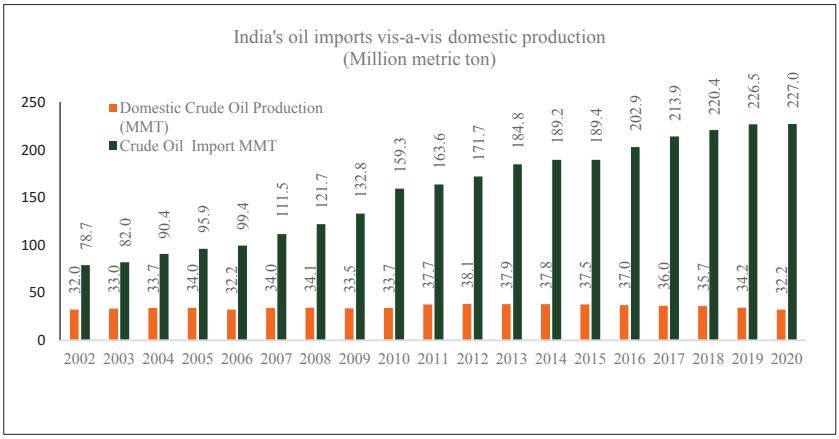


Figure 1.6: Crude oil Import and Production - Historical

was characterized by the varying duration in which a reference price like the Arabian Light 34 degree API remained at consistent level in nominal dollars. Price volatility arise within the inter-related set of oil markets which includes the spot, futures and other derivatives. The fundamental difference is in the nature of the adjustment process that shocks and induce volatility.

The global energy scenario has been redefined by the hugely successful commercial exploitation of light oil and gas from the tight reservoirs and rocks by

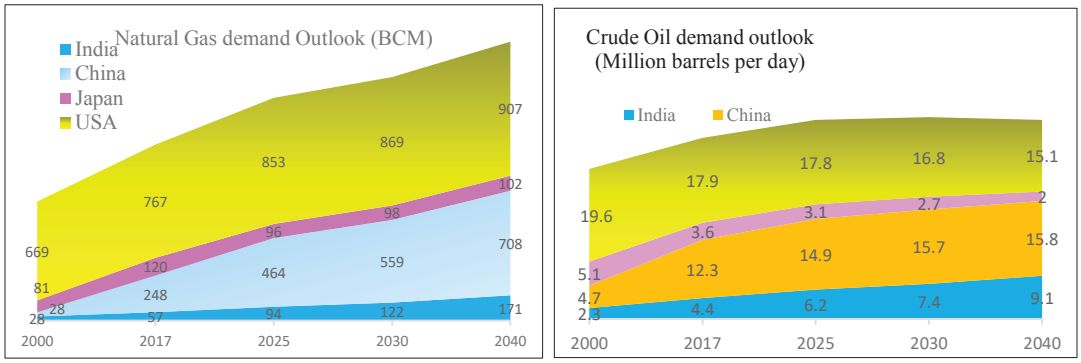


Figure 1.7: Oil and gas demand outlook of India, Japan, China and Unites States

technologically advanced oil and gas service companies in the United States. At the start of the decade at 2000, more than 40 percent demand of primary energy emanated from the North America and Europe whereas the developing economies of Asia accounted for around 20 percent demand. IEA outlook forecast the daily oil demand to increase by 1.1 million barrels every year till 2040, and nearly half of total demand increase would be from China and India. China leads oil demand growth to 2025, then India and the Middle East take over between the late 2020s and 2040. By 2040 China would swap the top oil consumer position with the United States and its net oil import per day would be exceeding 13 million barrels (**Figure 1.7**).

Countries dependent on imported oil are more vulnerable to sudden variation in energy supply and costs. Sudden spike in oil prices increases threats to stoke inflation, and also threatens derailing the earnings growth of commercial and business enterprises. The risk from a supply-side driven rise in oil prices is generally negative for the markets in Asia and especially for India. The adverse economic impact caused by spike in global crude oil prices is more severe in emerging markets (**Ghalayini, 2011**). The higher crude oil prices force emerging economies into positions of higher current account deficits and threatens high fiscal deficits. The twin prospects create the potential of larger net capital outflows and currency depreciation. This situation, in turn, tend to stoke inflation.

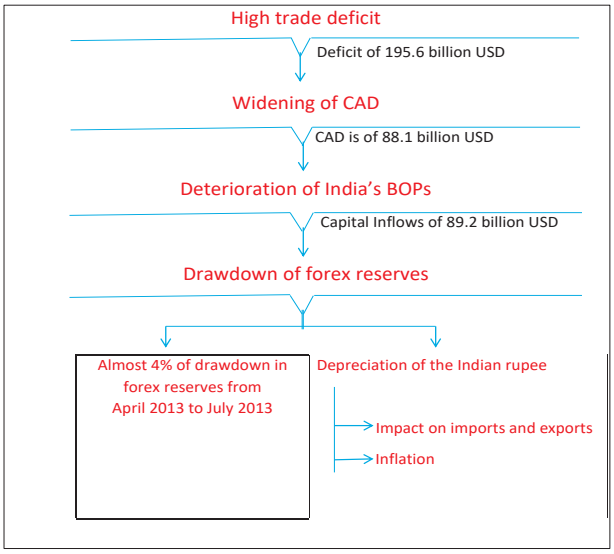


Figure 1.8: Impact of oil imports on Indian economy
[Source: Reserve Bank of India and PwC analysis]

CHAPTER 2

EQUITY OIL DEVELOPMENT FOR ENERGY SECURITY

2.1 Developing overseas equity oil

Oil and gas resources are asymmetrically distributed around the world irrespective of its consumption magnitude, for developing nations with large population like India and China which are devoid of domestic deposits, securing long terms becomes economic as well as strategic priority. Crude oil importing nations look for supplies forging international partnerships to get access to overseas oil deposits. State-controlled national oil companies from the resource deficient and aspirational Asian countries embarked on international expansions targeting sourcing of oil and gas, however, their expansions are also driven by geo-political considerations, strategic interests or it could be technology upgradation. The extensive globalization of national oil companies has altered the world energy scenario making it complex and intensely competitive. Keeping in tandem, India's energy cooperation for natural resources has gained pace in the last two decades. However, a comprehensive policy and institutional framework focused on sourcing equity oil and gas would be required, given the burgeoning demand supply gap.

The stronger national oil companies have expanded beyond their domestic shores and established deep footholds into energy rich provinces across the world. National oil companies of China, India, Republic of Korea, Norway and Malaysia each expanded into more than two dozen countries purchasing oil and gas assets. The national oil companies' impetus for venturing into overseas oil assets in regions create implications on geopolitics of the region and affects bilateral relation. While

examining the causes and patterns of China's oil investments overseas Wojtek and Tessman **(2012)** examined the factors guiding equity oil investments through economic opportunity and geopolitical relevance explanations. Economic opportunity has been explained with the assumption that enterprises, irrespective of whether state controlled or not, tend to operate independently on commercial principles, and thereby they generate has political impetus through oil investment. The other case of geopolitical explanation assumed that oil investments abroad are actioned by the government for its own geopolitical ambitions to deepen political ties with resource-rich countries. The dimensions of long term supply and opportunities of strategic collaboration with producer countries significantly overweigh in favor of equity oil development when compared to imports (**Figure 2.1).**

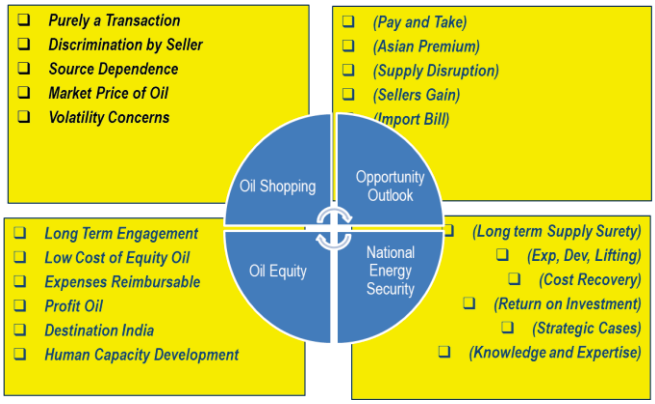


Figure 2.1: Equity Oil vis-à-vis Oil Shopping

Along with equity oil, transnational gas pipelines has also complimented the strategic goals of securing supplies. China and Russia signed a historic USD 400 billion mega deal in May 2014 for gas supply of up to 38 billion cubic meter over thirty year period through a transnational pipeline from Russian gas fields to China. The historic gas supply deal between China and Russia highlighted the strategic agenda of respective governments for secure long term energy supplies.

The upstream exploration and development projects are capital intensive and has higher degree of risks in its commercial, political and technical dimensions. The risks spread out through different phases of project starting with evaluation of deposits, their delineation, constructing wells and plants for their exploitation and

commercialisation. In addition, risk arise from dynamic nature of global economic conditions that affect revenue realisation, changes in regulatory regimes, contract administration, as well as force majeure conditions of natural disaster. Given its higher risk profile, international upstream venture investment has to counter higher expectations of purchase considerations than market economics, which pose major challenges while using mid-term and long term price projections for assessing fair value of assets. Inadequate benchmarking of the acceptable levels of project risks and country risks associated with equity oil investment decisions also poses economic challenges in closing cross-border transactions.

Government of India strengthened the enabling provisions for equity oil investment after the year 2000, post the acquisition of a participating interest in Sakhalin project in Russia through collaboration between the national oil companies of India and Russia. To facilitate efficient and time-bound decision making towards meeting the competitive demands of foreign oil acquisition transactions, the government constituted inter-ministerial committee comprising the heads of related ministries and the government's planning institute Niti Aayog, earlier known as Planning Commission, for time bound processing of investment proposals from government controlled public sector oil companies. In 2011 the government expanded the ambit for its state administered companies to purchase mineral resources in foreign countries and issued comprehensive policy guidelines in this regard.

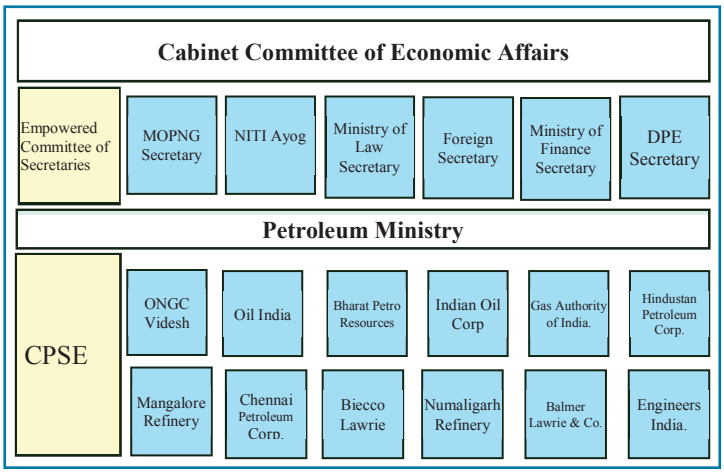


Figure 2.2: Institutional structure for overseas equity oil acquisition

The finance ministry and India's federal banking institution Reserve Bank of India [RBI] from time to time issued guidelines governing the financial aspects of permitting investments abroad, whereas the investments for equity oil development are made by the government controlled public sector oil companies with or without involvement of its administrative ministries. The RBI guidelines on investment abroad prescribe the various categories of permissible capital account transactions and foreign exchange cap admissible. Under the extant provision of automatic route the RBI guidelines permit overseas investment up to 400 per cent of the net worth of the investing entity.

2.2 Equity Oil and Gas Acquisitions made by India

The state controlled oil and gas companies from India that forayed into oil and gas ventures abroad include ONGC Videsh, Oil India, Indian Oil Corp, Gas Authority of India, and also refinery companies HPCL and BPCL. ONGC Videsh made the largest investment for overseas equity oil, and built up a large portfolio of producing and development assets. As on 31st March 2019, ONGC Videsh participates in 41 oil and gas projects across 20 countries. The company has stakes in exploration, appraisal and production projects in oil producing project in offshore Azerbaijan in the Caspian sea, oil producing project offshore Brazil, Bangladesh (oil exploration projects), Colombia (oil producing projects and exploration projects), Iran (Persian Gulf), Iraq, Israel, Kazakhstan (exploration project in Caspian Sea), Libya, Mozambique (offshore gas development linked LNG project) Myanmar (onland and offshore exploration projects and gas producing projects), Namibia, New Zealand, Russia, South Sudan, Sudan, Syria, United Arab Emirates (oil producing project offshore Abu Dhabi), Venezuela, and Vietnam (offshore gas producing and also exploration projects). During the financial year 2019 ONGC Videsh produced 14.83 million ton of crude oil and oil equivalent gas as compared to 14.16 million ton during financial year 2018.

Indian Oil Corporation has acquired stakes in multiple oil and gas projects overseas, some of which are in association with ONGC Videsh and Oil India. As on 31st March 2019, Indian Oil has stakes in eight oil and gas projects located in Canada, United States, Venezuela (in oil producing and development block acquired in consortium with ONGC Videsh and Oil India), Libya, Gabon, Nigeria (exploration block) and Russia (oil producing assets in consortium with ONGC Videsh and other Indian public sector oil companies). Its Russia assets include 23.9 percent stake in Vankor oil producing fields, which also has ONGC Videsh as a non-operating partner with 26 percent stake, and 29.9 percent stake in the Taas assets. Indian Oil is also a partner in Lower Zakum concession in Abu Dhabi. During the financial year 2017-18, Indian Oil produced 2.67 million metric ton of crude oil from overseas producing assets comprising Lower Zakum, Taas and Vankorneft projects in Russia, Niobrara shale oil asset in the United States, Carabobo-1 project in Venezuela and Pacific Northwest project in Western Canada.

Table 2.1 enlists the stake holding of Indian public sector oil companies in overseas oil and gas projects as on 31st March 2019 (**Table 2.1**). The list include licenses that might have been since relinquished by respective companies.

Table 2.1: Equity Oil acquisitions by India's state controlled oil companies

A. Producing Blocks

Sl. No.	Country	Project/ Field	Stakeholding (%)	Date of Acquisition
1	Azerbaijan	ACG	OVL: 2.7213%	Mar'13
2	Brazil	BC-10	OVL:27%	Apr'06 & Dec'13
3	Colombia	MECL	OVL:25-50%	Aug'06
4	Myanmar	Block A1	OVL:17%, GAIL ; 8.5%	Jan'02
5	Myanmar	Block A3	OVL:17%, GAIL: 8.5%	Mar'06
6	Oman	Mukhaizna oil field	IOC 17%	2018
7	Russia	Sakhalin -1	OVL:20%	July'01
8	Russia	Imperial Energy	OVL:100%	Jan'09
9	Russia	Vankorneft	OVL:26%, IOC-OIL-BPRL: 23.9%	May'16 & Oct'16
10	Russia	License 61	Oil India: 50%	July 2014

11	Russia	Taas-Yuryakh	IOC-OIL-BPRL: 29.9%	Sept 2016
12	South Sudan	GPOC	OVL:25%	Mar'03
13	South Sudan	SPOC(Block 5A)	OVL:24.125%	Sep'03
14	Sudan	GNPOC	OVL:25%	Mar'03
15	Syria	AFPC	OVL:16.67-18.75%	Jan'06
16	Venezuela	San Cristobal	OVL : 40%	Apr'08
17	Venezuela	Carabobo-1	OVL:11%, IOC 3.5%, Oil 3.5%	May'10
18	Vietnam	Block 06.1	OVL:45%	May'88
19	Canada	Pacific NW LNG	Indian Oil: 10%	2014
20	UAE	Lower Zakum	OVL 4%, IOCL 3%, BPRL 3%	2018
21	USA	Niobrara Shale Oil	Oil India 20%, IOC:10%	4.10.2012
22	USA	Eagle Ford Shale	GAIL: 20%	Sept 2011

B. Exploration Assets

Sl. No.	Country	Asset/Project	Stakeholding (%)	Date of Acquisition
1	Australia	Block –WA 306 P	OVL:55%	2004-05
2	Australia	Block EP – 413	BPRL: 23.803%	August 2010
3	Australia	WA-338-P	BPRL-8.4%	2009-10
4	Australia	Ac/p32	BPRL-20%	2009-10
5	Australia	EP- 413	BPRL-27.8%	2009-10
6	Australia	TP-15	BPRL-50%	August 2010
7	Bangladesh	SS-04	OVL & OIL 45%, each	17.02.2014
8	Bangladesh	SS-09	OVL& OIL 45% each	17.02.2014
9	Brazil	Block BM-SEAL-4	OVL: 25%	04.06.2007
10	Brazil	Block BM ES24 Spirito Santo	BPRL : 15%	2007-08
11	Brazil	Campos Basin block BM-C-30: 101	BPRL: 12.5%	2007-08
12	Brazil	Block BM SEAL16	BPRL: 20%	2007-08
13	Brazil	Block BM-POT16: 663,760, Potiguar	BPRL: 10%	2007-08
14	Brazil	BM-S -74	OVL:50%	2007-08
15	Brazil	BM-ES-BAR1	OVL:50%	2007-08
16	Brazil	BM-ES-42	OVL:50%	2007-08
17	Brazil	BM-S 73	OVL:50%	2007-08
18	Congo	MTPN	OVL:50%	2007-08
19	Colombia	Block RC-8	OVL:50%	2007-08
20	Colombia	Block RC-9	OVL:50%	30.11.2007
21	Colombia	Block RC-10	OVL: 50%	30.11.2007
22	Colombia	LLA 69	OVL; 50%	29.11.2012
23	Colombia	Block CPO-5	OVL: 70%	26.12.2008
24	Colombia	Block SSJN 7	OVL: 50%	24.12.2008
25	Colombia	GUA OFF 2	OVL: 100%	03.12.2012
26	Cote D'Ivoire	C-112	OVL:15%	2004-05

27	Cuba	Offshore exploration blocks N25, N26,N27,N28, N29 & N36	OVL: 30%	2004-05
28	Cuba	Offshore exploration blocks N34 & N35	OVL: 100%	2004-05
29	Egypt	Block 6	OVL:100%	2004-05
30	Egypt	Nemed	OVL:100%	2007-08
31	Egypt	Block 4	OIL-25%	2007-08
32	Egypt	Block 3	OIL-25%	2007-08
33	East Timor (Timor Leste)	Exploration Block JPDA 06-103	BPRL: 20%	2007-08
34	Indonesia	Block Nunukan	BPRL: 12.5%	2007-08
35	Iraq	Block-8	OVL; 100%	28.11.2000
36	Kazakhstan	Block Satpayev	OVL; 25%	16.04.2011
37	Qatar	Najwat Najem	OVL: 100%	2005-06
38	Libya	Contract Area 43	OVL: 100%	17.04.2007
39	Libya	NC 188 & 189	OVL	2003-04
40	Libya	NC 81-1	OVL	2005-06
41	Libya	Area 102/4	OIL-50%. IOC-50%	2003-04
42	Libya	Area 95/96	OIL-25%, IOC-25%	2003-04
43	Myanmar	Block AD 2, AD3, AD7 & AD9	OVL	2007-08
44	Myanmar	Block B-2	OVL: 97%	08.08.2014
45	Myanmar	Block EP-3	OVL: 97%	08.08.2014
46	Nigeria Sao Tome Principe JDZ	Block 2	OCL 13.5%	Dec. 2004
47	Nigeria	OPL-279	OVL – 23.21%	May 2006
48	Nigeria	OPL 285	OVL – 32.81%	May 2006
49	New Zealand	PEP-57090	OVL: 100%	December 9, 2014
50	Sudan	Block 5B	OVL: 25%	Mar 2004
51	Turkmenistan	Block 11-12	OVL: 30%	2007-08
52	UK	North Sea 48/2C	BPRL-25%	2007-08
53	Oman	Block 56	GAIL 25%, HPCL:12.5%, BPRL:12.5%	2007-08
54	Vietnam	Block 127 and 128	OVL:100%	2006-07
55	Yemen	Exploration block 82 and block 83	OIL: 12.75% IOC: 15%	17.3.2009

C. Pipeline Projects

S. No.	Country	Project	Participating Interest (PI)	Date of Acquisition
1	Azerbaijan	BTC Pipeline	OVL: 2.36%	Mar'13
2	Myanmar	Shwe Offshore Mid-stream	OVL: 17%, GAIL: 8.5%	Jul'13
3	Myanmar	Shwe Onshore Gas Pipeline	OVL; 8.347%, GAIL: 4.1735%	Jul'14
4	Sudan	Khartoum to Port Sudan	OVL:90%, Oil India: 10%	Aug'05

D. Discovered and Development Projects

S. No.	Country	Project	Participating Interest (PI)	Date of Acquisition
1	Gabon	Block Shakti	Oil India: 45%, IOC: 45%	17.4.2006
2	Iran	Block Farsi (Farzad-B)	OVL:40%, IOC: 40%, OIL: 20%	25.12.2002
3	Libya	Area 95-96	Oil India: 25%, IOC:25%	1.6.2008
4	Mozambique	Area-1	ONGCVidesh 16%, OIL 4% and BPRL 10%	Jan'14 and Feb'14
5	Nigeria	Block OML 142 (OPL 205)	IOC: 25%, Oil India 25%	31.8.2006
6	Syria	Block 24	OVL: 60%	May'04

2.3 Analysis of issues and challenges in equity oil development

Research literature on energy security and energy economics attribute the issues and challenges in overseas equity development to a variety of energy security indicators including political relations, geographical distance, capital requirement, geopolitics, role of diplomacy, pooling of resources and swap deals for oil and gas resources. The generic indicators apply to the case of overseas oil investment made by India's state controlled oil companies. A number of large transactions of India's national oil companies in Kazakhstan, Nigeria, Angola, Ecuador and Russia were blocked and pre-empted by competitors, notably, the state backed oil companies from China. In addition, the scale of Indian investment is no comparison to Chinese investment in overseas oil projects. While the cumulative investment made by India in overseas equity oil totaled about US Dollar 30 billion by 2018, the International Energy Agency held that between 2011 and 2013 when the Chinese state-controlled entities rapidly took over oil and assets and companies the world-over, the estimated Chinese investment in overseas equity oil development totaled around US Dollar 73 billion.

The limited capability of Indian national oil companies to form operating joint venture emerged as a handicap in global expansion efforts.

Upstream oil and gas projects call for major capital investment where the legal and commercial relationship need to be defined through contracts between the host government and investing companies. Broadly, the contracts governing the operations and ownership of joint venture oil and gas projects can be categorized into production sharing contracts, concession agreements, service contracts and joint venture contracts. Each one has its advantages, disadvantages and particular suitability to the region that it operates. The contracts differ with respect to the ownership of oil and gas resources and also on the degree of control over the management, operations and finances. Concession agreements provide the incoming foreign companies direct ownership of petroleum resources and establish greater control on the operations and expenditures. In the early era of oil development during the 1950s, the model of concession agreements were popular in developing countries. The amendments made to the contracts are results of host countries aspirations to have more control and fiscal gains defining its relationship with foreign companies. Enforced participation of the national oil companies of the host government into projects where the risk money has already been invested, is considered to be a key risk element in oil and gas contracts and in ensuring fiscal stability over the contract life.

Independent approach by companies and inadequate synergy between companies and Indian state apparatus do not facilitate mega deals for large scale resource acquisitions that involve enhanced complexity and consortium approach. In comparison, Chinese national oil companies are more adept in risk management because they have the ability and propensity to approach and work closely with their government agencies so as to engage the host government at the economic and diplomatic level to sort out issues in the project as well as to influence the overall bilateral cooperation with oil rich host countries.

A consortium approach by investing companies complements skills, increases financial and negotiating power, ensures better linkages across the value chain. For the host country a group of investors in a consortium arrangement brings in varied capabilities, be in technical, project management or financial, and provide broader and holistic advantages beyond the particular project. The constrained ability and limited empowerment of state-controlled entities of India to form operating joint venture with international oil companies could be seen act as limitations for global expansions. The government panel drafted policy paper in 2014 on the roadmap for reduction in import dependency in the hydrocarbon sector dwelt into the specific and strategic advantages that a consortium approach could bring-in in the form of bargaining strength, financial power, joint marketing of products, cost saving due to economies of scale and leveraging complementary skills. Joint venturing is more acceptable to the host nations as it provides a holistic turnkey solutions.

It can be argued that large investments made by Indian companies in geo-politically unstable countries of Syria, Libya, Nigeria and Venezuela did not succeed to bring in energy security to India. In addition, Indian public sector oil companies Oil India, ONGC Videsh, IOCL, HPCL and GAIL made investments in exploration blocks in Oman, Egypt, Nigeria, Suriname, Libya, Australia, East Timor, Yemen; however these investments did not result into equity oil development.

2.5 Motivation and the Need for Research

A researcher's desire to carry out research arises out of his or her liking and fascination of research topic. Answers to unresolved issues and unanswered questions are attempted through systematic investigation. New insights are gained and new knowledge emanates from research where researcher can also bring in his subject knowledge. My motivation is inspired by my fascination with the subject

and the wider impact that the research project could have on India's energy security system through policy interventions. This is elaborated below.

For a developing country with 1.4 billion population, India is committed to the upliftment of living standards of its population and seeking for energy independence. Major impediments toward achieving self-reliance in energy is the growing reliance on foreign oil, which makes India vulnerable to geopolitical pressure groups and economic hostage situations. Lack of endowment of commercial oil and gas resources prevents India from charting its own development ambitions and diverts its focus towards energy sourcing on round the year basis. This has caused the country large outflow of foreign exchange affecting economic growth potential and social upliftment.

Historically India has been scouting the world for importing oil and gas on term contract basis that are of pay-and-take type commercial transactions. Given its large consumer base and increasing buying requirement, investing in overseas equity oil can be turned into opportunities of leveraging India's might as instrument of economic power and foreign policy. Towards its ambitions of shifting away from a helpless buyer situation, overseas equity oil development provides opportunity to Indian companies and the government to establish integration and cooperation with countries around the world, a multi-dimensional benefit beyond economic benefits and extending into diplomatic ball game and collaboration with countries on global multilateral fora. However, there has not been a structured approach towards overseas oil development in India and research literature on the subject are limited. Unlike in China where policymakers have effectively used the overseas oil development to forward global expansion of China and to strengthen its government's economic and political influence, overseas oil investments made by national oil companies of India and its approach in this regard has been abstract in nature. As the component of overseas oil becomes increasingly inevitable in the total oil consumption of India, there is a need for detailed research highlighting

dynamics of energy security system specific to India on long term sustainable basis. This research, therefore, is motivated by my interest in the vital subject of India's energy security where overseas equity oil development can play very critical role, and accordingly, the systematic research towards a thematic framework would bring out the energy security indicators that can assist policy makers to identify policy interventions towards a better energy future of India. Energy being the lifeline of modern society, the topic of this research touches a million lives. The fact that this research project can have meaningful and wide impact on India's energy security policy making is what motivates me to go for the dive.

India has set up defined targets to achieve renewable power in its endeavors towards carbon free environment commitment. India's installed renewable capacity target is 175 GW to be achieved by March 2022. Out of this, 100 GW renewable capacity is earmarked from solar. Coal is the primary source of electricity generation in the country, coal-fired plants currently generating 72 percent of India's electricity. With increase in renewable share, the contribution of coal has been predicted to decline to 42 percent by 2040 (**BP Energy Outlook, 2020**). The large population of India, with growth in its prosperity is predicted to cause India's primary energy consumption increase by 1.2 billion ton of oil equivalent by 2040. This amounts to an increase of 156 percent by 2040 and places India as the largest source of energy demand growth of the world. In absolute terms, India's primary energy demand has been projected to increase from the level of 6 percent to 11 percent by 2040. The share of renewable energy consumption has been predicted to increase to about 300 million ton of oil equivalent by 2040. The current level in India is about 20 million ton of oil equivalent. The outlook for India's energy sector points towards increased usage of renewables, mainly solar, however, the dependency oil and gas shall continue for India due to the large magnitude of its demand growth rate.

To establish long term access and avoid sudden disruptions, developing countries tend to use collaborative approach in association with host government. Oil for

infrastructure deals have become common form, whereby foreign companies invest in developing infrastructure in the host nation in return for license to exploit its natural resources. Such collaborative approach requires pro-active support at the government and coordination amongst companies investing in identified projects, infrastructure companies, oil and gas service providers, contractors, regulators, bankers and associated government agencies.

Cutting-edge technology development has greatly influenced oil and gas sector. Introduction of automation and artificial intelligence is replacing traditional work methods on a growing scale. Data science has grown exponentially as more and more physical equipment are getting connected to the cloud. Introduction of advanced technology combined with data science is rapidly changing the business approach in industrial sector and is expected to have significant impact on global energy industry.

The present research project is a systematic effort to get answers through a methodical conduct of deep studies to look for the relevant determinants for situations particularly suited to the Indian condition. My research project directly deals with the area of augmenting India's energy supplies through securing long term supplies with rights and privileges that are critical to India's economic, military and energy needs. Given that there have not been comprehensive work done earlier in this area, the research project attempts addressing issues through a process driven systematic research to develop a framework for overseas equity oil acquisition in the Indian scenario. Thus, my research attempts to address the gap. At the same time, the research experience would benefit new researchers in the vital subject of energy policy, with its data collected, systematic approach to the issues, application of research methodologies, and analysis of the findings carried out for this research.

CHAPTER 3

BUSINESS PROBLEM

India's reliance on imported crude oil increased over the decades. Taking into considerations the hydrocarbon prospectivity and the constrained production growth potential within the country, oil and gas will need to be practically procured through imports, an unavoidable practice that has adverse consequences on India's economy and exposure to supply disruptions and price volatility.

Ensuring the uninterrupted supply of adequate petroleum resources to satisfy energy needs of the population is a core element of energy security. India does not have enough petroleum reserves delineated that can produce sufficient quantities of oil and gas domestically. Accordingly, sourcing overseas oil has emerged as an inevitable and not an option. To gauge the impact of overseas oil in ensuring the uninterrupted energy supplies, the percentage contribution of foreign equity oil in India's oil demand consumption can be used as an indicator. The resource availability significance as key factor energy security framework is established evidently in China's case. The average daily consumption of imported crude oil in China increased rapidly from the level of 2.5 million barrels in 2005 to the level of 6.7 million barrels by 2015. With enhancing demand forcing over dependency on imports, Chinese state functionaries gauged with concern the economic, political and military risks and vulnerabilities associated with import dependency of energy resource and threats of disruptions (**Michal, 2016)**. China sought to hedge against supply disruptions through investments in overseas oil through its national oil and gas companies. The government of China accorded proactive support and strategic directions to its state controlled oil and gas companies to go for aggressive expansion globally, especially in oil-rich provinces. Consequently by the year 2015 the share of overseas oil and gas production by the Chinese state-controlled oil and

gas companies from acreages abroad increased to 1.7 million barrels per day. The annual equity oil production level reached 17.80 million ton by 2016-17, over 200 times of the level of 2007.

India's oil imports also increased year-on-year due to the increasing demand. The cost of crude oil imports of India annually averaged about USD 120 billion since the year 2011. The trend was interrupted during the global oil price crash starting the middle of 2014 which provided relief in foreign exchange outgo for oil imports. The average daily oil import by the world's top oil consumers are shown in the table 3.1 below (**BP Statistical Review, 2020**). During the period from 2008 to 2018, the crude oil import of India has experienced an average growth rate of 5 percent year-on-year basis, vis-à-vis the growth rate of 9 percent in China. During the year 2019, the growth rate of crude oil import decreased to 4 percent in India whereas for China the growth rate decreased to 7 percent, and for the United States, the crude oil imports fell by 9 percent.

Table 3.1: Crude Oil Import growth matrix for the World's large consumers
[Oil Imports in Million barrels per day]

	2010	2015	2016	2017	2018	2019
Country						
USA	11.69	9.45	10.06	10.15	9.94	9.09
China	5.89	8.33	9.21	10.24	11.02	11.83
India	3.75	4.38	4.95	4.92	5.20	5.38
Japan	4.57	4.33	4.18	4.14	3.94	3.78

India is heavily reliant on the Middle East region for its crude oil supplies. It could be seen from the data presented in the figure 3.1 regarding the top crude oil suppliers to India that the country has developed overdependence for oil imports on the politically unstable regions (**BP Statistical Review, 2020**). The geo-politically sensitive regimes and its direct control over oil resources and commodity pricing has direct consequences on price volatility and supply disruption threats. The continued demand increase is bound to add to the risks of high import dependency. On the global front, the occasional threats of supply disruptions from the Persian Gulf region has helped artificially lifting crude oil prices, for which all importing countries depending on the region has economically suffered setbacks. The probability of geopolitical events occurring in the Persian Gulf and its effect on disrupting the global crude oil market has been subject of major research studies in oil economics. Such disruption create multiplier effects amongst nations which tend to broaden into wider economic disruptions (**Phillip et al, 2018**).

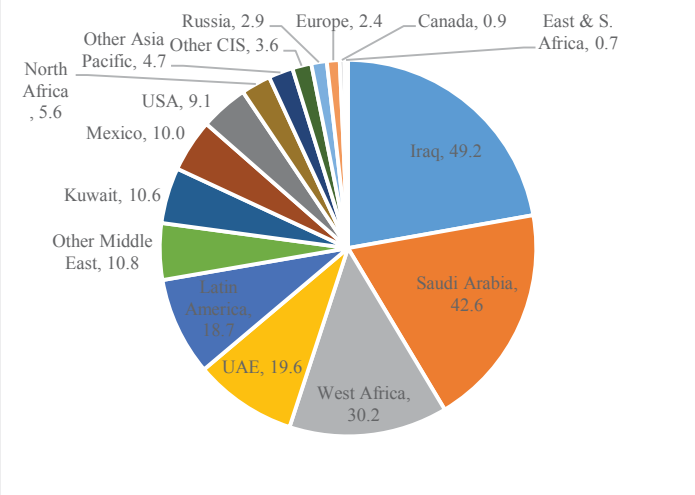


Figure 3.1 Country-wise Crude Oil Import by India in 2019 (Million Ton)

The overseas oil and gas production of India's national oil companies have seen substantial rise in the last four to five years (Figure 3.1). India's state owned oil companies' production from overseas blocks increased to about 25 million ton in financial year 2020, whereas the domestic production has largely remained stagnant.

The government of India has set a tangible target of 10 percent import reduction to be achieved by 2022. However, domestic oil output has not increased inspite of sustained capital infusion, but rather remained on a declining trend mainly due to ageing fields. The new policy initiatives introduced to attract private capital and technology is yet to be tested in increasing oil production.

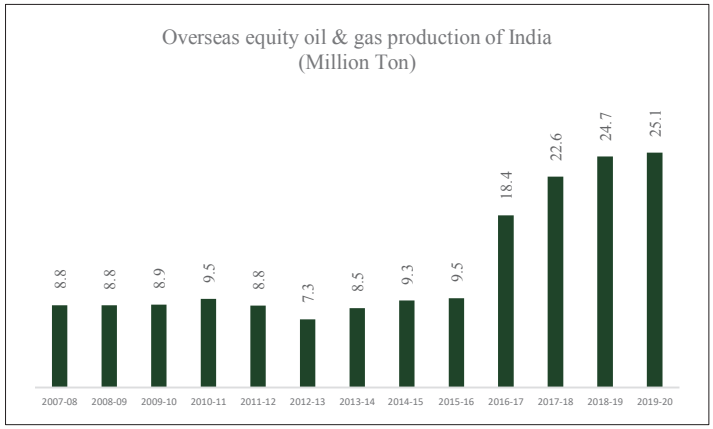


Figure 3.3: India's overseas equity oil production

Niti Aayog of the Government of India has developed a statistical tool for energy demand projections of India under various demand supply scenarios [IESS, 2047]. The demand prediction tool takes into account the scenarios of demand and supply situations, domestic resource constraints, technology induction effects on India's energy supply systems and a host of other quantifiable parameters and assumptions. The import dependency of fossil has been worked out using the statistical model up to the year 2047, and the predictions are summarized in **Table 3.2.** The cause and effect of the enhanced potential of raising domestic supplies of energy and enhanced usage of renewables in India can be derived from the tool developed by the Niti Aayog. The predictions provide for significant rise in import dependency of crude oil and nearly doubling of demand of natural gas till 2047.

Table 3.2: Projections on India's Import dependency of fossil fuels

Fuel Type	2012	2047
Oil	77%	74-96%
Gas	26%	59-75%
Coal	16%	44-87%
Overall	31%	48-85%

For securing equity oil in the short run India depends on imports from its traditional sources, with the US adding in recent years allowing the country some extent of import diversification. However, imports are prone to price and supply volatility and for long term assured supplies, investing in equity oil is of paramount importance. Increased competition among oil importing countries would provide challenge to India's investing entities in the future. The increasing sense of resource nationalism by oil producing countries have also happened which restricts access to resources for national oil companies from India in select cases.

In its research work carried out on the overseas acquisitions of energy assets in India, Mahajan (**2014**) has evaluated the impediments and challenges of acquiring oil and gas assets in foreign countries by India's state controlled entities. Author brought out the need to engage energy rich countries by energy diplomacy and foreign policy for ensuring availability of commercial energy at competitive prices. Beginning early around 1998-99, India's ONGC Videsh could succeed in getting entry to some large oil and projects whereas other Indian oil and gas companies have made staggered investments that are yet to be materialized into equity production.

Table 3.3: Overseas investments by India's oil and gas companies

	ONGC Videsh		**BPRL**		**IOCL**		**OIL**		**Total**		**Major Countries**
Geography	Number of Projects	(%)	No. of Projects	(%)	Number of Projects	(%)	Number of Projects	(%)	Number of Projects	(%)	Major Countries
Africa	7	**17.5**	1	**10**	3	**37.5**	4	**37**	15	**22**	**Libya, Sudan, South Sudan, Mozambique, Namibia, Gabon, Nigeria**
Middle East	6	**15**			2	**25**	1	**9**	9	**13**	**Syria, Iraq, Iran, Israel, UAE, Oman**
Russia	3	**7.5**	2	**20**	2	**25**	2	**18**	9	**13**	**Russia**
CIS and Europe	2	**5**							2	**3**	**Azerbaijan, Kazakhstan**
South East Asia and Far East	11	**27.5**	1	**10**			2	**18**	14	**20**	**Vietnam, Bangladesh, Myanmar, Indonesia, East Timor, New Zealand, Australia**
North America							1	**9**	1	**1**	**USA**
Latin America	11	**27.5**	6	**60**	1	**12.5**	1	**9**	19	**28**	**Venezuela, Colombia and Brazil**
Total	**40**	**100%**	**10**	**100 %**	**8**	**100 %**	**11**	**100 %**	**69**	**100%**	

The region wise spread of number of oil and gas projects where India's national companies have acquired stakes are represented in T**able 3.3.** Based on distribution, it could be inferred that India's state controlled companies have made substantial investments in Russia, Mozambique, Brazil and Sudan. This could be considered to be dispersed sourcing, a scenario better than concentrating only on the Middle East. Among India's oil and gas equity investments overseas, Africa has 22 percent share, Russia has 13 percent share and they jointly account for 35 percent share.

The percentage share of overseas oil and gas production in India's gross production has increased to two-and-a-half times in five years to 24 percent during the financial year 2019. In the same period, India's domestic production declined 6 percent to 67.1 Million Metric Ton of oil and oil equivalent. Large investment made in recent years in oil producing assets in Russia and the United Arab Emirates led to the material spike in overseas production share of India's national oil companies.

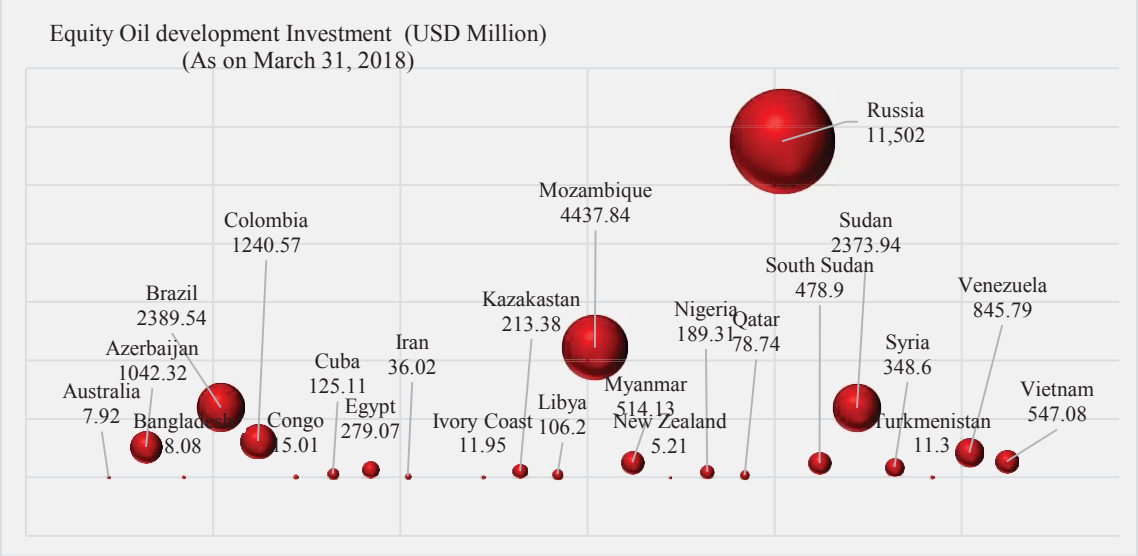


Figure 3.3: Distribution by overseas acquisition Investment 1995-2018 (Million USD)

The illustration in Figure 3.3 brings out emergence of equity oil acquisition as a critical element to bridge the supply gap and ensure long term supply security.

India's public sector oil companies have gone ahead for large investment in acquiring oil and gas abroad, however these have not resulted in substantial contribution towards augmenting energy security, largely on account of lack of cohesive and collaborative efforts, lack of pooling resources and the absence of lead role factor when more than one entities are involved.

The high risk-high reward nature of upstream industry provides for the use of leverage by stake holders. Decisions on equity oil acquisitions are made on discretionary basis, often the decision analysis have to cover due diligence on project execution, production and reserves. The due diligence also has to cover additional risks due to changes in the macroeconomic parameters, country risks, regulatory regime, contract terms, fiscal stability issues, and political factors on host country oil and gas projects and marketing.

Capacity building in India's public sector oil companies to scan and negotiate lucrative oil contracts under the competitive conditions of international exploration and production business need to be supplemented through policy enablers. Such policy enablers shall be facilitated through development of a framework of factors influencing overseas equity oil acquisition. The framework would be applicable to Indian conditions that are specific to the business, regulatory, commercial, legal and contractual conditions under which the public sector oil companies have to conduct their international expansion for resource acquisition.

Based on the above, the business problem is defined as below.

"Lack of a framework for overseas equity oil acquisitions under Indian conditions, considering its governing mechanism for overseas resource acquisition vis-à-vis global competitive landscape for oil and gas resources, is hindering overseas equity oil development. This in turn is affecting India's efforts to improve energy security by reducing import dependency and vulnerability to supply disruptions and price volatility".

CHAPTER 4

LITERATURE REVIEW, LITERATURE THEMES AND RESEARCH GAPS

4.1 Literature Review

In the midst of the development in international energy business in top oil consumers China, Japan, Korea and India, researchers have extensively studied the oil sourcing phenomena in strengthening energy security by emerging economies. Research literature deals in changes on international equity oil investment development scenario. For the present research project, literature review has been carried out with exhaustive study of large number journals, research reports, industry publications, company reports, government policy documents and manuscripts pertaining to research topic and research problem. The review contained research publications in reputed peer reviewed journals like Energy Policy, Applied Energy, and other indicated in the bibliography, scholarly articles in data base of EBSCO, JSTOR, EMERALD, Science direct and ELSEVIER, publications of World Bank and ADB, energy industry reports by global agencies and government regulatory agencies. Review was also done of the investor presentations of oil companies and its Annual Reports, analyst reports of universities, oil policy advocacy agencies handling energy security, energy policy issues, as well as books, articles and reports on factor analysis, framework analysis, grounded theory applications and their theoretical presumptions. A detailed list is placed at **Annexure-1.**

The theoretical discourse concerning how to explain the determinants and their inter relationships towards a framework development can be described using analysis of

transnational transactions for oil resources from the emerging market multinational firms as a distinct theme. We can correlate with review of empirical studies of Asian and Chinese firms (**Dannreuther, 2011**) as factors using mergers and acquisitions carried out by the state controlled multinationals from the emerging market. In attempting to access strategic assets and knowledge, cross border acquisitions through mergers and acquisitions have been a frequently observed mode of outward investments from national oil companies of emerging economies, using mergers and acquisitions as a route to rapid globalization for fossil fuel energy resource control.

The oil and gas industry is generally viewed with focus on activities in exploration and production assets wherein competitive advantage can arise from a variety of factors. It could be technical prowess, project management capabilities, cost management, company reputation, in-house skills, market penetration, infrastructure and intellectual property rights (**Garcia, Lessard & Singh, 2014).** Researchers argued that energy security ecosystem can be made more robust when the sources of energy supplies are spread out across geographies. However, there are factors catapulting changes to the ecosystem as more and more low-cost reserves of oil and gas get produced. The changes are necessitated by the requirement of exploiting difficult oil at higher cost margins to meet rising demand in emerging markets of China and India, and also due to the specter of climate change effects.

The unit costs for equity oil have often proved to be cheaper than finding and development cost when sold at international market prices. It is because equity oil has price advantages in the exploration, development, production and operating costs model. Section of experts argue that for large consumers like India, equity oil may not be adequate to provide buffer in case of abrupt prices surges because the international oil market is inter-wined globally and not centered around any one country but its spread encompasses producers and consumers. Critiques argue that

due the very global nature of oil and gas market, essentially the price of crude oil commodity should be identical at the touch point of border of every country. However, another section argue that equity ownership benefits extend beyond commercial gains in furthering strategic tie ups, military and economic cooperation between countries.

The tendency of government venturing into overseas equity oil through its state controlled entities has been witnessed across the world. While writing on the trends of oil investments by national oil companies from the Latin America, and their urge for intense internationalisation Jones and Sierra (**2015**) highlighted their internal domestic pressure as one of the key trigger points for such globalisation spree. Brazil's Petrobras is the largest oil company in Latin America owning oil assets in 18 countries. The Russian state controlled gas major Gazprom has emerged the world's biggest gas producer and has established its operations in many countries. State-owned Pertamina of Indonesia, Petronas of Malaysia, CNPC, Sinopec and CNOOC of China, JAPEX of Japan, KNOC of the Republic of Korea are major national oil companies pursuing equity oil and gas agenda. The overseas investment patterns of national oil companies provide strategic direction of their respective governments because the majority of proven reserves are under control of the governments through its state controlled agencies. Olawuyi (**2015**) studied the oil and gas investment by foreign oil companies in Africa from the perspective of legal risks and mitigation strategies. The author carried out risk profiling for economic viability of investments in the resource rich African countries by several foreign independent and state owned enterprises. Study revealed that despite bilateral collaboration for oil investments monumental risks exist in form of threats of sudden changes in contract terms, complex systems for meeting local content needs, interference in project execution by delaying approvals, etc. The author concluded that the risks could be monumental but these are manageable with mitigation strategies worked out through negotiations with the host government and its agencies.

Across the world, state controlled entities established themselves as international giants through state-backed policies and support. Messrs Yacimientos Petroliferos Fiscales [YPF] was amongst the earliest national oil companies established by Argentina in 1920s. Oil-rich Mexico traditionally exercised tight grip on its natural resources through its national oil company Petroleos Mexicanos [Pemex], which was established in the 1930s. After the oil shocks of 1970s, the number of state controlled petroleum entities increased substantially and governments inclined towards establishing ownership and control over deposits of oil and gas. The cartelization of oil producers started with the formation of OPEC around this time. OPEC could successfully counter the hitherto dominance of oil companies from the United States and Europe.

State controlled national oil companies gradually adopted western-style management styles and reorientations of business practices, as could be seen in the case of national oil companies from Asia as well as in Russia, United Kingdom and Norway. The national oil companies' strategies continued to evolve as the energy landscape became more dynamic. The demand supply situation keeps altering with advent of technology and new deposits in ultra-deep waters, as well as new tie ups and geopolitical developments. From their traditional role of the custodian of national oil and gas resources, the national oil companies have attempted operating oil projects in association with technology savvy multinationals (**Al-Fattah, 2013).**

Overseas acquisition of oil and gas was pursued by India through its national oil companies from the year 1998-89 onwards when the Indian government company ONGC was allotted three exploration acreages in Vietnam through an exploration and production contract. Later, with acquisition of oil producing assets in Sudan and Sakhalin, the momentum of developing overseas equity oil gained pace and the government of India started setting specific targets of overseas equity oil production in its five year plans. The last such target was set to produce 67 million ton of oil

and oil equivalent gas from overseas during the 12th plan period spanning 2012 to 2017, after which the five year planning concept was discontinued.

Capital investments in oil and gas projects have large lead time and they cannot immediately respond to the current market developments on real time basis. The market conditions get combined with variables existing regionally and such variables dictate the lead in the region. Further, oil investment decisions are affected by the relationship between government and its national oil companies as well as depends on the inter-relationship amongst national and international oil and gas companies. Such relations grow over time and are also to change, however, changes in inter-relations can cause big shift in decisions for oil investment.

Investments made by China's oil companies in overseas equity oil provides deep insights. Till the year 1933 China was a net oil exporter of oil. The domestic oil production could adequately meet the energy demand of China, however with increase in industrial activity and demographic growth, China's oil demand grew manifold. With limited domestic production, China could not maintain self-sufficiency in oil and its leaders increasingly conceded the need to go abroad for oil (**Zheng, 2017**). China's demand of crude oil increased from 4.2 to 7.9 million barrels per day from 1997 to 2007, consequently China's oil imports increased nearly four times from 1.0 million to 4.2 million barrels daily. With large increase in energy demands China claimed the third position after US and Japan in oil imports. The demand of crude oil in China is set to rise to 16.6 million barrels daily by 2030. Analysts forecast that China will need to import 75 percent of its crude oil requirement by 2030 and its oil imports will reach 12.5 million barrels per day.

Asia's foremost energy consumer Japan is almost solely dependent on imports to meet its demand. The highly industrialized Japan has a land area of less than 378,000 square kilometers and is densely populated with nearly 127 million population. Japan has the world's third-largest economy. Japan generates power

using 82 percent conventional fuels of gas, coal and fuel oil, 8 percent hydro, 4 percent biomass and 2 percent nuclear energy. The balance power sources are geothermal, wind and solar energy. For oil imports, Japan maintains government administered agreements with number of producer countries, particularly from the Middle East region. Japan also has agreements for leasing crude oil storage in the United Arab Emirates and Saudi Arabia

The Republic of Korea is Asia's fourth-largest economy and one of the world's top energy consumers. Korea imports all of its crude oil as the country is devoid of oil and gas reserves similar to Japan, Taiwan and coastal China. It sole dependence on oil imports depended its vulnerability as the demands rose with industrialization. The higher demand resulted in a policy push for diversification of country's oil supply sources. Korea has developed strategic petroleum reserve managed by KNOC where the strategic oil stocks are equivalent to about three month supply requirements. The reserve serves as a buffer net against supply disruptions period (**Hong, Kim, Shin, Lee & Kim, 2019).**

Republic of Korea also does not have transnational gas pipelines and depends on sea routes for its supply of crude oil and tanker LNG (**Jeon, 2011)**. South Korea's national oil company KNOC acts as its government entity in pursuing equity stakes in oil and gas assets overseas. The company has entered into joint venture projects for equity oil and gas across the geographies; in Peru, Argentina, Venezuela Yemen, Libya, Vietnam and the North Sea.

Hvozdyk and Valerie of Cambridge University **(2010)** suggested that commercial entities face challenges of tough and complex geological issues when it goes to find oil under the ground in foreign territories. Exploitation of such resources involve large capital outgo even when technically and geologically de-risked. Therefore development costs rises, production costs get multiplied and there are often delays on account of technical or project management issues in complex development

projects. These factors generally persists for long periods and therefore the constraints of supply can remain a dominant factor for oil price fluctuations for long. Research literature has established that combining factors to cause proliferation of strategic alliances for oil asset acquisitions. **Table 4.1** lists key determinants of strategic alliances for oil resources.

Role of national oil companies extend beyond their primary functions and a number of ancillary businesses and national objectives are thrusted upon national oil companies including social sector investment, education, skill development, health care, transport and other infrastructure industries (**Cheon, 2019**). Some state owned companies serve interests of its owner management in other non-strategic businesses like retail, real estate, infrastructure, and transport services. In few under developed and low income regions of Africa and Latin America the investing foreign national oil companies operate medical and safety gears. To understand what drives interests of national oil companies, the key would be to research the host nations' economic and social priorities and look beyond its petroleum business.

Table 4.1: Determinants of strategic alliances for oil and gas

Factors / Determinants	**Rationale / Key Characteristics**
Financial and Funding Considerations	Upstream petroleum industry is capital intensive. Small and mid-size companies obtain capital from bigger firms at development stage of oil project, which are extended at more favourable terms. It could be because the smaller borrower caters to needs of bigger lender on other key areas, or bigger company might have good knowledge about oil discoveries made by borrowing entity.
Technology Validating and Access	Partnering provide opportunities to access cutting-edge technology, and also validating technology pilot basis. Small to medium size companies working on technology gain in credibility when big firms partner them and look for capital for technology validation.

Distribution Network	Joining hands can provide the opportunity to gain access to distribution network already established. New regional markets can be readily accessed by the emerging energy companies through tie ups.
Access to Regulatory Expertise	Upstream oil industry operating climate demands specialized regulatory expertise. Company that has developed over the time a robust mechanism and possesses rapport with regulatory authorities and are adept with the operating framework, enjoys inherent advantages to manage and resolve regulatory issues in foreign country. Tie ups with such companies extend advantages to the partner company.
Elimination of Duplication	Companies avoid duplicating resources and costs by joining of hands in carrying out research and development. Certain functions that are of similar nature could be combined for synergy in areas of purchasing, administrative functions, warehousing, marketing, etc.
Risk Sharing	Companies spread out the risks through joint ventures with other companies in developing projects in capital intensive oil and gas sector. Strategic alliances facilitate sharing of expenses on account of exploration, seismic, field development, engineering, and marketing.
Entering New Markets	Product varieties go up. Petroleum companies start producing a variety of products once two or more companies join hands in sharing the manufacturing facilities and intellectual capital. Such joint ventures can be seen in the technology intensive oil sand industry of Canada.
Economies of Scale	Companies gain efficiencies from scales of operations, production and development activities through strategic alliances. Strategic alliances permit pooling resources at marketing, advertising and promotion, bringing down the unit costs of production on material scale.
Pooling complementary Resources	By collaborating, companies pool in each other's resources that could be outside their core business areas. One partner may possess enhanced production facilities which can be effectively utilised through raw materials supplied by the partnering company. A company can utilise the marketing network of partnering company for bettering sales volumes.

Change of law by the government of Japan in regular intervals enabling its companies to partner foreign companies to gain access to overseas oil is testimony to the strategic significance of strategic alliances. In order to offset its vulnerability

to price shocks and supply disruptions due to over-dependence on foreign oil, Japan changed laws to empower state agencies getting stakes in production in foreign oil fields. Japan's concept of self-developed production of oil and gas derived from Japan's direct ownership and control in the project operations and production activities that contribute to stability of long-term supplies. Its strategy of gaining direct control offshore was also evidenced from its tendency to develop bipolar relationship with oil and gas supplier countries (**Kobayashi, 2014).** Amongst the various measured suggested, establishing a regular mechanism for bilateral energy dialogue and sorting out regulatory issues could provide a major push for energy alliance with oil rich countries.

Oil and gas deposits are tool of engagements for host governments form power grabbing and they tend to exploit their resources at a slower pace at their own convenience. When crude oil prices jack up and revenue flows increase, these governments become empowered to provide better services to their citizens that primarily reinforce their control on political process. Due to lack of competition from private companies in developing the oil and gas resources, governments enjoy some leeway and can do way from prudent pricing strategies that ensure economic efficiency. Formal and informal collusion among oil-producing countries provide the opportunities to overprice oil resources that can provide additional revenue to the states. Such cooperation create monopolistic conditions that may expand or contract over time as market conditions undergo change. The example is the creation of OPEC as cartel of oil producers that still exerts some upward pressure on global crude oil prices. Empirical estimates of the oil import premium incorporate this market failure as the market power component, estimated as the ability of the oil-importing nations to reduce the monopoly price charged by OPEC.

The regional practices and considerations for acquisitions by independent oil companies, national oil companies and international oil companies are summarized and listed in the table below (**Table 4.2**).

Table 4.2: Regional practices and indicators of acquisitions

	Independents	**International Oil Companies**	**National Oil Companies**
Recent Activities	• As oil companies focus on cost reduction, the extent of mergers and acquisition activities reduce and companies go slow on expansions, especially of capital intensive projects and redevelopments. • Key decision makers and managers concentrate on maintaining cash flow, including hedging.	• Focus on cash preservation through reduction of costs, also on delays in project execution • Strategies to reduce complexity of projects • Construct portfolio of assets under same categories or types • Large acquisitions are restricted and carried out only in exceptional circumstances.	• **Russia:** Its national oil company Rosneft expanded globally focusing on a small number of deals in countries that are friendly and strategic to its interest, like India and China. • **Middle East:** Upstream activities are matured, big exposure • **India**: largely perceived to be slow mover despite signalling interest • **Southeast Asia:** In this region the pace of oil and gas mergers and acquisitions slowed down since 2015, because of ageing assets where redevelopment capital would be required to either maintain production level or get incremental volumes. • **China:** acquired aggressively oil and gas resources till 2013 however, the pace slowed on internal political consolidations

Considerations and Challenges	• Independents with high debt focus on sustaining survival and cash flow • Spotlight on biannual redetermination or portfolio revamping. • Stronger operators manage costs better and can make bold portfolio decisions.	• Preserve cash through capital efficiency and streamlined portfolios. • Reduce expenditures through efficiency and redistribution of capital. • Change operating models for different asset types through six sigma and other modern management approaches.	• National oil companies made to support host government projects and budget ambitions • Whenever oil revenues decline due to global slump in crude prices, governments embark on cost cutting. • Generally subsidies are curtailed, sovereign wealth funds may be repatriated.
Actions to Consider	• Financially weaker oil and gas companies tend to approach debt providers to ensure credit facilities. Such companies also get cosy with debt companies to identify potential partners. • Companies which are financially stronger undertake portfolio appraisals. They identify candidates for potential divestment for achieving synergy in efficiency and costs. • Structural transformative actions are undertaken to reduce costs, enlarge cash positions and reserves.	• IOCs build competitive advantage after selective assertion in few focus areas • Cost reduction through structural changes and adopt new methods beyond traditional approaches • Operating models are changed and new innovative models are adopted • Trade-offs are carried out across business verticals on a global scale. • Mergers and acquisitions are pursued for new opportunities where the core competencies and capabilities can match	• National oil companies for expansion mode capital go for joint ventures with stringer IOCs and Independents in their existing assets and projects. • Scan market for targets that can be acquired for adding to its portfolio towards achieving strategic goals. • Focus on structurally reducing costs and entering new territories with friendly governments.

The diversification strategy adopted by China in its oil and gas sector sought to be comprehensive and maneuverable. In the short run China preferred coal extraction. It was supported by policies for exploration and production and refining of oil and gas. In the longer term plan, construction of energy infrastructure, especially for

renewable development projects for captive as well as grid power generation assumed significance and priority. Such resource augmentation included solar, wind, and nuclear. In the era of slower Chinese growth, India has emerged as a new contender. India's burgeoning budget deficit prior to the oil price drop in 2014, added to the lackluster investment climate and oil demand growth languished at around 0.13 million barrels a day for the past decade (**Michal, 2016**)

Looking at import diversification, crude oil import from singular source is far riskier than from multiple sources because with a diverse group of suppliers the vulnerability risk for buyers get significantly reduced and they do not face single hostage situation. With multi-sourcing capabilities, the importing nations can experience interruptions in supply in case of a group of suppliers become incapacitated to fully comply with its committed supplies for reasons beyond its control like the acts of terrorism, natural calamities, earthquakes, change of political and military regimes and other force majeure events. Adopting diversification strategies that can be implemented both for supplies and consumption end can significantly reduce vulnerabilities and improve energy security (**Yergin, 1991**).

India's endeavors towards oil import diversification has achieved limited milestones. Crude oil demand of India increased by 5.5 percent from 203 million ton level in 2015-16 to 214 million ton next year in 2016-17 whereas global average growth was 1.6 per cent during the period. The modern technology driven refining sector of India can handle wide variety of crude oil slates that provide opportunities to be super-efficient in operations and be globally competitive. Indian refining companies are consciously scouting for multiple sources in order to optimizing their refinery productivity and enhance geographical spread of India's crude oil imports.

The governments have focused across the globe towards making arrangements for assured supply of raw materials over the long term, so the country can achieve higher economic growth. Those raw material assets that are limited in supply within

the country but are necessary for the industry, demands for alternative arrangements to be made to avoid supply disruptions. The Government of India recognizes the race of emerging economies for securing oil and gas supplies and has accorded facilitating guidelines for overseas oil and gas assets acquisition.

While deliberating the need for a policy framework in this regard, it is emphasized that the raw material assets of oil, gas and coal are extracted from the deposits under the ground, and predicting and assessing their quantity and commercially available volumes cannot be done correctly at all times. Application of scientific methods and theories are required for assessing volumes of deposits. Since commercial decisions are to be based on technical assessments, hence, investment analysis comprise undertaking technical challenges and commercial risks.

The Government of India, while formulating policy framework for overseas acquisition, enjoined upon proactive role of its foreign ministry and diplomatic missions abroad. It has promulgated that its foreign ministry shall be associated right from the beginning of the process of scouting and potential acquisitions. The Department of Public Enterprises [DPE] has issued enabling policy guidelines for enhanced autonomy and delegation of powers to different categories of central public sector enterprise [CPSE]. Such guidelines were issued subject to certain stipulated conditions in cases of Miniratna, Navratna and Maharatna schemes. The enhanced autonomy and financial powers given to the Maharatna, Navratna and Miniratna category companies provide policy support for expedited acquisition of raw material assets abroad.

The public sector oil companies from India that could acquire stakes in overseas oil and gas projects benefited from their foreign energy quest. Overseas oil and gas has contributed to increasing their portfolio reserves and fiscal coffers. However, such endeavors translating into enhancement to India energy security system is not

automatic as the share of output from such projects can be in form of revenue, production or in kind, based on contracts signed.

The times of low oil price regime and periods of global financial crisis create new opportunities to diversify and acquire oil and gas assets in countries that hitherto were inaccessible to emerging economies. The United States, China and Japan are the world's top oil importers, and all of them place greater focus and strategic impetus towards diversification. Working towards diversification and geographically expanding oil investments are core indicators to their energy strategies. Academicians and researchers have carried out extensive work on various conceptual frameworks for assessing the diversification indicators and sub-elements of energy security system of energy deficient economies reliant on imports.

4.2 Themes from Literature Review

Based on the literature review carried out, four themes have emerged in the present study. The themes are described in subsequent para summarizing the research gaps and explaining the need for research.

Theme 1: Literature providing the existing practices followed in India for acquisition of overseas equity oil

Theme 2: Literature providing the practices followed in the global arena for acquisition of equity oil in energy importing advanced economies of China, South Korea and Japan, which provide the direction and key learnings

Theme 3: Literature providing energy security of India with the perspectives of oil and gas resources

Theme 4: Theoretical underpinning of equity oil asset acquisitions.

Theme 1: Literature providing existing practices for acquisition of equity oil

The government of India agencies do not participate directly in acquiring equity oil assets abroad, acquisitions are carried out through its state controlled petroleum companies. ONGC Videsh invested in Russia, Myanmar, Vietnam and Sudan, and India's first equity production started in January 2003 in offshore gas project Vietnam. This was followed in March 2003 by acquiring 25 percent stake in a large oil producing project in Sudan. Starting with overseas production of 0.25 million ton of oil and oil equivalent in financial year 2003, equity oil and gas production reached all-time high of 14.98 million ton during financial year 2019-20, with cumulative investment of USD 30 billion incurred till March 31st 2020.

Industry body FICCI highlighted the need for forging ties for securing energy supply requirements for rapid growth of economy in India and highlighted the major challenges in this area. The possible impediments on account of price controls in India where actual oil pricing is dictated by the world market, was brought out. The paper advocates building on diplomatic relations with producing countries and urges the government to attribute prime importance in engaging in a continuous dialogue with the oil-exporting countries. The theme based literature review with gap analysis are summarized and presented below (Table 4.3).

Table 4.3: Literature Review Summary and Research Gap – Theme 1

Sl No.	Research Paper/Journals	Key Observations	Research Gap Identified
1	Bardhan, Debnath and Jana, 2019	Authors investigate the historical development of planning for energy in India since its independence, from the context as to how the strategic visions evolved over the time to maintain the goals of sustainable development. Phase wise analysis in distinct era are illustrated focusing on supply constraints, development of infrastructure and industry and growth of fuel, modernization of the electricity system and diversification of oil supplies.	The study brought out that India's energy policy has been evolving to maintain energy security needs but has largely followed a reactionary approach. India has ratified the Kyoto Protocol in 2001 and since then its energy policy has focussed intensely on sustainable development keeping the focus for greener economy and cleaner climate.
2	Soni, Singh and Banwet, 2016	Authors develop a framework model for analysis of energy security situation based on situation-actor-process. The model is developed to analyse the supply-side of energy security management for power generation system in India. Different situations are presented based on the issues related to execution of a particular energy project, and such issues that arise during execution provide leads. The leads are studied to understand the lessons learnt from the case study and situations are assessed for better understanding the implication of the issues on performance of the energy project.	Authors developed the framework model for the power sector energy supply perspectives. It provide the vital information of the performance of energy supply system in a single framework. The findings assist in understanding of energy security for power and energy projects, sustainable management practises and management of life cycle cost as well as the limitations in research and development in the context. The analysis can explain the managerial perspective as applicable to the Indian energy sector. The model can provide information on the key issues influencing the power sector projects.
3	Xie, Reddy and Liang, 2017	The paper assesses the factors influencing international mergers and acquisitions. To undertake the study the authors have carried out literature review of more than 250 studies pertaining to cross-country mergers and acquisitions. The study brought out the macroeconomic factors as well as institutional and political issues that has strong relationship with cross-border mergers and acquisitions. Researchers also bring out that the regulatory regime, corruption index and taxation and accounting standards in the host country are also important influencing factors.	Research findings establish strong positive correlation between cross-border mergers and acquisitions and the prevailing financial markets and high level of corporate governance in the host country. Authors also find that issues like geographical distance of the host country and cultural differences can be overcome by the endowment of natural resources and market size in the country of investment. From the corporate taxation point of view and capital gain tax perspective, the target country becomes attractive for cross-border mergers and acquisitions when it has strong institutional framework.

Sl No.	Research Paper/Journals	Key Observations	Research Gap Identified
4	Sen and Sen, 2016	Authors argue that the demand of crude in India is predicted for getting boost because of structural changes and policy reforms, coupled with lower oil prices. 4Structural changes are happening because of the government push towards manufacturing and improvement in the road transportation network which enhances demand of fuel for transport. These factors are set to enhance the per capita oil consumption of India.	Structural reforms can make India achieve the same levels of oil demand growth as witnessed by China. Authors bring out that the oil demand growth projections can alter because India has emerged as net exporter of petroleum products and is increasing its refining capacity. The paper concludes that managing the structural reforms on a sustainable basis for overall economic growth of India will help in sustaining an increased oil demand
5	van Moerkerk and Crijns-Graus, 2016	Authors evaluate the risks associated with supply of crude oil from overseas territories to the top oil consuming countries of the world. The study has been undertaken to assess the oil supply risk till the year 2035. The countries covered in the study are Japan, India, China, the United States and the European Union. Authors researched oil supply sources and the diversification of supply portfolios of each of the oil importers and have constructed different scenarios to prepare the outlook. The research outcome bring out that the risk of oil supply from overseas territories would increase when the consumer countries prevent implementation of tougher policies on climate change.	In the scenario that abundance of oil supply are expected to obviate the requirement of compliance to the climate change stipulations towards greener environment, the risk of supply disruptions in crude oil get increased. In case of China, the study finds that in majority of scenarios, the country encounters higher risk of oil supply disruptions given the spread of its import sources. Japan also has high risk of supply disruption threats because of very high level of reliance on imported crude oil and also due to the fact that there are lower diversifying of sourcing of oil in Japan when compared to diversification of supply sources in peer nations of India and China. The study also finds that in case of the European Union countries the risk of supply securities are highly dependent and influenced by Russia.
6	Kelkar, 2014	The report of the committee of experts constituted by the government of India examined the underlying contractual, commercial and economic factors towards its task of framing policy guidelines for enhancing exploration and production activities.	The experts emphasize on the importance of offering investors reasonable returns on their high risk capital well beyond the hurdle rate. Striking the right balance between the risk and reward for oil and gas investment is the key to attract capital in oil and gas exploration, development and production activities. Further, tax reforms are advocated for encouraging overseas oil and gas acquisitions by Indian companies, and the government has to ensure that oil and gas companies from India are not

Sl No.	Research Paper/Journals	Key Observations	Research Gap Identified
			disadvantaged in their operations in foreign countries.
7	Zhou, Song, Li and Chen, 2018	Authors developed a statistical model for assessment of risks in making investment decisions for acquiring mineral resources in foreign countries. The model assist in making decisions for investment in such projects and has been developed keeping in mind the deficiencies that were observed in other models that determine a single rating or index. In this particular model, a combination approach has been adopted for dynamic with determination of the weights.	Researchers work on the risks factors and assess them in utilising the model that provides an index. The index system is useful for bringing out issues by utilising the data on the existing system in a particular country as well as incorporating the experience of experts and industry veterans who have proficient knowledge in those natural resource sector in the countries of operation. The model provides a scientific way to analyse the risks associated with investment in mineral resources in foreign countries and is used as a decision making tool.
8	McKinsey & Company, 2016	India being an import dependent country, its domain of energy security extends beyond securing oil and gas supplies to providing affordable energy to its citizens irrespective of paying power. Therefore for Indian scenario, sustainable energy supplies, economic viability, energy access to all and fuel mix are the energy security key themes. Authors develop an energy security index based on fifteen distinct and actionable factors around the key themes.	The energy security index developed indicates negative evolution in last 10 years. However the energy evolution is positive only during few immediate preceding years. The deep extent of import dependence and vulnerability to external factors are primary reasons for negative growth. The subsidy based government policies of India are also identified a key factor towards negative growth.
9	India Hydrocarbon Vision, 2000	The energy policy of the government of India articulates the need for empowering Indian national oil companies to enhance their efficiency so that they can compete with global entities. It proposes giving fiscal and tax incentives for outward energy investments. The document also dwells upon leveraging the buying power of India's large consumer base for upstream integration.	While analysing the energy demand supply scenario in holistic way and providing for outlook for the future, the perspective of oil and gas supply situation in the global scenario to bridge energy gap in emerging economies are not elaborated comprehensively
10	Integrated Energy Policy, 2006	Emphasises on enhancing domestic exploration and production activities to enlarge India's energy resource base in one hand, also advocates overseas equity as an element of energy policy	
11	Zhu and Singh, 2016	Authors analyse the relationship between crude price volatility and	The real options model establishes the relationship between price volatility

Sl No.	Research Paper/Journals	Key Observations	Research Gap Identified
		strategic investment of oil companies. Real options methodology has been followed in the analysis. The study is conducted in three global regions in Asia, Europe and North America. The findings demonstrate existence of regional influence. Empirical outcome are described as a policy tool towards determining oil investment.	and strategic oil investment on regional effect basis, where only in case of Europe, a positive correlation with linear relationship has been observed. The relationship is non-linear for Asia and North America. The study captures the host country effects on the decision making for overseas oil investment in a particular geographical region.
12	Meyer, Ding, Li and Zhang, 2014	Research applies the neo-institutional theory to explain the determinants of offshore investments by national oil companies. The study finds the factors influencing investment decision of national oil companies outside their countries boundaries are more complex than for their private counterparts. There are considerations of political nature at home as well as there are host of non-economic factors in the host country that affect oil investment of national oil companies	Role of national oil companies investing for oil overseas from geopolitical perspective, rather than economic viability perspectives are explained. Authors find that investment by national oil companies for foreign oil supplies may be triggered by institutional pressures. Such pressures can be for inducing or directing the firms to extend foreign policy priorities of the investing government in the country where oil investment is being done.
13	Dadwal, Ray & Sinha, 2005	Examines the reasons and motivating factors behind the decision of companies to invest abroad in uncharted territories. It explains whether firms are investing overseas for market, resource, assets, efficiency, etc.	Evaluation of the factors for overseas equity acquisition and related challenges are not covered in the research work.
14	Pradhan, 2008	Elaborates on the trends, motives and challenges faced by India in overseas oil acquisitions	
15	Adams et al, 2019	Authors investigate the reasons and implications of the negative impact oil wealth on the host countries which are oil-rich and are either poor or developing. The paper brings out the traditionally the curse of oil wealth in such poor countries are on account of lack of transparency and absence of accountability of the political and governance institutions. However, with the advent of global companies hunting for oil, the negative impact have been established on account of organisational practices that encourage the curse phenomenon.	The study concludes that increased globalisation for oil resources and activities of international stronger oil companies have created situations for oil curse in the oil-rich developing and poor countries. The findings provide insights about how changes in the organisational structure of multinational companies towards imbibing ethical practices while dealing in oil resources in developing countries can contribute towards taking advantage of the oil resources for positive development in the oil rich poor nations.

Sl No.	Research Paper/Journals	Key Observations	Research Gap Identified
16	FICCI, 2013	Study identifies characteristics of equity oil acquisitions done by Indian Public Sector companies. On the comparative note, the research paper brings out that mergers and acquisitions carried out by the state owned oil and gas companies of China have been supported by diplomatic and State support and funding from China's sovereign wealth fund corpus of US$375 billion. Research brings out need to encourage a healthy trade with producer countries by offering robust Indian products and services like IT software and garments.	The aspect of foreign ties towards strengthening energy security through foreign oil acquisitions is comprehensively researched. The challenges are well brought out but mitigation measures, which are the crux of the research work, are not investigated.
17	Deloitte, 2020	Identifies the key transactions for international oil and gas and its key considerations, drivers and the outlook. The number of cross border oil and gas mergers and acquisition transactions during 2019 reached about 400 with deal value of about USD 370 billion.	International oil and gas transactions were largely accounting for the divestment of non-core global assets towards portfolio optimisation. Focus on getting a footprint on renewables and less carbon fuels also were factored into the divestment programs. Lower oil prices would again effect the global oil and gas mergers outlook.
18	Huda and Ali, 2017	Researchers conducted analysis of the cross-country TAPI pipeline project from the perspective of viewing the security situation associated with large energy projects from the border terms of energy security. The multi-country pipeline project which was inaugurated in December 2015 is a joint venture project promoted by the government of Turkmenistan, Afghanistan, Pakistan and India to supply gas from Turkmenistan to the consortium partner countries through a pipeline. Authors find that the participating countries to the pipeline project exclusively focused on the physical security situation associated with the pipeline rather than expanding the key considerations on a multi-stakeholder approach towards energy security.	Researchers provide interesting insight that by approaching additional stakeholders beyond the participating countries the energy security situation can be improved for energy infrastructure projects like the TAPI. The additional incoming parties joining into the project, that can be large corporates or countries not having interest into the pipeline project, can help in building consensus on political issues amongst the consortium countries. The interest of communities around the pipeline as well as other direct and indirect stakeholders can be brought together instead of focusing only on physical security issues. Authors argue that focusing on the social aspect for energy infrastructure project can create a shift in viewing large energy projects from security angle to projects of cooperation amongst the communities and governments amongst the countries.

Sl No.	Research Paper/Journals	Key Observations	Research Gap Identified
19	Bogoviz, Ragulina, Lobova, and Alekseev, 2019	Authors reviewed the key elements of energy security to measure its performance in the BRICS group of nations. The data has been analysed during the period of 25 years from 1992 2015. Four dimensions of energy security have been taken into consideration while evaluating the performance of energy security in the BRICS group. They are energy efficiency, environmental issues, the level of adequacy of energy supplies and finally the paying power of consumers. Authors developed an index for the energy security performance. The model provides for the indicators of energy security to measure their progress in the context of overall dimension of energy efficiency, energy poverty and environmental concerns.	Research finds that each country within the group has made certain amount of progress on the energy security performance which are different from the other country on a particular energy aspect or dimension of energy security. However, as a cohesive group the BRICS could not make substantial changes in his energy security performance during the period of study. The most significant changes have been made on the energy security performance By Russia, where the performance has improved. Whereas in case of China there has been the severest decline amongst BRICS group in their energy security performance during the period of study.

Theme 2: Literature providing the practices in energy importing advanced economies of China, South Korea and Japan, which provide the direction and key learnings

Literature review has brought out the practices followed for oil and gas equity acquisitions by different countries of the world. Review of the trends in global

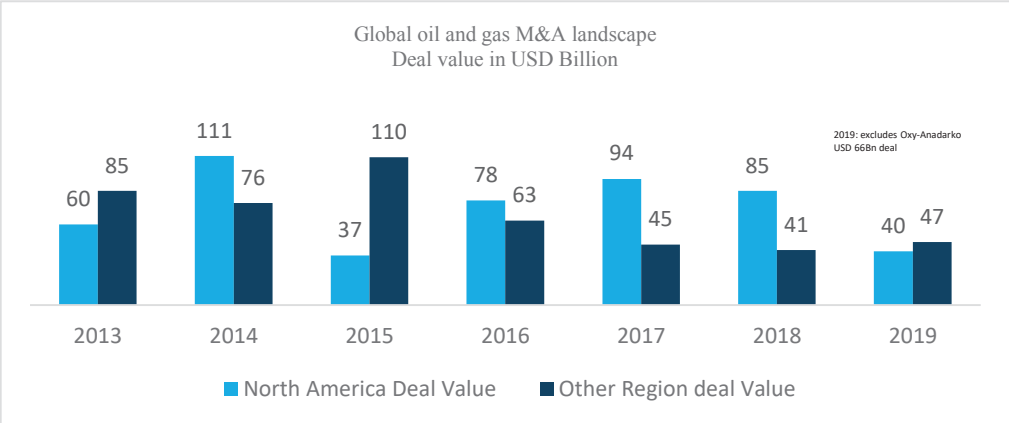


Figure 4.1: Number of upstream oil and gas deals with deal value

mergers and acquisitions for upstream oil and gas (**Figure 4.2**) indicate that transaction activity slowed down with fall of crude oil prices by more than 50% starting July 2014. Global oil majors and other large integrated international oil companies are the traditional candidates driving the oil and gas mergers and acquisitions globally. Capital allocation of larger oil companies have been adversely affected post the 2014 oil price crash, several of them have had asset disposal programs towards debt reduction and exited non-core assets in its portfolio. The capital constrained small and mid-size oil companies became potential takeover targets.

The number of oil and gas sector merger and acquisition transactions have fallen during the last three years. Also, the value of the deals have decreased in this period despite recovery of oil price gradually from 2016 onwards. During 2019 the global oil and gas deal value decreased by USD 38 billion from the previous year, however, with Occidental Petroleum acquiring Anadarko Petroleum for USD 66 billion during the year, the overall deal value in 2019 work out to be USD 153 billion, an increase of USD 27 billion from 2018 (**Fitz, Alkadiri, Webster & Dewar, 2020**)

Triggered by the sudden price crash in late 2014, global oil and gas companies reporting bankruptcy restructurings increased manifold. The slump in global oil spend improved after 2016 with uptick in crude oil price. By the late 2019, the financial distress in oil and gas sector started emerging again on the onset of global flu pandemic that halted industrial production and movement of people and goods and services, and consequently the oil demand shrunk, creating a supply glut. The oil price crash triggered by 2019 flu is rebalancing global oil industry as more and more oil companies reporting reduced or deferred capital plans. The situation is evolving as the demand may rise after the pandemic and the supply situation may not be able to meet demand immediately due to stoppages in oil investment.

Table 4.4: Literature Review Summary and Research Gap – Theme 2

Sl. No.	Research Paper	Key Findings and Inferences	Research Gap
1	Ahmadi, Manera and Sadeghzadeh, 2019	Authors explore the inter relationship between oil investment and the associated uncertainties on account of the underlying components affecting global oil market. Study brings out that in situations of higher oil consumption demand outlook, the uncertainties' associated in global oil industry market can lower oil investment. Uncertainties in the stock prices have a negative impact on oil investment with lag time of about a year.	The study brings out absence of a positive relationship between uncertainty in oil market and oil investment, however, in cases where the oil investment can be reversed, there could exist a positive relationship. The findings are in conformity with the option theory of investment. The study has been conducted on the oil companies originating in the United States.
2	Gholz, Awan and Ronn, 2017	Researchers evaluate cross border oil and gas deals where the state controlled financial institutions of China have extended concessional funding of billions of dollars to the oil-rich countries in exchange of access to equity oil by China's oil companies. The Chinese national oil companies have acquired oil assets in underdeveloped and poor but oil rich countries in Africa and Latin America where Chinese government through its financial institutes and commercial banks have provided loans that can be categorised as loan for oil deals.	Authors have used standard financial analysis technique. Researchers conclude that the agreements executed by Chinese national oil companies with oil producing countries for purchasing stakes are not oil and gas investment which can be classified as profit seeking. Authors argue that providing concessional funding in exchange
3	Tang, Song, and Cao, 2018	Changes in the policies related to taxation has big impact on oil and gas investment and investors take exhaustive analysis of likelihood of changes in taxation regime of the host country while making oil and gas investment decision. Researchers developed an evaluation index in the context of China's oil and gas investment overseas that can evaluate the stability of taxation system in different countries where oil and gas investments have to be made. By identifying the regimes which has more stability in their tax regime, the	The study undertaken by the authors indicate that in China the risk of changing the policies regarding taxation pertaining to oil and gas investment are higher. However for Chinese state controlled companies making investment in oil and gas resources overseas, the stability index differs from country to country. The OECD countries have been found out to be less welcoming for Chinese

		investment risk in those regions become relatively lower and such countries are ranked relatively more attractive for oil and gas investment.	investment in their oil and gas resources. These countries have set investment barriers targeting oil and gas investment in particular from China's state controlled companies. The study has also found that the risk of changes of tax policies in Latin American countries like Ecuador are short lived. They follow a cyclical pattern and can change with time.
4	Erel, Liao, and Weisbach, 2012	Authors used data of large number of global mergers and acquisitions carried out between 1990 and 2007, especially sample of 56,978 cross-border mergers have been collected and analysed. Authors find that regional geography and bilateral relations increase the likelihood of mergers. Accounting disclosures are also important factor identified.	Study focuses on socio-economic factors affecting trans-national mergers. However the research work does not consider the change in company and asset valuation between a set of countries that occur through currency fluctuations and variation in exchange rates. There are also significant factors of stock market movements that usher in macroeconomic changes. The research gap is in extending the results to upstream sector merger and acquisitions on standalone basis.
5	McFarland, 2018	Oil is fungible commodity and is more portable compared to other hydrocarbon energy sources, which makes it globally traded commodity. Author investigates the role of international diplomacy for securing the strategic oil resources, in the context of its role in modern warfare and economic development.	Oil diplomacy, trade and economic sanctions and a host of other geo-strategic tools have been employed to secure oil supplies and also to control oil deposits of third countries. The relationship between oil and international relations are thoroughly investigated from geo-strategic perspective.
6	Ng, Chatzkel and Macbeth, 2012	Author harnesses earlier studies on significance of cultural lineage of China's state backed oil and	The research gap is that the key findings are based on disclosures made by only

		commodity companies. It studies that strategic purpose of reverse technology transfer that occur through trans-national mergers. Technology transfer.	two state backed companies. The limited exposure devoid of a larger group can only accord circumstantial evidence of developing some intellectual capital through the periods of pre and post mergers.
7	de Jonge, 2016	The study examines the potential for strategic alliance like triangular cooperation between the investing companies partnering from China, Australia and the African nations. The potentiality of such alliance in enhancing economic development in Africa are analysed.	Authors assume that when the African nations design their FDI policies, they would keep the potential benefits of the triangular cooperation comprising China, Australia and African nation. Another major research gap is in the assumption that investing companies from China and Australia might be exploring synergies for investing in Africa.
8	Bokpin, Mensah, & E. Asamoah, 2015	Researcher investigates how natural resources impact the inflow of foreign investment in African countries. The findings establish strong correlation between trade in natural resources and amount of FDI, even after accounting for rents, taxes, duties and export charges.	While it is quantitatively demonstrated that natural resources like oil and minerals influences FDI, the measures of natural resource vary significantly. Such variation are on account of percentage contribution of one or two particular form of minerals having higher contribution in attracting investments in Africa, rather than all forms of minerals.
9	Strom and Nakamura, 2013	Authors investigate characteristics of mergers and acquisitions carried out in Japan by the state owned companies of China. Motives of such investments are investigated. Author also investigates the composition of post-merger management team as per nationalities. Findings suggest that Chinese M&As in Japan are a result of well-considered investment decisions backed by state policy. Such policies are aimed at strategic	The study brings out the motives and patterns of mergers and acquisitions carried out in Japan by the state owned companies of China, as attempts towards getting competitive advantage and strategic resources. The gap is this study does not address equity oil factors as Japan is oil resource deficient and

		assets, advantages like competitive advantages and also specific mineral resources.	hence does not represent foreign markets for oil.
10	Tang, Zhou, Chen, Wang and Cao, 2017	Authors analyse the factors for oil investment and evaluation methodologies in the context of the complex international and geo-political scenarios involving uncertainties and irreversibilities. The investment opportunities arise in certain economic and political set up and the state controlled investment is intended towards safeguarding national energy security.	The paper concluded that international oil project at the start-up phase encounter higher level of uncertainties and risks. Economic viability for project investment can be met by considering certain low costs parameters and the timing of investment. The study focussed on the evaluation of oil investment in a Chinese oil venture.
11	Charfeddine and Barkat, 2020	Researchers explored the impact of oil price shocks on the real GDP of Qatar. This has been investigated along with the changes in oil revenues on account of changes in the oil price. The statistical models AB-SVARX and a nonlinear autoregressive distributed lag model are utilised. Different scenarios of oil prices and revenues considered.	Findings indicate responses of GDP to negative shocks on real oil price and revenue are higher than impact of positive shocks. This indicates asymmetric impact of shocks in short-run. This is also confirmed by NARDL studies. Authors conclude that research results provide confirmation that the economy of Qatar is resilient to negative shocks and that the oil and gas industry has played a pivotal role in diversifying the economy of Qatar.
12	Mlambo, Mlambo and Mubecua, 2018	Authors investigate the motives of growing investment by China in the oil and mineral rich countries in Africa. A qualitative approach has been utilised for the research in finding out the drivers of Chinese investments and its growing footprints in Africa. The bilateral relations of China and Africa and its effect through Chinese investments are researched.	Authors find that China has invested in Africa as part of a strategic vision and has set up various institutes in oil and mineral rich countries of Africa to strengthen its grip on the political landscapes. It is concluded that Chinese investments may have benefitted the African countries but they need to protect their economies from cheap imports from China.

13	Krane and Medlock, 2018	Author explores the geopolitical dimensions of the changing relationship of traditional oil suppliers to the United States. The United States has grown more self-reliant with oil and gas and its dependency on historical allies and traditional suppliers have undergone a paradigm shift.	Author argues that as more and more oil are being found in Africa and Latin America, there would more diversification of oil supplies. This would cause a gradual decline in the strategic importance of traditional US allied countries in the years to come. Going forward basis, author suggests that the United States may not be inclined to abide by the Carter Doctrine principles of protecting its interest in the Persian Gulf.

Capital investment in the oil sector is intertwined with undertaking geological and development risks under the ground are the most important factor in deterring investment in the oil project. Major global companies go for investment in projects with complex geological challenges beneath the ground. Mitigating these challenges sometimes can put upward pressure on the cost of finding the lifting the oil and also can delay commencement of production significantly. Such constraints generally persist for longer period of time in upstream oil development projects for which the sourcing constraints are likely to remain a dominant factor causing price fluctuations (**Bob, Scott & Kassia, 2016**).

The oil and gas market is susceptible to price volatility, which has been evidenced in severe form from the fourth quarter of financial year 2020. The flu pandemic has disrupted economic activity in developed as well as developing economies. Oil and gas companies turned cash stressed and were forced to forego debt funded volume growth. The focus reverted on preserving cash flows through massive cut in capital spends. Going forward the outlook is for increase in mergers and acquisitions activity as oil companies go for divesting non-core and distressed assets. The aging

oil and gas assets which demand redevelopment capital are expected to be on sale by financially stressed companies

Theme 3: Energy Security situation of India

With steady increase in consumption demand of its growing population, India's crude oil demand surpassed that of Japan during the financial year 2015 and India became the third largest oil consumer in the world. While the consumption continued to grow, the domestic prosecution remained largely stagnant. During financial year 2019, India produced 34.2 million ton of oil and consumed 242 million ton.

Figure 4.2 showed historical growth of crude oil consumption in India vis-à-vis other three top consumer of the world, indicating a steady rise in India's case. In India over the past decade the average annual oil demand growth has been about

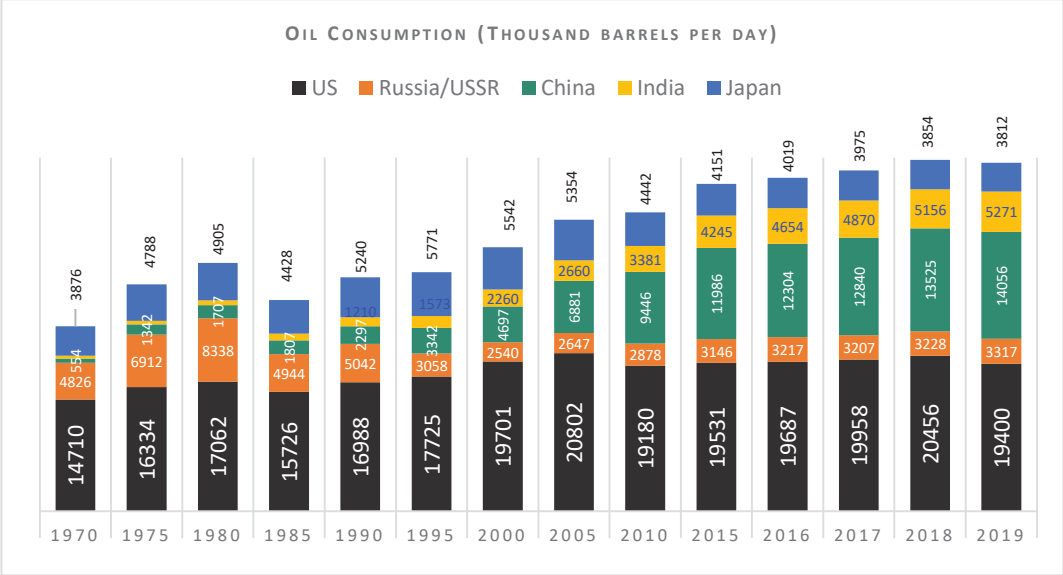


Figure 4.2 Top Consumers – consumption growth patterns

0.15 million barrels per day. While consumption of energy has been rising steadily in the Asian countries, sustained growth its economies also resulted in enhanced consumption of energy in the European region including in Germany, France and

Italy. The United States energy consumption level has remained stable for the second consecutive year on account of enhanced energy efficiency measures and lower demand of electricity (**Anisimov, Truntsevsky, Bessel & Yessetova, 2020**).

The catalysts for enhanced energy demands in India have been extensively covered in research literature. India's economy has been on accelerated growth path since 1990s at yearly average rate of 6.5 percent. On comparative notes the growth rate is about two-and-a-half-times the average growth rate globally. Amongst emerging economies, the growth rate of India was next to China. In case of India, its economy is expected to benefit from enhanced spending in the infrastructure sector, creating ease of doing business norms and providing priority on the manufacturing in India. Economic growth, large population and urban shift are predicted to sustain enhanced demand of energy resources in coming decades.

Figure 4.3 presents the cost of crude oil imports by India. Oil imports consume a large part of India's foreign exchange and the crude oil imports have experienced steady rise through the years. Demand for oil in India has been increasing steadily outpacing gains in oil production and energy additions. A big reason is that the developing nation of India has a large population that have been growing rapidly. The economy have become increasingly urbanized and industrialized that contributed to steady increase in the demand for oil.

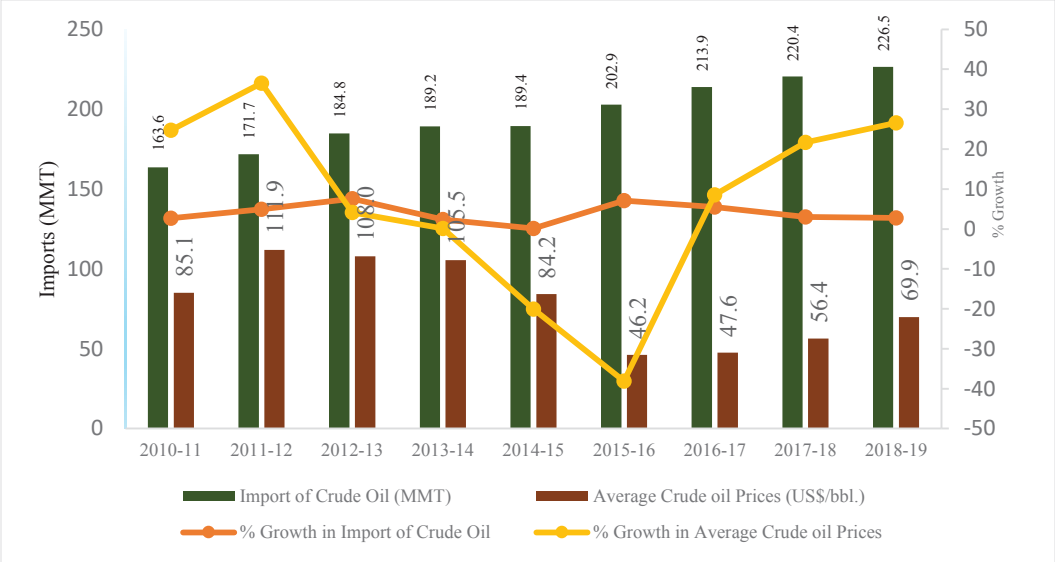


Figure 4.3 Crude oil import vis-à-vis average price

As the crude oil market fell drastically following the global spread of flu pandemic by the fourth quarter of 2020, India's oil import bill decreased by about 10% in financial year 2020. According to provisional data from Ministry of Petroleum (PPAC, 2019) of the petroleum ministry, crude oil import bill of India was USD 101.4 billion in financial year 2020 as against USD 111.9 billion in previous fiscal year. During May 2020, global crude oil prices have slumped to about USD 30 a barrel as against a high of over USD 70 a barrel in January 2020.

While increasing domestic oil production has inherent limitations on account of lack of new discoveries, diversification of energy supplies have emerged pivotal for India’s situation. Crude oil is fungible commodity that can be traded offshore and hence need not be brought to India for refining purpose, this offsetting the supply deficit situation. The periodic low oil price cycles offer opportunity for India to acquire energy assets overseas at competitive prices as more and more energy companies face cash constraints in low price regime and assets become available for potential acquisition.

Energy inadequacy situation has also assumed paramount significance in the context of the recent push by the Government of India on domestic manufacturing. The endeavor depends on efforts first to secure energy uninterrupted to business, industry and citizens. India's high import dependency also requires infrastructure to be put in place for the rising energy imports and on the other spectrum, creating distribution channels of energy within the country by augmenting port and rail infrastructure. The pipelines for transportation of crude oil, natural gas and petroleum products within the country need to be strengthened, along with participating in creation storages, cross-country pipelines and regasification and liquefaction terminals.

The other key determinant is import costs. Oil and gas importing emerging economies of India, Japan, China and Korea have occupied top positions in economic growth curve. These economies become beneficially placed in lower energy price regimes whereas producer countries like Saudi Arabia, Iran, Iraq, Russia would look to newer strategies to steam up oil demand and oil revenue earnings.

Table 4.5: Literature review summary and Research Gaps: Theme 3

Sl No	Research Paper	Key Findings and Inferences	Research Gap
1	Mohsin, Zhou, Iqbal and Shah, 2018	Researchers have developed a composite index of energy security as a tool for police analysis. The research is based on the energy security indicators of South Asian countries and identifies the challenges of sourcing oil supplying to the region. The energy security index model is based on a host of indicators including but not limited to geopolitical risk, consumption pattern,	The composite energy security index developed by the researchers provide a competitive score for energy security assessment amongst the South Asian countries. The outcome indicates that the energy security index of India is on the higher side compared to Bangladesh and Afghanistan. Researchers justify that higher score on the energy security index makes India lesser vulnerable to supply risks

Sl No	Research Paper	Key Findings and Inferences	Research Gap
		diversification, foreign exchange rate fluctuation and per capita GDP.	compared to its South Asian peers and this is account of its higher potential to shift its supply sources. Researchers further conclude from their model that oil supply risk can be improved by adopting innovative technologies and diversification of supply sources.
2	Babajide, 2018	Author evaluates the economic and environmental implications of the inadequate energy supply situation of India by examining efficiency of primary energy sources and its diversification. India has emerged as a major country of greenhouse gas emission because the major portion of its primary energy mix constitutes fossil fuels. Oil, natural gas and coal constitute the majority of India's primary energy consumption that poses climate threats due to enhanced carbon emissions	The paper conclude that India's thrust towards renewables, especially solar energy would reduce carbon footprints, decrease its reliance on fossil fuel and consequently the import dependency situation and environmental sustainability would improve. Strategic oil reserves would also reduce India's vulnerability, along with policy push towards development of renewable energy and technological innovation.
3	Bhandari and Kulkarni,2016	Author emphasizes that India's position unlike the peer countries that are economically emerging, is heavily dependent on energy and hence imports. The imports have become critical due to its gradual rise with increasing demand situation and lack of domestic feed. Energy resources need to be acquired overseas but for that India entities need to be agile and flexible, with necessary support from the government for a strong and financially empowered state back government company.	Lower oil prices offers India opportunity to secure energy needs by diversifying sources, investing in equity oil and through financial instruments.
4	IEA, 2020	Since the year 2000, a share of 10% in the increase in global energy demand has been	The projected level of energy consumption scenario propelled by demographic expansion and

Sl No	Research Paper	Key Findings and Inferences	Research Gap
		engineered by India. India's growing population will expand the demand further and may double the present rate. Authors noted that per capita energy demand in India is still significantly below the world average to the extent of 40 percent.	high economic growth of India that is expected to double by 2040.
5	Ang, Choong and Ng, 2015	Authors evaluate the dimensions of energy security of Singapore through literature survey on energy security framework developed for energy importing countries. Energy security framework is developed by the researchers for assessing the energy security indicators of Singapore based on composite index. More than twenty number of energy security indicators have been utilised. The study has been carried out for a period of 20 years from 1992 to 2010.	The research paper finds that the energy security of Singapore has remained stable throughout the period of study, and there has been improvement in the supply chain of energy for Singapore. Further, the sub-indexes related to the environment aspect have also shown improvement. However the improvement on environmental aspects are set aside by economical aspects which shown a decline during the study period. The energy security framework developed can be used for identifying deficiencies in the supply chain in the context of energy security of Singapore.
6	Rastogi, 2014	Research paper assesses the vulnerability of India to the risk of supply disruptions due to geopolitical developments in the middles east regions from where India sources majority of its oil imports. Paper suggests reasons as to why a major economy like India must diversify its supply sources as new oil and gas deposits are discovered in Latin America and Russia.	Researcher analyses India's oil demand supply situation in the last four decades and proposes a model for energy outlook prediction in the future.
7	Chakrabarti and Anindita, 2016	Authors examine energy security situation in India with particular focus on the oil and gas sector. Rising GDP per capita in the context of the current structure of	Domestic production capacity of all the sources of energy is inadequate to match the demand and consumption, and hence there the dependence on import is

Sl No	Research Paper	Key Findings and Inferences	Research Gap
		energy sector and the impact of crude oil prices have been studied along with research in patterns of import of coal, crude oil, gas and coal in India.	rising. The regulatory and policy environment in India are identified as key impediments that discourage investment in energy sector thereby reducing energy security position.
8	Kurian and Vinodan, 2013	Authors investigate the key considerations and contemporary issues related to energy security and its implications in the South Asian economies. Evolution of strategic significance of energy security in the context of historical events of political and economic importance are examined.	Authors argue that energy security would vary from country to country and also from one period of time to another due to its circumstantial contexts including social, environmental and innovations in technology. Accordingly the dimensions of modern energy security systems are not isolated within the country but are globally integrated, which brings in the aspects of climate concerns and growing internatiolisation of energy security.
9	Konijn and Tulder, 2015	The role of natural resources in the nature of swap deals for investment in infrastructure projects are examined in the context of globalisation strategies. Study concludes resources-for-infrastructure swap deals has been used as a successful strategy for internationalisation in various countries of the world, particularly for getting access to natural resources in Africa and Latin America region.	The study is based on case studies pertaining to deals that are swapping in nature and classified as resources-for-infrastructure swaps done by the Chinese state controlled entities. The sample size used in the study for arriving at the conclusions are small and focus is on the political economy perspective of Chinese swap investments in seven African countries. The model cannot be applied to global multinational oil companies due to lack of state institutional machinery institutional role in foreign investments of companies.
10	Rodríguez-Pose and Cols, 2017	The authors researched the inflow of foreign direct investment in various countries in Africa and observed that countries with endowment of natural resources generally attract much higher	Authors evaluated the data of 22 countries in Sub Saharan Africa pertaining to factors that influence foreign direct investment. The findings indicate that the quality of governance has a much

Sl No	Research Paper	Key Findings and Inferences	Research Gap
		level of foreign direct investment. There has been increase in quantum of foreign direct investment in multiple countries during the last two decades but investment inflow into the sub-Saharan African countries has remained lower. This is in spite of the fact that the sub-Saharan African countries are rich in natural resources and also they have growing local markets. The research underlines the factors that determine the influencing factors for attracting foreign direct investment into the country.	stronger influence in decision making for investment into the sub-Saharan African countries. The research indicates that among countries in sub-Saharan Africa that have relatively better governance system and political stability have attracted higher foreign direct investment, irrespective of the level of endowment of natural resources. Another influencing factor that emerged in the study is the rule of law and accountability of the ruling establishment in the country of investment that has attracted higher level of foreign direct investment.
11	Singh, 2010	Author argues that the demand for energy resources have increased in India because of the demographic and industrial shift from the agriculture sector to towards manufacturing. Service sector has also grown tremendously at the cost of agriculture. The expansion in India's economy coupled with its large population has created unstinted energy demand, causing the country to go for unavoidable imports	Research brings out the factors that can strengthen the market functions. Energy usage efficiency, transparency in execution and policy making using international benchmarks, etc. have been identified as key factors. Author advocates free trade to improve market efficiency and transparency.
12	Narula and Reddy, 2016	Researchers develop an analytical model for evaluation of energy security system. The research focus on sustainability of the energy security system in developing countries and provides a methodology for constructing sustainability index for energy security.	Research paper proposes hierarchical structure with energy security components categorised into different sub categories of demand and supply as well as distribution. The model provides the outcome using quantitative metrics for assessment of sustainability and availability of energy.
13	Kamiński, 2017	Research paper analyses the pattern of energy investment	Through investment of Chinese sovereign will funds, China gets

Sl No	Research Paper	Key Findings and Inferences	Research Gap
		made by China through its sovereign world funds in the energy market of Europe. Utilising analysis of empirical data author argues that the impact of sovereign wealth fund investment made by the China in the energy sector of Europe may be negative and such energy investments are intended also for geopolitical purpose.	access on the Board of major European companies and its sensitive data. The mechanism make European countries vulnerable to economic and political pressure of China, and author proposes strict monitoring of expansion of China by investing its sovereign wealth funds in the energy sector.

Theme 4: Theoretical underpinning of equity oil asset acquisitions

The market for corporate control over oil and resources primarily point towards the market for acquisitions and mergers where there is intense competition for control rights over the scarce and strategic resources. In theory, the weaker companies in

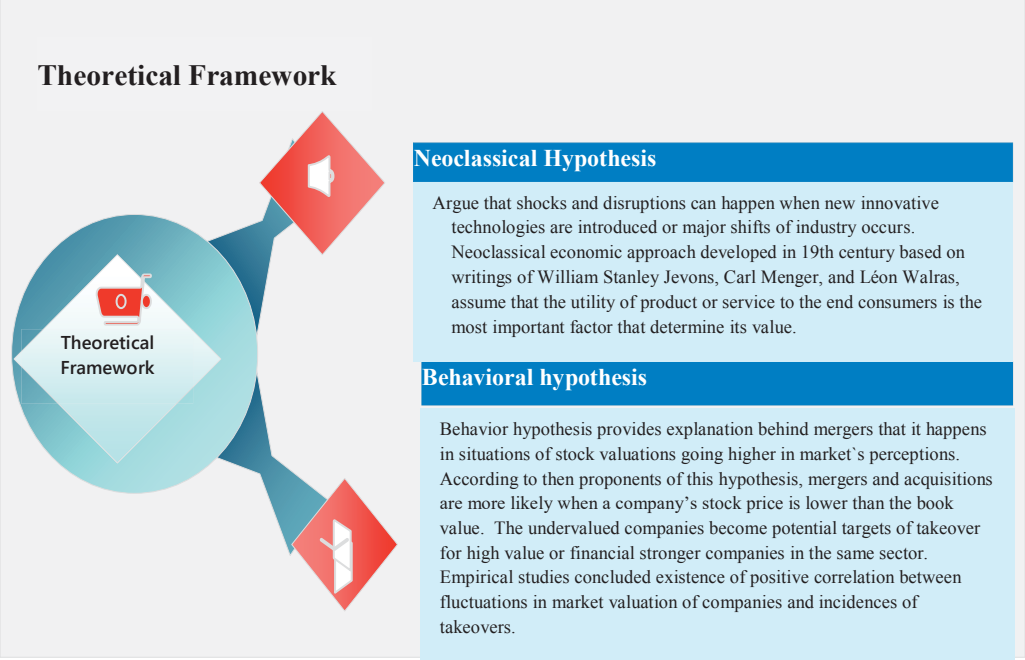


Figure 4.4: Theoretical Framework

the sub-sector of oil and gas would be influenced by the conduct of stronger companies in that sector because there are treats of extending corporate control

through takeovers. Such takeovers may happen through merging to form a new business entity or through corporate acquisition. Merger has been traditionally defined as combining assets of two companies and merging their operations and personnel under a single management entity. Such activities could be reasoned on account of advantages in financial or managerial synergy or for strategic reasons. Mergers are targeted to increase volumes of production at reduced unit costs. Such assimilation can also be realized by the absorbing a smaller company or a competitor. In the context of petroleum industry, such activities shall comprise acquiring the petroleum assets of a project like the reserves and production; instead of acquiring the corporate entity.

Letaifa (**2017**) reviewed the theories and empirical studies dealing with the mergers and acquisitions. The study focused on general concepts of mergers and the factors influencing such decisions, and observed that the process of finalization of the mergers and or acquisitions are slower, but are performing. Gupta (**2012, August**) in his research work on the concepts for mergers and acquisitions in corporate sector studied the theoretical framework describing mergers and acquisitions as strategic concepts in corporate sector. Traditional financial theories would suggest that mergers and acquisition activities can be caused because of commercial, strategic or business reasons. There could be efficiency gains in such incidents of mergers because of operational synergies in different verticals of the business. The motivating factors for a company to pursue acquisition for oil and gas can be explained through the behavioral and neo-classical hypothesis that are explained in Figure 4.6

Macroeconomic events and socio economic uncertainties tend to deter international oil and gas mergers and acquisition activities. **Ng and Donker** (2013) in their research work on the subject of oil investment found empirical evidence that supports the postulation of energy companies going for purchase of oil and gas assets and companies through mergers and acquisitions with intent to enhance

reserves position. Acquisition of additional reserves enhances long-term wealth of the oil and gas entities. The study also evidenced tat oil companies have carried out more acquisitions in high price regime rather than when prices were lower.

Table 4.6: Literature review summary and Research Gaps: Theme 4

Sl. No	Research Paper	Key Findings and Inferences	Research Gap
1	Liu, Cao, Shi, Cheng and Liu, 2020	Energy security is evaluated on the basis of the outcome of complex network analysis. Researchers developed a hybrid assessment framework which combines various network indicators for international oil trading with the traditional indicators over a period of time. The paper argues that the major economies of the world tend to examine and treat oil security from the geo-political angle often ignoring the complex web of global oil trade in which each country shall be having a defined role within the network. The authors assess the oil security situation from the complex network analysis at a global as well as individual country level from the period of 1965 to 2016.	Study finds existence of a pattern in countries diversifying the its oil supply sources and also the level of cooperation between the importing and exporting nations indicate greater degree of enhancement banking on regional cooperation. Study also concludes that the complex network of international oil trading can also be associated with a subset of smaller scale pools and skill free network. It has been concluded that the international all security index shown improvement during the period of study.
2	Chung, Kim, Moon, Lim and Yun, 2017	Researchers developed a thematic framework for analysing the energy security system of South Korea. The framework takes into account the energy components of power generation in South Korea comprising fossil fuels and renewable energy sources, and blends them with policy interventions for sustainable development.	The conceptual framework model results indicate that each dimension of the energy security system needs to be evaluated in a distinct and thorough manner taking into considerations the indicators of its sub-components. The model analyses different scenarios specific to the energy situation in South Korea in the context of energy supply scenario indicators like geopolitical conflicts and climate change concerns.
3	de la Rue du Can, Khandekar, Abhyankar, Phadke, Khanna, Fridley and Zhou, 2019	Researchers construct a bottom-up model for evaluating the impact of climate change policies and inter-relationship between energy growth in Indian industrial context. The model is primarily aimed in finding out the drivers that can contribute to the economic growth while adopting a low carbon environment friendly policy.	Study finds India can achieve the desired level of economic growth in a sustainable way by adopting to the low carbon policies. The study brings out the underlying factors and its impact on the sustainable energy system to assist policymakers towards making targeted policy interventions in this regard.

4	Hsu, Wright and Zhu, 2017	Research delves into factors impacting oil and gas mergers and acquisitions across the globe and especially in the upstream sector on the United States. Factors are categorised into two distinct categories. The first one covers behavioural hypothesis; mainly led and represented by stock market valuations. The others are bracketed into categories pertaining to the oil and gas industry like production and development.	Theoretical application not verified outside the United States. Empirical evidence proves crude oil price and production to be the significant factors, while other factors do not show consistent patterns of influence across the regions. Results also prove the number of mergers and acquisitions follow a wave pattern which is consistent with wave hypothesis.
5	Hughes, 2012	The energy security framework model developed by the researcher focuses on evaluating the energy system in its entirety. Accordingly researcher has combined the dimensions of energy security definition provided by the International Energy Agency with process analysis techniques.	The model provides for energy security indicators in the context of a process flow system. The framework is applicable to energy systems in the process flow model. It evaluates the indicator matrix of energy demand supply scenario and explore inter-relationships with energy system constituents
6	Wabiri and Amusa, 2010	Author attempts to quantify security risks for oil imports by South Africa through an empirical framework. Risks which are systematic in nature are dependent on events affecting oil market and crude oil prices. The systematic risk index scores are less affected when the quantities of monthly crude oil imports do not change much. Portfolio theory and AHP has been applied.	The study is carried out on data during the period from 1994 to 2007. The results indicate impact of diversification on the specific risk. It also provides the systematic risk index crude oil import portfolio of South Africa. The gap is that the study does test variables for equity oil transactions for large consumers.
7	Adams et al, 2019	Authors investigated the negative impact of oil endowment on the oil rich developing economies. The socio growth in these countries get adversely impacted due to collaboration between the ruling elite in these countries and the multinational corporations exploiting its natural resources, due to various reasons including implicit or explicit encouragement to corruption. The global dimension of the impact of multinational corporations operations in oil rich poor countries have been studied.	The authors bring out the traditional collaborative practices between the global majors and the political establishment in oil rich under developed countries that encourage negative practices in detriment to the welfare of the citizens. While authors argue that globalisation may have negative impact on resourceful poor countries, they also suggest that such practices can be averted through ethical practices to gainfully utilise the natural resource wealth

8	Haaland, 2012	Investigates the conventional activities of mergers and acquisitions driven by Neoclassical hypothesis and Behavioural hypothesis. The study presented case studies in the context of western countries perspectives of oil and gas M&A.	Researcher investigated acquisitions in the unconventional oil and gas sector, assumed the underlying motivations to be similar to the overall market. Factors enabling acquisitions in the traditional oil sector have been identified as technology, operational expertise and the assets of the companies to be acquired. Application of conventional Behavioural hypothesis explains waves of mergers and acquisitions done by oil companies in high price regime when stock valuations are higher. In contrast hypothesis applied in Canadian oil sector reveals higher investments in high price regime. The research does not cover Asia region.
9	Wang and Zhou, 2017	Researchers develop energy security framework based on balance score metrics. The framework provides for assessment of energy security on subjective as well as objective weights or indicators. The energy security framework is useful to assess capability of a country to manage its inter dependency relations amongst its key dimensions of energy security.	Research outcome indicates that almost all the countries universally struggle to secure their energy supply system. Countries in the western Europe and North America get a good score on the index whereas countries in the Africa and Asia region get poor score on the performance of respective national energy security. The model can highlight deficiencies in the energy system and provide suggestive way forward for addressing the same.
10	Mulder and Hagens, 2008	Authors establish a theoretical framework for (Energy Return on Investment, EROI) that encompasses various methodologies extant in the literature. The various usages of EROI are reviewed and placed into a consistent schematic frame work.	The employed methodology of energy investment return has yielded apparently conflicting outcomes. The gap is that accounting for the intricate details in net fossil fuel energy is more technical. Results do not define appropriate boundaries of EROI analysis.

11	Al-Fattah, 2013	Author investigates the strategies of national oil companies in the global energy landscape, motivations and the challenges they face in the face of intense globalisation. The national oil companies change their strategies on geo political considerations and they have become dynamic from their traditional position of the custodian of national oil wealth.	The trends and motivations of national oil companies turning as international joint venture partners in foreign countries oil operations are investigated. Paper finds that national oil companies of major consumers from Asia preferred globalisation for securing energy supplies, whereas countries like Russia and Venezuela allowed its national oil companies seek international joint venture roles for seeking additional oil revenue from lucrative oil projects abroad.
12	Pierru and Babusiaux, 2008	Author describes application of the after tax weighted average cost of capital method for valuation of oil investment methodology in investment decisions, and has been applied to oil and gas transaction. Author reasons that the after tax weighted average cost of capital method is more appropriate for oil development projects. This is because of the reason that debt financing in majority of such projects is different from the amount that would correspond to the debt ratio aimed at corporate level. Decision trees and sensitivity analysis are designed to tackle uncertainty of project investment.	The outcome of the After-Tax Weighted Average Cost of Capital method when applied to the oil and gas industry shall vary widely. This is because the fiscal and taxation regimes pertaining to oil and gas are distinct in every country, depending on its reserves and production status, and the lucrativeness for the foreign investors to invest in that country. Even within the country, the fiscal parameters and taxation can change from one oil project to another. This fact is overlooked there limiting its universal applications.

13	Hughes and Seth, 2009	Author highlighted the complex elements pertaining to energy security, including qualitative aspects, and that energy security cannot be measured with ease. Authors explained methodology whereby different energy sources used can be ranked in terms of supply, price and infrastructure. The results can then be combined with the jurisdiction's consumption to get energy security graph that allows energy security in a jurisdiction to be assessed.	AHP methodology used for determining the index. The energy security index can be a useful tool for ranking, however, the index would not be factoring in the circumstances of accessing the resources concentrated in particular geographies. Further the study does not cover the consumption patterns. Combining consumption patterns with the ranking can produce enhanced understanding of the energy mix from energy security perspectives.
14	Bany-Ariffin, Hisham and Mcgowan, 2014	The authors investigate the impact of macroeconomic variables on international acquisitions carried out by the companies of Malaysia. The findings indicate economic conditions in the foreign country where investment has been made has negative wealth effect. The economic development level of host nation has positive wealth effect.	Macroeconomic variables are examined for 159 international acquisitions carried out by multinational companies of Malaysia in 22 nations. Study implies that wealth effect of international transactions done by companies of Malaysia. Findings bring out that international acquisitions are inter-correlated with the stage of economic development in invested country. However, the conditions are not tested on macroeconomic variables pertaining to oil deals from emerging economies.
15	Kitamura and Managi, 2017	Research paper works on the quantitative perspectives of energy security of Japan by analysing the possible disruptive scenarios in its energy sourcing. The study finds that disruptions due to gas shortage situation in sourcing countries for LNG supplies to Japan has higher levels of impact on non-energy sectors like the industrial customers.	Research outcome also brings out that in case of Japan the energy security supply situation can be affected by unplanned shut down of nuclear power generation plants in Japan, and to the extent of possible supply disruptions sourcing countries.

1.3 Conclusions

Literature review acknowledges extensive research work on thematic frameworks on assessments and needs of securing energy and brings out the pivotal role of equity oil in augmenting energy security. However, literature do not address the dimensions of energy security ecosystem of India in the context of augmenting it through overseas oil production, as it brings out the demand growth projections. India's endeavors to oil equity acquisition has been driven by corporate strategy of national oil companies while the Government primarily providing only policy guidelines support. As such national oil companies acquiring overseas equity oil assets fail at individual level to establish linkage to overseas equity oil development to the greater national priorities.

Acquiring equity oil assets overseas need deeper studies from strategy point of the investing country and the invested country; as well as from a commercial perspective. Equity oil investment promote government to government relations, provide additional comfort areas security wise besides fulfilling the primary objective of ensuring uninterrupted supplies of crude oil and gas to the economy for long term. Equity oil development also acts as a tool for portfolio diversification of the companies.

Literature on the subject adequately bring out the equity oil investment to be dependent on technical, financial, political and strategic factors affecting cross-border acquisitions of these strategic resources. The variables are correlated and vary according to the host country situations, tax regimes, country's risk profile, geographic regions, advancement of economies in host country and its relations with investing country and its investing entity management. Hence, more research work would be required in the vital area pertaining to energy security; keeping the specific country situation in mind to analyse and identify factors for equity oil

investment, as well as to understand the risks and costs associated for failing to address the factors in time.

Coordinated and integrated approach were found lacking amongst the petroleum companies from India that are engaged in overseas equity development and departments of the Government of India. Equity oil transactions being a sellers prerogative and non – transparent, global oil majors use their dominant position to influence the sale terms and tend to pick up buyer of choice. Individual companies from India would have limited influencing profile and government intervention would be required to negotiate and make entry at a proactive stage, which calls for a well thought out coordinated approach. Absence of the concept of mechanism facilitating coordinated intervention is evidenced in multiple cases of equity oil transactions ventured into by India's state controlled petroleum companies.

International practices in energy importing countries demonstrated overseas equity oil acquisition to be critically dependent not only on the market forces and commodity prices, but several technical, financial, political and strategic factors affect cross-border acquisitions of oil and gas resources. These factors are not universal and vary according to the host country situations, tax regimes, country's global profile, geographic regions and advancement of economies in host country or target country.

Emerging economies as in case of India, Japan and China put higher significance and a premium on self-sufficiency of energy resources, as well as for all types of resources, which basically restrict the dependence on external powers. Overdependence on oil creates vulnerability and subjects nations to pressure situations. A test case is the issue of supply routes to China (**Tang, Song & Cao, 2018**). China imports majority of its oil through sea routes, over which are the control of foreign military, especially the United States, a situation strategically unfavourable to China. There are concerns and fear within the political class of

China that energy supplies through narine routes could be targeted by the world powers in the event of a conflict.

Another issue of concern for energy markets is the fact that major chunk of oil reserves, which are prolific in nature and can be developed commercially relatively quicker than those in the deep waters or sub-salt plays of offshore Brazil, are all located in Persian Gulf region. Countries in this regions have been traditionally under the hegemonic control of the western powers. For countries dependent on oil from this region shall have additional source of vulnerability on the geo-political posturing of the involved nations (**Hoeven, 2013**).

It cannot be denied that large oil and gas companies from Asia dominantly controlled by their governments, often act a tool for political manoeuvring purpose when they go global. The activities of national oil companies in foreign countries are keenly watched and they are often put under suspicion by western powers. That because the politically administered big oil corporations, particularly from the Asian region has close ties to their political establishment and can get state funds for investment. Such a situation denies a level playing field to other peer companies vying for the resources. The geo-politics of the State gets closely interlinked in seeking oil and gas deals.

Given the geo-political intricacies involved, deeper research needs to be done for international energy investments, particularly in the context of Indian situation so as to analyse and identify factors influencing India's equity oil resource acquisition pursuits and to understand the risks associated for failing to address these factors in time, so as to enable India to eliminate opportunity losses and be self-reliant on energy sourcing.

The review of the literatures provides the following sixteen variables depicted in Table 4.7 which would help in developing a framework for equity oil acquisition. These variables are being called universal variables.

Sl. No.	Universal Variables
1	Affordability of energy resources
2	Equitable Access
3	Transparent and stable pricing policy
4	Bilateral trade promotion for products and technologies
5	Encourage and enhance trade relations with energy rich nations
6	Adaptation and investment in latest technologies
7	Government to Government relations through proactive energy diplomacy
8	Better tools to estimate the demand potential and capacity planning
9	Providing tax incentives for outward investment in equity oil and gas
10	Concessional State funding for oil acquisitions overseas
11	Stable fiscal regimes in governing contracts
12	Maximise exploitation of domestically available petroleum resources
13	Maximise strategic tie-up between NOCs and IOCs
14	Pooling Complimentary Resources
15	Reducing risk through joint venturing in oil project development
16	To have a secured and uninterrupted supply of oil and gas

Table 4.7: Universal Variables

The literature review carried out provide overview of the global geo-political landscape for transnational energy deals, key characteristics of international oil and gas transactions, factors influencing oil and gas resource acquisitions in foreign countries, concepts and developments and identifies the research gaps in relation to the research problem. The universal variables emerging through literature review will be used as input to this research.

CHAPTER 5

RESEARCH PROBLEM, RESEARCH QUESTIONS AND RESEARCH OBJECTIVES

5.1 Research Problem

Having understood the challenges India faces for overseas equity oil development towards augmenting energy security, the research problem can be stated as below:

"How to develop a framework for overseas equity oil acquisition in Indian Scenario"

5.2 Research Questions

Research gaps identified have been illustrated in Chapter 4 of the Thesis. Following three research questions have been identified for probing, based on the literature review and identified research gaps.

Q1: What are the variables that enable acquisition of equity oil overseas?

Q2: What are the best practices in energy importing developed economies for overseas equity oil acquisition towards strengthening energy security?

Q3: What is the framework and elements of the framework for the acquisition of overseas equity oil in Indian scenario?

5.3 Research Objectives

Research questions defined above shall provide for three research objectives. The three research objectives are listed below.

Objective 1: To identify the factors influencing development of overseas equity oil.

Objective 2: To identify conceptual framework for overseas equity oil acquisition based on learnings from resource deficient developed economies like Japan, Republic of Korea and China and the factors identified in Objective 1.

Objective 3: To develop framework for the acquisition of overseas equity oil in Indian scenario

CHAPTER 6

RESEARCH DESIGN

In this chapter we dwell upon the procedures to be followed for gathering data for the research project. First researcher would need to structure his research with data and information before attempting solving the research problem. The research design need to be selected based on the philosophical assumptions and the strategy of inquiry. This is influenced by the end objective to be accomplished and research questions at hand. Softer issues like researchers experience and audience of the research report also are often considered in selecting the research design (**Malhotra and Dash, 2011**).

6.1 Types of philosophical assumptions / world view

The philosophical assumptions of the world views are categorized into four types briefly illustrated below.

In postpositivism, data is reduced into smaller sub-set of data or similar ideas. Researcher starts with the concept and collects data which either disapproves the concept or accepts it. Hence, with postpositivism approach the researcher needs to apply quantitative methods.

When researcher believes that learning and knowledge can be constructed through social interaction that forms the core idea of social constructivism (**Vygotsky, 1978**). The idea is to capture all the varied and complex views to build in the theory

rather than narrowing the data as is the case in postpositivism. The view of participant becomes more important in such study. Constructivism approach helps in development of a theory or a concept.

Advocacy or Participatory: Everyday practices that have been in vogue can explain many traits of how people behave in dealing with the everyday challenges of life. Researchers investigate why people behave the way they are familiar with and force a rethink on established traits that can exist in the population in a different setting or situation. Research inquiries are purposely intertwined with social and political agenda of the population.

Pragmatism – Human experience can be influenced by an objective reality, grounded in environment around which people exist, work and live. Unlike in postpositivism where actions would lead to results, pragmatism worldview works based on certain actions and situations which exist. This form uses most of the approaches which are available to understand the problem and seek solutions **(Patton, 1990).** Pragmatism research concepts apply to mixed methods of research.

The world views described are listed in Table 6.1

Table 6.1: World views in Research

Positivism	**Constructivism**
• Definitive • Help in reducing data • Cause and effect relationship • Verifies a theory	• Considerate of the situation • Varied and Complex views • Expand understanding • Deduce a theory
Advocacy/ Participatory	**Pragmatism**
• Better social understanding • Change in Society • Combined approach	• Addressing real world problems • Liberal use of all methods

(Creswell, 2003)

6.2 Worldviews, Strategies and Methods

Research designs contain the plan for research and provide pre-decided set of procedures to follow during research work encompassing its step-wise actions. The worldview researcher would adopt influences the decision to select the methods. The overall decision on designing the research project involving the worldviews, strategies and methods shall finally determine the particular approach that should be used to study the topic. **Table 6.1** summarizes the distinct nature of researching when the methods of quantitative, qualitative, or mixed methods are employed. The specific world view that is to be adopted for the research is related to the objects of study and depends on characteristics described in the table. In case the objects to be studied are human beings, then such objects would be capable of interpreting both themselves and the environment.

Research Methods

Once the philosophical assumption and strategies of inquiry in a research design are decided, the next thing is to firm up the research method to be used. Research method primarily pertains to data collection methods and the method used for statistical analysis. Data collection can range from close ended to open ended questions with a possibility to have a mix of the both. Similarly, statistical technique chosen can be statistical to purely non-statistical in nature.

1. Quantitative Research Method

Quantitative researchers perform statistical or computational analysis. Data collected through population sampling, either in online survey mode or approaching respondents through a questionnaire. Leedy and Ormrod (**2001**) wrote that quantitative research is independent of researcher and builds upon existing theories. Such research outcomes help in creating new meaning through the

objectivity that gets analysed and uncovered in the data. The outcomes can be statistical in nature that are logically and statistically explained. (**Creswell, 2003**).

2. Qualitative Research Method

Qualitative researchers attempt finding out the reason behind people thinking or behaving in a particular manner or direction. Grounded theory study, content analysis, phenomenological study, case study and ethnography study are popular forms of qualitative research methods. All of them employ inductive reasoning and researcher can get involved in actual experiences when analyzing data (**Creswell, 2003**).

3. Mixed research method

Mixed method enables researcher to use both quantitative and qualitative approaches. Questionnaire survey can be conducted with closed-ended questions to collect numerical data. At the same project, researcher conducts interviews using open-ended questions which provide descriptive type of qualitative data. Advantage of mixed method lies in the fact that research can take advantages of one method say, quantitative, and minimise its weak areas by employing the other method of qualitative approach.

6.3 Developing mixed research design

By combining the qualitative and quantitative components in the research project, researchers' scope of investigation gets expanded and it also strengthens the conclusions. The reasons for need to strengthen the study and conclusions serve different purpose to different researchers, but the common link is to answer research questions with validity. Suitable quantitative and qualitative approaches are chosen to answer research questions, and the research design gets formalized in finalizing

the mixed methods. Designing a mixed methods in research projects can provide flexibility as there are no fixed ways combine these methods. Some important guidelines that assist in considering the suitability of the methods can be considered.

Consider comfort level with both methods. Consider researchers own philosophical preferences between quantitative and qualitative approaches. Judge their applications against the available resources and time. Follow systematic approach in choosing particular quantitative and qualitative approaches, not to be random and abstract. Follow the guiding principle of mixed methods research, i.e. choose methods where their strengths can complement each other and overlapping weaknesses can be avoided.

What type of method need to be followed for data collection has a big role in research design. Also, the type of data to be collected. Other factors to consider are the timing and time zone of data collection. Further the methodology would also depend on the sequence. When data collection need to be done simultaneously, then concurrent designs can be followed. If data can be collected in different stages then sequential designs can be adopted. The method of their integration shall also play big role that need careful consideration in selecting the methods.

Once the factors illustrated in the above para have been considered and examined in the backdrop of researcher's requirement, resources and timelines, an overall mixed methods design can be chosen for the research project. There are various categories of mixed methods design strategies. Researchers given setting, data collection methods, resources, timelines, research preferences and other factors like population sampling shall assist in determining the mixed methods design suitable to his research project out of the following mixed methods design strategies. These strategies were developed by Creswell et al (**2011).**

1. **Sequential Explanatory Design** In data collection sequence first the quantitative data is collected followed by qualitative data collection. The method provides the advantage of carrying out quantitative analysis and then utilizing that outcome as feed to the subsequent qualitative data collection and analysis.

2. **Sequential Exploratory Design** In a change of data collection sequence, first the qualitative data is collected followed by quantitative data collection and analysis. This two-phase research design helps in identifying variables and can develop a distinct classification for testing variables.

3. **Sequential Transformative Design** Theoretical perspective of researcher plays important role here and guide the study. This research design also has two phases, however, the order of data collection varies.

4. **Concurrent Triangulation Design** qualitative and quantitative data are collected in one phase concurrently. Even when data is collected concurrently their analysis is carried out separately. Data is compared later. Data then combined at a later phase after individual analysis is completed. This method has proved to be useful in confirming or validating findings.

5. **Concurrent Nested Design or Embedded Design** – One phase is accorded priority over all other approaches in data collection. This particular phase of research data collection approach adopted guides the overall project. The other approach is ingrained into the project and after the first phase is completed, the other approach is deployed to provide support.

6. **Concurrent Transformative Design** – the approach uses a theoretical perspective that gets shown in research questions. The theoretical

perspectives guide the overall selection of methods. Theoretical perspectives can be evaluated in phases during the analysis at different levels.

The above-stated six type of mixed methods identified by Creswell et al in 2003 which he has discussed further in his book in 2009, using four important aspects in the designing process. These four aspects are (i) timing, (ii) waiting, (iii) mixing, and (iv) theorising. A brief introduction is provided below.

(i) Timing

Pre-deciding timing of data collection becomes important depending on suitability and convenience of the researcher. Timing depends on the method to be employed, whether quantitative first and qualitative later, or otherwise. The timing to be decided in each situation in which data is collected one after another or concurrent in which case the data for both phases is collected sample tennis Lee is collected simultaneously.

(ii) Weighting

Weight is the importance of the researcher gives to one part of the study compared to the other part. The weights can be either equal i.e. quantitative and quantitative phase of research can have equal significance or one method can be more favoured. This gets decided by the researcher based on the type of study, audience and use of research, research objectives and limitations in research, if any.

(iii) Mixing

Mixing decides the timing and method of mixing the data collected at the quantitative and qualitative phase. This method involves methods like connecting, integrating and embedding. Connected in mixing means collecting data of one

phase and then using that data to collect data at the next phase. Integrating as the name suggest is using data from both the faces together for analysis post integration. Embedding involves data set of one phase used in other phase to meet further objectives.

(iv) Theorising

Theorising is anchoring the entire research design on a particular theoretical perspective and the entire methodical process is guided by it. The theory can be one that is already existing in social sciences or statistics. A conceptual lens developed by the researcher can also be used. This can be either explicit or implicit in the research. The shape and design of this for factors to decide our mixed method study.

6.4 Selecting the research method

In selecting a research design, the worldviews, strategies and methods all contribute together. Together they assist researcher to zero on a research design that can be mixed method or a quantitative research or qualitative. Adopting **quantitative approach** with postpositivist worldview and experimental strategy of inquiry, a theory or concept is tested. Hypotheses are specified and data collected either in support or to contradict the specified hypotheses. Adopting **Qualitative approach** through constructivist worldview and through ethnographic design, researcher try to assign meaning or try explaining an observed phenomenon by analyzing views and responses of participants. Adopting a **qualitative approach** with participatory worldview, narrative design and interview method, researcher examine issues that are broadly related to suppression or oppression of individuals. Adopting **mixed methods approach through** pragmatic worldview and sequential collection of data through quantitative and qualitative techniques, data collection are deployed in a defined sequence, qualitative and or quantitative. It helps in cases where data to be collected are diverse and needs to be assimilated for better understanding.

The current research project intends to develop a framework for overseas equity oil development in Indian scenario. The research, based on the chosen subject in the niche area of oil and gas resources and business that extends globally, requires a world view which is pragmatic. This requires use of all possible approaches to explore and research the problem. Objectives of the research emanating from research questions have been identified and illustrated in Chapter 5. The research is being carried out to explore and meet the following objectives:

Objective 1: To identify factors for overseas equity oil acquisition.

Identification of factors, once done through literature survey and semi structured interviews need to be reduced in numbers, for interpretation and further analysis. This is best done by quantitative methods like Factor Analysis.

Objective 2: The second research objective is to identify a conceptual framework for overseas equity oil development based on learnings from practices, systems and factors prevalent in oil importing countries with advanced economies i.e., China, Japan and The Republic of Korea, and factors identified in Research Objective 1.

Objective 3: To develop framework for overseas equity oil acquisition in Indian scenario.

Identifying and developing frameworks require emerging approaches, textual analysis using open ended questions with experts in the field. This can be done through the qualitative methods like Framework Analysis for first identifying a conceptual framework for developed markets and then using the Grounded Theory for creation of the framework for Indian conditions.

Considering the aspects of research designs described above and the research objectives that emanated from the research questions of this project, the mixed

method fits to be the best method. The process flow for this research project is schematically represented below in Figure 6.1. The decision of world view and strategy of inquiry is influenced by research questions and the end objective to be achieved.

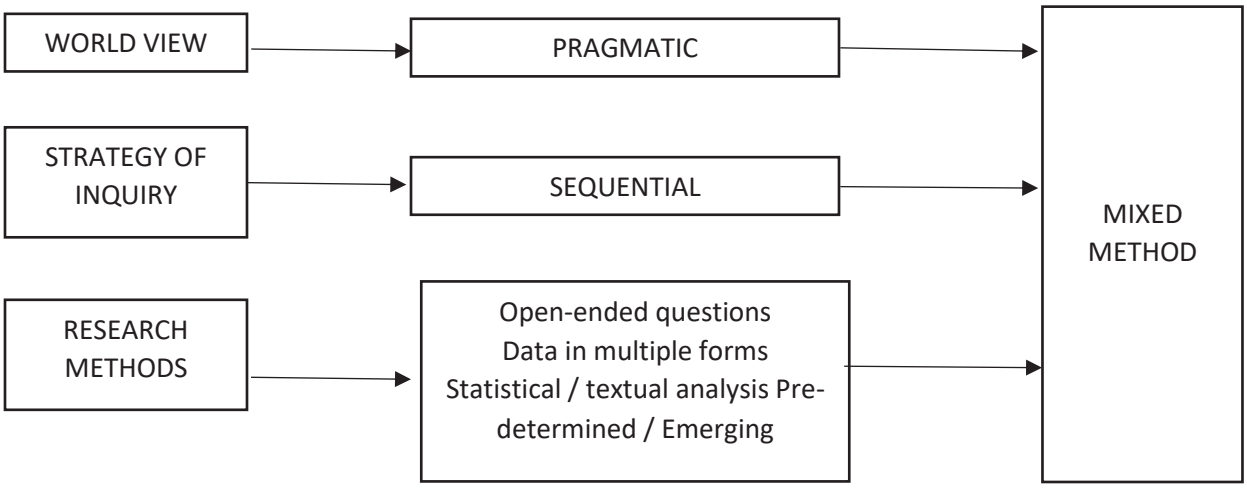


Figure 6.1 Selecting the research method

6.5 Advantages of mixed research

The mixed method provides several advantages over other methods.

Mixed method not only involves collecting data using both the approaches but also uses methods which are both textual and analytical in nature. This helps to strengthen the study which is more robust in comparison to either quantitative or qualitative method.

The understanding of the research is much wider and deeper using mixed method in comparison to use of only qualitative and quantitative method. The mixed method also helps in building, developing and explaining the results of one method to get a more robust output from the other method. In case the research is complex, the use of quantitative or qualitative approach will not only be inadequate but may

also not be able to provide the desired outcomes. Combined use helps to expand the understanding and triangulate the data **(Creswell, 1998).**

Mixed-method design helps in expanding the research, which otherwise would not have been possible by following a single approach. The mixed method design offers the statistical analysis along with observation of qualitative aspects, and hence the research through mixed method becomes more comprehensive. Information is collected from a large number and a variety of sources that provides a broader canvas to the project. More and more information that can be generated, collected, evaluated and analysed in the mixed method design can help in developing more hypotheses.

The creation of a framework for overseas equity oil development is a complex issue. The use of a single method, quantitative or qualitative approach, shall be inadequate considering the gamut of the specialized subject and may not be able to provide the desired outcomes. The complex nature of the research would benefit from use of mixed method. In fact, the data obtained by mixed method shall have more in-depth information and the use of mixed method would also help enhancing reliability and validity of research conclusions **(Robert, 2014).**

6.6 Procedure for mixed method design

We can choose from the six designs of mixed method that has been described in this chapter while deciding on the research design. To recapture, they are sequential explanatory, exploratory and transformative design; and concurrent triangulation, embedded and transformative design.

We have chosen the Sequential Explanatory Design proposed by Creswell since we need to first find out factors, screen out them and then input the factors in our further study towards developing a framework.

Sequential Explanatory Design

The sequential explanatory design consists of dealing with each phase of the design separately wherein data is first collected for phase one and then analyzed. The output of phase one is used as an input to phase two data, in addition to its own data collection and then the same is analyzed. In this approach, quantitative phase is carried out first after which the qualitative phase is initiated.

6.7 Justification for use of the identified research method

The final objective of the research project is developing a framework for overseas equity oil development in Indian scenario. Developing a framework not only requires extensive knowledge of Indian E&P sector, but also the knowledge of international oil and gas business and practices, global competitive scenario, cross border energy transaction dynamics, and international geo-political landscape. The number of experts available in India are limited and hence qualitative method(s) are best suited for developing this framework.

The framework development would require three key inputs which comprise (i) universal variables which influences equity oil development for energy security, (ii) learning's from developed and emerging markets which are energy deficient and large importers of fossil fuels, the practices from these countries can be applied to Indian context, and (iii) sequencing of variables in form of a timeline map for effective implementation.

It can be argued that the above output can be achieved only using the qualitative method. However, one key issue in the present research topic is specialized nature of the subject of oil and gas where since the number of experts are limited, using only a qualitative technique may have elements of personal bias in the outcome.

Also in using a single methodology, the conceptual lens would have to be developed only with the help of literature survey and personal experience of researcher which again might have the possibility of bringing in bias to the research.

Hence to develop a robust framework and to triangulate the data, a larger group of experts are asked close ended questions on the variables influencing cross border equity oil acquisition for India. This was done first using a quantitative methodology. The output from the quantitative phase and the literature survey on the international market was then used as input for development of a conceptual lens which would be tested with experts for development of framework for overseas equity oil development in Indian scenario. The data has to be collected sequentially for both phases which takes a long time, which can be considered a weakness of this study. The main strength is that this method is very easy to understand and implement.

The process is shown diagrammatically in Figure 6.2

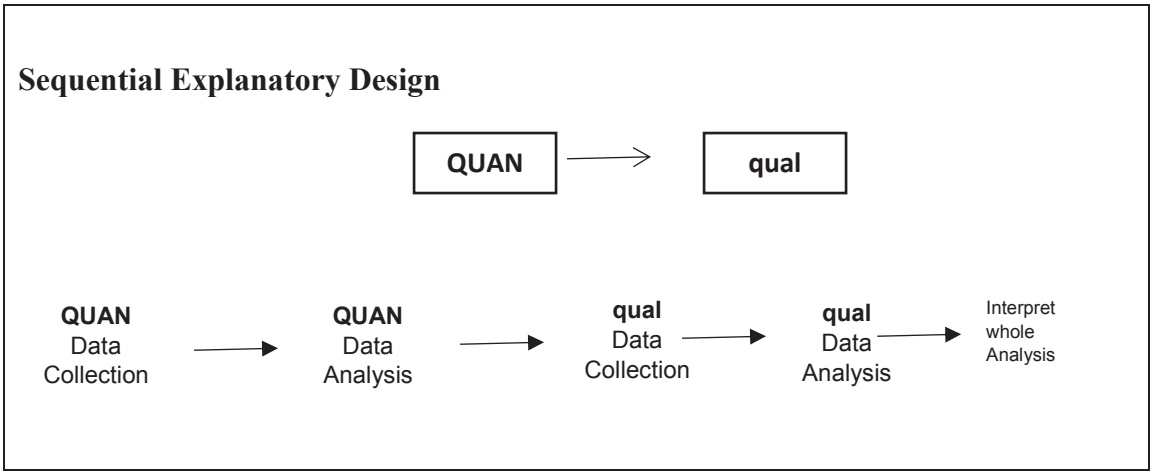


Figure 6.2: Sequential Explanatory Design

In view of the detailed illustration above, research design of the present project shall include following steps.

a) Use quantitative techniques to find the factors influencing overseas equity oil development. Factor Analysis method is being applied at this stage.
b) The output from the factors analysis and literature review and analysis on practices in energy importing advanced economies of China, Japan and Republic of Korea (Framework Analysis) is then used to develop a conceptual lens for overseas equity oil acquisition.
c) In the end, grounded theory methodology shall be applied for testing the conceptual framework.

The schematic representation of the step-wise mixed method design of the research project is represented below (Figure 6.3).

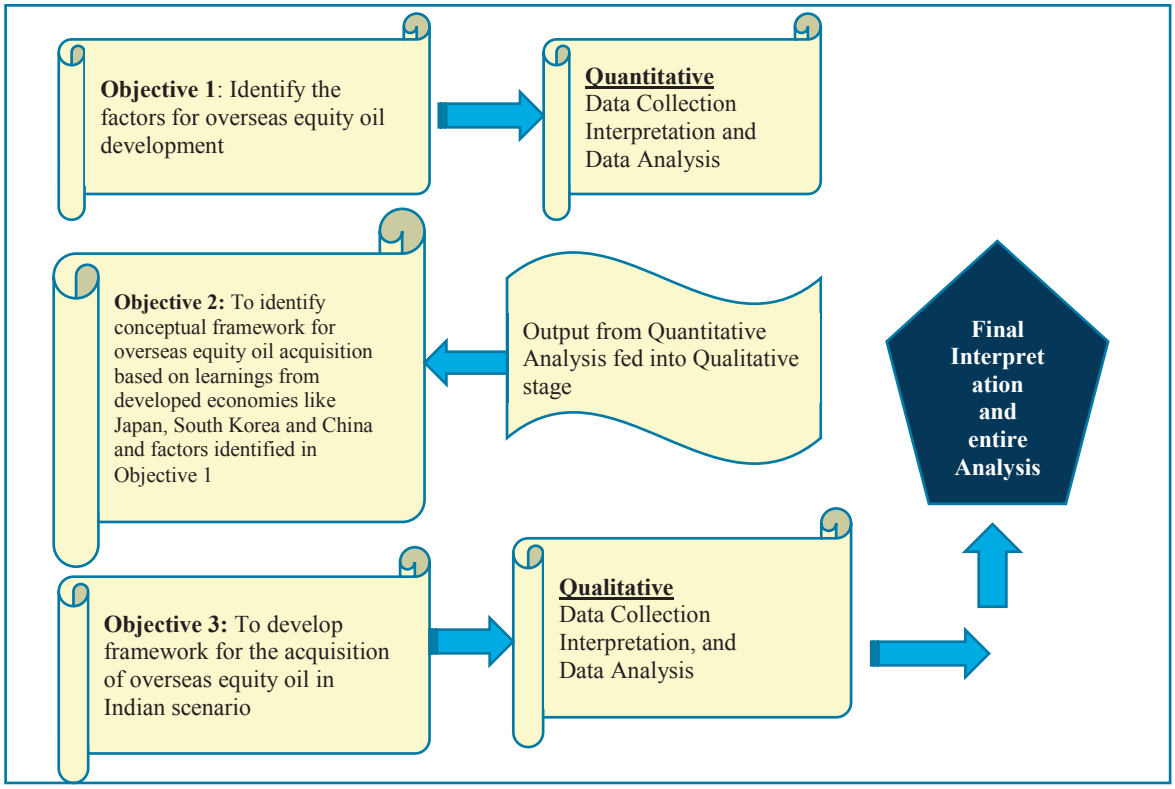


Figure 6.3: Research Design – Mixed Method

CHAPTER 7

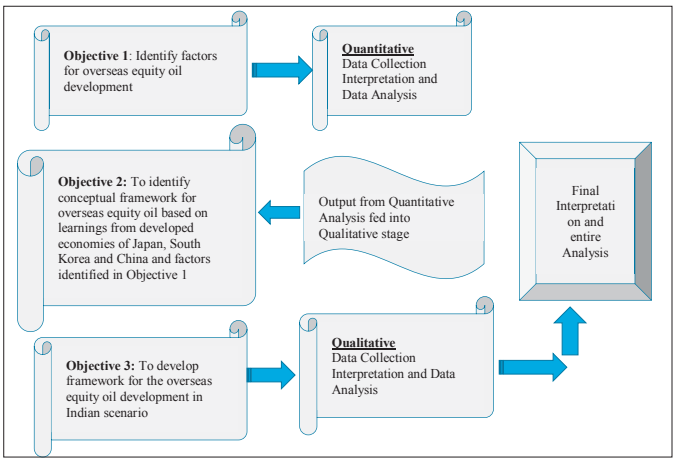
RESEARCH METHODOLOGY: DATA COLLECTION, INTERPRETATION AND ANALYSIS FOR OBJECTIVE 1

7.1 Research Methodology

The first objective is to identify the factors influencing cross border equity oil acquisition for energy security.

To achieve the first objective, quantitative technique of Factor Analysis has been conducted using software suite IBM SPSS Statistics 25.0

We start the research with multiple variables. We need to make sense out of these variables to help identify factors that influence overseas equity oil development.



Factors analysis helps to meet the two objectives, i.e. summarize data while identifying structures through the summarized data and then reduction of data. Data reduction helps in seeing the data in a more meaningful way and help in better analysis. The methodology used includes summarizing the information hidden in initial variables which are quite large in numbers, into a

composite factors that are into lots of smaller sets. While doing so the method ensures that the loss of information is negligible.

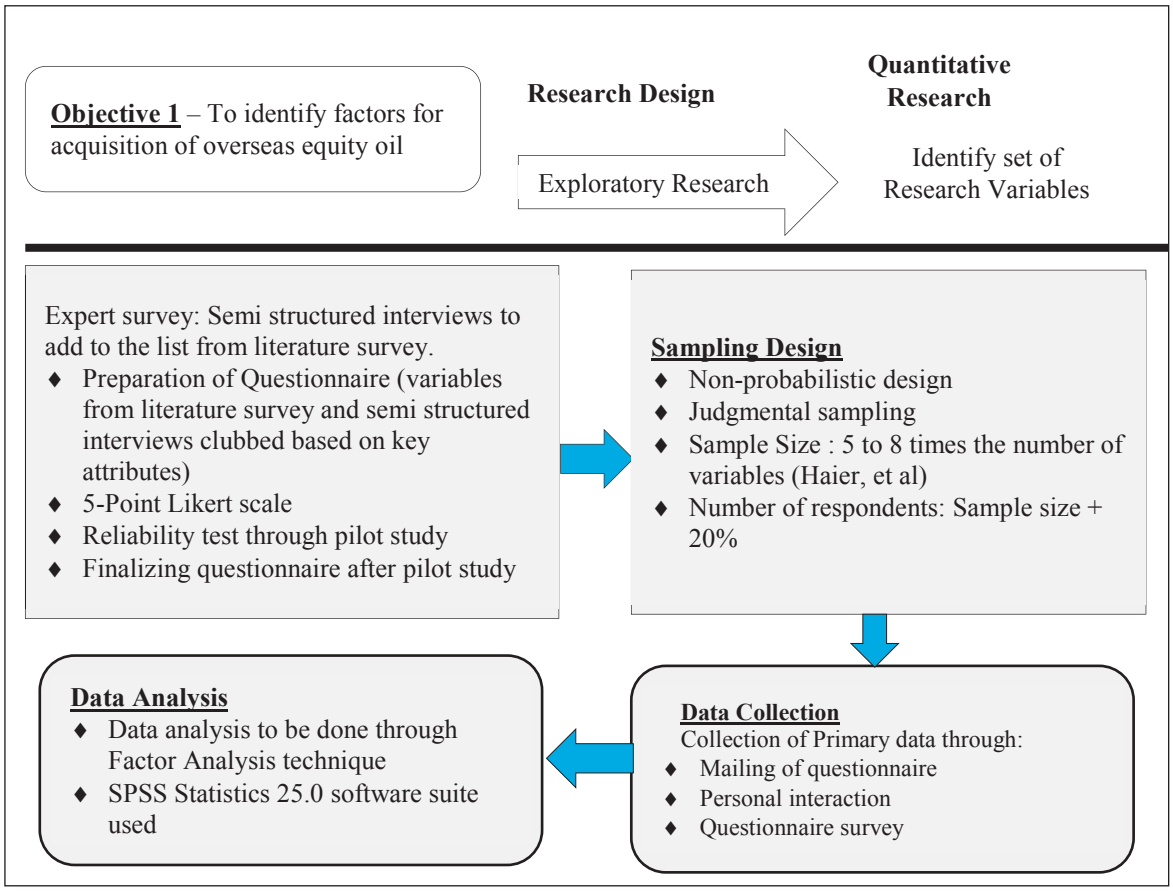


Figure 7.1: Research Design – Objective 1

Accordingly, we will be using the factor analysis towards summarization and data reduction. The new set of variables so produced from factor analysis will be used in the subsequent analysis. The new set of factors may partially or totally replace the initial set of variables.

In the beginning, those variables are identified by researcher which help in systematic of literature review and identification of research gaps. The set of variables at initial stages would be identified through review of literature on the work done, practices followed and determinants influencing the energy security

system in emerging economies that like India, are dependent on energy imports to meet domestic demand and economic growth. These countries are not self-sufficient in oil and gas, have faced serious issues in energy sourcing, and have reached a desired level of advancement in their socio-economic development status and energy market maturity and therefore, can have lessons to offer to developing countries on issues of ensuring uninterrupted long term secured supplies for energy security. In addition, research publications in energy journals like Energy Policy, Applied Energy, Oxford Institute of Energy Studies, Gateway House, International Association for Energy Economics, reports from various government agencies, the World Bank, Asian Development Bank, independent energy policy experts, International Energy Agency, Energy Information Administration, Organization of the Petroleum Exporting Countries, and various international energy research agencies used for shortlisting the initial set of variables.

The research design for Objective-1 is summarized in figure 7.1 and detailed in later sections of this chapter.

7.1.1 Research Variables

Review of literature available on the subject provide the universal set of determinants that influence acquisition of overseas oil and gas assets towards energy security of nations.

7.1.2 Research Design – Exploratory Design

Literature survey would provide list of universal variables. The initial variables list would be expanded, scrutinized strengthened through another level of data gathering. At this stage the initial variables get expanded and validated against additional data that can be collected through conducting semi-structured interviews with experts in the field of petroleum industry.

a. Preparation of Questionnaire

A questionnaire developed based on the variables identified through literature survey and output of semi-structured interviews. Designing a questionnaire provides a significant opportunity for previously unknown information to emerge in interviews. Respondents that participate in the interviews are chosen from the experts in the oil and gas industry. They have niche experience and knowledge pf the subject and therefore they can provide new and novel information when provided with sufficient opportunity to speak freely.

Flow of questionnaire:

Part A – Respondent demographic details, including their profession and subject of expertise.

Part B – In this part questions are included after structuring them upon the identified variables. Based on the key attributes, the various thus emerged are grouped. Participants response are collected systematically and structure way and Likert Scale are utilized capturing the responses. We have used a five-point scale which has been found to be the most suitable for this study.

Part–B has ranking requirements. The participants are provided options and requested that they rank their answers as per the given options, in this case their opinion on the factors influencing overseas investment of oil and gas for energy security of India.

Options given are intended for response ranking and could be in the order from 1 to 5, with 5 denoting strongly disagree and 1 denoting a response of strongly agree, 3 being neutral to the question. Respondent would be requested to choose one of the given options in the questionnaire in which he would affix the number according

to his or her choice. The variables later can be segregated into parts for better understanding and analysis, based on the number of responses received in each of the ranks.

b. Pilot Study

Weakness of the questionnaire designed for intended survey is tested through a pilot study on a smaller number of respondents to get insights on key indicators, and researcher can redesign the survey questionnaire before launching full scale survey. Pilot study output would be tested by measuring Cornbach's Alpha.

The extent to its intended measurement up to which an instrument can correctly measure signifies its validity, whereas reliability shall be denoted by the consistency with which the instrument is measuring what it is required to measure. Cronbach's alpha is widely used for measuring the reliability. Range of Cornbach's Alpha is measured in the scale from numerical value ranging from 0 to 1. As per the criteria set by Haier et al, a Cornbach's Alpha value of 0.60 and 0.70 would mean lower level of acceptability (**Hair, Anderson, Tatham & Black, 1998)**. Cornbach's Alpha value in the range higher than 0.9 indicate there may be redundancies existing in the designed questionnaire. Amongst remedial measures to eradicate such redundancies the research can shorten the length of the questionnaire (**Tavakol & Dennis, 2011**).

7.1.3 Sampling Design

We examined suitability of non-probability as well as probability sampling design. In non-probability sampling technique the odds of any item getting selected for a sample cannot be calculated. Non-probability sampling technique rely on the subjective judgement that researcher shall have of his own. Such method of sampling is also called purposive, deliberate or judgment sampling.

Probability sampling involves selecting samples randomly. Its chance sampling where all items of the population shall have an equal probability that it would be included in the sample.

Personal judgment of researcher and his subjective or objective motives influence non-probability sample survey, and not the probability of items getting selected itself in the sample (**Malhotra & Dash, 2011**). Its judgmental sampling which can be selective depending on discretion of researcher. The early stage data collection is intended to understand the broader issues of management problem in the energy industry with its strategic perspectives. Accordingly, research was of qualitative exploratory nature where few experts from the oil industry and relevant policy makers were interviewed. Given that an in-depth understanding of the research problem would arise from talking to respondents having sectoral knowledge and expertise, the researcher has found the non-probability sampling technique as the appropriate one for the present study.

International oil and gas resources pertains to energy sector where specialized knowledge and expertise will be required. Accordingly, for sample survey the target population cannot be selected randomly but only by judgmental sampling. Respondents from oil gas and energy policy background, or sector experts shall be the target population for the questionnaire survey. Accordingly, following sectoral experts and institutions shortlisted for questionnaire survey sampling population.

a) Senior management personnel from global upstream oil and gas industry.
b) Officials at the Petroleum Ministry of India and it agencies like the PPAC
c) Oil and gas regulators DGH
d) Academic researchers in energy, oil and gas sector.
e) Independent experts and consultants from oil and gas sector
f) Experienced industry professionals including veterans who have retired
g) Government officials with oil and gas background

The key aspect in the applicability of judgmental sampling is its effectiveness when respondents' numbers are limited. Such restricted number of respondents are used in surveys of specialized matter that a smaller group of people in a population shall have knowledge of and the researcher expects that the respondents own the experience, knowledge of subject matter and the desired qualities.

Judgment sampling methods are conceptually and technically appropriate for research involving processes or systems. Assumptions that have to be made for classical sampling theory cannot be made in real world where complex situations are involved and therefore such assumptions become less applicable or not applicable at all. In cases where target population comprises people with technical or expert knowledge or are intellectuals, random sampling is unsuitable.

7.1.4 Sample Size

Reliability results improve when sample size in enhanced even though it is not necessary or desirable to target sampling of the entire population for reliable results. In the current project which pertains to a niche area pertaining to oil and gas that involve specialised knowledge and expertise, a total of 320 respondents were surveyed. The number of variables and size of samples have relationship defined. Samples size should be five to eight times the number of variables (**Haier et al, 1998**). For robustness and reliability purpose researcher shall keep provision for including 20% respondents in addition so as to ensure that Haier criteria is achieved, since 100% response from the participants cannot be expected and accordingly margins need to be kept, to avoid developing additional list.

7.1.5 Data Collection

Primary data is gathered from original source, they do not pre-exist. For present research project primary data has been collected through sample survey of respondents using structured questionnaire and interview methods. Information and data which are already available to researcher in form of publications from institutes or individuals form secondary data. Research journals and data bases are used from peer reviewed journals and publications. Reports of public sector oil and gas companies, petroleum ministry, regulator DGH, annual reports of foreign and domestic oil and energy companies, universities, think tanks, etc. are used for the present research project. Published online reports of industry associations CII and FICCI, energy experts Wood Mackenzie, Chatham House, Ernst & Young are reviewed for secondary data source, and for discussion on energy security.

Data Analysis

Data gathered in the course of research project become infructuous without appropriate analysis of the same. The data analysis would need to be put into a system for transforming into the form though which useful information can be gathered for current research subject. Such useful information derived might need further refinement or organizing depending on its thorough review and systemic methods of analysis through analytical, statistical methods as well as methods of logical reasoning.

The process of analyzing the data would be through using a proper tool that can be descriptive, analytical or statistical. The application must allow researcher to organize the data as per his needs, explore the contents in broader perspective and look for patterns that assist in deriving conclusions or explanations of situations or events.

Factor Analysis

A quantitative analysis technique widely employed in empirical research, Factor Analysis has been employed in the present research project to explore the research objective of identifying and extracting factors of acquisition of overseas equity oil. The multivariate statistical method is employed for extracting a limited number of factors from a large number of variables or parameters. It reduced data and summarised information gathered from literature survey, review of publications of companies, and respondents' feedback obtained through questionnaire surveys and or interviews.

Variables that emerge may have correlation of various extent amongst themselves. The inter-linked variables need to be studied along with its inter-relationships. The process would reduce the large number of variables in form of only a few important underlying factors (**Malhotra & Dash, 2011**). In the process, the fewer set of underlying factors become important for understanding the way they influence the success or the failure of overseas equity oil acquisition practices.

In the factor analysis, weights or factor score coefficients are assigned in a defined way. Factor that is extracted first account for the highest amount of total variance that means that factor (s) can explain for the highest variance percentage. The second factor extracted explain the next best variance percentage, and so on.

The concept map for factor analysis as per Malhotra and Dash is provided in figure 7.2 (**Malhotra & Dash, 2011**).

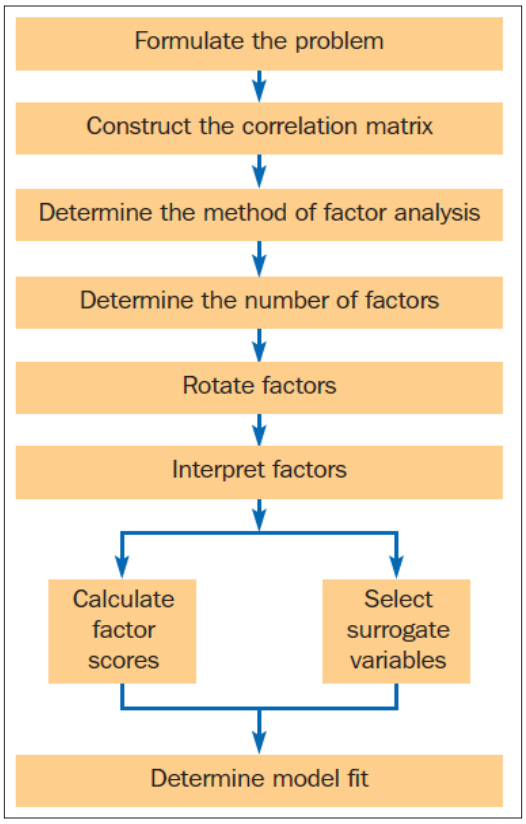


Figure 7.2: Process Map – Factor Analysis

7.2 Discussion on data output and analysis

Step 1: Identifying variables through literature survey

Literature survey carried out for the present research are described in Section 4 of this thesis. Through literature survey, a list of sixteen (16) variables have emerged. The data analysis method employed at this stage was textual analysis that derived variables that could be universal in nature. The variables outlined through the theme based literature review are listed as below.

1. Securing supplies uninterrupted
2. Affordably priced energy services
3. Access to energy equitably
4. Transparent and stable pricing

5. Promoting trading in technologies and products
6. Bilateral trade relations with energy rich nations
7. Lowering energy intensity. Energy intensity is defined as measure of energy required per unit of economic output.
8. Adapting and investing in latest technologies
9. Maximize exploitation of domestically available petroleum resources
10. Healthy G-2-G relations through proactive energy diplomacy
11. Energy conservation by people and industry
12. Better tools to estimate the demand potential and capacity planning
13. Tax incentives for outward investment oil and gas by national oil companies
14. Maximize strategic tie-up between national oil companies and international oil companies
15. Reducing risk through joint venturing in oil project development
16. Concessional State funding for oil acquisitions overseas

Step 2: Semi-structured interview using judgmental sampling

Interview protocol included the following brief and questions.

Brief to the experts

The twelve experts chosen were briefed that the interview was part of the academic work on finding factors for acquisition of overseas equity oil for energy security of India. The industry veterans and experts were also informed that by identifying the factors, these would be further used to develop a framework for development of overseas equity oil in Indian situation.

1. What factors enable or impede acquisition of overseas equity oil
2. What factors enable or impede acquisition of overseas equity oil which are related to Indian conditions in the context of international market mechanism

3. What factors enable or impede acquisition of overseas equity oil which relate to government policy
4. What factors enable or impede acquisition of overseas equity oil which relate to regulatory interventions
5. What factors enable or impede acquisition of overseas equity oil which relate to development of competitive skill sets and management capability

In addition to the above, intervening questions were asked on the topic to act as aid to the discussion. The discussion is captured in summary form as the key points emerging from the deliberation. Each semi structured interview lasted from twenty to twenty five minutes.

The factors identified through the literature review (Step-1) and that obtained from the semi-structured interview process were combined. These variables were converted into a questionnaire.

Step 3: Questionnaire design and pilot survey

Designing a questionnaire requires thoughtful consideration on the subject of getting appropriate and desired responses. The questionnaire should be designed in a way that encourages the respondent to attend to it and also the researcher to get the desired information for the research. A particular question when put in different ways can generate different response and information. Few specific objectives need to be kept in focus while designing the questionnaire. The questionnaire should incorporate the information required into clear specific forms of questions which respondents can answer. It is necessary that the questionnaire is not tricky, that it must encourage the respondent to cooperate and respond. Also it is necessary that the questionnaire does not provide response errors due to lack of understanding or complexity.

The beginning step in designing the questionnaire is to pin point the information that is sought from the respondents. Clarity on this aspect would then enable focus on identifying the target population for survey. The composition of the respondents that have been chosen for the survey, like whether post graduates or undergraduates, would have significant effect on how the questionnaire should be designed to elicit the desired information.

A question that are posed should the objective to give particular contribution to the survey objective. Respondents do not like a large number of questions, so the number needs to be restricted to a reasonable limit but that can elicit the information completely. If there is no use for the information resulting from a question, that question should not be included. Respondents can be probed sometimes with questions indirectly related or in a way that the respondent would be addressing indirectly.

Such questions are to be used as supplementary questions to the extent possible.

Questionnaire is designed with few start up questions that are not related to the research topic but are intended towards rapport building and better understanding of the respondent. This is particularly useful if the respondent views the questions with suspicion or seems the questions as sensitive ones that may prohibit free and frank conversation. In some cases researcher designs some questions to mask the intention and to drive honest answer. Sometimes questions are indirectly posed or disguised so that the details of sponsors or commercial or non-commercial brands are not revealed as that might elicit different response from the respondent. A limited number of important questions are either repeated if that helps in addressing the reliability (**Malhotra, 2006**).

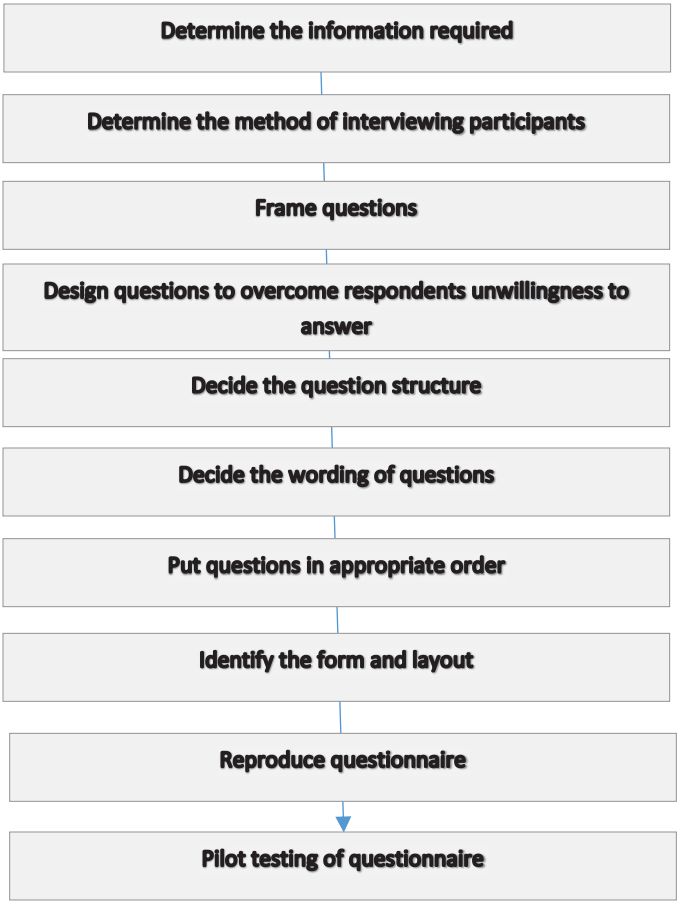


Figure 7.3: Questionnaire design process

A five-point Likert scale questionnaire has been designed for the current study. The questionnaire was designed on and divided into four segments for ease of administering **(Annexure-II).** Pilot survey was done on thirty respondents for checking reliability of the questionnaire.

Cornbach's Alpha score for our pilot survey is 0.8, demonstrating that the Questionnaire is reliable, valid and have internal consistency.

After the pilot testing results, the questionnaire was administered on a large sample size, which met the Haier criteria.

Step 4: Sampling Frame & Size

The present research project pertains to international oil and gas resources which is a specialized subject. It has limited number of experts on the domain and therefore judgmental sampling technique was utilized. These respondents included employees of oil companies, regulators, domain experts, consultants dealing international energy, policy makers and government authorities.

Factor analysis was conducted with variables that emerged through literature review, discussion with experts and research guide. Experts were selected from academia, policy, government and industry. The questionnaire was administered through various means like mails, face to face meeting and telephonically.

The questionnaire was administered to 320 respondents chosen from the oil and gas sector in India and abroad. The questionnaire has been designed identifying the principal dimensions underlying energy supply securities, participant's opinion, beliefs, and perceived priorities for long term energy supplies from overseas. In addition, demographic characteristics have been introduced to moderate responses of the participants to the questionnaire. Out of 320 selected respondents, replies were received from 268 respondents (**Annexure-III**) which has been analysed. Two respondents decided to respond beyond permissible response time and hence their responses could not be accommodated. As per Haier the sample size of 5 to 8 times is adequate. For the twenty one variables considered in the present project, the sample size exceed the number of variables by 12.76 times.

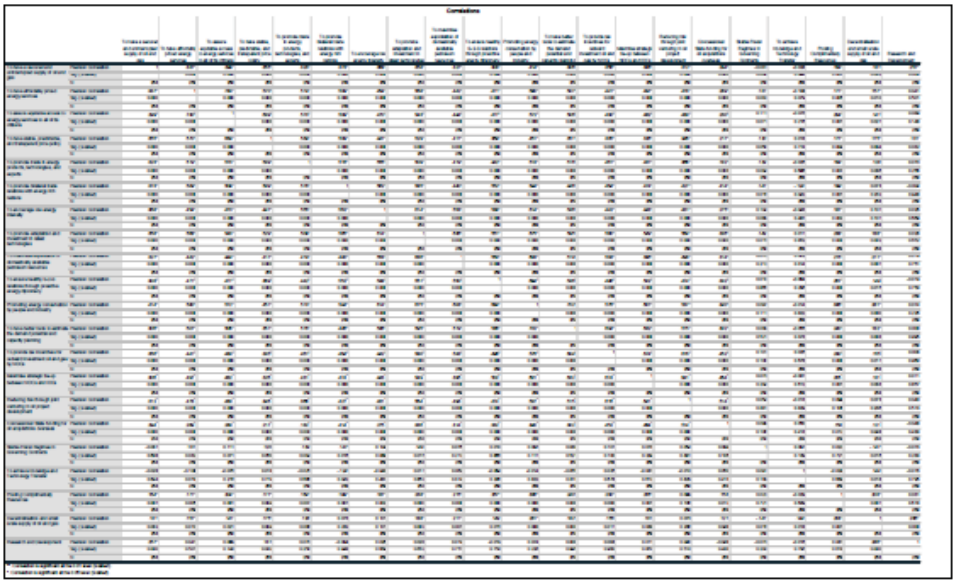
Step 5: Constructing the Correlation Matrix

In all cases where there are more than one independent variable, a matrix form is used to represent the collection of all pair-wise correlations between the variables.

To make factor analysis meaningful the variables should be correlated. For smaller correlations between all variables in the study, employing the technique of factor analysis may not be suited. Variables that are intensely correlated amongst themselves tend to exhibit higher correlation with the same factor.

Null hypothesis is that the variables are not correlated in sample population. The hypothesis could be tested through Bartlett's test assuming the population correlation matrix is an identity matrix. In such a matrix the terms which are at diagonal angle in the matrix are one whereas that lie off the diagonal are zero. The matrix of correlation that exhibited simple correlation between the pair of variables are depicted in **Table 7.1**. In this case the diagonal elements are all 1 and these are ignored. The diagonal line running from top to bottom in the matrix table shown below is always a set of ones. This is for the reason that correlation between any one variable with itself shall always turn out to be one. The upper-right triangle can be filled however, it would be identical of the lower-left triangle. Due to the symmetry it can be explained that the correlation matrix is a symmetric matrix.

Table 7.1: Correlation Matrix



Step 6: Kaiser Meyer Olkin measure and Bartlett's Test Output

A key requirement is to check whether the variables in population are uncorrelated to each other. This is stated as the null hypothesis described in the preceding para i.e. variables are independent or uncorrelated to each other. Bartlett's test output provides this confirmation. It is equally important to test sample adequacy. Kaiser (1970) originally established a sampling adequacy measure which was later amended by Kaiser and Rice (**1974**) and is popularly named the Kaiser-Meyer-Olkin (KMO) measure. KMO measured values between 0.5 and 1 indicate appropriateness of application of factor analysis and a value lower than 0.5 would indicate that application of factor analysis on the samples might not yield the desired results.

Table 7.2: KMO measure and Bartlett's Test

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy.		0 .926
Bartlett's Test of Sphericity	Approx. Chi-Square	2719.402
	Df	210
	Sig.	.000

Table 7.3: KMO score range

KMO Score	Interpretation
0.9+	Perfect
0.8 – 0.89	Great
0.7 – 0.79	Good
0.5 – 0.69	Mediocre
<0.5	Unacceptable

From the test carried out in present study the KMO value has come out to be 0.926, which is higher than 0.5 and hence is acceptable as per Kaiser. If the value was below this live than we need to review the decision to go for factor analysis. We can go for collecting additional data. Another alternative would be to prefer that

more number of variables are selected for the analysis (**Hutcheson & Sofroniou, 1999**).

The value of significance level (.000) in the above table indicate existence of relationship between the variables in the population.

Step 7: Factor Analysis

To decide the method of Factor Analysis

Since suitability of applying factor analysis for analyzing the data collected has been established above, the next step is to decide on the suitable method of factor to be applied. Procedures followed in deriving the factor weights or loadings, which are also called factor score coefficients, differentiates between the methods of factor analysis to be applied.

Factor analysis can be applied through application of the methods of Principal Component Analysis or Common Factor Analysis. Conceptually both methods are different but can produce identical output. Principal Component Analysis turns out to be the default method for factor extraction when factor analysis is carried out through computer based statistical modelling techniques using SPPS software suites.

Sometimes, such outcome might cause some amount of confusion about as to how the two methods of factor analysis are distinctly differing as both are data reducing methods which allow researchers to measure variance in the selected variables in a narrower set. The methods of Principal Component Analysis or Common Factor Analysis can be run using computer based statistical software and their outcome, as stated above, can be identical or similar. Both methods are step-by-step approaches in sequential form. The steps comprise extraction of variables followed by interpretation, then applying rotation techniques. Final step is selecting the smaller set or number of components or factors and description and analysis.

However, even though there are similarities between the methods, there are distinct variation between the methods of Principal Component Analysis or Common Factor Analysis.

In its methods, the Principal Component Analysis approach reduces data from a larger set of variables towards creating one or some index variables. A linear combination is utilized throughout the extraction technique, which is basically a weighted average of a set of variables. The focus point of Principal Component Analysis is to determine how to carry out this exercise in an optimal way in deciding the number of components, variables in component, and assigning weights.

Therefore the approach to data reduction in Common Factor Analysis is fundamentally different than the Principal Component Analysis. Principal Component Analysis measures the latent variable. A single variable cannot be used to directly measure this latent variable. For example a single variable cannot be determined to address factors like social intelligence or social anxiety.

Principal components analysis intends to extract lesser number of factors and the number should be to the minimum possible, considering the requirement that extracted factors should account for the maximum possible variance in data. This method considers total variance in the data whereas common factor analysis follows extracting variables based on common variance in data instead of total variance.
Only the common variance of data would be analysed through common factor analysis while cases of finding total variance in data would be analysed through principal component analysis.

Number of factors to be determined

The goal is that the information that exist in original variables need to be condensed and summarized through the extracted factors which shall be in smaller sets. The

concerns in applications of factor analysis in determining number of factors to be extracted. The issues received considerable attention from quantitative researchers (**Yeomans & Golder, 1982**) and researchers formulated distinct procedures that can guide for as to how many factors can be extracted.

Priori method of determination

A priori can be the knowledge that exist from experience. Researcher can have prior knowledge of the subject that under study. Based on his or her prior knowledge, it can become possible to assess the number of factors to be extracted without losing the latent or total variance. A priori knowledge is derived from the power of reasoning which is based on researcher's self-evident knowledge.

Determination based on eigenvalues.

A widely popular approach, researcher retains those factors that have eigenvalues higher than 1.0. The quantum of variance attached to a factor are indicated by eigenvalue. Eigenvalues lower than 1 are excluded in the analysis as they shall attributes of a single variable, each variable with variance of 1.0. while following the eigenvalue method of extraction, the number of factors should be on the higher side of 20 because a number lower than 20 can provide outcome with number of factors on conservative side.

Scree Plot

In a scree plot graphical representation method, the eigenvalues are plotted vis-à-vis the number of factors in the order of their extracting. The scree plot curve shall have a distinctly identifiable break in its slope, containing factors that has larger eigenvalues associated than others. The steep slope breaks down and trailing starts gradually after the distinct break with the factors that contain lower eigenvalues,

and is called a scree. The point of commencement of the scree indicates the true and i.e. the desired number of factors extracted.

Percentage of variance method

In this method the cumulative percentage of variance is measured. The cumulative percentage variance extracted by a smaller number of factors in the study reach a percentage level acceptable and satisfactory to the researcher. Researcher can determine the specific percentage of variance that can be considered satisfactory depending upon the problem being studied under the research project.

Significance Tests

Significance test are carried out to find statistical significance of eigenvalues. Factors with eigenvalues that are found significant are retained. With large sample size which extend beyond 200, there can be number of factors that are significant statistically. However, not all these significant factors may account of large variance. Many of these actually may account for a tiny share of the total variance, which can be major drawback in using the method on standalone basis.

In the present study, we have chosen the method of percentage of variance.

Malhotra (2011) recommends that if we use the percentage of variance method, the number of factors extracted shall exhibit a minimum of 60 percentage cumulative variance. The five factors shown in the table below has 63.728 percentage of cumulative percentage of variance.

Table 7.4: Total Variance

Explaining Total Variance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.344	39.734	39.734	8.344	39.734	39.734	5.024	23.923	23.923
2	1.534	7.307	47.041	1.534	7.307	47.041	4.044	19.257	43.180
3	1.365	6.499	53.540	1.365	6.499	53.540	1.693	8.064	51.244
4	1.111	5.290	58.829	1.111	5.290	58.829	1.490	7.097	58.341
5	1.029	4.899	63.728	1.029	4.899	63.728	1.131	5.387	63.728
6	.926	4.410	68.138						
7	.831	3.958	72.096						
8	.779	3.709	75.804						
9	.676	3.218	79.023						
10	.582	2.770	81.793						
11	.513	2.443	84.237						
12	.500	2.379	86.616						
13	.423	2.013	88.629						
14	.412	1.961	90.590						
15	.349	1.662	92.251						
16	.340	1.618	93.870						
17	.310	1.478	95.347						
18	.270	1.287	96.634						
19	.257	1.223	97.857						
20	.237	1.131	98.988						
21	.213	1.012	100.000						

*Extraction Method: Principal Component Analysis.

For the present study, we use eigenvalue approach to decide on number of factors to be extracted. As indicated in the table above, the five factors with eigenvalues higher as 1.0 have been retained, and they accounted for about 63.73 percentage of total variance. The scree plot is shown in figure 7.4. Plotting the eigenvalues, the distinctly identifiable break can be seen occurring at five factors which also contain the eigenvalues higher than 1.0. These values can be seen in the two columns on the left hand side of the table immediately above. The line gradually tapers down after the slope breaks and thereafter becomes almost flat. The flattening indicate that each successive factor has accounted for lesser and lesser share of the total variance.

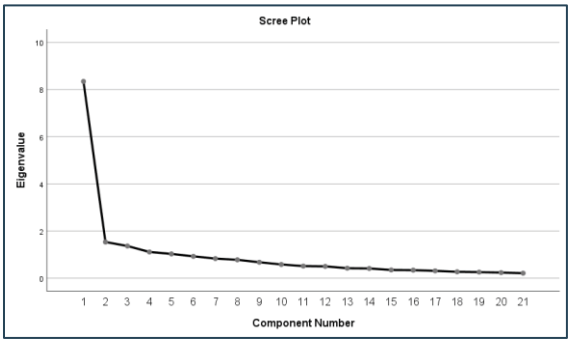


Figure 7.4: Scree plot

Communalities

Communalities is indicated by the percentage share of each variable's variance that can be accounted for by the factors. Those variables that have high values get adequately shown in the common factor space. The variables that have low values do not get represented well. The high communalities indicated in the Table 7.5 point towards the fact that the components extracted very well represent the variables. Whenever communality is found to be very low while conducting principal components extraction, researcher should go for extracting another component.

Table 7.5: Communalities

		Initial	Extraction
1	Secured uninterrupted supply	1.000	.517
2	Affordability of energy resources	1.000	.641
3	Equitable access	1.000	.689
4	Transparent and stable pricing policy	1.000	.672
5	Trade promotion for products and technologies	1.000	.593
6	Bilateral trade relations with energy rich nations	1.000	.582
7	Encourage low energy intensity	1.000	.559
8	Adaptation and investment in latest technologies	1.000	.681
9	Maximise exploitation of domestic petroleum resources	1.000	.564
10	Healthy G-2-G relations through proactive energy diplomacy	1.000	.611
11	Promoting energy conservation by people and industry	1.000	.757
12	Better tools to estimate demand potential and capacity planning	1.000	.633
13	Tax incentives for outward investment oil and gas by NOCs	1.000	.676
14	Maximise strategic tie-up between NOCs and IOCs	1.000	.679
15	Reducing risk through joint venturing in oil project development	1.000	.707
16	Concessional State funding for oil acquisitions overseas	1.000	.601
17	Stable Fiscal Regimes in Governing Contracts	1.000	.506
18	To achieve Knowledge and Technology Transfer	1.000	.819
19	Pooling Complimentary Resources	1.000	.526
20	Decentralisation and small scale supply of oil and gas	1.000	.661
21	Research and Development	1.000	.711

Extraction Method: Principal Component Analysis

The second column in the above table under the 'Communalities' heading (**Table 7.5)** indicate the relevant information post extracting the factors. It can be noticed that the communalities values under Extraction column are different from those under Initial column. This if for the reason that unless all factors are retained, all of the variances attached to variables do not get explained.

Table 7.6 Component Matrix

Component Matrix[a]

		Component				
		1	2	3	4	5
1.	Secured and uninterrupted supply	.510	.308	.009	-.157	.370
2.	Affordability of energy resources	.739	.014	-.297	-.011	.071
3.	Equitable access for all citizens	.736	.065	-.375	.039	.016
4.	Transparent and stable price policy	.647	.174	-.415	.192	.120
5.	Trade promotion for products and technologies	.691	.058	-.324	.081	.005
6.	Bilateral trade relations with energy rich nations	.727	-.119	-.177	-.069	.056
7.	Encourage low energy intensity	.730	-.025	-.133	.015	-.083
8.	Adaptation and investment in latest technologies	.816	-.038	-.012	.106	-.056
9.	Maximise exploitation of domestic petroleum resources	.715	.018	.108	.155	-.130
10.	Healthy G-2-G relations through proactive energy diplomacy	.733	-.048	.073	-.103	-.235
11.	Promoting energy conservation by people and industry	.842	.076	.077	.000	-.193
12.	Better tools to estimate demand potential and capacity planning	.763	-.042	.124	-.088	-.161
13.	Tax incentives for outward investment oil and gas by NOCs	.744	-.122	.317	-.027	.081
14.	Maximise strategic tie-up between NOCs and IOCs	.740	-.165	.276	-.137	.097
15.	Reducing risk through joint venturing in oil project development	.706	-.199	.295	-.104	.267
16.	Concessional State funding for oil acquisitions overseas	.502	-.209	.442	-.011	.330
17.	Stable Fiscal Regimes in Governing Contracts	.112	-.397	-.314	.473	.119
18.	To achieve Knowledge and Technology Transfer	-.038	.104	.339	.824	.111
19.	Pooling Complimentary Resources	.327	.204	.130	.012	-.600
20.	Decentralisation and small scale supply of oil and gas	.243	.686	.278	.190	-.136
21.	Research and Development	.044	.755	-.065	-.115	.349

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

The table above indicate the variances attached to the retained factors. It can be seen that these are the identical to those shown in the table under 'Initial eigenvalues'. This outcome is a typical characteristics of principal components analysis.

Step 8: Rotation of Factors

The un-rotated or initial factor matrix represented the relationship between factors and individual variables. However, factors are not related to a single but with many variables for which interpreting them becomes complex exercise. Varimax rotation attempts to simplify interpretation by maximizing variances of the variables loadings on each factor. Each variable is rotated. Varimax rotation with Kaiser Normalization (**Malhotra & Dash, 2011**) technique used to convert the factor matrix into a simpler matrix which can be easily be comprehended. Table 7.7 exhibit the rotated factor loadings. Rotated factor loadings represent the way the variables are weighted for each factor as well as correlation between variables and factor. The rotated component matrix using the orthogonal Varimax rotation that exhibit the variable's factor loadings can be seen in Table 7.7 below.

Table 7.7 Rotated Component Matrix

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
1. Secured and uninterrupted supply	.364	.375	-.085	.580	-.076
2. Affordability of energy resources	.734	.293	.067	.059	-.084
3. Equitable access	.793	.202	.106	.068	-.057
4. Transparent and stable pricing policy	.790	.095	.011	.165	.103
5. Trade promotion for products and technologies	.733	.197	.116	.052	-.006
6. Bilateral trade relations with energy rich nations	.628	.406	.072	-.041	-.124
7. Encourage low energy intensity	-.040	.350	.235	-.017	.616
8. Adaptation and investment in latest technologies	.614	.476	.268	-.013	.079
9. Maximise exploitation of domestic petroleum resources	.354	.440	.670	.008	.154
10. Healthy G-2-G relations through proactive energy diplomacy	.454	.560	.420	-.047	-.121
11. Promoting energy conservation by people and industry	-.005	.489	.451	.071	.556
12. Better tools to estimate demand potential and capacity planning	.448	.530	.380	-.008	-.085
13. Provide tax incentives for outward investment in oil and gas	.320	.729	.198	.019	.044
14. Maximise strategic tie-up between NOCs and IOCs	.324	.158	.737	.000	-.073
15. Reducing risk through joint venturing in oil project development	.297	-.003	.786	.025	-.019
16. Concessional state funding for oil acquisitions overseas	.069	.759	-.075	.025	.116
17. Stable Fiscal Regimes in governing contracts	.656	-.053	-.273	-.428	.344
18. To achieve Knowledge and Technology Transfer	-.100	.054	.026	.028	.897
19. Pooling complimentary resources	.142	.034	.710	.004	-.012
20. Decentralisation and small scale supply of oil and gas	.054	.048	.466	.589	.303
21. Research and Development	.104	-.108	-.092	.825	-.006

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]
a. Rotation converged in 6 iterations.

The output from the Varimax rotation represented in the Table 7.7 above indicates that each variable load's significantly only on one of the five factors of the initial matrix. Five factors emerge from the analysis. These factors are now labeled and summarized to understand their significance and help in further analysis.

Step 9: Factor Interpretation and Labelling

Once the patterns are determined, the researcher will study them and ascribe an appropriate label to the variables in the patterns. Putting labels facilitate the better understanding and communication and helps in thorough discussion of the results. In the present case because solution is reached, we try and name each of the five factors. It is necessary to ensure that the factor extracted shall have loading on one dimension. Those items with factor loadings lower than 0.50 are excluded. Also items with loading on two or more factors with a loading score more than 0.50 on each factor are excluded. The Table 7.8 included only those loadings which were above .50. None of the twenty one items was required to be excluded in the present case for factor loadings below .50. Accordingly, factor analysis has been conducted considering the twenty one variables.

Each variable has a loading number on the factor, for example equitable access and stable pricing policy has higher loadings of 0.793 and 0.79 compared to other variables. The significance of this factor originates from the fact that a long term stable policy framework which is transparent and predictable shall enhance energy equity investment in the high capital intensive oil and gas industry. Amongst other variables, promoting bilateral trade scores the next highest loadings. Hence the name provided to the factor is 'Long term stable policy promoting bilateral trade relations'. Following the principle, each factor has been named in the table below.

Analysis of the factors extracted as represented in Table 7.8 indicate the clubbing of variables under each factor with respect to their factor loadings and corresponding naming of the five factors.

Table 7.8 Factor Names

	Component					Factor Name
	1	2	3	4	5	
1. Affordability of energy resources	.734					Long term stable policy promoting bilateral trade relations
2. Equitable access for all citizens	.793					
3. Transparent and stable pricing policy	.790					
4. Trade promotion for products and technologies	.733					
5. Bilateral trade relations with energy rich nations	.628					
6. Adaptation and investment in latest technologies	.614					
7. Healthy G-2-G relations - proactive energy diplomacy		.560				Concessional Government funding for outward energy investment by NOCs
8. Better tools to estimate demand and capacity planning		.530				
9. Tax incentives for outward investment		.729				
10. Concessional State funding for oil acquisitions		.759				
11. Stable fiscal regimes in governing contracts		.656				
12. Maximise exploitation of domestic oil resources			.670			Pooling of resources forming joint venture partnerships
13. Maximise strategic tie-up between NOCs and IOCs			.737			
14. Pooling complimentary resources			.710			
15. Joint venturing in oil project development			.786			
16. Secured and uninterrupted supply of oil and gas				.580		Decentralization to secure uninterrupted supply
17. Decentralization and small scale supply				.589		
18. Research and Development				.825		
19. Promoting energy conservation					.556	Promoting knowledge and technology transfer
20. To encourage low energy intensity					.616	
21. To achieve Knowledge and Technology Transfer					.897	

7.3 Discussions and interpretations

The five factors extracted based on factor loadings and as named above are discussed in detail on their applicability and influence in cross border equity oil development. The factors are depicted in pictorial form in Figure 7.5

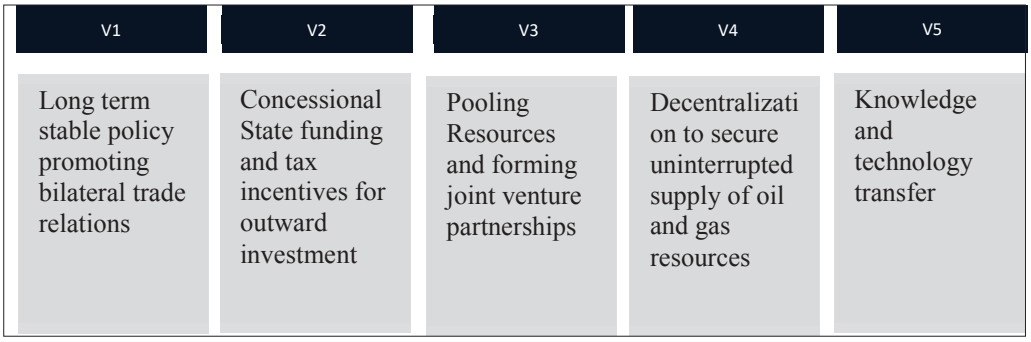


Figure 7.5: Factor Labelling and Factor Description

Understanding the logic of energy security problems helps to prioritise national policies for long term implications especially in the context of overseas equity sourcing. Supportive policies of the government towards both inward and outward foreign investments have great influence on economic development of the country, especially predictable and stable policies that provide boost to bilateral trade. The role of governments in formulating long term policies in energy sourcing has greater significance as energy strategies get intertwined with economic policies. In case of China, the country adopted an outward looking oil economy when it became increasingly evident that its reliance on imported oil is poised to overshoot all previous estimates. China turned into a net oil importer by 1997. With its oil imports growing, the government shifted its policy after four years with the realisation that demand for oil and gas is poised to increase significantly as the country's economy develops. The policy makers envisaged that with improvement in the living standard of its citizens, the consumption of oil and gas will grow manifold. The Chinese premier Li Peng publicly declared that great strives are required to develop China's domestic crude oil and natural gas resources, however, since their limited endowment and availability, foreign oil resources also to be acquired for meeting the enhanced demand. Several indicators have shown China's oil strategy to move in that direction during the last few years.

The adoption of bilateral cooperation practices across energy exporting and consuming countries has emerged a robust institutional mechanism for long term energy policy agenda. An example is the emerging role of U.S. as the new oil and natural global supplier. Whenever the oil and gas production in the U.S increases, the competition for OPEC countries to supply consumers goes up in tandem in the short to medium term, which can cause moderating of oil prices. After the U.S. ended the self-imposed ban on its oil exports in 2015 after a long four decades, the first crude oil shipment from the U.S arrived in India in October 2017. India set in place a new energy architecture with the U.S. and by 2019 concluded contracts to

source 9 million ton LNG per year from the U.S, making India the sixth-largest buyer of LNG originating in the United States.

The concessional loans from the state controlled agencies and targeted tax incentives for equity oil investment are appealing because they respond to a number of interests. Cross border oil and gas investment projects contain large externalities. A project can have higher socio-economic and political benefits for the investor but its financial returns could be weaker that could impede investing decisions on commercial principles. Oil-backed loans concessional loans advance government's goals of energy access and diversifying foreign exchange reserves. Additionally it helps the bank to enhance its own profile and expand global footprints. Funding backed by the State can be overtly political in nature rather being totally economic decision and accordingly, could allow for deferred loan repayment whenever needed.

Some oil-backed loan deals have facilitated the government controlled entities to get involved in infrastructure projects in the foreign country, like the Chinese investment-for-resources carried out in few African countries. China's successes in getting access to the oil and gas resources in a host of African countries can be attributed to the usage and promotion of Chinese government controlled financial and banking institutions. China has developed strong financial and banking institutions that are controlled by powerful political members of its ruling party. Industrial and Commercial Bank of China, China Development Bank, Sinosure, China Export and Credit Insurance Corporation, Export- Import Bank, China International Trade and Investment Corporation, are some of its state controlled banking and financial institutes that have provided soft funding to facilitate oil deals made by Chinese oil companies overseas.. These entities have large resources, are backed by its political leaders and prompted to provide discounted loans to Chinese corporations on the overseas resource acquisition trail (**Japan External Trade Organization, 2018**).

The energy investment in the Belt and Road Initiative which was launched by China in 2013 to connect it through Asia and Europe, has developed strong connotations synonymous with China seeking greater geopolitical and economic power. The project has grater ambitions to serve the geopolitical goals of China through reshaping the global energy landscape and commodity market structure. In this context the Chinese state back oil companies are being utilized through overseas energy investments in serving its governments macroeconomic and geo-political goals. In the process, the risk assessment of certain large oil investment by Chinese oil companies might have been compromised that resulted in economically unsustainable investments (**Galkin, Chen & Ke, 2019**).

The factor of resource pooling for joint venturing assumes significance in the context of investors partnering to gain through leveraging the combined capabilities from participant companies and host governments. Oil and gas companies generally avoid extensive exposure to a speculative E&P investment or investment in a new region or unproven reserve. International oil development projects are risky and capital intensive and a single company may not be ready to secure finance on its own the entire project requirement. Another good reason for partnerships in joint venture oil and gas projects is the proprietary technology. A consortium approach could be the preferred mechanism to go for oil assets abroad. Joining hands and forming consortium provide additional strength in finances, and bargaining power. Joint venturing can leverage the complementary skills of partners. For the host nations, a consortium of two or more companies become a preferred option as it brings in diverse capabilities and capital.

Decentralizing energy emerges on the agendas of policy makers to assess whether new energy pathways could be developed in a more decentralised manner to tackle high import dependencies and restrictive access to energy sourcing. Technological breakthroughs are catalysing energy move across the value chain. Foreign oil

reaching the processing centres and imported LNG regasification locations are at the centre of the energy transition, that are prompting newer policy so that decentralized energy can be delivered at far-off places in segregated manner. India and China spread over vast geographical areas. In both countries a growing number of industrial consumers have started to make provisions to reduce relying on centralised supply system.

Technology transfer is a contentious issue in international negotiations on partnerships for cross border oil and gas investment. There are growing concerns on climate change effects emanating from increasing usage of fossil fuels. Multilateral agencies have recognised the need to lower carbon footprints and various concrete steps are being undertaken through initiatives like the climate change framework of the United Nations. In case of Japan, its lack of domestic hydrocarbon resources and higher energy consumption prompted its companies to hunt for oil and gas abroad. Japanese companies participated in oil and gas projects and provided technological support to the host government in engineering, project management and energy research programs. Japan has also collaborated with India for research and development in the area of deep sea gas hydrates and methane molecules.

Technological advancement and economic reforms in the coming decades could transform the way energy is consumed and supplied in all the consuming sectors of industry, transport, household and agriculture. In the more advanced economies technological advancement involves the generation of new knowledge and applications that can be applied to productive activity in energy and other sectors, and for developing countries technological advancements is strongly influenced by their ability to access, adapt and disseminate advanced technological knowledge that has been generated outside their shores. The later pertains more to India in its long term energy sourcing endeavours through equity oil development.

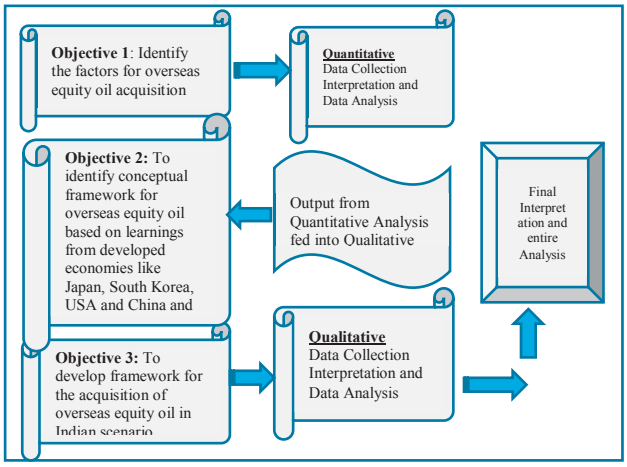
The overall security of energy services through cross border equity oil development shall depend on the interaction of the different components extracted and described above, whether they are technical, commercial or geo-strategic in nature. The factors extracted have the cumulative effect of increasing the collective sense of energy security when it relates to cross border equity oil investment. The heightened competition for scarce energy resources is exacerbating existing geopolitical tensions and catalyzing new conflicts, but also channelizing energy cooperation, policy reforms and innovation.

CHAPTER 8

RESEARCH METHODOLOGY AND DATA ANALYSIS FOR OBJECTIVE 2

Developing a conceptual framework for overseas equity oil acquisition shall be probed in the second research objective. Identification of the conceptual framework shall be attempted based on learnings from crude oil importing countries with advanced economies i.e., China, Japan and the Republic of Korea and factors identified in research objective 1. The conceptual lens that shall be derived as outcome of research objective 2 shall be used as input for carrying out the grounded theory methodology for research objective 3.

A conceptual framework shall comprise concepts and theories. Together with reference to the relevant literature, it should illustrate the understanding of theories and concepts relevant to the research. Theoretical framework connects the researcher to knowledge that is existing through course readings and literature. The analytic models and theories pertinent to the research subject are studied in the framework research methodology. The framework analysis method is employed for probing the research objective two of the present research study for developing conceptual framework. Data shall be compared and contrasted by the themes across multiple



cases. The method enables the researcher to situate emerging perspectives in proper context and simultaneously evaluate its relations with other aspects. The framework method comes within the purview of a broad family of analysis methods that are often called thematic analysis, qualitative content analysis or known as textual analysis. Commonalities shall be identified. Simultaneously, the difference in the qualitative data are also be pointed out; and thereafter the inter relationships between parts of data are explored. The process is intended to generate descriptive conclusions clustered around identified themes. The distinct feature of the theoretical framework methodology is the summarized matrix output wherein data and information can be systematically condensed for exploring and analyzing by case and by code.

While key themes are analysed in-depth across complete data set, views expressed by the research participant continue to remain attached to various other views and perspectives within the matrix. It is emphasized that the context of participant's views are retained. The process enables researcher to compare and contrast the information that are carried out within the case as well as across the various cases. Unlike the sequential process of data gathering and analysis done in quantitative research, in this case data collection do not get entirely preceded by data analysis and there is ongoing interplay between data gathering, analysis and developing the theory or concept.

Researcher focuses on the specific variables and define the specific viewpoint or a framework that the researcher shall probe thereby limiting the scope of the data in theoretical framework methods. It assists in better understanding of the concepts in the given context. New knowledge can be gained when the researcher attempts challenging the theoretical assumptions or these get validated. The validity of existing theory in a given set up or issues are to be tested by the researcher in the theoretical framework method, as the very method is bounded in a specific theory or phenomenon or event or beliefs of social science (**Patton, 2002**).

8.1 Steps in Framework Analysis

Theoretical framework provides flexibility in positioning the researcher' framework concepts within a broader context of related theories, models or existing frameworks. It also permits researcher carry out sequential data analysis or simultaneous data analysis. Themes are generated and charting and sorting of data in accordance with key issues and themes are carried out at collection stage itself.

Table 8.1: Framework Analysis – stepwise categorization

Contextual	Identify what exists and in what form	• perceptions or attitudes • nature of experiences • needs of sample population • elements operating within a system
Diagnostic	Probe the reasons as to why it exists. The causes or reasons are probed and diagnosed.	• Underlying factors for perceptions • Reasons of actions and decisions • Why do particular needs arise • Reasons for not using services or programs
Evaluative	How effective is the concept or theories that exist in the context of concepts being probed in researchers project	• The way research objectives can be achieved • Variables that can affect delivery of services • Personal experiences affect behaviour. How significantly they affect and the way experiences make effect. • The restrictions that exist in operating a system
Strategic	Identify and bring out new concepts or theories, provide its description	• Services needed for meeting the needs • Actions that help increasing effectiveness of services • Improvement of systems. How it can be achieved. • Strategize the ways to resolve problematic issues

The framework method is a systematic analytical research process that involves the following steps **(Ritchie & Spencer, 1994).**

1. Familiarization stage to get accustomed to the data and information
2. Identification step for identifying a thematic and theoretical framework
3. Putting information in order in form of Indexing
4. Arranging data and information in charts depicting themes, and
5. Representation in maps and interpreting the key characteristics

The first step is **Familiarization** with the concepts, definitions, theories and relevant literature, that is are to be used in the study undertaken. During this process researcher becomes familiarized with data transcripts. An overview is obtained by studying the available literature on the subject of interest, listening to audiotapes, and going through transcripts.

Identifying a thematic framework: Themes that start emerging from the literature and from the data collected are identified and noted. The themes or the key issues may emerge from the views expressed by participants or through studying the particular phenomena or theories. These concepts form the basis of a thematic

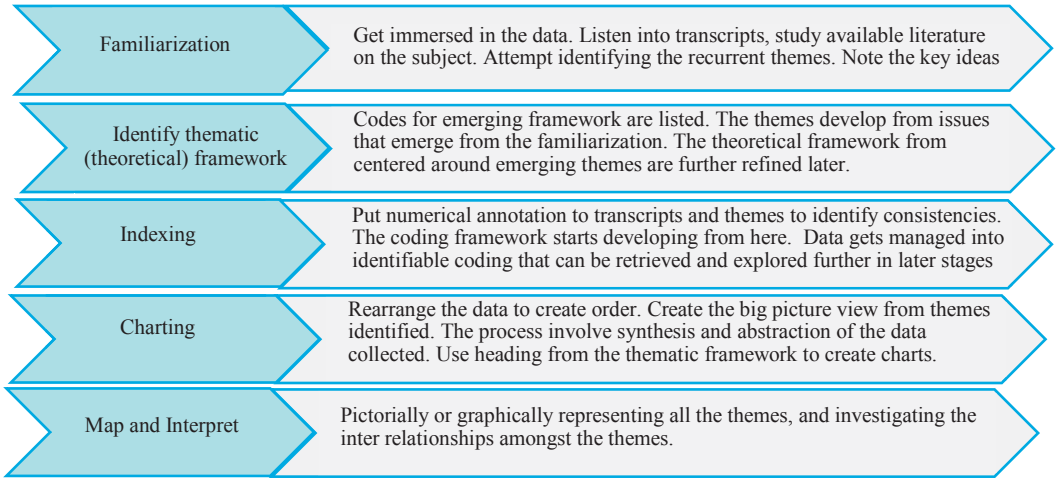


Figure 8.1: Framework Analysis Process Steps

framework. This thematic framework emerging at this stage is refined later through further classification of data (**Ritchie & Spencer, 1994**). There could be a priori issue as information of research topic or knowledge of research subject exist. However, researcher has to maintain a welcoming and receptive mind set. Ritchie and Spencer has emphasized that the thematic framework is not the final framework and should be refined further subsequently as the analysis progresses.

The next stage of **Indexing** would mean researcher identifying sections of the data that relate to specific theme. Then the process of assigning numerical annotations

start to identify consistencies. However, numerical annotations are optional and researcher can use words for indexing purpose as per his convenience. The indexing is done for the entire textual data.

Charting refers to the process to rearrange the data to create order. Create the big picture view from themes identified. The process involve synthesis and abstraction of the data collected. Use heading from the thematic framework to create charts of themes. Researcher can also use a priori inquiries.

Drawing **maps and interpretation** involves pictorially or graphically representing all the themes, and investigating the inter relationships amongst themes**.** Analysing the key characteristics can enable drawing a schematic diagram representing the phenomenon. Reaching the stage of mapping and interpretation, researcher shall be aware of the objectives of analysis. Such analysis may have the goal to delineate the concepts by defining them, mapping the nature of events, probing relations and associations, seeking explanations and drawing conclusions to be able to develop strategies (**Ritchie & Spencer, 1994).**

Here Researcher felt that the question - identifying a conceptual framework for overseas equity oil development, fitted with both contextual and strategic category since we are interested in finding out the form and nature in which such conceptual framework exists and help evolve new theories. Researchers who follow qualitative techniques are divided on the fact whether using a special software for their analysis is helpful or even the use of generic software like msword, excel spreadsheets available would be sufficient.

The following aspects are kept in the perspective while deciding on the above.

1. The Complexity of the data being handled
2. The aim of the research
3. The work justifying the cost of any specialized software

4. The depth of analysis required
5. The expertise of the researcher
6. The preference of the researcher
7. The value added by using particular software

(Scott, 2007)

Since literature on equity oil development framework are limited, researcher has gone ahead with manual method since using any specialized software would not have provided any additional benefit or perspective. The step-wise process description and methodology output of the framework analysis is depicted in figure 8.2 below.

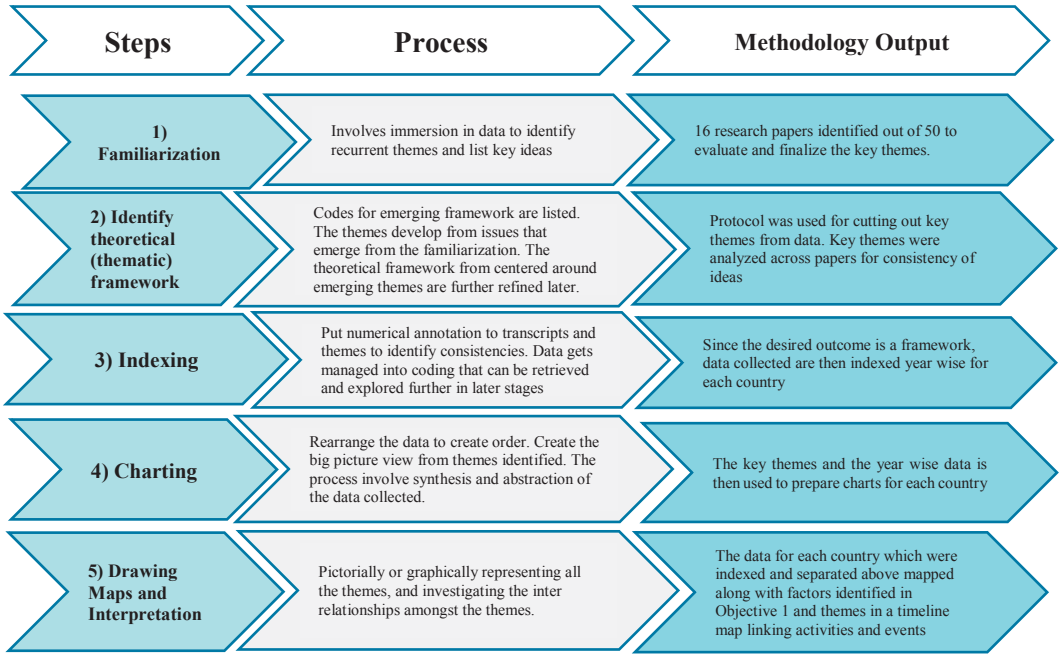


Figure 8.2: Step-wise process and methodology output of framework analysis

8.2 Discussion on data output and analysis

Step 1: Familiarization

A large volume of data is collected in qualitative research. It might not be possible that researcher goes through all the materials gathered pertaining to his subject, and hence researcher has to use and review a selected data set pertaining to his area of study. Familiarization involves understanding the data available and generating whole or partial transcriptions in the field. For the present research topic, there are large volume of literature available that pertains to energy security and international oil and gas resource acquisitions. Researcher has reviewed fifty research papers published in reputed international journals. Sixteen research papers were shortlisted as listed below and the initial transcripts generated by markings on the papers in soft and hard copy versions. List of authors whose research papers were shortlisted out of the fifty research publications considered are listed below. .

1. Ang, Choong and Ng, 2015
2. Charfeddine and Barkat, 2020
3. de la Rue du Can et al, 2019
4. Gale et al, 2013
5. Gallagher, Kevin and Kong, 2016
6. Hughes, 2012
7. Jeffrey, Kucharski and Hironobu, 2017
8. Krane and Medlock, 2018
9. Phillip et al, 2018
10. Soni, Singh and Banwet, 2016
11. Stephen and Hillard, 2018
12. Srivastava and Thomson, 2009
13. Tang et al, 2017
14. Thomson and Boey, 2015
15. Wang and Zhou, 2017
16. Zheng, 2017

Step 2: Identification of thematic framework

The thematic coding is progressed from the first step of familiarization where passages of text are identified that are related by a common theme or concept. The eight factors from quantitative analysis stage, listed below (a priori) form part of the emerging themes in the framework analysis.

1. Reserves of oil and gas resources and access mechanism for the investing entities to the volumes produced in the host country.
2. Availability of infrastructure to export. Crude oil is fungible as a commodity and can be transported through surface or sea routes. Natural gas transportation would require trans-country pipelines or liquefaction facilities at the producer end to convert gas to LNG for marine transport in tankers.
3. Freedom to sell the produce in international market at arm's length prices.
4. Export mechanism and legal framework at the producer country
5. Incentivizing investment in equity oil and gas fields in foreign country for acquisition of natural resources
6. Fiscal stability in contracts providing long term stable and transparent mechanism in governing contracts
7. Maximise strategic tie-up between NOCs and IOCs and building capacity and advanced technology.
8. Pooling complimentary resources to large scale investment and assist oil rich countries (cases in Africa) for infrastructure development.

At this stage, a protocol was used to scan through the literature to draw out the themes. The protocol listed below was applied on literature on overseas equity oil and gas development in energy importing mature consumer countries of China, South Korea, and Japan.

1. How the equity oil and gas developments have panned out in the context that country's economic growth and long term supply of energy resources have increasingly become critical.
2. What are the factors influencing the development of equity oil (to use a priori knowledge from factor analysis to look for factors influencing such developments).
3. Which of these developments or events can be considered as the key themes as per available literature on overseas equity oil and gas development in energy importing mature consumer countries of China, South Korea, and Japan.
4. What are the dominant themes and similar themes emerging
5. Can the themes be mapped in a sequence with a timeline
6. Can a conceptual framework common to all oil and gas consuming emerging economies emerge from the dominant theme.

While conducting the present study, the following themes were identified combining themes emerging from output of Objective 1 cited in the report and those emerging from data of literature survey.

1. Stable, predictable and transparent price policy
2. Trade promotion in innovative technologies and products
3. Enhancing trade relations with energy rich nations
4. Adaptation and investment in latest technologies
5. Healthy Government-to-Government relations through proactive energy diplomacy
6. Providing affordability for citizens
7. Equitable access irrespective of paying capacity
8. Better tools to estimate demand potential and capacity planning
9. Incentives (for example income tax and duties) for outward investment in equity oil and gas
10. Development of secured system for uninterrupted supply of oil and gas

11. Concessional state funding for oil acquisitions overseas
12. Stable fiscal regimes in governing Contracts
13. Transparency in pricing
14. Maximizing strategic tie-up between NOCs and IOCs
15. Pooling complimentary resources
16. Reducing risk through joint venturing

Since our objective is to map the evolution of cross border oil and gas equity investment towards strengthening energy security in energy importing mature consumer countries of China, South Korea and Japan, using the emerging themes, we have tabulated and indexed the data based on the year and then mapped the themes.

The next step is indexing where researcher assigns numerical annotations to the data transcripts for finding consistencies. The process of indexing enables developing a coding framework. In the context of the present study pertaining to international oil and gas resources, indexing step is followed little differently for the extant study and we describe the evolution of oil sector, which include, inter-alia, the overseas equity oil development, for India first.

8.3 Evolution of India's oil and gas industry

The origin of the oil & gas industry in India can be traced back to the 19th century. In the year 1889 crude oil was first found in an oil well drilled by the Britishers at Digboi town in Assam. Realizing the significance of oil sector in providing fuel to develop industries and for economic development of citizens, in 1954 the Government of India included petroleum in the core sector industry. There were two oil companies exploring for crude oil during the pre-independence era. The Assam Oil Company was active in the northeastern part of India. Another company named the Attock Oil Company was engaged in oil exploration activities in the

northwest part of India, when the country was still undivided. However, both companies were producing small quantities of oil and there was not much of exploration activities as modern technologies were yet to be adopted in India.

The Industrial Policy Resolution of 1954 laid the foundation and gave birth to the oil and gas industry of the newly independent India. Petroleum was included in the core industry sector. In 1954 the Government of India established its first national oil company Oil & Natural Gas Commission (ONGC). Originally it was established within the Dehradun based Geological Survey of India as a separate Directorate for oil and gas. It was turned into a Commission by an act of the Parliament in 1956. For exploration in the northeastern India, another public sector company was established in 1959 by nationalizing the Burmah Oil Company. In the year 1959 the government formed another national oil company for marketing crude oil within India named Indian Refineries Ltd. This company was later acquired by the Indian Oil Company Limited in 1964. The merged entity was named Indian Oil Corporation, India's biggest petroleum refining company. During the formative days of 1960's ONGC carried out exploration in different parts of India and was successful in making smaller pool of oil and gas discoveries in Assam and Western Gujarat. In February 1974, the Mumbai High field was discovered in the western offshore about 176 km in the sea from the coast of Mumbai. The successful development of the field in offshore Mumbai High established India as a credible oil producer because of the high technology involved in the creation of infrastructure in the middle of the high sea, which was all done by Indian scientists and engineers with technological assistance from Russian geologists. The high

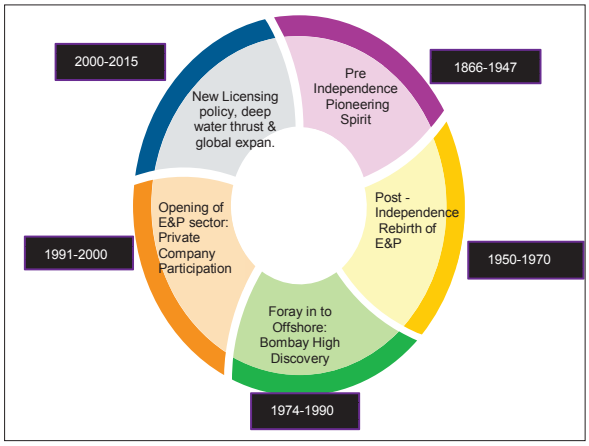


Figure 8.3: Five distinct era of E&P evolution

quantity of natural gas produced in the offshore fields of ONGC in the western offshore was brought to Gujarat coast for processing through subsea pipelines. For marketing the processed gas to industries and other establishments, the government formed the public sector entity Gas Authority of India in 1984 out of the gas division of ONGC.

After achieving about 70% self-sufficiency in oil & gas in eighties, India's domestic production growth stagnated and could not keep pace with increasing demand growth. In 1991, India's public sector oil companies were corporatized and the exploration and production sector was opened to private industry through joint venture route. During 2000-2015 period, the new licensing policy came in, deep water area exploration got major thrust and the national oil companies of India were permitted to go for overseas equity oil investment. Unconventional plays like the shale and tight oil and gas, and gas hydrates were also brought into focus. India's NOCs ventured overseas starting 2000-2001 and made large number of acquisitions of oil and gas assets across the world.

8.4 Indexing (Step 3)

We first map the evolution of Indian E&P sector globalizing from inception through the decades, using the emerging themes, we have tabulated and indexed the data based the year and then mapped the themes to the data.

Table 8.2: Indexing: India's E&P overseas

Year	Key Developments / Evolution
1963	India's national oil company dealing in exploration and production of oil and gas - ONGC formed joint venture with Agip SpA and Phillips Petroleum and participated in the discovery of giant Raksh and Rustam fields off the coast of Iran.
1973-75	ONGC awarded 4,500 sq.km area about 200 kilometres west of Basra in the desert adjoining Saudi Arabia.
1976	ONGC signed service contract with Tanzania's NOC for drilling in a small island off the coast of Dar-es-Salam, called Songo Songo island.

1989	India acquires first overseas exploration block 06.1 in Vietnam
2001	India's ONGC Videsh acquires 20% participating interest in Sakhalin-1 oil development project from Rosneft of Russia
2003	India's ONGC Videsh acquires 25% participating interest from Canadian company Talisman Energy in the onland oil producing project in undivided Sudan in the Mughlad basin
2004-06	India's national oil companies make new acquisitions of oil assets located in Syria, Sudan and Qatar. Also the Indian public sector oil companies expand their operations in the far-off Cuba and the Latin American country of Brazil, Colombia and Venezuela. ONGC Videsh enters west African country of Nigeria and acquires stakes in exploration blocks.
2008	India's NOCs spreads into Trinidad & Tobago, the Government of India enhances delegated power of NOCs to make larger investment in overseas equity oil.
2013	Indian state owned oil and gas companies enter the CIS region with ONGC Videsh participating interest in the Azeri, Chirag and Guneshli fields in offshore Azerbaijan on 28th March 2013.
2014-16	India takes major strides in Mozambique gas fields and consolidates in position in Russia by acquiring stakes in oil producing fields in the western Siberia region. Indian public sector company Indian Oil Corporation acquires stakes in oil and gas project in Oman.
2018	Indian public sector oil and companies join hands and jointly acquire stake in the Lower Zakum concession in the offshore fields of United Arab Emirates.

8.5 Indexing and Charting for China

8.5.1 Surging energy requirement of China

China has shifted from a centralized to a more market based economy since the time it initiated market reforms in 1978, thereby it experienced rapid economic development. GDP growth of China has averaged nearly 10% a year and as per the China report of the World Bank, more than 850 million Chinese people have lifted themselves out of poverty (**World Bank, 2020).** The rapid economic growth has led China to become a major energy consumer. The primary energy requirement of

China has grown from 417 million ton in1980 to around 3273 million ton in 2019, which was 23% of the world's energy consumption in 2019.

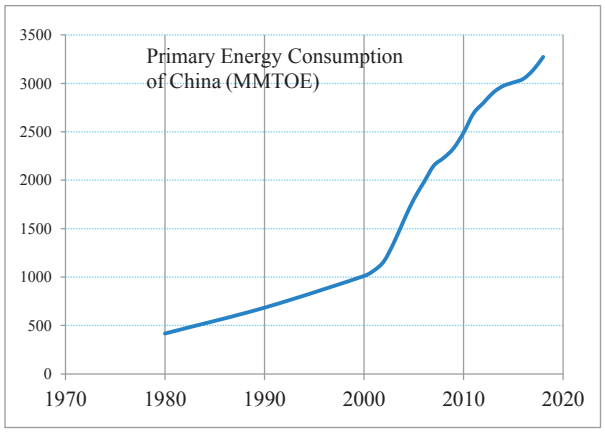


Figure 8.4 Primary Energy Consumption by China

Coal has the largest share in China's consumption basket. During 2018 share of oil was 20 percent and natural gas 8 percent. China produced 189.1 million ton of oil in 2018 which accounted for a small 4.2 percentage of the world's share of total oil production. Compared to the smaller volume of oil production, China consumed more than 600 million ton which amounted to about 13 percentage the total oil consumption of the world. Similarly, in 2018 China produced 4.2 percentage share of total gas production in the world which was 139 million ton of oil equivalent, and its gas consumption was 243 million ton oil equivalent, much higher at around 7 percentage of total gas consumption of the world. Naturally, the rapid economic growth in last decades has made china increasingly dependent on imports. Since 1993 onwards China turned into an oil importer. Due to stagnant oil production in China and rising consumption, the demand supply gap has been steadily rising since then.

The large domestic oil fields of China have matured and their oil and gas production level has long achieved its peak plateau. The big Chinese oil companies have invested in new technologies to sustain oil flows from mature fields. But with declining production and burgeoning demand, China's imports of crude oil increased and sourcing has to be done from across the world. The oil demand of China is partly consumer-driven which is likely to be more volatile in coming years when compared to the traditional demand patterns led by diesel fueled industry.

The higher demand side volatility of crude oil can have significant impact on the demand supply situation of the world oil market due to the sheer size of China's energy consumption ecosystem

The neo mercantilism policy pursued by the government, encouraged the Chinese NOCs and the decision makers to look for the ownership of reserves of oil and gas abroad. They expected that it would not only reduce the imports from other countries, but also be a crucial factor in long term energy security and ensuring the supplies in the times of global disruption in oil supplies. Over a period of time, the government pushed the state controlled oil companies to acquire oil assets abroad and offered diplomatic and economic incentive packages to many resource rich countries in exchange for entry into oil and gas resources.

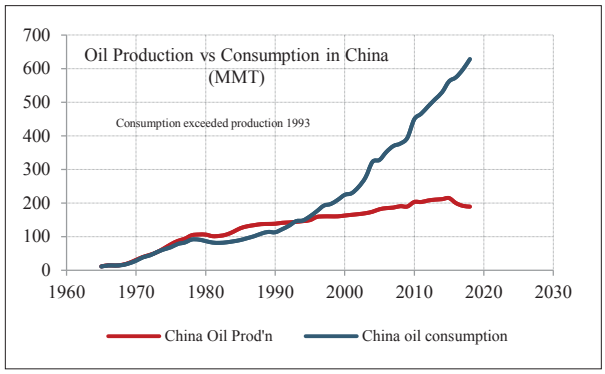


Figure 8.5: Oil Production vs Consumption in China

The evolution of oil production in foreign countries through acquisition of assets and companies by the Chinese public sector oil and gas companies has been the subject of energy and economic researchers. There are distinct patterns observed in the foreign oil investments made by Chinese companies. The patterns observed included collaboration at political level with host country, commercial partnerships with IOCs operating in joint venture projects in foreign oil assets, offering economic packages, investing in infrastructure development in host country, military cooperation and extending diplomatic support to the foreign nation in various multilateral fora. There are also instances where the Chinese companies intended partnerships for developing technical competence and expertise in the field of exploration and production to gain global stature by capturing value upstream (**Julie & Ding, 2014**).

Consumer countries from Asia including Japan, Korea, China and India has made overseas investments in oil assets through its national oil and gas companies. China's large oil and gas companies established independent subsidiary companies for foreign oil and gas business and listed them in the stock exchanges in the United States (**Xin & Honglin, 2012**).

Chinese investment for equity oil are not limited to oil and gas assets but extend beyond. China has made oil and gas deals with foreign countries in exchange for soft loans as a tool of energy and foreign policy engagement. The practice has been observed in African countries and also in few Latin American countries where resource nationalism sentiments run high (**Gallagher & Kong, 2016**). Concessional loans were extended for infrastructure development in exchange for getting access to its oil and gas resources. Such strategic deals have done by China with Kazakhstan, Turkmenistan, Russia, Venezuela, Brazil, Bolivia, Ecuador, and Angola and Ghana in Africa.

In countries like Iran, China invested in buyback contracts type system. China has also invested in cross border pipeline projects to allow for transportation of petroleum to its mainland. Its national oil companies invested large capitals in buying LNG assets abroad.

8.5.2 China's Going-out policy and State support

The Government of China has a neomercantilist approach to exercise control on the foreign oil and gas production of the state oil companies. This was to be achieved through supporting the large NOCs in form of concessional funds and diplomatic push in foreign countries for gaining access to its oil assets.

Chinese Premier Jiang Zemin made historic declaration of going out policy in November 2002 at the 16th national meet of its ruling party. The going out policy was a big step by Chinese government to embrace globalization. Before that also, acquisition of foreign petroleum assets was pursued by NOCs since the early 1990's, but after the going out policy was instituted, its NOCs got the necessary political boost to expand overseas.

Political support to national oil companies for overseas equity oil investment also prompted the Chinese banks to provide easy financing. Besides, there was active energy diplomacy pursued by the government, which smoothened their pursuit of acquiring oil and gas assets abroad. Many oil agreements were finalized by high profile visits of Chinese officials and politicians. The 'going out' strategy support by the government can be attributed to the readiness of Chinese establishment to associate with the foreign government and its ruling party. The implicit directive to state controlled companies were in line with Chinese foreign policy attributes that encouraged non-interference in the internal affairs of the host country, except initiatives at the military level, infrastructure development, concessional funding, and other such strategic and bilateral imperatives that are to be handled by the central party in Beijing (**Jonge, 2016).**

8.5.3 Geographical coverage of overseas oil development by Chinese NOCs

In 1993 China started with a small acquisition in Thailand. The three Chinese NOCs along with other private players have since grown to build their portfolio throughout the world and in diverse assets such as equity oil, equity gas, LNG and pipelines. Their major acquisitions in initial stages were in Sudan and Kazakhstan around 1997. After China joined WTO in 2001 and subsequent to roll out of 'Go Out' policy by its government, there was aggressive push by Chinese companies to acquire oil assets in various countries in coordination with government. China acquired oil and gas assets in Iran (2004), Oman (2002), Yemen (2005), Syria

(2004), Indonesia (2002), Venezuela (2005), Ecuador (2005), Colombia (2006), Angola (2005), Congo (2005), and in later years in the USA, Russia, Canada, Myanmar and Australia. Chinese NOCs have also invested in cross border pipeline projects to source oil and gas from Kazakhstan, Russia and Myanmar.

8.5.4 Indexing

We have tabulated and indexed the data based on the year as represented below in Table 8.3.

Table 8.3: Indexing for China

1949	Establishment of the Chinese ministry of fuel industry.
1950	A national level petroleum meet of China was held in which it was decided at the highest political level to establish a new department for oil and gas. It was named petroleum administration department.
Early 1950's	Beginning of development of petroleum industry in China.
1955	The department dealing with oil and gas petroleum was turned into a federal ministry. It was named Ministry of Petroleum Industry. This ministry was mandated to supervise exploration of petroleum, oil and gas development. Refineries were also put under this ministry. The ministry became the federal agency specially tasked for developing the oil and gas industry of China.
1960's	Domestic successes in oil exploration, leading to china being self-reliant in oil.
1978	Onset of China's first round of economic reforms, leading to high growth of Chinese economy in coming decades, thus also leading to increase in oil consumption.
1982	Chinese state owned oil company CNOOC was incorporated. The company was set up for exploration, development and production of oil and gas from offshore areas.
1983	State-owned SINOPEC (China National Petrochemical Cooperation) was established, whose functions were mainly limited to downstream activities.
1988	China's largest state owned oil company CNPC (China National Petroleum Cooperation) was set up. Those oil and gas assets and facilities that were directly being supervised by the petroleum ministry of China were put under the jurisdiction of CNPC

1993	Onset of China's second wave of reforms, took place, which aimed at the establishment of socialist market economic structure.
1993	China faced steady rise in consumption of oil and gas and by 1993, the country's production was not sufficient to meet the demands. China started importing oil from 1993.
1993	First overseas investment in petroleum sector by Chinese national oil companies in Banya Field in Thailand.
1995-1997	Major overseas acquisition of petroleum assets in Kazakhstan and GNPOC Sudan. These were the first major investment by Chinese NOCs abroad, although few smaller sized acquisitions have been made earlier 1993 onwards.
1998	CNPC and Sinopec became vertically integrated major oil companies. Earlier, Sinopec's activities were limited to refining and retail distribution, but now it was able to enter exploration and production. These two companies, along with CNOOC which specialized in offshore oil production, became the three major NOCs of China. This step was a preparation of Chinese entry into WTO's, after which China's companies will a have to compete with global oil and gas giants.
2000 and Feb 2001	Listing of Chinese national oil companies were done on foreign stock exchanges. CNPC, SINOPEC, which listed in HK, NY and London stock exchanges (through SINOPEC Corp) and CNOOC were listed. CNOOC was listed on the HKSE and NYSE.
Dec 2001	China joined the World Trade Organisation
2002	China rolls out 'Going Out' policy. NOCs got significant state support in form of financial as well as diplomatic assistance, which led to aggressive investment in oil and gas assets abroad.
Mid 2000's	Due to abnormal surge in crude prices, as well as increasing vulnerabilities about crude supplies, china went to aggressive acquisition and investment in oil and gas. Major areas of investment were Africa, Latin America, among others.
2005	CNOOC's bid to acquire UNOCAL in US was vetoed. This was the first time that China's aggressive drive in overseas oil was flagged by lawmakers in the U.S. Many western countries expressed concerns on the long term implications of the strategic investments being made by China to acquire natural resources in foreign countries through its national oil companies and other agencies.
2006	China initiated a new Africa Policy. China made large investments in African countries to develop infrastructure in return for gaining access ot its oil and gas resources. Some African countries were provided with military and diplomatic support in multi-lateral for a. The document

	emphasised China's policy of non-interference in the internal affairs of the host country and promoted principles for peace and co-existence.
2009	After the economic recession, china's push for overseas investment became even more aggressive.
2010-2013	From 2010 to 2013 Chinese entities made many acquisitions in oil and gas in foreign companies. Some of the acquisitions were very aggressive nature almost defying commercial principles of investment. China made big ticket oil investments in Canada in Syncrude project, it also acquired Canada' independent oil company Nexen.
2014-2017	Chinese investments in oil and gas gets reviewed after oil price decline started in middle of 2014. Chinese companies started reviewing and reshaping their aggressive investment strategy under political directions. The state owned oil companies' few senior management personnel were put under scrutiny by their government for the aggressive spree in foreign oil acquisitions. Consequently the Chinese companies started adopting a more realistic approach with lower speculative tendency in investing in foreign oil and gas.
2018-2020	China extends oil investment and infrastructure development projects in the Middle East and Africa regions as part of its belt and road investment program. Spending target for the region estimated to be USD 29.7 billion during 2019.

8.6 Japan: Indexing and Charting

8.6.1 Surge in energy requirement of Japan

Japan for decades has been a major energy importer and consumer and has evolved into a technology leader in petroleum research. With rapid economic development in Japan initiated by the 1900 and to fuel the military needs, Japan's oil and gas requirement increased multifold. There are no notable commercial oil and gas development in Japan and the country started depending wholly on imports. Japan undertook some investment in oil development in the North Sakhalin. It also ventured big into the Southeastern countries for supply of oil.

The March 2011 earthquake triggered the tsunami that damaged Japan's energy infrastructure. The nuclear plant at Fukushima had to be abruptly shut down which caused loss of about 10 gigawatts of nuclear power that was being used for electricity generation. The sudden loss was to be compensated with spot purchase of oil and gas which affected Japan's economy to a great extent in the immediate aftermath of the natural disaster.

In 1921, Japan first imported oil from the Iran. After the World War II Japanese demand for oil increased manifold due to post-war reconstruction and economic growth. Japan participated in 1957 in the oil development project in Khafji field of Arabian Oil Company in the neutral area of Saudi Arabia and Kuwait. However, Japan was mostly dependent on western oil companies for importing its crude supplies, and its efforts to start import by own entities could not make any major headway for decades. The oil majors from the Europe and America extended tight control on oil resources of the Middle East and Africa region and they had executed agreements with host governments for developing these resources.

In 1973 the oil rich Arab countries put an oil embargo after the war between Arab States and Israeli. Japan was not recognized as an Arab-friendly nation and faced oil export reduction. The oil embargo caused serious economic crisis around the world, causing high inflation worldwide and forcing many governments to make laws to prevent hoarding of goods and raising prices. The supply disruptions and its adverse effects on economy triggered rethinking of the strategy pertaining to security of oil supplies to Japan. Its relations with the Middle East countries also did undergo new adjustments. In 1974 Japan set up an institute named Japanese Institute of Middle Eastern Economies focused on enhancing the understanding of geopolitics of the region from Japanese energy security perspectives and for strengthening ties at bilateral level.

Since the crisis, several measures were undertaken by the Japanese government to strengthen supply securities. Japan increased strategic stocks to provision for at least 100 days. Various energy saving initiatives were implemented to reduce energy consumption rate and save energy wherever possible. Share of natural gas in the industry feed was enhanced to reduce over dependence on imported oil. Use of nuclear power was taken up at policy level and new nuclear plants were set up for power generation. The diversification strategies were reasonably successful as the share of crude oil in its primary energy basket reduced from the level of 75.5 percent in 1973 to 41 percent by 2015. However, even with the success in supply diversification the dependence of Japan on Middle Eastern oil did not go away (**Jeffrey, Kucharski & Hironobu, 2017**).

Japan's relations with the Middle Eastern countries historically inclined towards the need of maintaining oil its supplies. The relationships have changed over last few decades and expanded beyond oil supplies. Saudi Aramco's business in Japan grew from oil supply to establishing a footprint in the downstream. Saudi Aramco participated in the strategic oil storages in Japan and leased 8.2 million barrels of storage capacity. The leases deeds specified the quantity of crude oil out of the stored in Japan that Japan could use as its own strategic petroleum reserves.

Japan reorganized the state owned oil company JPDC particularly to increase overseas oil development. The state-owned Japan National Oil Corporation was set up by the government in 1978 for upstream activities. The company made investments in foreign countries oil field development. Japan also set target for foreign oil share in its energy self-sufficiency index. The JNOC was empowered to make investments in foreign oil and gas fields both at development phase as well as in the production phase, with guarantee debt by the government. In November 2016, the Japanese government introduced JOGMEC Act strengthen its state-owned enterprise JOGMEC. The company was initially providing equity to

Japanese entities investing in foreign oil. With the reformist agenda JOGMEC was now permitted to invest directly in foreign NOCs.

There are a large number of Japanese entities that have since invested in overseas oil and gas. Inpex and Nippon Group have made investments in oil exploration projects along with supply contracts. Mitsubishi owns LNG facilities in Australia, Oman and South East countries (**Lesbirel, 2004**).

Japanese companies have ventured into North America after its successful exploitation of tight oil and shale gas assets through innovative technology interventions. They have made investments in LNG linked upstream gas projects. In the year 2013 Japan's Mitsubishi, Mitsui and Sumitomo acquired stakes in the Cameron LNG project, and also made significant investments in shale oil and shale gas projects of North America.

With Orange revolution sparking unrest in the Middle East, Japan embarked upon the revised strategy for boosting LNG supplies from U.S and Canada for enhancing its energy supply and reducing reliance on the Middle East due to geo-political tensions in the region. Japan also undertook integration efforts in its oil industry by strengthening the upstream sector and consolidating its refining over capacity. By the end of 2017 Japanese company JOGMEC, along with other Japanese firms JAPEX, INPEX and Mitsui acquired stakes in 45 plus oil and gas projects across the world.

8.6.2 Indexing for Japan oil and gas sector development

1940	In 1940 Japan set up the Teikoku (Imperial) Resource Development company. This was later changed to Teikoku Oil Corporation in 1941. The Japanese government partly owned the oil company along with private investors.
1965-1985	After World War-II overseas oil development started in 1965 after amending oil development law. During these times the oil companies from the west dominated and controlled oil fields in almost all major oil producing countries and it was not possible for other entities to gain entry without government assistance or by economic collaboration with western oil companies. According to a study carried out by Japanese Ministry of International Trade and Industry, during 1968–1970 three fourth of oil concession area was held by oil companies from Britain and U.S. French and Italian companies were holding the remaining areas. The total area with oil concession surveyed was 17.8 million square kilometre. Japan had a concession area around the Khafji field in neutral zone of Saudi Arabia and Kuwait. This was small area of 3,400 km2 which was prolific in petroleum resources and one of the earliest foreign oil investments made by Japan.
1970s-1980s	Japan's oil dependency increased rapidly. Japan became heavily reliant on the Middle East for oil supplies, and imported more than 90 percent oil from the region. Japan government invited private participation for oil supplies. Japan Petroleum Development Corporation was formed. Later in 1978 this company was renamed Japan National Oil Corporation. It was tasked with building strategic oil storage reserves in Japan. The company was also providing financial support to private companies for oil development Japan encouraged oil investment overseas by its private companies. The oil import target was set at 881 million barrels in 1985. This was about one third of Japan's consumption at that time. The funds invested by private companies of Japan in oil import increased rapidly with the state support. It was 5,122 million yen in 1967. By 1982, the oil investment made by private companies of Japan for imports reached 226,853 million yen.

	Japan National Oil Corporation was actively supported by the government in its tasks of encouraging private investments in oil imports. It was provided support of sovereign guarantee for raising funds. No corporate tax was levied on the entity. There were concessions and exemptions from other duties and taxes.
1980s	Japan introduced a new system called "one-project one-company structure". Special purpose vehicle was formed aka a distinct company for executing each oil project. Such companies formed for specific projects were funded jointly by Japan National Oil Corporation and private investors. Japan participated in oil development project in offshore China in the Bohai Sea. In 1980 Japanese government formed a dedicated SPV called Japan China Oil Development whose only purpose was to own the asset in this offshore project. This company was provided funds from the government of Japan and 47 private companies of Japan did the part funding.
1998-2002	After 1998 the role of national government was publicly reconsidered. In 2002 as part of major restructuring of oil sector, the Japan National Oil Corporation was dismantled.
2002	Japan changed its law to permit acquisition of existing oil fields by Japanese companies.
2004	A new organisation was set up in the oil sector. It was called Japan Oil, Gas and Metals National Corporation. This company was established after dismantling Japan National Oil Corporation. In addition to extending financial support for oil development to private companies, this new company was established for research and development activities in the oil petroleum sector, as well as for building strategic oil stocks in Japan and overseas territories. The company was further provided empowerment to invest in unexplored areas. The company was also permitted to acquire oil and gas fields that are on development phase or are already on production.
2006- 2008	Japan revised its oil self-development target. Self-development ratio set at 40% of oil and gas imports, to be achieved by 2030
2016-2017	Japan had established over capacity in petroleum refining. During 2016 the oil and gas imports of Japan was around 1.467 million barrels per day. However, its refining capacity far exceeded its imports and it had a refining capacity in the range of 3.5 million barrels of oil per day.

2017-18	JOGMEC investments in overseas was in around 45 oil and gas projects. Many of these investments were for upstream linked LNG projects. Other Japanese companies also got involved in some of these projects. Japan embarked upon a gas based economy policy implementation and linked LNG contracts in Canada and America.
2019-20	Japan seeks to shift away from its heavy reliance of Middle East oil and gas. Announces plan to invest USD 10 Billion to promote LNG usage around the world, through private and public sector industry participation of Japanese companies.

Table 8.4: Indexing of overseas oil development by Japan

8.7 South Korea: Indexing and Charting

8.7.1 Energy demand and supply overview

South Korea is reliant on imported oil to meet about 98% of fuel consumption. The country has very little oil and gas resources and imports the third largest quantity of LNG in the world. Since last 30 years, South Korea has made an impressive growth on economic front and as a result, its primary energy consumption has increased rapidly to around 300 million ton of oil and oil equivalent in 2018. South Korea has built large refining capacities for petroleum product exports, and it has emerged as Asia's largest export of refined petroleum products. South Korea exports gasoline, jet fuel and gasoil whereas its major imports are LNG and naphtha. South Korea's economy is mainly driven by its export of various products such as electronics, petrochemicals, semiconductors etc.

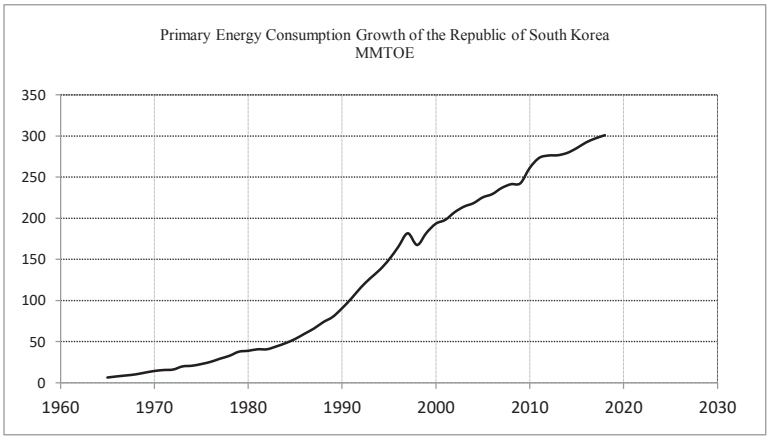


Figure 8.6 Primary Energy Consumption of South Korea

South Korea is projected to remain a major energy consumer in Asia in future, mainly due to high living standards and due to the export oriented nature of its economy.

The pattern of crude oil consumption level of South Korea has historically changed with fluctuation in global crude oil prices, status of its exports and growth in domestic economy. The demand for oil increased rapidly during 2015 due to sudden drop in oil prices in the second half of 2014 and also disruption in its nuclear power generation capacity. The oil demand slowed down in 2017 after the crude oil price started rising again, also because the country could resume nuclear power generation in its halted plants. Crude oil and natural gas accounts for about 44 percent and 14 percent of its primary energy basket. South Korea's daily oil consumption was measured to be 2.7 million barrels in 2017.

South Korea imports the third largest quantity of LNG in the world primarily for its electricity, industry and power generation requirements. Coal and nuclear energy are the baseload sources for power generation. Natural gas plays an important role in peak demand seasons. Moreover, due to environmental concerns about pollution due to coal usage and safety issues about nuclear power, use of natural gas is likely to be significantly enhanced.

Middle East is the main source of oil imports for South Korea. In 2018 Korea imported crude oil from the region in excess of 82 percent of its total oil imports. Saudi Arabia and Kuwait are the major import sources for crude oil supply to South Korea. Its heavy reliance on the Middle East for sourcing oil has been a concern to its policy makers due to the vulnerable situation in the region and the country has been making efforts in diversifying its supply sources. In recent years South Korea imports of crude oil have increased from Russia, U.S, United Kingdom and Mexico.

8.7.2 Korean investment in foreign countries

South Korea's efforts of increasing its oil and gas assets abroad are mainly through their state owned companies, although private players have limited presence. The Korean government encourages consortium of various companies from different industries while venturing into overseas oil. Such partnerships are forged under the leadership of a state entity that enjoys proximity to the ruling dispensation. The consortium arrangement is provided support by the government in offering variety of cooperation items to make a package deal **(Jeon, 2011).**

In 2018 KNOC, Korea's largest public sector oil company engaged in exploration and production activities, produced an average of 116,000 barrels of oil per day from its overseas oil and gas assets. Its daily gas production from foreign acreages was 170 billion cubic feet. Another Korean public sector major KOGAS is mandated for importing LNG. The area of operations of the two Korean national oil companies were clearly demarcated, however, both companies transgressed into each other functional areas. KOGAS has participated in exploration and production activities towards vertical integration and revenue generation. KOGAS has particularly focused on participating in liquefaction projects which has upstream linked gas exploration component. By 2018, KOGAS was actively participating in 24 oil and projects spread across 13 countries.

Besides these two major state owned companies, other companies from private and public sector also made investments abroad in petroleum assets. Korean state owned entities have invested in Pipeline Company in the United States and also in the large oil sands extraction projects in Canada.

Korean Companies have participated in overseas projects in more than 35 countries. KNOC has 20 production projects, 2 development projects and 5 exploration projects as on 31st March 2019. It has presence in Vietnam, Peru, Yemen, Libya,

Kazakhstan, USA, Iraq, Canada, UAE and the UK. One of the biggest acquisitions was of the U.K based Dana Petroleum, acquired by KNOC in October 2010. The acquisition enabled KNOC to expand its E&P activities globally. It spread out to the United States, Canada, Russia, CIS countries, North Sea, the Middle East and Africa.

KOGAS also has been active in overseas upstream deals. It has assets in Uzbekistan, Iraq, Canada, and South East Asia. As of 2018, KOGAS held investments in 24 projects in exploration, production, LNG, and downstream facilities in 13 countries.

South Korean companies also own equity stakes in liquefaction projects in the Middle East, Australia, Indonesia, and Canada and has executed long-term LNG purchase agreements in Australia and the United States.

8.7.3 Role of South Korea government - Policy and Activity

Korean government and its concerned ministries actively promote the overseas endeavors of its oil and gas companies through setting up conducive policy environment and also through vibrant resource diplomacy at government to government levels. The government of Korea instituted a special economic package by creating a dedicated sovereign funds to provide concessional loans to Korean companies for foreign oil investment. Managing the fund was also placed with KNOC.

Government of Korea set targets for energy companies in achieving self-sufficiency in oil for reducing import dependency in its energy usage. The targets were set against the volume of crude oil and gas that can be produced in foreign countries vis-à-vis domestic consumption of oil and gas. It came into force for the first time in 2008. However, the policy of providing concessional funding for oil and gas

acquisitions through state mechanism did not succeed in enhancing oil volumes drastically but did raise high level of debts. In 2013 Korea changed its earlier policy of working on self-sufficiency targets. The new focus area was reducing the debt-to-equity ratios of oil and gas companies that went high at undesirable levels.

Besides setting up targets, government plans also provide the strategy to ensure success in overseas endeavors. Some strategies included developing the Korean Cooperative business model which helps in offering a package deal to resource rich countries, encouraging investment in research, promoting investment from private sector, financial guarantee, and loans from national banks.

Given the vulnerability of its imports and to safeguard against abrupt disruptions in supply, Korean government has built caverns to store crude oil and petroleum products. Such storage facilities, estimated to contain capacity up to 146 million barrels have been built and nine of them are run by KNOC on behalf of the government. Other Korean companies like Hyundai, Caltex, SK Energy etc. also operate strategic petroleum reserves built in Korea either on standalone basis or in consortium with KNOC and KOGAS.

In June 2008, the central ministry released a KNOC expansion strategy intended to transform KNOC into a world-class company. It provided tangible target for KNOC in form of production, total assets, number of E&P engineers, etc. The strategy also provided measures to achieve the targets such as promoting acquisition of producing assets rather than exploratory, research and development, and strategic cooperation with overseas technology service companies.

Despite their presence in large number of countries, Korean companies have limited operations at competitive level compared to oil majors or other NOCs like the Chinese ones (**Jeon, 2011).** Besides, Korean NOCs lack experience as project operator in complex upstream joint venture petroleum projects.

8.7.4 Indexing of South Korea

Table 8.5: Indexing for Korea's overseas oil and gas development

1979	Enactment of Overseas resource development promotion act. It was later renamed as Overseas resource development business act in 1983.
1979	KNOC, the national oil company of the country was founded.
1983	KOGAS, another state owned company, which mainly deals in wholesale natural gas, was founded.
2001	Start of 'Overseas resource development plan', which was to be issued every three years.
2008	Start of self-sufficiency targets for Korean energy companies by the ministry. Targets indicated the percentage share of Korea's oil and gas consumption to be achieved by overseas production of Korea's companies..
2008	KNOC expansion strategy released by the government to transform KNOC into a world class company. It provided numerical target for KNOC in form of production, total assets, number of E&P engineers etc. The strategy also provided measures to achieve the targets.
2009	In October 2009 KNOC purchased Calgary based Harvest Energy Trust and turned it into its Canadian subsidiary company. The USD 3.95 Billion transaction in cash was a watershed moment for KNOC, as it directly gained ownership over 53,400 barrels of oil and gas daily production in Canada.
2010	One of the biggest acquisition by Korean Companies, Dana Petroleum was acquired by KNOC IN October 2010. Through the acquisition of Dana, a UK based multinational oil company, KNOC's oil and gas operations extended all over the world from North Sea to Latin America and Africa.
	In October 2010, another Korean state owned company KOGAS entered big way in Iraq. It won contracts in gas fields Akkas and Mansuriya. Akkas field contract was the first occasion when KOGAS was engage in gas field development as operator.
	Harvest, as a wholly owned subsidiary of KNOC, acquired Canada oil and gas assets from Texas based Hunt oil in Dec 2010. Acquisition of Hunt oil in Canada gave KNOC the access to prospective unconventional natural gas plays in UK and Canada.
2013	South Korea's energy policy was amended from the earlier focus of working on self-sufficiency targets. The new focus area was reducing the debt-to-equity ratios of oil and gas companies that went high at undesirable levels. Korea's two major oil and gas companies KOGAS and KNOC borrowed large sums and invested in oil and gas projects abroad that went unprofitable. Many of these investments were done in high oil price regime and marginal economics that

	worked due to concessional loans. On account of accumulating high debts and also cost overruns in several projects, Korean government reversed the soft loan based energy investment policy.
2017-18	By the end of 2017, KNOCs international operations spanned around 20 producing assets. In addition, KNOC was participating in seven discovered fields.
2019-20	Korea seeks to diversify its import sources outside the Middle East to ensure supply stability. Inks pacts for oil imports from the United States. Korean oil refineries import of crude oil from the United States increase manifold. From a level of 2 percent in 2017, the share of United States oil imports in Korean refineries increase to 20 percent in 2019.

8.8 United States - Indexing and Charting

8.8.1 Oil and gas overview and consumption trends

The United States has emerged the second largest energy consumer of the world. The United States faced declining oil production during the 1990s and its imports were increasing at alarming rate. The demand of energy could not be met by oil production which was concentrated in the Texas provinces and the Gulf of Mexico. The oil and gas landscape in the U.S changed forever after the advent of innovative technologies to extract gas from tight rocks or shales under commercial quantities. By the second half of 2000s, shale gas revolution has already started in the U.S with the new fracking technology that made commercial production oil tight oil and tight gas possible. It also changed the definition of conventional petroleum reserves where shale and tight reservoirs got included for

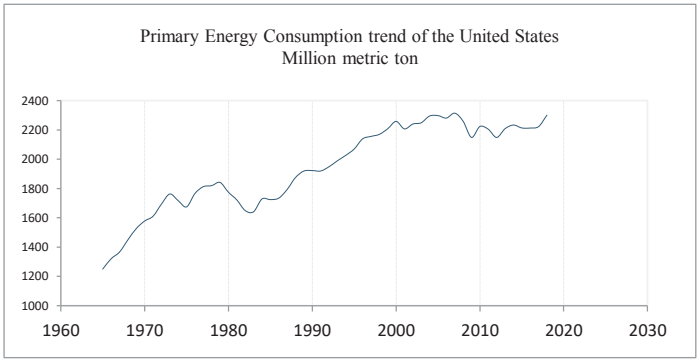


Figure 8.7 Primary Energy Consumption of the U.S

commercial exploitation. Large size of its economy, socio-economic advancement, use of technology in industrial processes, large urban population base, higher living standards and greater level of industrialization within the country are the primary reasons catering to higher energy consumption levels.

Crude oil accounts for about 40 percent share of primary energy consumption of the U.S. The gas based economy is stronger in the U.S and natural gas accounts for 31 percent of the primary energy consumption. Other sources are coal and nuclear power. Renewables have about 4 percent share in the energy mix. With high share of crude and gas in its energy basket, the country has been historically focused on oil and gas sourcing from around the world and establishing a sustained availability of crude oil and natural gas has, since long, remained a key focus area for its energy planners.

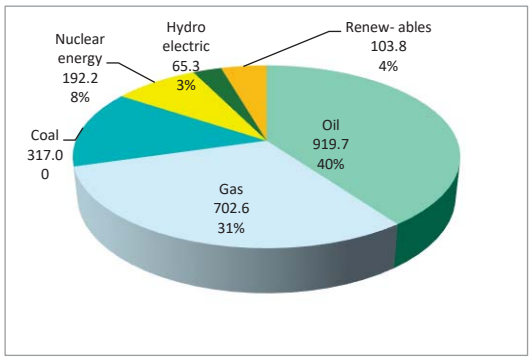


Figure 8.8: Primary Energy Consumption – Fuel wise (MMTOE, % share)

In 2018, the U.S surpassed Russia and Saudi Arabia to emerge as the largest crude oil producer in the world. With addition of shale oil, the oil production level reached 15% of the world oil production. However, owing to its high consumption it had to import around 386 MMT of crude oil to meet its demand. The U.S imports oil from a large variety of sources, Canada being the highest contributor at about 48 %, followed by South and Central America (15%), Saudi Arabia (11%), Mexico (9 %), Iraq (7%) and other countries.

For natural gas, pipeline gas transport and LNG combined, the U.S has become a net exporter of gas in 2017. In 2018, its gas exports stood at around 96 BCM against an import of 79 BCM.

Although the shale boom in the current decade has boosted oil production, the U.S still needs to import about 40 percent of its total demand of crude oil. Given such high dependence, securing long term uninterrupted supply of it has been accorded strategic primacy by policymakers and the government. Oil sourcing has been arguably the biggest influencer in deciding foreign policy and choosing geo-strategic impetus areas, since the oil shocks of 1973 and 1979 had exposed the vulnerability of the country (**Stephen, Brown & Hillard, 2018).** Countries susceptible to vulnerability concerning high oil dependency faced severe inflation in periodic intervals.

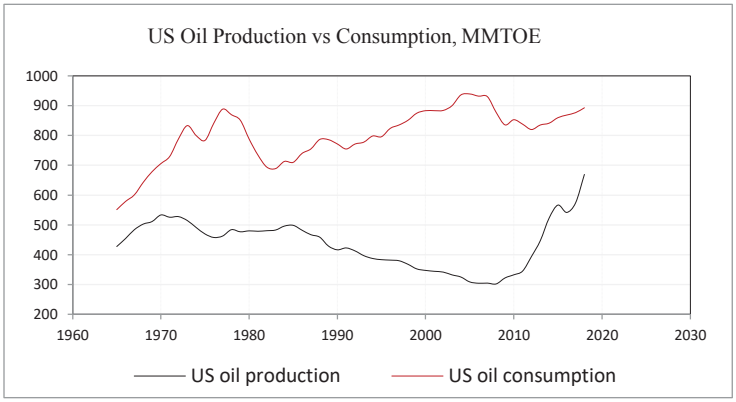


Figure 8.9: U.S oil consumption and production

The oil and gas industry contributes significantly to the U.S economy. The industry generates more than 10 million jobs and accounts of about 8 percent of the GDP of America. The cyclical nature of the oil industry that triggers job losses and economic slowdown, creates a cascading effect on the global economy. However, events that happen outside the US also affects consumers of the U.S because of the global and integrated nature of international crude oil market. The U.S. economy is reliant on oil and gas supplies and hence are vulnerable to price fluctuations, like any other nation.

The first U.S oil company Standard Oil was set up in 1870. Standard Oil was into oil producing, transporting, refining and marketing and by the end of nineteenth century, it established almost a monopoly in the sector. In 1911, it was broken into 34 smaller companies. Its successor companies then dominated the global oil

industry. The present day ExxonMobil and Chevron are the prominent entities among the restructured, renamed successors of Standard Oil.

Post-World War I, there was a greater quest among western oil companies to go around the world exploring for oil supplies. The Arabian Peninsula and the Persian Gulf were the focus areas. After the World War II, due to large deposits of resources in these region, the oil companies from U.S and Europe concentrated in the region and entered into contracts with the host governments for developing their oil and gas deposits. During that period most of the oil assets in the Middle East were under the control of western multinational oil companies, popularly named the 'Seven Sisters' which comprised five American companies out of the seven. The group of Seven Sisters were a very dominant presence in the world oil landscape for at more than two decades after the second World War.

However, there was a growing feeling among the host nations that they are being unfairly exploited by the oil majors and that the concession contracts were biased against the host country. Gradually the ownership of oil assets was restructured with concepts of production sharing and host country decided to enter into oil field management through equity participation. OPEC was strengthened and became powerful to control the supply levels and determine global crude prices.

The direct role of U.S government became intense in the global oil and gas dynamics triggered by the severe oil crisis of 1970s. Government intervened to ensure protection of its strategic military and economic interests and arguably to some extent the commercial interests of its oil companies. The operations of American oil companies extended across the globe almost in all the continents (**Raphael and Stokes, 2011**) and they engaged with host governments in its economic affairs, as more and more oil revenue flowed into the host governments and its ruling regimes.

8.8.2 The role of U.S. government in ensuring supply

Mid-size independents and major oil companies based in the United States have sourced its share of oil and gas production from across the world. However, concentration of U.S oil companies have been existing in oil rich countries that are vulnerable to disruptions. Such vulnerabilities often arise from geo-political instability and civil and military unrests in these countries. The ruling regimes in the oil-rich but improvised and or geo-politically volatile countries become economically empowered from revenues accruing from oil sales that are produced by the men and machines of western oil companies.

The role of the U.S government in oil play is catalyzed by the recognition that the large revenues accruing from oil sales can empower the host governments in economic and military terms. The producer countries, backed by oil revenues, get the motivation and flexibility to pursue new foreign policies. Such countries may look for new alliances with regimes that are hostile to the United States. Such situations has the potential to create adversity for U.S interests and the ability of the U.S to form partnerships can be constrained by political realignments triggered by oil dependence. A sizeable portion of the United States defense budget goes to military presence and monitoring in the Persian Gulf region, and consequently significant reductions in this military posture could be achieved in the absence of a dependency on oil.

Since the 1970's, structural changes in the oil industry in OPEC era and experience of oil shocks of the 1970s led to strategic steps by governments to protect national interest through securing stable supplies of energy. Post the 1979 oil embargo, through the Carter Doctrine, the U.S. pledged to defend their access to Persian Gulf oil with armed forces if needed. The Carter Doctrine was reasserted and extended by every successive U.S. President.

Energy strategists believe that the larger motive of oil related interventions by the United States governments in various parts of the world is element of its statecraft in the post-war era. Such actions of the U.S might not be directly targeted to safeguard economic interest of its oil companies in the host country. It also might not be directly linked to providing benefits to the U.S citizens and its economy. Instead, such interventions by the government agencies could be intended to bring together the oil-rich political economies into the wider global economy. Such wider group of oil producers, when formed at political level, shall benefit of all major countries participating in the form of a larger cartel. This may increase cooperation and increase oil production at global level. Countries will get more sources for importing oil instead of depending on single or few sourcing countries that can create a hostage situation and weaken economies. The groupings shall benefit not only American industries and consumers, but also western industrialized nations and emerging economies (**Raphael & Stokes, 2011).**

Many analysts expected that the significant production addition from the United States would curtail oil production from traditional large producers like Saudi Arabia, Russia, and the Middle East. However, there was diminishing effect of U.S intervention in oil rich countries with increasing volume of U.S oil available for exports, and the countries were left to decide themselves on reducing their actual or planned production of oil in the face of changing dynamics of oil politics.

8.8.3: Indexing

Table 8.6: Indexing for the United States

1870	Standard Oil Company was established. Till the first decade of 2oth Century, Standard Oil Company was the predominant player in the oil industry of United States. The company had almost monopoly in many operations.
1911	Standard Oil company broken into 34 smaller and independent successor companies.

1930's and 1940's	Following World Wars, western oil companies focussed on finding oil and gas to fuel their military and economy. Strong oil companies ventured into many oil producing countries and partnered their governments to get access to oil. The Arabian peninsula, Persian gulf area, etc. were the prominent areas ventured.
1950's and 1960's	Seven Sisters - the world oil industry was dominated by private multinational companies of the west, most of them American. Together they were known as Seven Sisters. Five of these seven companies were American.
1971-73	Trend of restructuring of ownership of oil assets in oil rich countries, Concepts of production sharing brought in, host country governments entered in contracts with their own participatory interests
1971-73	In some countries like Libya and Iraq, oil and gas assets nationalized in early 1970's. This gave a stimulus to many other national governments to nationalize oil assets.
1970's	OPEC, founded in 1960's, got strengthened and became powerful enough to control the supply levels and determine the world crude oil prices.
1973	Yom Kippur War, that altered the oil price dynamics throughout the world
1973-74	Oil embargo on many western countries including the U.S. First oil shock, leading to abrupt rise in crude oil prices.
1977	The United States created the Department of Energy. Western States together created the International Energy Agency and began organizing a strategic petroleum reserve system to cope with future disruptions.
1979	Second oil shock (after Iranian revolution and invasion of Afghanistan by Russia)
1979	Through the Carter Doctrine, United States pledged to defend their access to Persian Gulf oil with armed forces. This cemented the West's political commitment to ensuring energy security by all means necessary
2010-2015	Onset of Shale Boom consequent to use of new technologies such as fracking.
2015	Repeal of ban of crude oil exports out of US, which have been in place since 1970s.
2011-2018	Sharp rise in production levels leading to US becoming world's leading largest oil produce. In 2018, US oil production emerged the largest in the world. In natural gas (pipeline and LNG combined), the U.S. became a net exporter in 2017.
2019-20	The crude oil production in the United States continued to rise year-on-year basis. The annual crude oil production during 2019 was the highest at 12.23 million barrels per day, which was an increase of 11 percent from the preceding year.

8.9 Charting (Step 4)

In charting, the draft framework developed earlier can be applied back to the transcripts of data (**Ritchie & Lewis, 2003**). This process shall permit the researcher get immersed in data and extract the themes. The themes and sub-themes could be further refined into the process. Similarities shall emerge at this stage. Differences shall also emerge, which facilitate decision making. Themes will become gradually clearer. It could be identified that few of the sub-themes that emerged in the framework initially were in the nature of the main theme or closely related to that. Accordingly, adjustment shall be done so that the themes closely reflect the data being explored. As the framework gets refined, repetition of data into themes and sub themes are can be avoided.

At this stage the themes and sub-themes were refined for the present study of energy importing advanced economies. As new themes emerged, some of the sub themes could be combined and repetition of data avoided. The transcript data was studied and notes were made on the draft of the framework. Coding was done towards data indexing. Themes and sub-themes from the evolving framework were annotated.

The process of abstraction was utilized in making the coding framework. This was done to extract the relevant information from the data transcripts. It also ensured that no elements were missed while coding the elements into the framework, as sometimes it can happen with a priori. Since we are interested to know the evolution of overseas oil development in developed economies that import energy like the China, Korea, Japan and United States, using the themes and indexing above, charts for each country has been drawn as shown in the following illustrations.

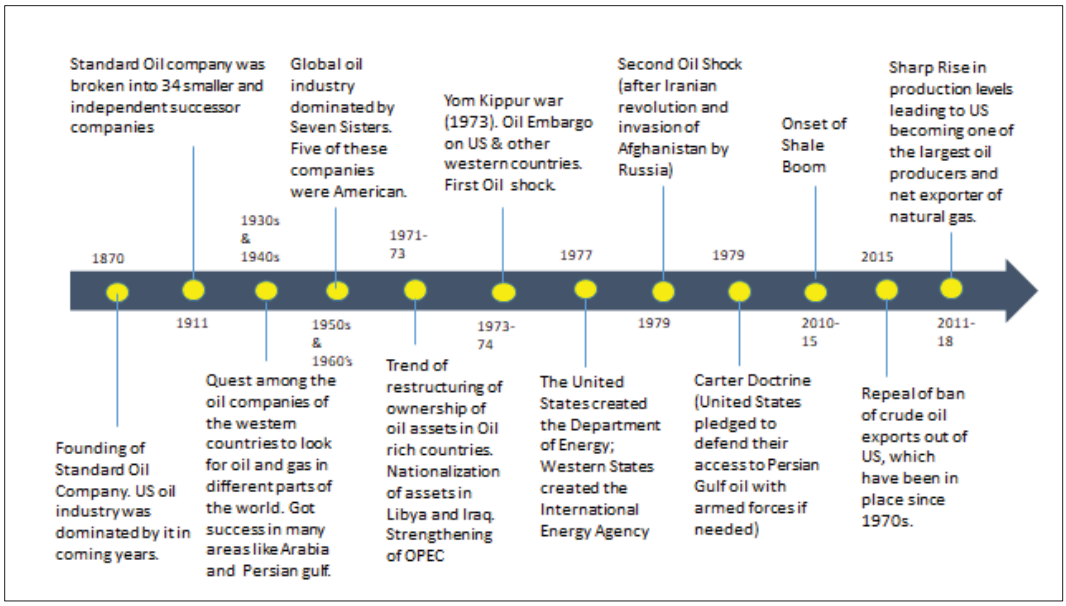


Figure 8.10 Charting for the United States

Each country is different when it comes to overseas oil development as per its own energy and strategic policy and relations with different energy rich countries. This defines it trajectory of reforms. Important themes of learnings can be drawn from the developments in each specific country.

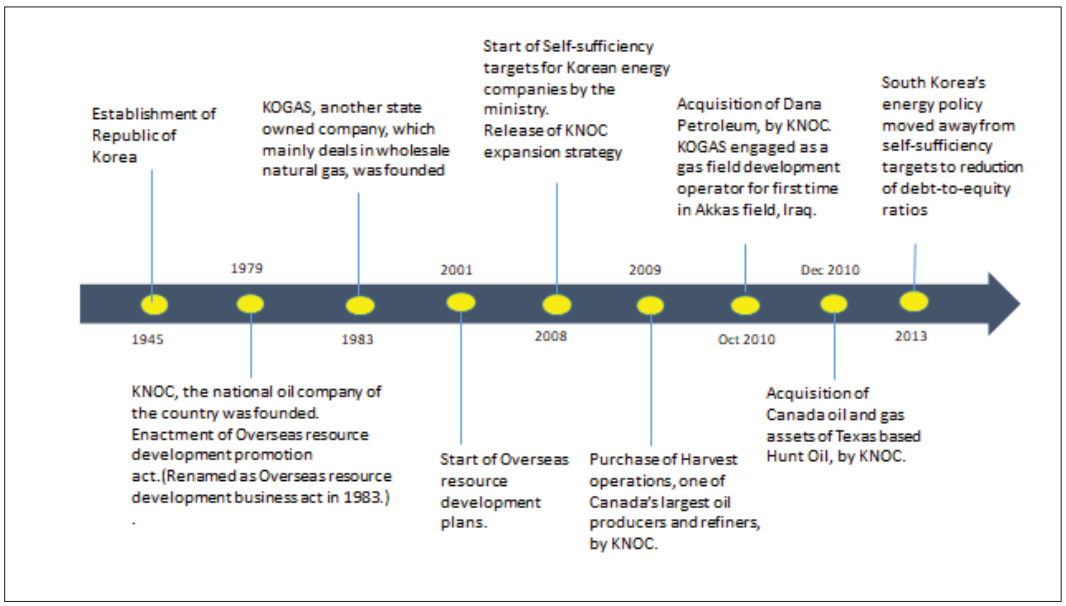


Figure 8.11 Charting for the Republic of Korea

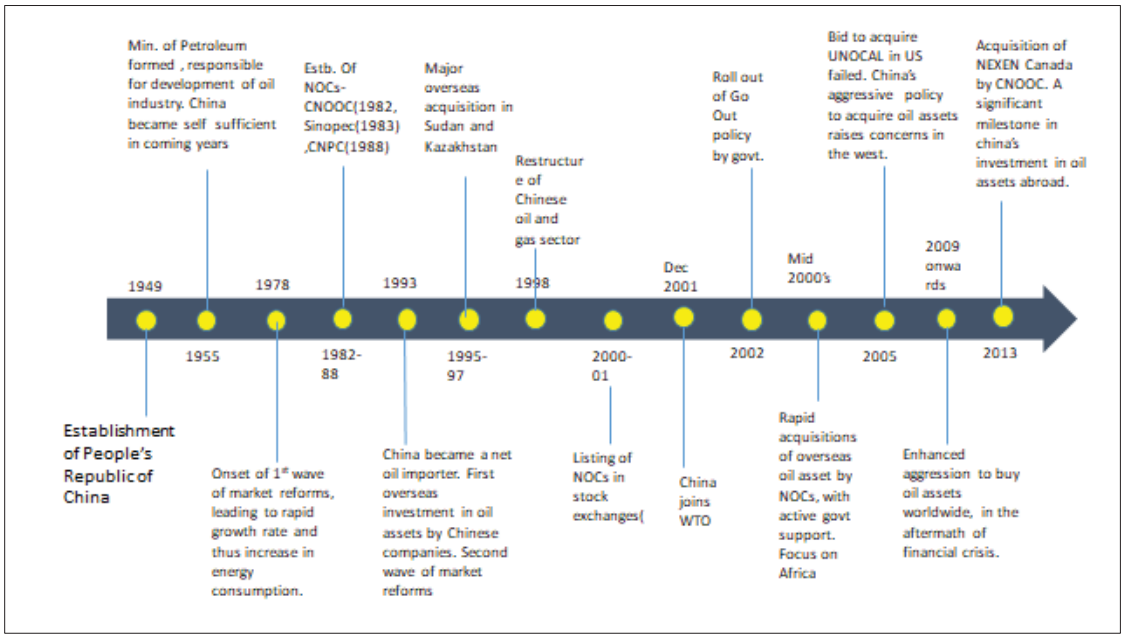


Figure 8.12 Charting for the People's Republic of China

Summarizing permits researcher to condense and go for reduction of data and information gathered. Smaller data sets are prepared into understandable briefs noting the themes that emerge from each situation in the country of interest (**Ritchie & Lewis, 2003).** A computer software package can be used to summarize scanning the full text. When using framework analysis it can be difficult for a researcher without subject knowledge of international oil business to predict the extent of information that can be put into each segment. Charts can overfill with data and information unless researcher can summarize with input from his own subject knowledge. This is important because otherwise researcher would be required to frequently go back to the original data that would hamper his progress. Permitting refinement of themes in framework analysis assists in encompassing development of a conceptual framework.

Policy directives: KNOC was founded through an Act in 1979 and was empowered for overseas equity oil development and asset acquisition through enactment of the Overseas Resource Development Promotion Act. This policy was renamed in 1983 as Overseas Resource Development Business Act.

1. Policy reform to enable crude oil export. The United States selectively revoked its self-imposed curb on crude oil exports in the year 2015. The ban on oil exports outside the US was in place from the 1970s. The Government of Korea commenced overseas resource development plans in 2001 and by 2008, Korean energy companies were given self-sufficiency targets by the Ministry.

   The Korean government came out with energy policies in regular intervals, each one delving into resource sourcing arena. The latest energy plan was made in the year 2014. The plan envisaged the oil and gas demand scenario up to 2030 and postulated various policies towards energy rebalancing,

including lowering share of nuclear energy usage, lowering carbon footprints and promoting renewable sources.

2. Independent regulator: the Chinese system for oil sourcing was entirely administered by their government, through its state agencies. As CNPC, SINOPEC, CNOOC and other Chinese companies grew bigger in size and operations, the Chinese gave partial autonomy to them to compete in the global market. However, the government control was retained unquestionably in a model of regulation that can be called market-plus-government regulation model. Legislation was slowly introduced to regulate oil companies operations and rules replaced administrative orders on policy decisions pertaining to oil and gas. The introduction of petroleum laws and policies in regulation of petroleum operations brought in several reforms in the petroleum sector of China (**Margaret & Wing-Chu, 2009**).
3. Freedom for pricing. And Marketing freedom both domestically and also in the global market.

4. Structural Reform: Japan carried out several structural reforms in the oil sector throughout its history. Japan National Oil Corporation was set up in 1978 and the mandate of creating strategic reserves in rock caverns was given to company, in addition to its oil operations in the Middle East. JOGMEC took over the company in 2002. JOGMEC was given a revised and expanded mandate of exploring for oil and gas abroad, investing in development assets, managing stockpiles, providing financial support to Japanese companies in venturing into overseas oil and promoting research and development in gas hydrates, methane and other forms on oil and gas development.

8.10 Step 5: Mapping and interpretation

Mapping helps in creating a visual display of data, providing insights into any patterns, concepts and elucidations.

Ritchie and Spencer (1994) also provide similar explanation on mapping and interpretation. In reaching at the mapping stage, researcher shall be looking for associations between data sets, defining concepts and mapping the nature of the phenomenon he is trying to explain or understand.

Mapping stage allows researcher to do comparative study of themes and sub-themes in the transcripts. These are cross-checked against the original data set and the notes that were taken previously in the context of the themes. Charts prepared are again reviewed to ensure the charts contain the themes from the entire data set and no aspect or views of participants are omitted. The reviewed gist captured in the charts are studied with original transcripts of texts. Themes and sub-themes are compared and contrasted against each other. Possibilities of making further changes and refinement or merging of themes and context are examined. Themes or sub-themes that emerge at this stage not changed further. The final thematic framework is conceptualized.

Development of the conceptual lens depict the robustness and transparency of the thematic framework methodology at this phase. In the framework method, it should be possible that at arriving at the stage, researcher is able to go back to original data for comparison purpose. This iterative process enhances rigor of the framework analysis approach in qualitative research.

Based on the above the main aim of mapping is to help researcher to display visually ideas and concepts emerging from the data which would help in future analysis, testing or interpretations.

The concepts, themes and charts developed above were linked at this stage and a conceptual framework was developed. The thematic framework would be applied for probing the research objective 3 of this research project in next chapters. The conceptual lens links various themes depending upon its occurrence in the developed markets.

At the beginning the conceptual lens provides for the factor of policy directives. It means that it is important for governments to provide the policy directions for the overseas equity oil acquisition to hedge against price shocks in imports. It is also imperative to understand that along the reform path there will be more policy interventions by the host governments as well as consumer nations towards reshaping its energy mix in the realm of lowering of carbon footprints. In the conceptual lens the policy directive refer to the following action.

1) Clear long term policy and direction
2) Integrated approach by government agencies
3) Proactive diplomacy
4) Strategic tie ups
5) Innovation and technology partnerships

Once the institutional mechanism for undertaking cross border energy transactions through the state controlled entities are in place, enabling policy initiatives and incentives for outward investment by the government would kick start concerted endeavors targeting resource base in specific geographies.

The thematic framework developed is represented below (Figure 8.14). The thematic framework developed through the analytical and iterative process

described above shall be used as conceptual lens to develop the framework for overseas equity oil in Indian scenario.

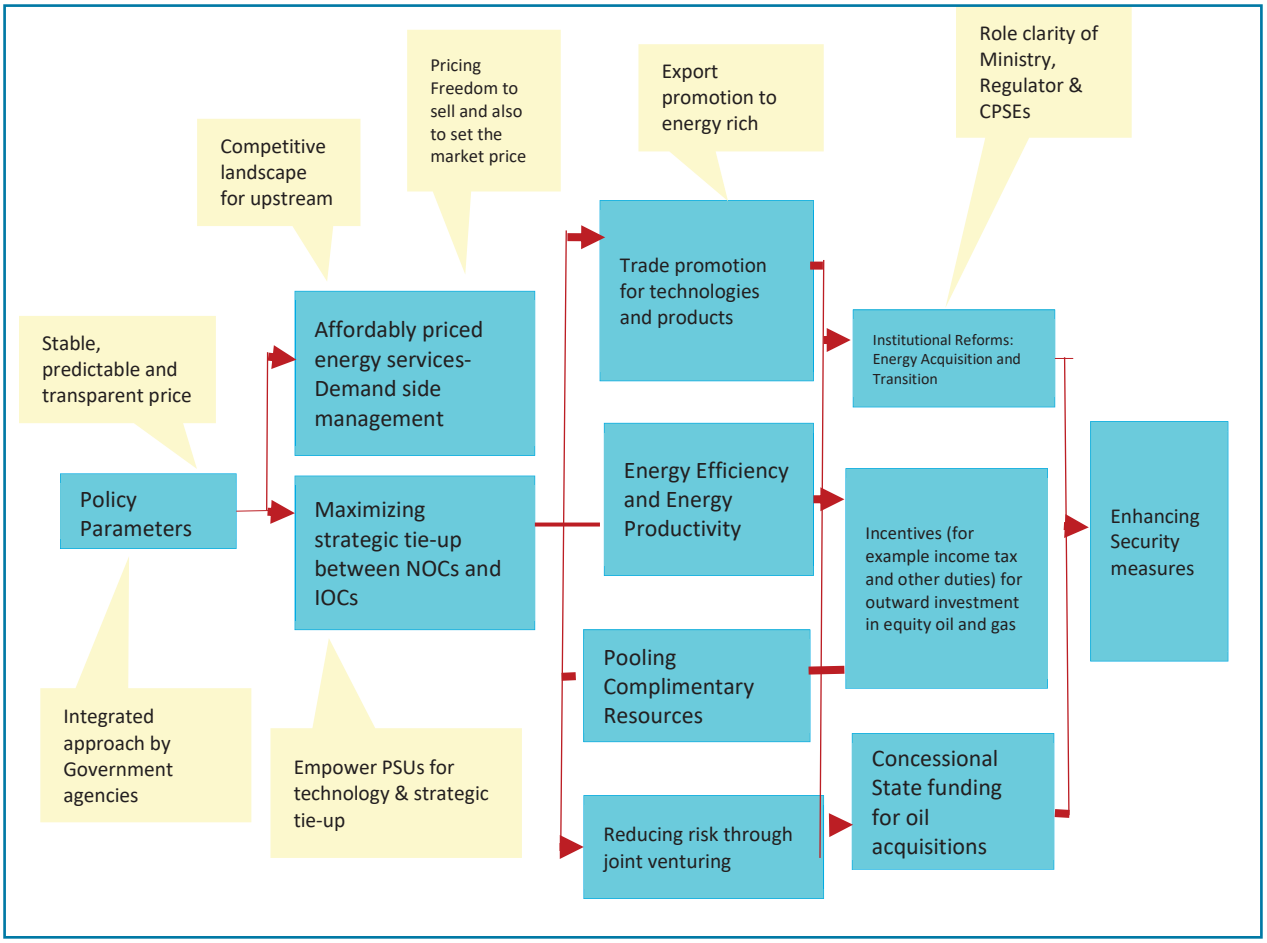


Figure 8.14 Conceptual Lens

CHAPTER 9

RESEARCH METHODOLOGY AND DATA ANALYSIS FOR OBJECTIVE 3

9.1 Research Methodology

Adapting to a methodical and systematic approach in conducting the research to reach a conclusion is a core requirement, the systematic approach must involve a method which is the most suited one to the probe being carried out. Qualitative research needs to be designed adhering to a systematic methodology aimed at bringing out the pattern of behavior of target population in the context of the research topic. Theoretical frameworks are utilized that talk of research problems in a social set up and bring out more descriptive results. Researcher can draw inferences from the data gathered addressing the meaning ascribed to a social problem. Grounded theory is a tool of qualitative research that enables researcher to look for and conceptualize the latent social behaviour through the process of constant comparison.

Each of the distinct approaches of qualitative research involve sets of assumptions about the type of knowledge or data that are important to the research topic. Following the method of ethnography in qualitative research comprises of studying cultural groups which are unbroken. This study is done in their natural setting and over long periods. Phenomenology comprises identifying core human experiences. This is normally captured as described by the participants. Biography as the name suggests allows the individuals to describe the stories of their life. Thus in essence

it studies the life of people. Case study explores the unique characteristics of one or many individuals relating to a program or an activity.

In contrast, the grounded theory takes views of participants to develop a theory, constantly update and revise the theory as the views of participants evolve and converge. Thus, any theory so derived is grounded in views of the participating individuals that are probed following a systematic procedure to develop that concept. The theory thus developed shall be able to justify the actions pertaining to the topic. In other words, the theory is derived from data that are methodically collected and evaluated in the research process with constant comparison (**Strauss & Corbin, 1990).**

Charmaz (**2014**) argued that the process of data analysis carried out in conducting the grounded theory follows the inductive approach at the beginning phase. The analysis commences with attempts for understanding the data collected with abstract concepts. Researcher first commences studying the subject area from which a concept or probable theory can emerge. Single data source can also be used for the grounded theory. The process provides flexibility to researcher to use either single or multiple sources of information. Data are gathered from various sources like conducting interviews, narration of experiences of respondents, records, data bank of institutes, reports and publications, newspapers, audio and video tapes. However, it is important that researcher pursuing ground theory method follows a systematic procedure of data collection rather than be haphazard, or abstract and convenience driven.

For probing the research objective 3 of the current study, the qualitative technique of grounded theory has been found to be the most appropriate as the method shall entail a systematic procedure for generating a theory from data that can explain the process at a conceptual level. The grounded theory shall be conducted through systematic data collection, scanning the data and information to look for

categorization of data according to emerging concepts or ideas. The process would then entail the researcher to examine how these categories are connected, the process through which the concept or the theory grounded in the data would evolve. The aim in the current research project is to generate a framework than can explain a process. The process pertains to overseas equity oil development. Being a subject of energy security economics pertaining to securing energy supplies, the expertise in this area are limited, and hence the grounded theory approach was best suited for this research **(Patton, 2002).** The concepts emerging would be tested in the grounded theory process. Inter relationships would be explored stage wise with brother concepts generated from the ideas of colleagues with experience in this area. Analyzing the concept emanating from one set of respondents or data and simultaneously subjecting to scrutiny by others during the firming up process greatly aid in avoiding personal biases. The process also helps in bringing in new ideas and new concepts through the process of constant comparison and collaborative analysis with involvement of team (**Strauss & Corbin, 1998**).

Equity oil acquisition for energy security is an area where the knowledge is restricted to a limited number of personnel and not widely spread over a large section of the population. Grounded theory becomes suitable for developing substantive theory in areas where knowledge or expertise is limited. The process can also provide a fresh perspective to practicing theories. Grounded theory will help bring a new perspective to this area pertaining to policy making for energy security.

Data collection in ground theory is carried out through theoretical sampling process. The processes of gathering data and information, its examination and evaluation and the coding are carried out sequentially. First a set of data gets collected after which it is analysed by researcher and data are coded. The outcome of the this subset of activities then decide the next set of data collection as to which data need to be collected at this stage and from where. Every concept that gets

developed becomes a distinct unit of analysis. The concepts that emerge at the initial stage gets refined through the subsequent stages, which also happen for the distinct categories delineated. The concepts start showing up in the subsequent data very regularly and thus become part of the emerging theory. This process entails constant comparison. The concepts as well as the categories are contrasted or similarities pointed out. The concepts are thereafter bunched together depending on its relationship in devising the categories. The iterative process is continued till the stage where a theoretical saturation is reached. At this point, additional data and information shall give out similar themes or concepts and new leads cannot be generated from the data. The grounded method provides flexibility to select the sample size of respondents. In the absence of a formula for determining the minimum sample size required, whether the sample size is adequate or not for the study is judged by the researcher by making the sample size diverse and broad based so as to cover all aspects of the research problem.

Figure 9.1 provides a schematic represents of the process of grounded theory as devised by Charmaz **(2010**). This includes deciding on a problem. This is also the stage where the conceptual lens is identified to answer the question of developing a framework for overseas equity oil development. This is followed by data collection and theoretical sampling, followed by coding and analysis.

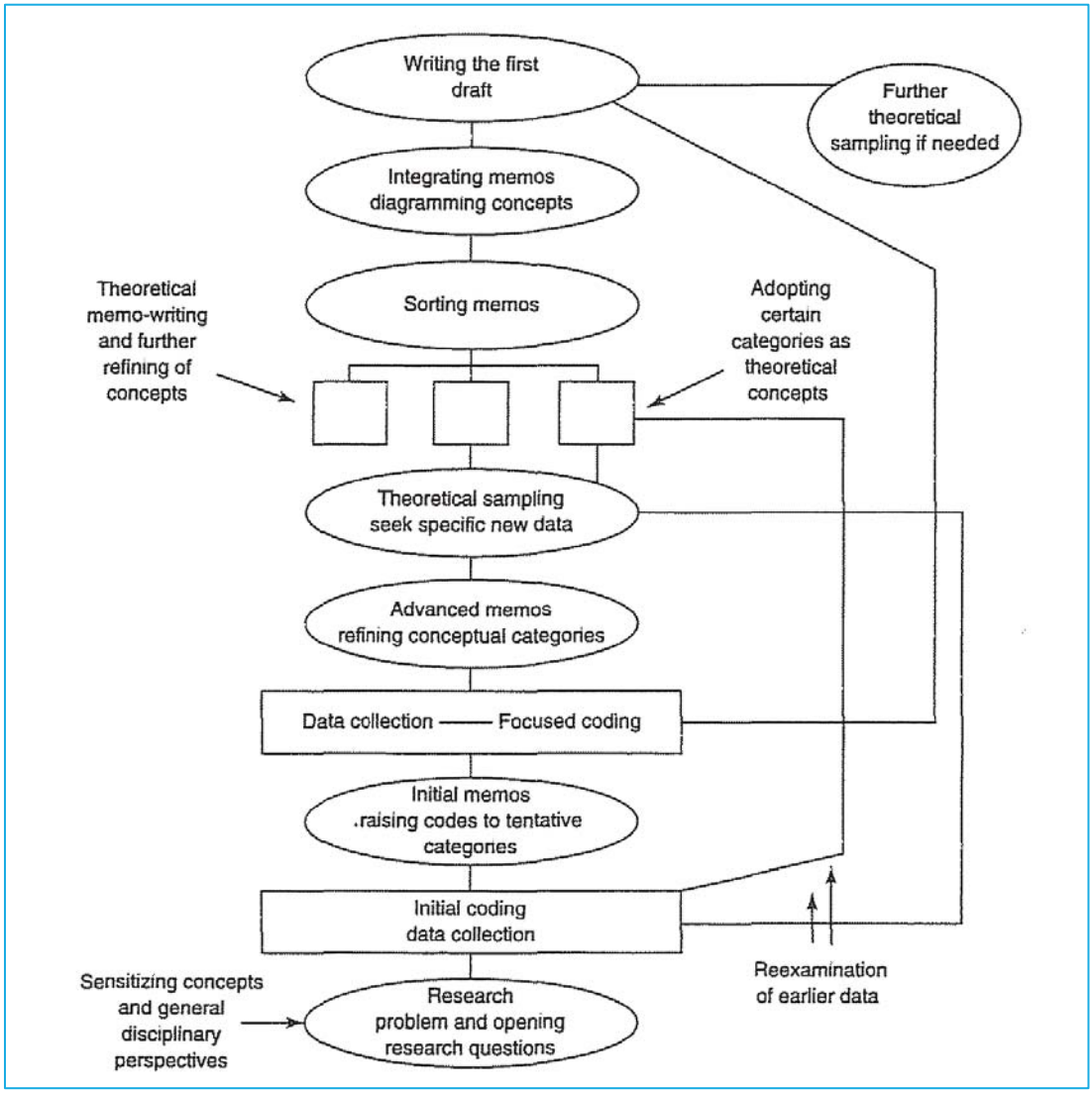


Figure 9.1: Schematic represents of the process of Grounded Theory

9.1.1 Sampling

Sampling in the grounded theory is a step-wise systematic activity. Researcher cannot jump from one stage to another with following the sub-set of activities in each stage. The initial data collection must be completed first before planning the next one. This is because the outcome of initial data analysis and the concept emerging from therein will decide what data to collect next. The participants were

chosen by way of initial sampling followed by theoretical sampling. Initial sampling is done based on existing knowledge on experts in the field being researched and the objective set to be achieved. Initial sapling is done before the first interview is started. (**Charmaz, 2014**)

Theoretical sampling is decided based on emerging concepts once the initial set of interviews are done. Often the person being interviewed, himself suggest names of other experts to help uncover ideas in certain new dimensions. Theoretical sampling gets decided also based on emerging themes, ideas or concepts which will help maximize the chances of developing the required theory (**Corbin & Strauss**, 2008).

Corbin and Strauss (1998) stressed that for the grounded theory to be able to comprehensively cover the research subject being explored, respondents should have experience in the domain or knowledge of the area. Since development of framework for overseas equity oil acquisition is a very specialized subject, therefore the sample of this study consisted of top executives and experts from the oil and gas industry, senior government functionaries, international consultants working in energy sector, and regulators. Corbin and Strauss (**2008**) further elaborated that while using qualitative research the issue is not whether the sample is drawn to represent a large population. In effect, researcher looks for variation in ideas and concepts and not similarities. Once the variations stop emerging the saturation is supposed to have been reached.

Therefore, in Grounded theory, size of sample is determined through theoretical sampling achieved through constant comparison of emerging categories. Grounded theory approach suggests saturation as the criteria to apply to the emerging categories. Glaser (**1992, 1998**) argued that the only criteria for sampling is checking for saturation.

As per Charmaz **(2006)** when after gathering new data and or interviewing new people do not throw fresh insights into categories being developed, saturation is assumed to be reached in gathering data.

9.1.2 Data Collection

Analysis of data continues along with collection of data. The process is iterative with constant comparison of theoretical concepts and ideas. Grounded theory cannot be a linear process where data analysis begins when data collection is complete. However, for proving clarity to the readers, this research follows a positivist paradigm and present literature upfront followed by methods and then findings.

Corbin and Strauss **(2008)** stressed that in grounded theory researcher should be using unstructured interview which help in collecting maximum data. Unstructured interviews of domain experts and with respondents with subject knowledge were used in the current study for data collection. If a researcher enters the field with a structured questionnaire, participants will answer only those questions which are asked and often the respondents would not have incentive or interest to elaborate as why they think in a particular way or the reasons behind their perception.. The participants might have other information to offer, which they don't share fearing that they might disturb the research process.

9.1.3 Interview Protocol

A pre decided protocol was kept ready to help navigate the interview; it included the interview style, procedure and general rules to be followed. As per Patton, the objective of such studies is best met using open ended questions and keeping the topics / areas flexible. Though a few initial questions

are asked, the wording of the question is not predetermined & the focus of the enquiry gets evolved with the interviews **(Patton, 1990).**

The questions are designed keeping in view the need to keep them general in nature and not turning them technical or political in nature. Questions should address a range of experiences. At the same time, questions have to be designed to keep sufficiently narrow so that the respondent provide answers without ambiguity and can also elaborate his/ her own experience.

Grounded Theory Interview Questions
Open-ended Questions to begin with: 1. What's your feel about the oil and gas industry 2. How important is energy security 3. Why countries fear about abrupt disruptions in oil supply 4. How important is oil and gas to country's economy 5. What are the major effects of growing demand supply gap in energy 6. How can the demand supply gap be better managed 7. When, did you first noticed the pattern in oil resource acquisitions 8. Who in your opinion influences the necessary steps for equity oil **Intermediate Questions** 1. Tell me about your thoughts when you learnt about the topic of discussion on equity oil 2. Who should be involved in oil acquisition and how? 3. Which factors will help in bettering the scenario of securing oil supply 4. What are the impediments, in your view 5. Which factors are more important than others? 6. How would you rate factors more important for equity oil acquisition? 7. You are talking of this country and its big oil corporation as key pillars. What can be replicated from this example for energy importing country 8. How does the factor contribute to equity oil acquisition 9. Tell me how the oil security scenario can be changed for the better 10. What should be the priorities of Government and Regulator 11. How is Indian context different from oil importing advanced economies 12. At what stage regulator intervention is necessary 13. How government should go about incentivizing outward investment for oil 14. Do you think policy reforms are important for betterment of energy security 15. How many years it will take for India to be self-sufficient in oil and gas **Questions at finishing the interview** 1. What are the most significant threats to oil supplies 2. Which one factor you think can be the most important enabler in equity oil acquisition 3. How, if at all, the policy for securing oil supply has changed since the last decade 4. Do you think gas supply should be preferred from abroad rather than oil 5. Any new concept that you can think of for overseas oil development 6. Do you have any question for me

Probing questions on oil security were asked to have detailed insight into the subject being probed. Some key probing questions are provided below.
Could you elaborate..? What contributed to ?, How …?, Tell me more…?, Could you throw more light on…?, Is this also the factor …?, Is this also important……

There is a set procedure which was followed for each interview. The main steps are outlined below.

a) Introduction
b) Giving background Information – narrating the study and the purpose of it.
c) Promising confidentiality.
d) Asking for concern and permission.
e) Putting the first mandatory question.
f) Putting probing questions.
g) Asking further leading and probing questions.
h) Asking for something they wish to tell or know more.
i) Asking for lead, and checking whether the participant is comfortable letting his name used.
j) Thanking for the support.

In any interview, there are some key rules which were followed as provided below

a) Informing the participant about the topic and process.
b) Ensuring that the place of interview be comfortable enough for the participant to share information.
c) Making a point to paraphrase the responses for capturing the thoughts of the participant correctly and checking your understanding.
d) Transcribing the interviews immediately after the interviews are done.
e) Checking for saturation levels.

9.1.4 Data Analysis

Qualitative research entails analyzing texts so as to ascertain whether the study texts pertain to researchers own or from other sources. Qualitative data analysis, as in the grounded theory for the present case, requires researcher to go through large amount of data. Interview transcripts are studied and the researcher must go through them with close intent to look for concepts and themes. Attempts to be made to put the themes under categories based on similarities or otherwise. When done manually, the method of 'cut and paste' has been widely used by researchers. Using pen of various colors is also a popular way to highlight and classify data under various categories and sub categories. However these are time consuming methods which can be cumbersome in dealing with large datasets.

Computer software packages have been developed that reduce the manual maneuvering and assist in better managing the qualitative and textual data. The computer packages have eased the complexities of manually segregating concepts within the voluminous data and facilitate the coding. These packages also assist in comparison method through data searching and data retrieval during analysis. Data analysis in qualitative research of grounded theory method is creative and helps researcher in inductive reasoning while deriving theories. Data analysis helps researchers get a handle to go through the massive data gathered, reduce its volume, capture emerging patters and generating framework for communicating what data the tells. The process of analysis in grounded theory may begin while the data are being gathered, and immediately after the interviews are transcribed.

However, wholesome representativeness and consistency of ideas are crucial in the process, which are to be accomplished by theoretical sampling. The purpose is to provide theoretical explanation of the cause of the concept arising, or grouping of ideas under specified classification. The phenomena need to be specified in the context of circumstances and situations on account of which they have arisen. Also

the inter relationship of the causes, and the way they are expressed through interaction and its effects need to be captured. After a concept has emerged through a data set and its latent relationship to the effect or behaviour under the study has been demonstrated, the consistency should be maintained throughout. This can be done by looking for similarities or dissimilarities of the concept ideas in the subsequent data transcripts and analysis. Grounded theory data analysis in the research would use constant comparisons method at each phase of data collection and analysis. The iterative process assists greatly in eradicating personal biases while labelling and grouping of data sets.

Applying the constant comparison method at each stage of the analysis, the present study compared concepts, categories and ideas within the same interview and then compared them in different interviews. The statement and incidents that seemed conceptually similar were given the same code.

The analysis of data in the present study was supported by using software suite Atlas.ti. The software suite has been useful in conducting grounded theory method throughout the systematic data collection, coding and analysis steps. Coding was done and the codes were with textual data. The suite helped in segmenting data and revising at interim. As shown below in the subsequent para in this chapter, the software Atlas.ti provided pictorial representation of the findings.

9.1.5 Coding

Coding consist of providing short labels to each set of data which helps in summarizing and analyzing the data (Charmaz, 2006).

Coding in grounded theory is carried out as an interface between data collected and the theory that emerges from the data. It is central in grounded theory approach. The abstraction of data and its conceptualization or reintegration as a concept or

theory is achieved through the process of coding. The coding in grounded theory application is done on a continuous basis and cannot be applied abstractly or discretely at few stages. Therefore researcher must get accustomed to the requirement of and the aspect of coding process so as to capture the conceptual prowess of this methodology. It is through the coding process that researcher applying grounded theory shall be able to undertake the contextual analyses of phenomena and breaking down the theoretical proclamations in the context of its relevance in time or the events or circumstances being explored.

The logic of grounded theory coding differs from quantitative reasoning for categorization of data based on themes or concepts. Researcher shall work out the code based on his understanding of the context and meaning therein being observed in data in the process of its scrutiny. This requires researcher to comprehend the distinctions between substantive coding and theoretical coding, between open coding and selective coding. As the coding progresses, the analyses is also taken towards higher level of conceptual abstraction and reintegration so that the core emerges. It is achieved through constant comparison I done in iterative manner looking back at the data in regular intervals throughout the process. As we interact with data repeatedly, the process of coding start explaining for ideas inherent in data through which new research questions might emerge.

With better understanding of the distinctions amongst the stages of coding and with continued experience, researcher gains in confidence and develops the capability in employing all aspects of coding over time. The ability to decide the time to upgrade from one stage to another comes with enhanced understanding of the data as well as with ease with the process of coding as researcher goes on confirming conceptual ideas as they emerge.

In initial coding as many ideas are generated inductively from the transcripts as possible. In focused coding, the initial codes which are important and

contribute more to the analysis are selected and elevated to the level of categories. In axial coding, relationship among categories with its subcategories is specified. In theoretical coding, possible relationship among the final concepts is specified.

The first two stages of open coding and focused coding has been done in the present study that enabled researcher to identify factors for equity oil development, and the final two stages helped in linking these factors in a sequence to help provide a step by step framework for equity oil acquisition in Indian scenario. This framework was then compared with the conceptual lens developed in the previous chapter.

Initial or Open Coding

Starting with line-by-line coding of data, researcher starts comparing the events with each other in regular pattern. Open coding of the data is done in every way possible when researcher seeks in the data the answers to what, when, and how. Line-by-line coding helps the researcher in identifying categories and their relevance to the research topic. It also reduces the chance that an important event or circumstance can be missed in the substantive area being studied. Generating codes ensures that the emerging theory is being built in the context of research subject and help researcher to see which direction to take in theoretically sampling Open coding, also called initial coding, is described by Corbin & Strauss (2006) as breaking each sentence or part, which are then provided names or codes signifying an idea or a concept. Data is studied through the abstracts and broken down analytically. New insights may emerge when data is broken down based on the understanding of phenomena or event inherent therein. The interactions or the ideas embedded in data set are compared with others during the open coding process. The constant comparisons brings out similarities and contrasts and assists researcher towards conceptualizing the themes being explained by data. Conceptual

labeling is done, and those events or actions similar in concept are grouped and classified under categories. Similarly, through labelling step down linkages of actions and ideas of data set within the category, further classification is carried out to form subcategories.

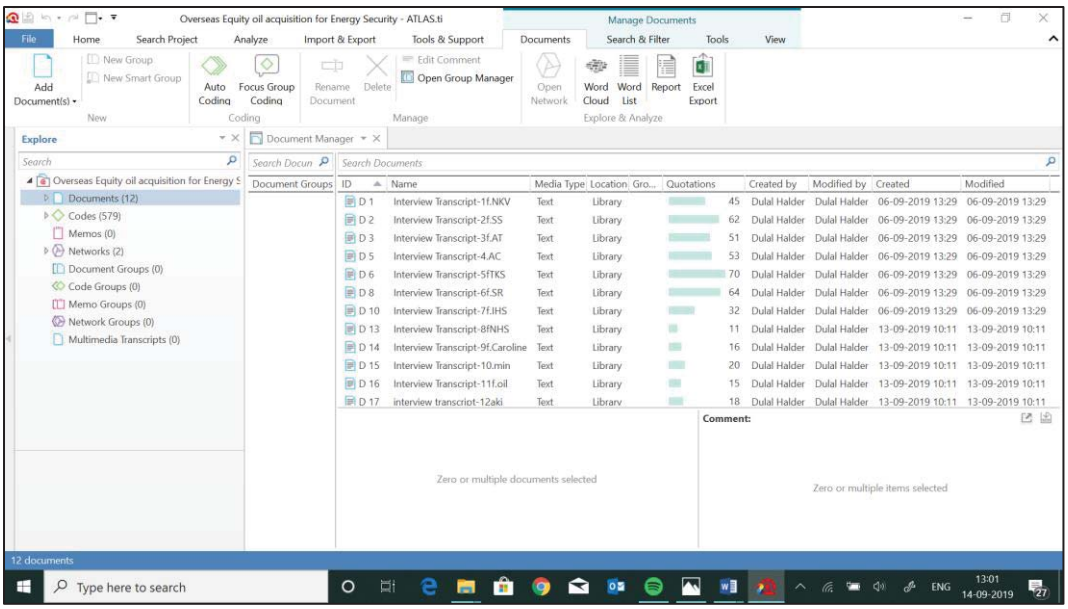


Figure 9.2: Open Code samples from present research

To carry out the grounded theory method for the present study, interview transcripts were prepared after interviewing eleven participants with subject matter knowledge and experience in international oil and gas, energy economics and energy policy. We have got a total of 579 initial codes in the present study. Guidelines of Charmaz **(2006)** have been followed while carrying out the initial codes. Attempts have been made to stay close to the words and ideas, actions of the participants were used in codes to preserve the fluidity of their experience, identifying actions seen in each data segment which was unique to itself, and making endeavor to code words that reflect action.

Figure 9.3 depicts application of above concepts in forming the initial codes. It shows a sample initial code output from Atlas.Ti 8.4 software suite.

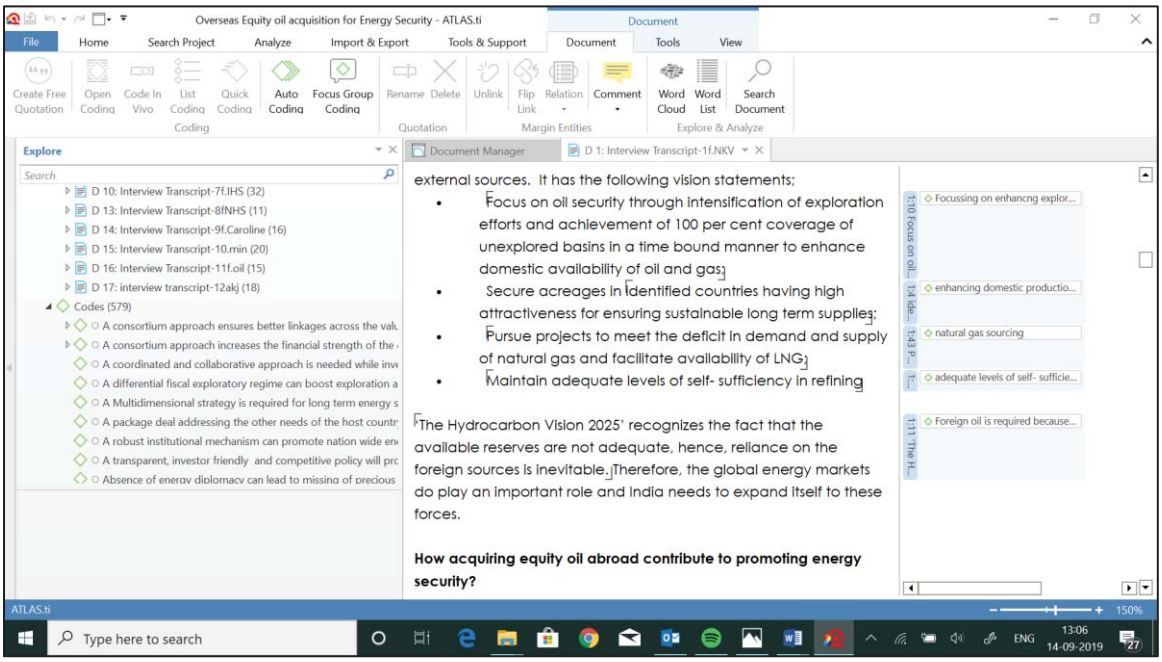


Figure 9.3: Initial / Open Codes – samples from the present project

Focused or Selective Coding

After open coding when the core variables could be identified, comes the next stage of focused or selective coding. Selective coding would mean that open coding has stopped, and at this stage onwards further coding is delimited to only those variables that relate to the core variable in quite untestable manner that points towards a conceptual theory formation. Selective codes are more selective and conceptual than open codes (**Glaser, 1978**). Focused coding requires the researcher to look back in the data again and again for comparison purpose. In focused coding, decisions are to be taken depending on the open codes identified that make much analytic sense for categorizing the data. The move from open coding to extract selective codes shall require the researcher to scan the entire data wholesomely, get accustomed to the process of coding and identify variables embedded in the data that has been extracted in open codes.

Selective codes bring categories together around a core concept or category identified through open coding. Selective codes were done in the present subject of international energy resources by asking questions and seeking answers around:

1. Core ideas and perceptions about oil and gas in energy security
2. Can we see reasons why oil and gas are being imported in few Asian countries
3. Are there common patterns of behaviour in countries where there are less oil deposits but economy is growing
4. How countries became stronger when its energy resources were secured
5. Incentives that prompted companies to look for overseas investment in oil and gas
6. How findings can be conceptualized in few sentences
7. Role of Governments specially how they behaved and what actions they took when their oil companies went global hunting for oil and gas
8. What does all the actions seem to be centered around
9. Can I group together all the events that occurred for a particular reason and locate its relations within data
10. How the variations amongst categories can be best explained

A core category gradually becomes clearer studying the codes already extracted and exploring their inter relations. Other categories shall have relationship to core category due to actions or consequences. Putting in diagrams help in integration of categories. Those who cannot be adequately explained or linked through concepts get excluded in this stage of focused coding. These can be abstracts for which only a small number of properties could be uncovered in data. There could be categories for which concepts did not emerge further or they could not get linked in adequate numbers or based on justifiable conceptualization. Therefore in these groups, no sub categorization could be carried out. They get excluded in selective coding stage and they could large in numbers when looked back at the open codes that get

ungrouped and isolated. Researcher has developed clarity at this stage that a thematic concept must have explanatory power on its own to justify its classification into distinct categories and further into its sub-categorization. When there is inadequate concentration of concepts, researcher to go back to research notes and look for additional data.

The study merged together the codes with common features to create conceptual categories **(Strauss & Corbin, 1998).** The consolidation made it possible to reduce the 579 initial codes into twenty five focused codes. To achieve this researcher, sift through the data, moved across the interviews and compared the categories. The example of focused codes are, supply side factors, Demand side factors, Infrastructure factors etc.

The early categories were kept provisional in line with the Grounded Theory to remain open to ensuing analytic possibilities. The constant comparison method resulted into many initial categories revised and re-revised.

Axial Coding

Strauss and Corbin (1998) described axial coding as the method of constructing relationships or linkages in data and concepts categories and subcategories developed in open coding process. Axial coding specifies the properties and dimensions of a category. The process involves relating data together in order to identify codes and categories grouped within the data.

In the real world people adapt different strategies, and behave accordingly, to handle the situations they are involved or fulfil the needs the way they have interpreted or the way it has suited their requirements. The pursuits of their strategies create consequences. The same happened in the case of China and Japan separately. Or for that matter the strategies of India, China and Japan differed to

address the same problem of securing supplies of energy security. Accordingly the consequences created through their actions were different, even though all may have similar objectives to achieve. Explanations reveal the conditions that have impact on the actions of these countries as well as the consequences that result from actions.

In the research project, Charmaz way of developing sub categories out of category have been followed to indicate the linkages between a category and its sub-categories.

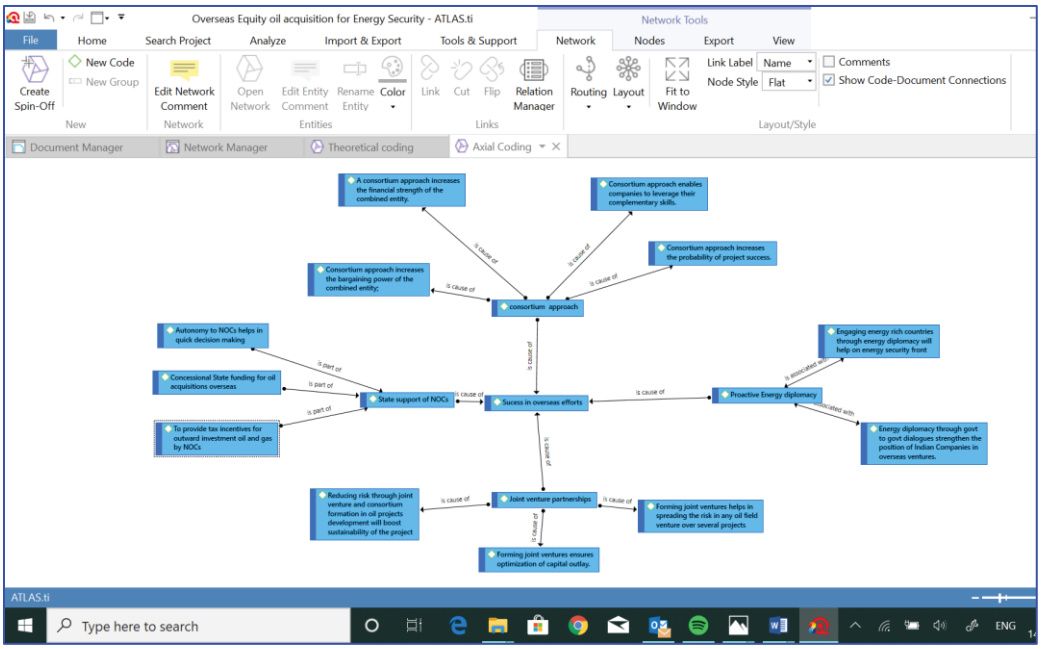


Figure 9.4: Axial Coding output from Atlas.Ti 8.4

Strauss and Corbin (1998) stress on exploring the data and examining the codes based on a paradigm. Such a coding framework must be focused on and related to the context and the conditions. Further, they must related to the interaction strategies and its consequences. Such investigation based on the perspectives help to find the relationships between concepts and categories and get them related on a

meta level. Therefore the coding paradigm provides the conceptual density and intensity to become an essential element in theory development.

At this stage, the relationship between categories and subcategories have been explored through the coding paradigm. Such conceptual relations are tested throughout against the strategies, actions and consequences identified in data. The strategies would define the actions and interactions. Therefore unless tested against existing and incoming data and gets represented in the data repeatedly, the hypothetical relationships being proposed are treated as tentative.

Figure 9.4 depicts a cross section of axial coding in the present study. The study used axial coding to integrate categories with sub categories like proactive diplomacy, and consortium approach as a category to its subcategories.

Theoretical Coding

Theoretical coding uses the codes generated during focused coding and linked them in axial coding. Glaser (**1978**) introduced the word conceptualizing while working on theoretical codes. Researcher works to link all the substantive codes into a theory. Therefore, this stage provides relationship between broad categories that have been developed in the previous stages (**Charmaz, 2006**).

Theoretical sampling in grounded theory derives a thematic category. Leads in the data are followed through sampling additional participants and enhancing the scope of data materials. It is a core process of grounded theory design in that it helps evolving the theory. Theoretical sampling helps accounting for the concepts, codes, groups and categories in data before the stage of theoretical coding (**Saldana, 2010**).

It can be assumed by the researcher that the central theme or the phenomena has been captured in the codes once few axial categories start emerging and they become available to the researcher to refer to. The core category items, or phenomena can be identified when its relations with other key categories become overtly evident and tend to form a core concept. A core primacy can be given to a concept when the phenomena relates to many axial category items or incidents. In cases where such core category cannot be derived, the researcher would be required to look for concepts or phenomena in a new concept category through reorganizing existing categories or adding new data materials.

In the present study involving the grounded theory, theoretical sampling has been done as the data collection continued. As the research topic pertained to the specialized subject of international oil and gas, research questions were framed accordingly, and a select group of respondents were interviewed based on the questionnaire protocol. The respondents were carefully chosen and included High Commissioner of India who have handled oil and gas ventures of Indian company abroad, senior officials from ONGC Videsh including former Managing Director, the company which has made large investments all across the world for equity oil and gas, senior officials from the petroleum ministry of India, and experts from international agencies dealing in global mergers and acquisitions.

Responses provided by the respondents were transcribed for records, reference and analysis. Based on the results of data analysis of transcripts, additional respondents were chosen for interview. There were respondents whose description in the interview texts have corroborated concepts already found, however, it was decided to look for expert views of respondents who can possibly throw additional perspective of the concepts so that the emerging ideas and findings can be tested for similarities or contrast. The selected few additional respondents were interviewed and again the textual data were analysed. Theoretical sampling process was progressed in this manner, with periodic look shuffling of data between data

collection and analysis until data saturation could be achieved and it could be assessed that no new information is emerging with subsequent interviews. In the process the focus codes were integrated and organized into a logical emerging framework to help creating the framework. Timelines are also integrated while linking these categories.

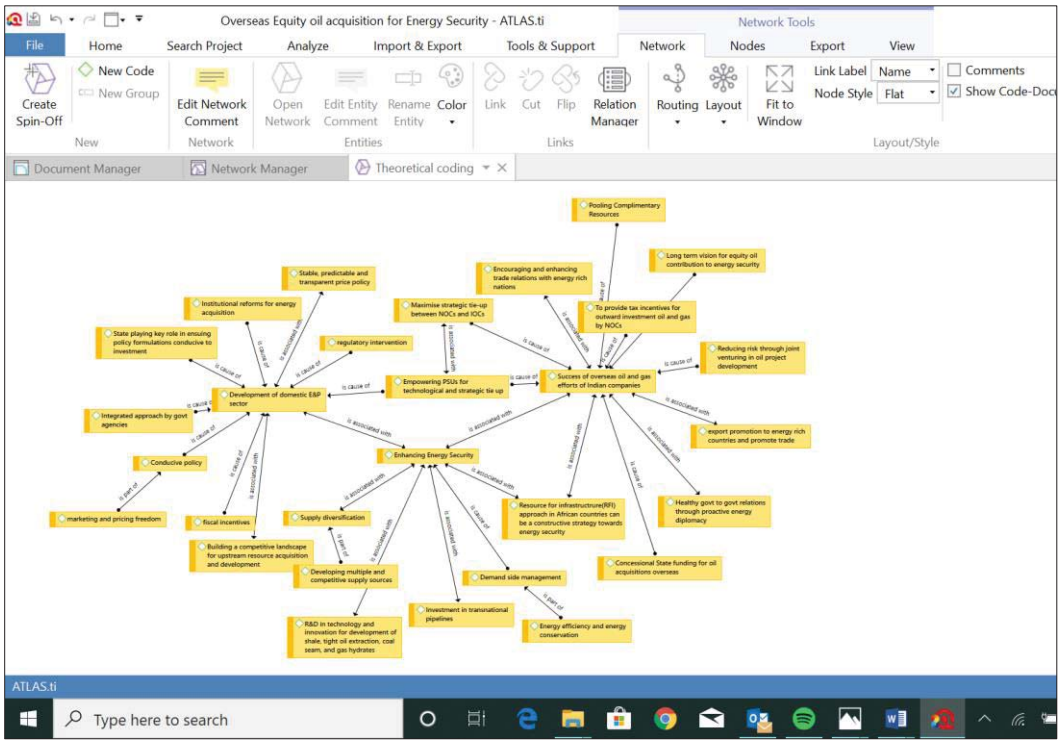


Figure 9.5: Theoretical Coding Output from Atlas.Ti 8.4

Coding outputs for the present project are placed at **Annexure IV.**

CHAPTER 10

DISCUSSION ON FINDINGS, CONTRIBUTION TO LITERATURE & PRACTICE, AND FUTURE WORK

10.1 Discussion on findings: Modified Conceptual Lens

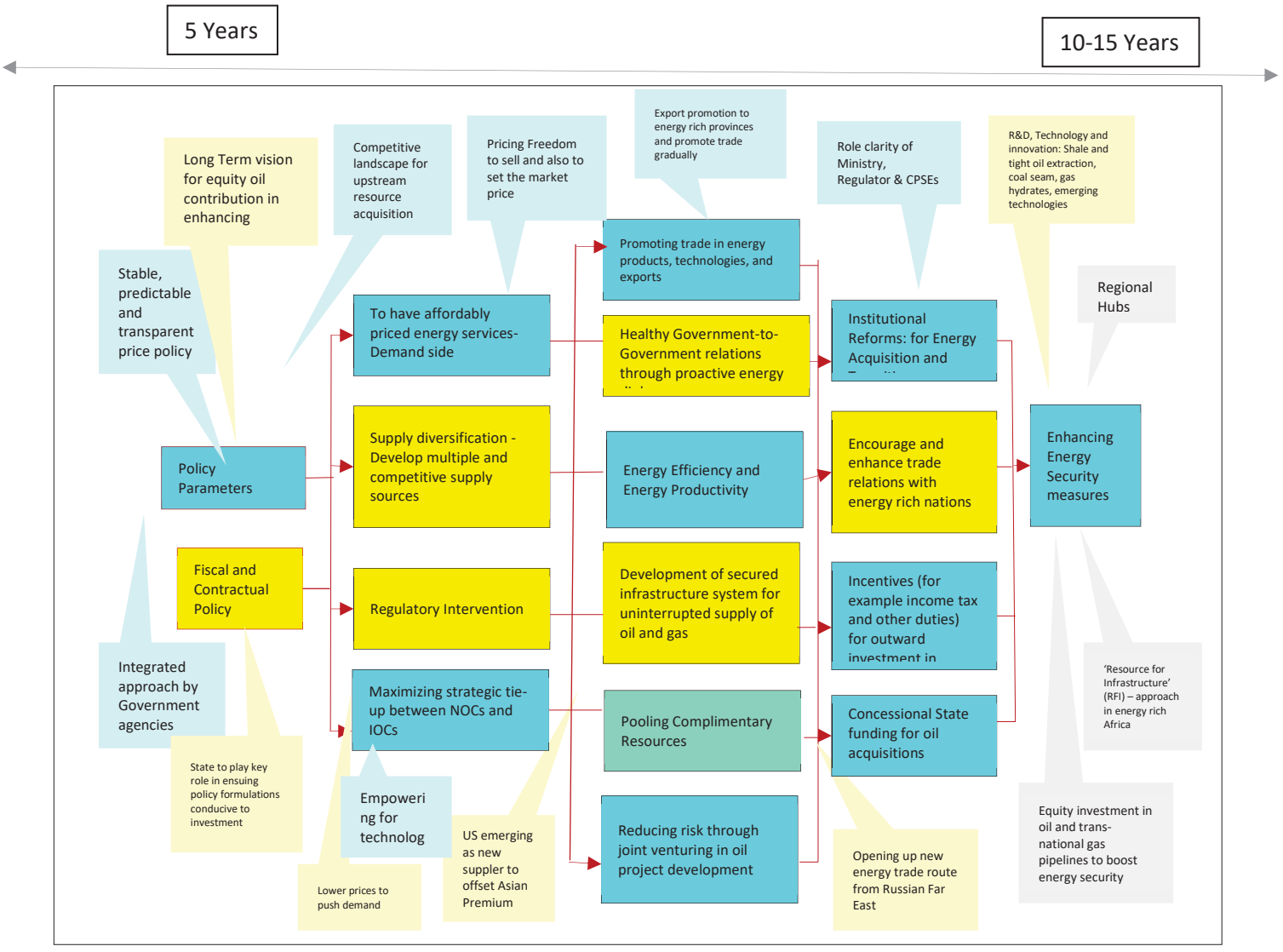


Figure 10.1: Modified Conceptual Lens

On completion of the grounded theory methodology, a new modified conceptual lens emerged from its outcomes. The categories emerged were compared with the conceptual lens.

It was found that many of the categories matched that of the conceptual lens

Policy Parameters, the demand side management to have affordably priced energy services, maximizing strategic tie-up between the national oil companies and multinational oil majors, promoting trade in energy products, technology and exports, energy efficiency and energy productivity, joint venturing, institutional reforms for energy acquisition, fiscal and tax incentives for outward investment for resource acquisition, concessional State funding.

Some new got created

Fiscal and Contractual policy, role of the state for formulating conducive laws, long term vision for policy making to facilitate equity oil development, supply diversification, regulatory intervention, promoting government to government relations, development of secured infrastructure for uninterrupted supply, enhancing trade relations with energy rich nations, research and development, technology and innovation, and equity investment in transnational pipelines to boost energy security.

Table 10.1 provides the summary of all categories when compared with the conceptual lens

Table 10.1: Comparison of Categories - conceptual lens and final framework

Matched categories	New categories	Modified categories
• Policy parameters • Affordably pricing • Strategic tie-up between NOCs and IOCs • Promoting trade in energy products, technologies and exports • Energy Efficiency and Energy Productivity • Reduce risk through joint venturing • Institutional reforms • Fiscal and tax incentives • Concessional State funding	• Fiscal and contractual policy • Supply diversification • Regulatory intervention • Healthy Government to government relations through proactive diplomacy • Development secured infrastructure system for uninterrupted supply • Regional hubs • Conservation efforts • Encourage trade relations • R&D, Technology and Innovations	• Polling complimentary resources • Decentralisation • Equity investment in trans-national pipelines • Resource for Infrastructure

10.2 Framework for overseas equity oil development in Indian scenario

Based on the modified conceptual lens, and taking into consideration the new categories brought forward by qualitative analysis using grounded theory, the framework for overseas equity oil development in Indian scenario is represented in Figure 10.2

As discussed above the framework is unique for India since many categories got added which has a unique relationship with the Indian conditions under which the

equity oil business needs to be carried out. The Framework for overseas equity oil development in Indian scenario. For simplicity and ease of understanding the framework has been divided into three broad phases depending upon the time horizon.

1) 0-2 years – Planning phase for medium term and long term energy security
2) 2-5 years – Growth phase through expansion and diversification
3) 5-10 years – Consolidation phase
4) 10-15 Years – Developed market phase: portfolio management

Each of these phases are discussed below to understand the framework for overseas equity oil development in Indian scenario.

1) Planning phase for medium term and long term energy security

This is the first phase of energy policy reformulation by the government keeping in mind the specific context of overseas equity development as a strong pillar of India's energy security. At this initial juncture, the central government should come out with an integrated energy policy for the upstream oil and gas sourcing.

While oil supply remains a key issue, the increasing complexity of energy systems requires systematic and rigorous understanding of a wider range of vulnerabilities. Disruptions also affect infrastructure and various end-use sectors. Therefore oil supply security need to be studied along with economic indicators for understanding energy security.

The policy should provide a directional statement about the role of the government of India and its executing agencies shall have in augmenting the energy security needs of India. International oil prices adjust in response to supply and demand. Supply security concerns are primarily related to the economic damage caused by price spikes. The concern for physical unavailability of supply is more prevalent in energy markets like India where transmission systems must be kept in constant

balance, such as electricity and, to some extent, natural gas. This is particularly the case in India where there are capacity constraints and prices are not able to work as an adjustment mechanism to balance supply and demand in the short term.

The ability to respond to a significant oil supply disruption in short-term forms the short term planning component. The policy framework needs to be stable in the medium term including fiscal and tax structure so that market has absolute clarity of returns on their investment. The long-term aspect of energy security objectives, which called for investing in research and development, technology and innovation for promoting emerging new energy sources in order to reduce oil import dependency.

The government of India and its executing agencies need to work to improve energy security over the longer term by promoting energy policies that encourage supply diversification, long term reserve base abroad, encompass different types of energy assets and that facilitate effective functioning and intervention mechanism for mitigating potential disruptions

2) 2-5 years – Growth phase through expansion and diversification

During the growth phase, for India to establish an energy system with commitment to security of long term supply is common cause for entering into strategic tie ups with oil and gas producing countries. The development of domestic economies in oil exporting countries is heavily dependent upon the revenue from petroleum sales on world markets. Like the energy importing counties like India, there is need for a flow of steady and predictable revenue for the oil producing countries that is essential for planning and investment for economic development purposes. Accordingly, when we plan growth, we must emphasize that oil-producing developing countries value security of supply as much as consuming countries, or

perhaps even more, and accordingly, highlight the importance of access to energy resources by India.

The growth phase is in evidently linked to getting access to more and more energy resources in host countries for equity investment. For the producing countries, India's access provides security of demand. To secure steady revenue, oil producers need predictable and steady oil demand. Their making plans for domestic development or for investment in future production capacity is dependent on assured revenue flows, and a large consumer like India has the capacity to make revenue stream erratic and unpredictable.

Share of natural gas in Indian energy basket is about 6% of total energy consumption and the gas supply is currently through imports and domestic production in equal ratios. Besides geopolitical issues and imbalances between demand and supply that result in potential supply disruptions, investment in upstream exploration and development of gas resources linked to LNG exports is also a key element for supply security. To manage investment bottlenecks, cooperation between IOCs and NOCs can play a vital role.

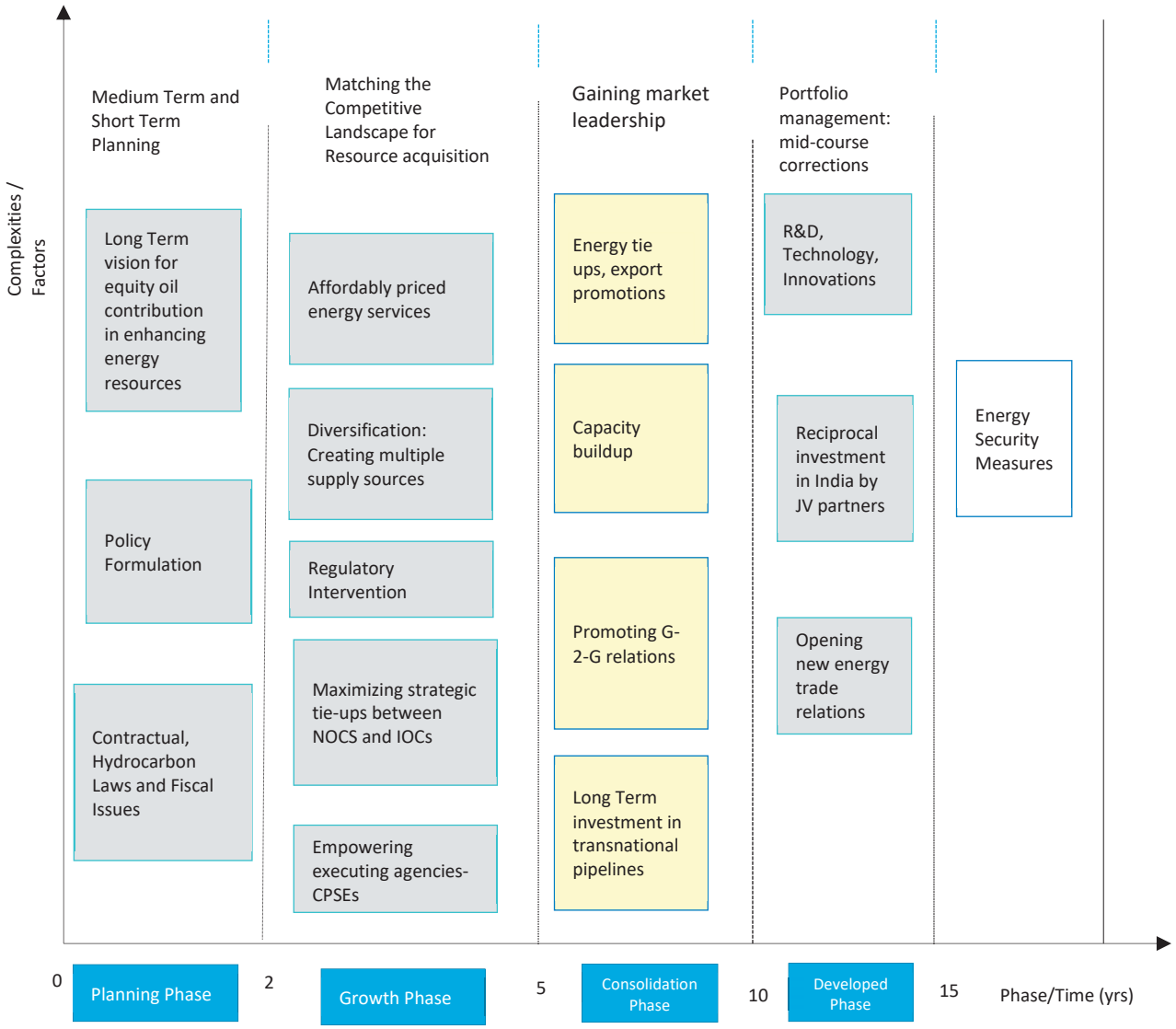
India, for growth of equity oil supply base, need to diversify sources of supply at our own discretion, including enacting legislation to this effect or to revise fiscal regimes. Very few would commit billions to a long-term petroleum project unless they are absolutely certain that there will be a satisfactory return on their investment at the end of the day. That is a requirement of energy producing countries and a competitive strength of countries like India looking to diversify its supply sources. The need for security of demand should by recognized by India while encouraging outward investment, as much as the need for security of supply. Energy requirement is substantial and is forecast to continue growing by an annual average of around two per cent in the medium term up to 2020. The growth phase, therefore, require focus on core elements for the spread of equity investing long term projects.

a) Creating and promoting multiple and competitive supply sources

b) Creating a long term solution for accessing host country reserves

c) Create infrastructure like transnational pipelines to connect this demand and supply

d) Implementation of practices and policies ensuring the ease of doing business



Balancing the Increasing gap in demand supply competition

Figure 10.2: Framework for overseas equity oil development in Indian scenario

3) Consolidation phase (5 – 10 years)

The portfolios of most oil and gas companies worldwide undergo tectonic changes due to a host of internal and external situations, making it more difficult to study and appraise them using standard portfolio evaluation metrics. The most talked about breakeven point published by producers can be incongruent, veiling the performance gap between premium assets and the overall portfolio of a company. Studies of top integrated oil companies, pure-play exploration and production companies and the NOCs reveal a breakeven gap of USD 19 to USD 33 per barrel between their best assets and their overall portfolio. There is a need to achieve more consistency among diverse market narratives. The oil and gas industry and its stakeholders would benefit from having a rigorous framework that normalizes changes in a company's portfolio across multiple dimensions and sums up all changes in one comparable number.

Oil and gas companies in the exploration and production sector made a record 208 transactions for an amount of USD 156 billion during 2019. Even though the deal value totaled higher by USD 26 billion from the level of preceding year, the total number of mergers and acquisitions transactions in oil and gas were 40 percent below the five-year trend. The trend is a cyclical one in the upstream industry and has been witnessed during weak equity markets. High oil price volatility have strained companies' finances and widened the gap between asking price and the precedent transaction indices (**Deloitte, 2020**)

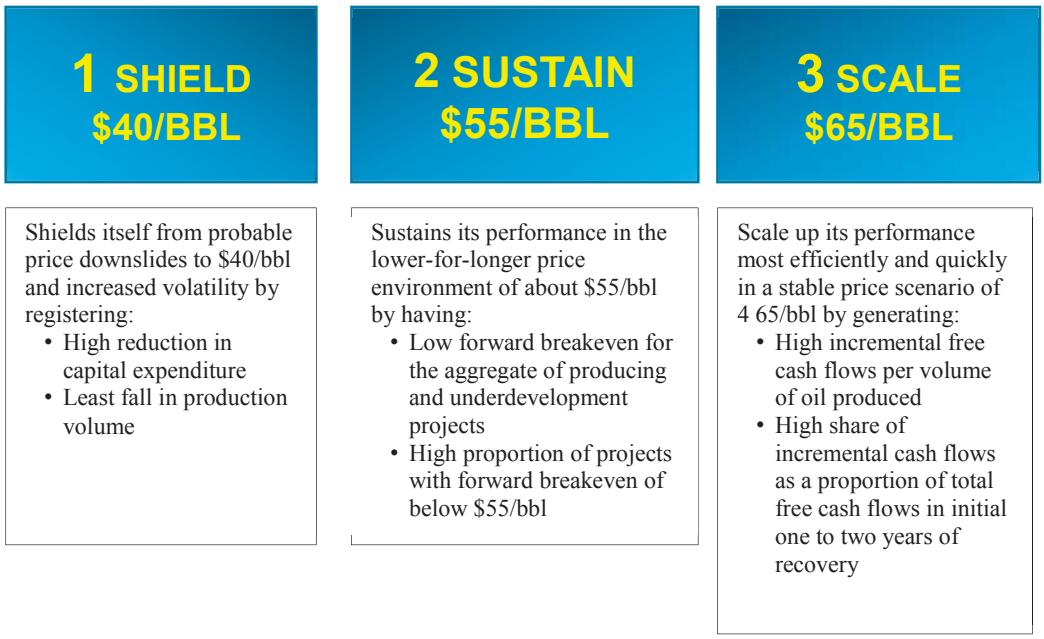
Oil and gas companies tend to focus on core assets in any downturn, but they in aggregate are diversified and each company group followed a different portfolio strategy over the past few years. Most IOCs diversify their portfolios despite following a value over volume strategy. North American E&Ps, on the other hand, extended their concentration in a highly competitive shale oil and gas business and has even withdrawn from non-core assets in foreign countries. The industry's *focus*

on crude oil remains despite its lower price expectations and weaker demand outlook for the long term. Put another way, the share of natural gas, which is projected by many as the fossil fuel of the future, in a company's production is still lower than crude oil. Many companies would benefit from having a comprehensive approach to assess and benchmark the future readiness of their portfolio. This is both important and challenging in this world of higher price uncertainty and more diversity of available performance metrics and benchmarks.

Over a period of time, the reliability of the country's equity oil supply will be determined increasingly by global oil market developments. Rise is global demand shall increase competition for resources. Technological advances are creating a more diffuse global supply and this is changing the patterns of energy trade. It is likely that these trends will lead to increasing levels and volatility of oil prices. This underlines the importance of domestic and international work to contain rising oil demand, encourage sustainable development of new oil production, diversify into renewables and natural gas and enhance oil price stability.

For coping with the shifting energy landscape, a fit-for-the-future portfolio would be the one that can **shield** itself from price downsides, best **sustains** performance in a lower-for-longer price environment, and **scales** up quickly when prices move higher. In Table 10.2, we detail the characteristics of the shield-sustain-scale framework.

Table 10.2 Consolidation phase - Shield, sustain and scale



In addition to the above, this is the stage when some part of the globe Indian companies would have heavy investments in equity oil (like Russia), then Indian companies and executing agencies would be matured enough to start development of regional hubs. It would also encourage investment in trans-national pipelines to bring natural gas to Indian consumers.

4) Developed market phase (10-15 Years) : Portfolio management

It is likely that even when a set target of oil and gas supply could be met from equity oil and gas from investment abroad, India's energy demand would far exceed the supply, primarily for reasons of lack of commensurate growth in production of domestic hydrocarbon, and improvement in living standard with increased consumption and economic growth.

For portfolio management and attracting reciprocal investment in India by the global joint venture partners in India, an example can be given about the refinery sector. India has emerged as a refinery hub. India's current refining capacity stands at 257.2 million ton per annum, comprising of 23 refineries; 18 under public sector, 3 under private sector and 2 in a joint venture. Top three Indian refinery majors Indian Oil, Bharat Petroleum and Reliance Industries contribute around 66.7 percent of India's total refining production from financial year 2019. Within the country, about 16,788 km natural gas pipeline is operational and about 14,239 km gas pipelines are under development. India has witnessed a steady increase in consumption of petroleum products over the years. Liquefied natural gas supply is forging ahead on both coasts with 10 new re-gasified LNG terminals (5 on the west coast and 5 on the east coast) coming up. Together with the four existing terminals of capacity 26.3 million ton per annum, overall capacity will reach 72.5 million ton per annum.

This is the phase for portfolio management of overseas equity oil development by India, leveraging its dominant position in the refining and marketing, whereby overseas crude oil can have assured capacity booking for refining. At this phase of global market integration, India needs to carry out portfolio management to push for value addition. Many regulatory interventions are required which shall include target of leveraging the dominant position in providing assurances of long term demand and revenue flows to the host countries, creating infrastructure network for creating energy corridors through new land and sea routes from energy rich countries, open access as well as capacity upgradation for usage within the countries market, and promoting research and development, technology and innovation to boost energy cooperation and energy transition.

10.3 Contribution to Literature and Practice

Contribution to Literature

This research project provides a framework for overseas equity oil development in Indian scenario. Previous research works on the subject did not provide a comprehensive step by step framework for addressing the issues and determinants influencing development of cross border investment in equity oil, which could be applicable to Indian environment. This research project has attempted to fill this gap.

The framework provides two key outcomes: one, it provides the factors that influences the overseas equity oil development and hence need to be holistically addressed, and two, the timelines and sequence in which the complete framework has to be made. This is a major addition to literature in this sector.

The assessment of the characteristics of the energy system and the indicators we have used do not provide a straightforward measure of the relative significance of determinants captured in the framework, or when change is needed: they are rather a way of flagging potential issues and a stimulus to debate. This research work will enrich the international understanding on development of overseas equity oil for long term supply by the developing and emerging economies, bringing in special Indian context including factors like

1. Energy tie ups and export promotions
2. Capacity buildup
3. Regulatory competence
4. Promoting G-2-G relations with energy rich nations
5. Tax and fiscal incentives
6. Trans-national pipelines
7. Reciprocal investments by joint venture partners
8. Regional hubs

9. Research and development, technology and innovations

Each country is unique and India is no exception, hence the international best practices cannot be applied to India as it exits. There must be unique features to the Indian market, which this research is attempting to address. Sustainable demand means demand at a price point which the Indian consumer can afford and use in a long run. Similarly, tax incentives play a large role in India since India does not have large natural resources and has to depend on expensive imports. Tax and fiscal incentives help develop sustainable markets. Similarly ease of doing business is unique to Indian market.

Contribution to Practice and Business:

The theoretical building blocks for equity acquisitions in foreign countries are drawn from a wide range of thematic areas like industrial economics, international business, finance, geo-political theories and strategic considerations within jurisdictions. The eclectic framework postulates that occurrence of cross-border mergers and acquisitions emerges from the existence of ownership of assets, globalisation benefits and the dynamic relation between home country's structural changes and the economic development. A commercial enterprise strives for expansion to enhance core competencies, develop new technologies and skill and forming joint ventures and brand value. This can be done through acquiring or merging to get the resources and expertise (**Alam & Zafar, 2014**).

Literature review underlines that Indian overseas acquisitions satisfied major objectives to access international market, target specific asset created by stronger State-owned company and supporting governmental objectives of augmenting energy security through strategic tie-ups for natural resources. Therefore, overseas acquisitions by Indian multinationals are directed with a set of multifaceted company specific objectives. The literature review also highlights that Indian oil

and gas companies engaged in overseas acquisitions are large, focusing on reserves acquisitions and equity oil production, but equally driven by governmental dictates.

Governments, Companies and business can use this framework getting additional insights to develop overseas equity oil to augment energy security of India. Initially the government needs to play a key role in providing a basis on which the government controlled companies can build the structure which is sustainable and workable for the Indian conditions.

Since the framework provides guidance on step by step approach along with indicative timelines, the, framework would guide decision makers to approach phase wise development of overseas equity oil under Indian conditions. The global energy picture is becoming diffused and diverse. A major energy consumer like India with its huge market potential is increasingly becoming part of more interconnected networks in the international oil and gas market and beyond. The Government and regulators will need to continue to facilitate for the development of interconnection arrangements which enhance the country's energy security.

10.4 Quality of Research and Validity

A research work should include description of the population of interest, an explanation of the process used to select and gather data, definitions of key variables and concepts, descriptive statistics for main variables, and a description of the analytic techniques. Quality and validity of research needs to be addressed for users of research to be comfortable with the outputs.

A valid study is required to respond to research questions in a scientific manner. Threats to a study's validity are found in three areas of internal, external, and construct validity.

1. **Internal Validity** refers to whether the outcomes observed in a study are due to the independent variables or experimental manipulations. Internal validity is the process to measure whether research is sound and done right. It is related to how many confounding variables exist in the experiment. If the investigation has avoided confounding variables then the internal validity is high. The more confounding variables one has, the lower is the internal validity. In a perfect world the research shall have a high internal validity which will allow high confidence that the results are caused by only one independent variable. For improving internal validity, researcher has to consider aspects of the research design that will make it more likely that researcher can reject alternative hypotheses. There are various factors that can improve internal validity.
    1. Randomization: By randomly assigning participants to control groups and ensuring that there is not any systematic bias between groups.
    2. Random selection of participants: By choosing participants at random or in a manner ensuring they are representative of the population.
    3. Blinding: It refers to participants being unaware of what intervention they are receiving to avoid bias in their perceptions, and creeping into the outcome of the study.
    4. Experimental manipulation: by manipulating an independent variable in a study instead of just observing an association without conducting any intervention.
    5. Study protocol: Here specific procedures are followed for the administration of a treatment in order not to introduce any effects of, for example, doing things differently with one group of people versus another group of people.

2. **External Validity** refers to how well the outcome of a study can be expected to apply to other settings i.e. how generalizable the findings are. The settings can be ecological validity, or other people (population validity)

or historical validity. Inclusion and exclusion criteria can be used to ensure that clearly defined the population that being studied in the research are clearly defined. Studies that randomly select participants from the most diverse and representative populations and that are conducted in natural settings are more likely to have external validity.

The key difference between internal and external validity is that internal validity refers to the structure of a study and its variables while external validity relates to how universal the results of the study are.

3. **Construct Validity** can be defined as the experimental demonstration that a test is measuring the construct it claims to be measuring. Construct validity can be tested by assessing performances and comparing between the group that has the construct and another not having the construct. The group with construct performing better than the other would provide for the construct validity. Intervention study is an alternative test. A group weak in the construct is measured. The group is then taught the construct and thereafter measured. If material difference is found between the two test results then the differences support the construct validity.

Irrespective of how construct validity is defined, there is no single best way to study it and construct validity should be demonstrated from a number of perspectives. In essence, construct validity of a test should be demonstrated by an accumulation of evidence.

Corbin and Strauss stress that validity and reliability are terms which are used more for qualitative inferences. These are not very important when carrying out qualitative research (**Corbin & Strauss, 2008)**

There are many strategies that can assist in increasing validity of the findings. These include constant comparison method where data collected is tested in next interview, treating data comprehensively and tabulating. Grounded theory method uses constant comparison thus validating the research.

However, Charmaz (**2006**) offers a list of criteria for evaluating constructionist grounded theory. Corbin and Strauss find these criteria's to be the best and covering all aspects required for qualitative research **(Corbin & Strauss, 2008).**

The four criteria which we will use to test the quality and validity of this research are

1. Credibility
2. Originality
3. Resonance
4. Usefulness

Let's discuss each of the criteria in detail and test how this research stacks against these parameters. The table 18 provides the indicators for evaluation, and provides assessment summary on criteria's of Credibility, Originality, Resonance, and Usefulness.

Credibility

It is important to check how credible the research is so that it can be referred with confidence. As per Charmaz, the following points need to be addressed to test the credibility

1) The gathered data and analysis should be linked logically
2) The data collected should be sufficient to back the results
3) The categories should be based on large size and array of empirical observations

This research used the mixed method to deduce its result. The use of mixed method has helped to triangulate the data. Also, the grounded theory method used for qualitative analysis uses constant comparison method which lends its credence to the validity of the results. This research has also used all types of data collection methods like

1) Primary sources like questionnaire survey

2) Secondary sources like key literature on the subject

3) Interviews of key oil and gas professionals

The above has provided enough empirical evidence to support this research. Also the data is comprehensive and very detailed, which required few years to collect.

Table 10.3 Quality of Research and Validity

Sr. No	Criteria	Indicators	Assessment
1	Credibility	• Do the categories cover a wide range of empirical observations • Are the data sufficient to merit your claimed • Are there strong logical links between the gathered data and analysis	• The researcher has used multiple modes of data collection e.g. literature, industry reports and experts. Also experts interviewed were from varied institutions to provide a holistic views. Constants comparison method also lends credibility thru validity of data at each stage. • Mixed method has added has helped to triangulation of key data.
2	Originality	• Are your categories fresh. Do they offer new insights • What is the social and theoretical significance of the work • How does the grounded theory challenge, extend, or refine current ideas, concepts and practices	• Research has offered new integrated conceptual Framework for overseas equity oil development. Also new categories were added like G-2 relations, Technology, export promotion, tax incentives, and trade relations.

3	Resonance	• Do the categories portray fullness of the studied experience • Does your grounded theory make sense to your participants or people who share their circumstances	• Constant comparison method in grounded theory helps in validating emerging categories. The last two interview not only validate all the concepts thrown by previous interviews but also did not provide any new category.
4	Usefulness	• Does your analysis offer interpretations that people can use in their everyday worlds. • How does your work contribute to knowledge? How does it contribute to make world better. • Can the analysis spark further research in other substantive areas	• The framework provided by the research would be useful for the government and decision makers to help acquire oil and gas assets abroad which in turn would help in energy security, fostering country's economy. • The data collection and analysis on the vital topic would certainly spark further research in the area, especially given the enormous energy requirement of the country for future growth.

Originality of Research

The main points to consider for testing whether the research has got originality is

1) The categories generated by the research should be fresh

2) The categories generated should offer some new insights

3) The output of the research should have social, practical and theoretical significance

4) The method of grounded theory should have helped to refine current ideas, provided challenge to existing concepts and developed new ideas, practices or concepts.

The research offers a new insight, since this provides a framework for overseas equity oil development, which did not exist. As discussed in detail in section 10 of this chapter there were many fresh categories which got added to the conceptual

lens and few categories got modified. Hence the grounded theory has helped challenge and extend / refine the current understanding.

India, as discussed in preceding chapters of this report, a country of 1.4 billion people, who need uninterrupted energy at affordable prices. Development of the framework for overseas equity oil development in Indian scenario will help achieve this objective adding substantially to other forms of energy sourcing, energy efficiency and energy conservation.

Resonance

The key issues to be tested for resonance relate to: when people are interviewed understand what has been asked and why grounded theory resonate with their circumstances, and categories which are built as per the research process should demonstrate completeness (**Charmaz, 2014**)

The framework was created using the grounded theory using software Atlas.Ti. Constant comparison method in grounded theory help validate the emerging categories. The last two interviews with experts in the field validated the previous interviews / categories, and did not throw up any new category.

The study did resonate with the experts interviewed and hence can be stated that it portrays fullness of the study.

Usefulness

The main areas if addressed demonstrates the usefulness of the research as per Charmaz

1) The output and analysis offer ideas and solution which is useful for everyday work

2) The research work should contribute to the existing knowledge and should help to make the world a better place to live.
3) The research work and output should help stimulate further research in important areas.

The developed framework can potentially be used by the government, policy makers, regulators, industry experts and consultants to help develop mechanism for developing strong equity oil base for long term supply of oil and gas as affordable prices on equity ownership basis.

In addition, this research throws open window for many multiple research in each category of the areas highlighted in the framework, since the objective was to create a framework and not go into details of the each and every element of the framework. Each element being a complex issue in itself can be picked up by future researchers.

Hence, it can be stated with confidence that this research meets the criteria of credibility, originality, resonance and usefulness. Therefore, the research can be termed as potentially as valid and of high quality.

10.5 Research Limitation

No research can be done which can be termed as the perfect one. Each research has its own limitations. The main limitation of this research is discussed below so that this can be factored in by the users of this research in their understanding;

1) Interview transcripts were prepared. A few interviews were not recorded but the researcher has used the following technique to ensure data is captured correctly and completely
    a. Paraphrasing
    b. Questioning
    c. Checking

d. Working on data immediately post interview

2) The output being a substantive conceptual framework, for the oil and gas international business, it cannot be generalized for the other sub-sectors.

3) This research does not claim that this is the only possible way to develop overseas equity oil business for energy security. There could be many other theoretical matrix to meet the same objective.

4) Any research project like the present one takes few years to complete, there can be bias in respondents based on in which year they were interviewed and / or responded.

While working on the issues of development of overseas equity oil, the needs of energy security also needs to be considered in the context of other energy objectives of sustainable energy supplies in particular reducing carbon emissions and affordable energy supplies. These objectives will often align. However, geo-political strains may emerge or new sustainable technologies may raise previously unforeseen challenges to the delivery of secure and reliable supplies.

10.6 Future work

Academic research is fundamentally a systematic process of collecting and analyzing information to increase understanding of the phenomenon under study. To qualify as good research the research process must have certain characteristics that it must be rigorous, verifiable, critical and empirical. A good research is the one that raises more question than it answers. This research to build framework for overseas equity oil development in Indian scenario is to achieve this objective. Each category / variable in the framework is a complex piece of area and will require dedicated work. In the present research, information within the paper itself shall be sufficient for future researchers to evaluate adequacy of data collection and analysis.

As a student of good research, I have diligently worked towards satisfying the following conditions.

1. **Systematic:** research is structured with specified steps taken in a specified sequence in accordance with the well-defined set of rules. Systematic characteristic of the research supports creative thinking and rejects use of assumptions and intuitions.

2. **Logical:** Research must be guided by logical reasoning and logical process of induction and deduction. While induction is the process of reasoning from a part to the whole, deduction is reasoning from the premise. Research conducted with logical reasoning are more meaningful to its purpose.

3. **Empirical or Tangible:** Research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity to research results.

4. **Comprehensive:** This research has the ability to encompass all important parts of the topic of overseas equity oil development for energy security into a complete picture.

5. **Prolific:** As a good research, it builds on, but also offers something new to previous research work on the topic of equity oil development for energy security. The current research has the potential to suggest directions for future research.

6. **Relevant:** A good researcher needs to extract relevant information from voluminous data. Complete research will have the sets of core information, which together answers the question directly, and the contextual information, which determines whether or not the core research is

applicable to given circumstances. Therefore, this research project is relevant.

7. **Well executed:** At last but not the least, this project is able to convey the research in an accessible format that is, the research is easy to make use of. This serves the ultimate purpose of making a decent contribution to the enormous field of research with a project well executed, that can be used for further research work.

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Annexure-I

Literature review: summarizes the literature reviewed under various sub-groups.

Sl No.	Category	Particulars
1	Research data base	♦ EBSCO ♦ JSTOR/ EMERALD/Sage Publications ♦ Science Direct ♦ ELSEVIER ♦ Google Scholar ♦ Wiley online library
2	Research report by multilateral agencies in dealing in energy	♦ International Energy Agency ♦ Energy Information Administration ♦ Oxford Institute of Energy Studies ♦ The International Bank for Reconstruction and Development/ The World Bank ♦ OPEC
3	Research report and Articles in Journals / world bank papers /work instituted by Universities	♦ Energy Policy ♦ Energy Research and Social Science ♦ Applied Energy ♦ Energy Strategy Reviews ♦ The King Abdullah Petroleum Studies and Research Center ♦ Energy Strategy Reviews ♦ Harvard International Review ♦ Oxford Institute for Energy Studies. ♦ OPEC Energy Review ♦ Journal of Advances in Management Research ♦ Resources Policy, ♦ Royal Institute of International Affairs ♦ Harvard International Review

4	Research report by oil and gas Industry expert groups	♦ Upstream Insight, Wood Mackenzie ♦ McKinsey and Company ♦ BP Statistical Review
5	Oil and Gas CPSE data bank	♦ Annual Reports of: ♦ Ministry of Petroleum and Natural Gas ♦ ONGC Videsh Ltd. ♦ Oil India Ltd ♦ Indian Oil Corporation Ltd. ♦ Gas Authority of India Ltd. ♦ Bharat Petroleum Corporation Ltd
6	Research report by Government Agencies of India and Industry Associations	♦ Ministry of Petroleum and Natural Gas ♦ Directorate General of Hydrocarbons ♦ PPAC ♦ Central Statistics Office, Ministry of Statistics and Programme Implementation ♦ FICCI and CII ♦ IDSA
7	Research Report by Oil and Gas Sector Transaction Advisory groups	♦ Ernst and Young ♦ Deloitte Petroleum Services Group ♦ KPMG ♦ Boston Consulting Group

Annexure-II

Questionnaire for Energy Security pertaining to oil and gas resources

SECTION 1

1. Please tell us about yourself:

a. Level of education: ☐ Postgraduate ☐ Graduate ☐ Undergraduate ☐ Other

b. Age: ☐ 18 to 25 ☐ 26 to 35 ☐ 36 to 45 ☐ 46 to 55 ☐ 55 and above

c. Gender: ☐ Male ☐ Female

d. Country of residence:

☐ United States

☐ China

☐ India

☐ South Korea

☐ United Arab Emirates

☐ Japan

☐ United Kingdom

e. Nationality:

_____

f. Type of Occupation:

☐ Private sector / Industry / Business / for-profit organization

☐ Government / National Institute / Regulatory Agency

☐ Non-Governmental Organization / Civil Society

☐ University / Academic Institution

☐ Inter-Governmental Organization

g. Name of Employer / Organisation (optional):

_____

h. Job Title (optional):

_____

SECTION 2

2. When you think about energy security for your country in the next five to ten years, how important is it . . .

	Extremely Important	*Somewhat Important*	*Neither Important Nor Unimportant*	*Somewhat Unimportant*	*Extremely Unimportant*
. . . to have a **secured and uninterrupted supply** of oil and gas	☐	☐	☐	☐	☐
. . . to have **affordably** priced energy services	☐	☐	☐	☐	☐
. . . to assure **equitable access** to energy services to all of its citizens	☐	☐	☐	☐	☐
. . . to have **stable, predictable, and transparent price policy**	☐	☐	☐	☐	☐
. . . to promote **trade** in energy products, technologies, and exports	☐	☐	☐	☐	☐
. . . to promote **bilateral trade relations** with energy rich nations	☐	☐	☐	☐	☐
. . . to encourage **low energy intensity** (i.e., the unit of energy required per unit of economic output)	☐	☐	☐	☐	☐
. . . to promote adaptation and investment in **latest technologies**	☐	☐	☐	☐	☐
. . . to **maximise exploitation** of domestically available petroleum resources	☐	☐	☐	☐	☐

(Continued)

section 2. *(Continued)*

	Extremely Important	*Somewhat Important*	*Neither Important Nor Unimportant*	*Somewhat Unimportant*	*Extremely Unimportant*
. . . to ensure healthy **G-2-G relations** through proactive energy diplomacy	☐	☐	☐	☐	☐
. . . to promote **energy conservation** by people and industry	☐	☐	☐	☐	☐
. . . to have better tools to **estimate the demand potential** and capacity planning	☐	☐	☐	☐	☐
. . . to **provide tax incentives** for outward investment oil and gas by NOCs	☐	☐	☐	☐	☐
. . . to maximise **strategic tie-up** between NOCs and IOCs	☐	☐	☐	☐	☐
. . . to **reduce risk through** joint venturing in oil project development	☐	☐	☐	☐	☐
. . . to provide **concessional State funding** for oil acquisitions overseas	☐	☐	☐	☐	☐

SECTION 3

3. Given the 16 dimensions of energy security pertaining to overseas equity oil acquisition discussed here, select the five that you think are most important for your country of residence, and rank them from 1 (the most important) to 5 (5th most important), without allowing for ties. Please rank only **five** dimensions:

- ☐ Securing supply of oil and gas
- ☐ Bolstering trade with resource rich countries
- ☐ Minimizing rates of depletion in domestic reserves
- ☐ Predictable and clear price signals
- ☐ Ensuring affordably priced energy services
- ☐ Decentralization and small-scale supply of oil and gas
- ☐ Low energy intensity
- ☐ Research and development
- ☐ Equitable access to energy products
- ☐ Predictability and clarity in taxation policy
- ☐ Pooling of complimentary resources
- ☐ Project Management expertise for scaling up
- ☐ Robust partnerships between NOCs and IOCs
- ☐ Stable fiscal regime in governing contracts
- ☐ Achieving economies of scale to reduce price
- ☐ Knowledge and Technology Transfer

SECTION 4

Did we miss any dimension that you consider important for the framework of overseas equity oil acquisition for energy security of your country in the next five to ten years? Please enter below (*or if we didn't, then leave blank*)

_____

_____

_____

_____

_____

With the above answer, when you think about energy security for your own country in the next 5 – 10 years, how important is this above dimension?

☐ Extremely Important

☐ Somewhat Important

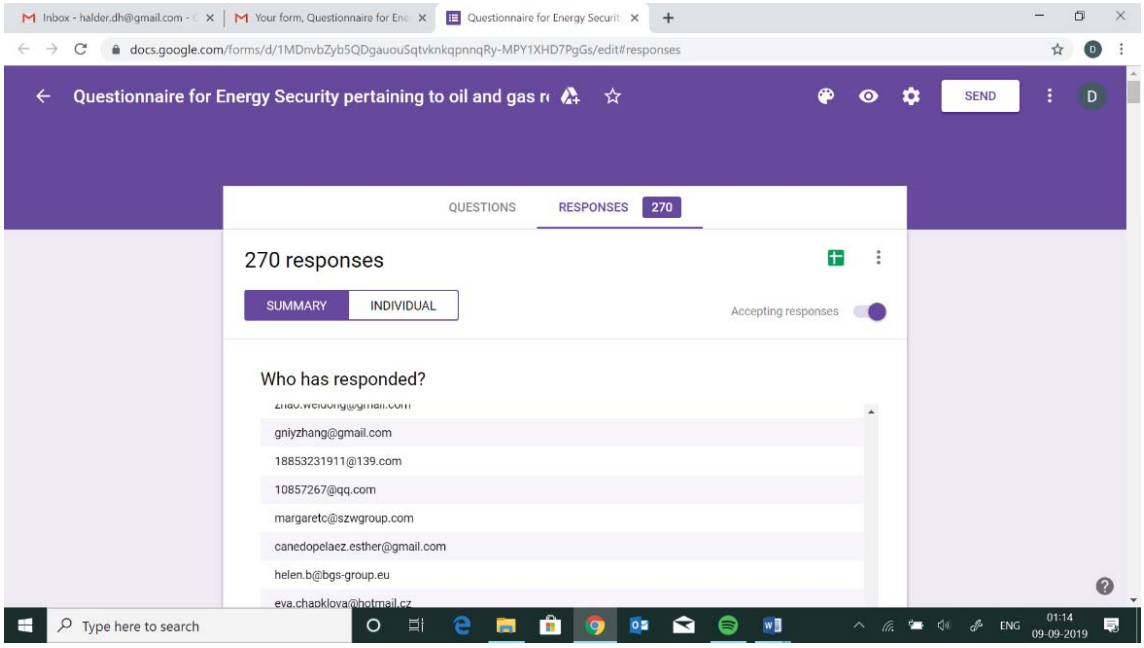
☐ Neither Important nor Unimportant

☐ Somewhat Unimportant

☐ Extremely Unimportant

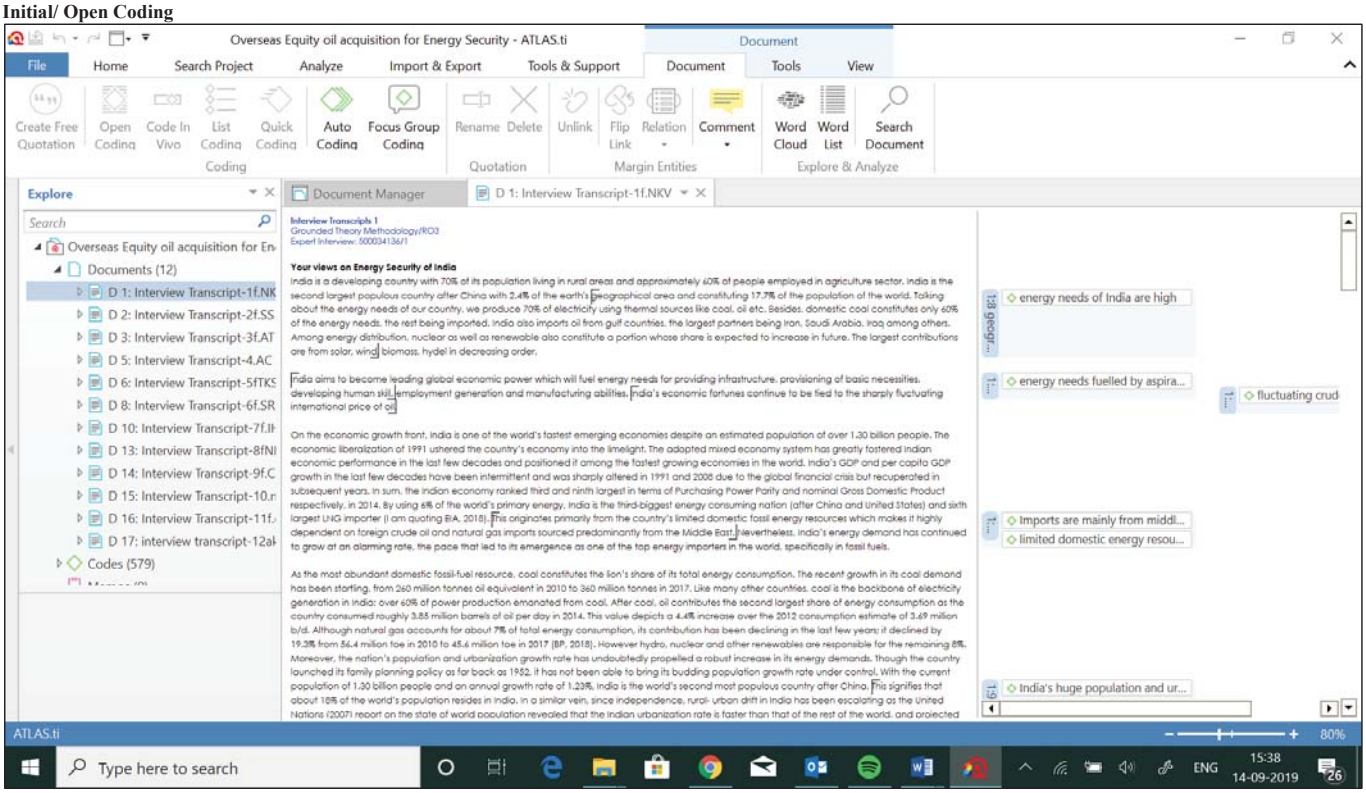
****

Annexure-III



Annexure IV

Initial/ Open Coding



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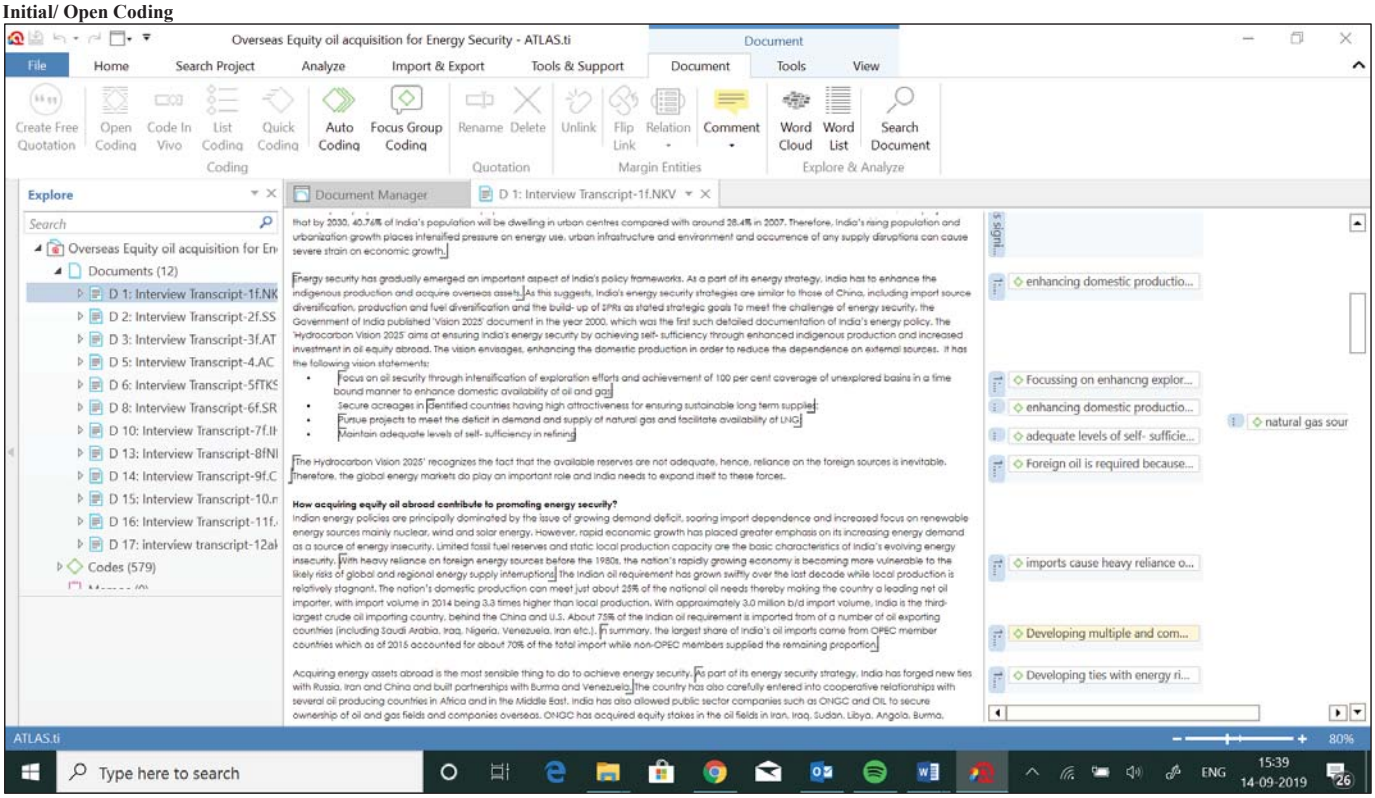

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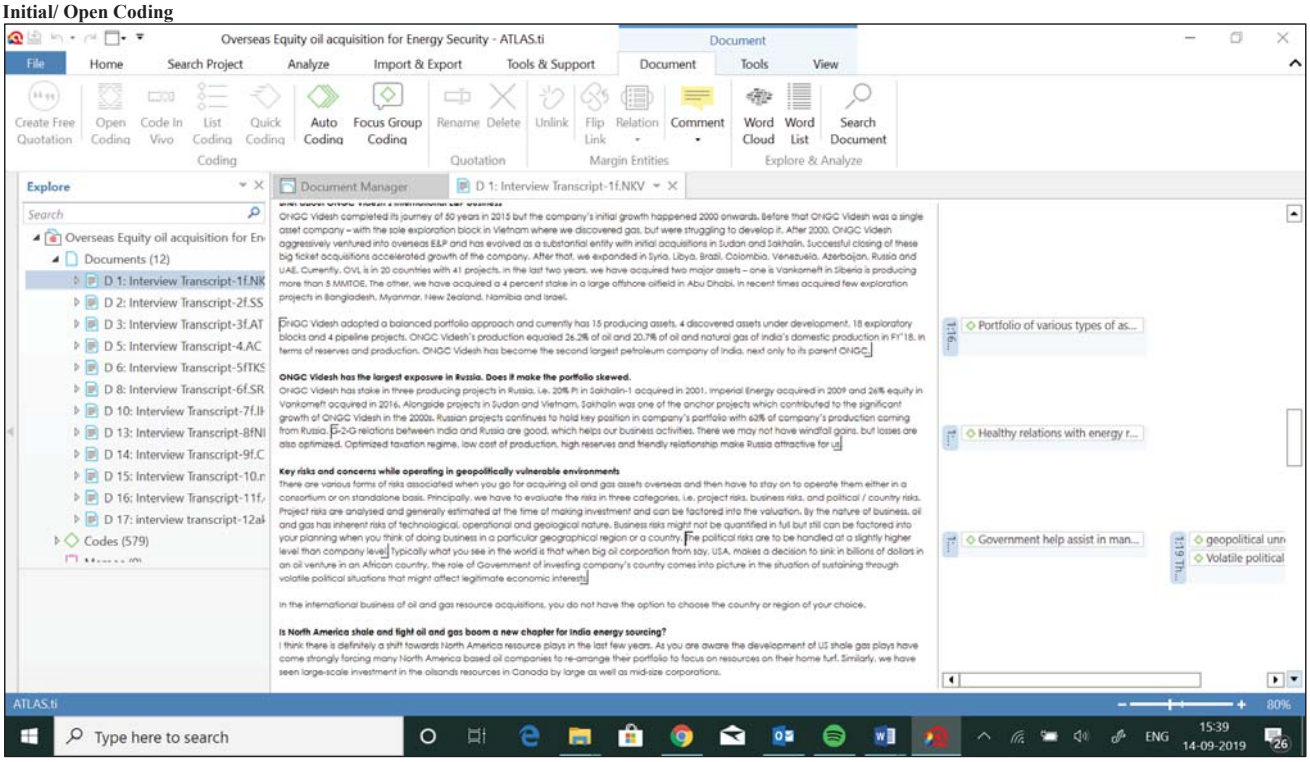

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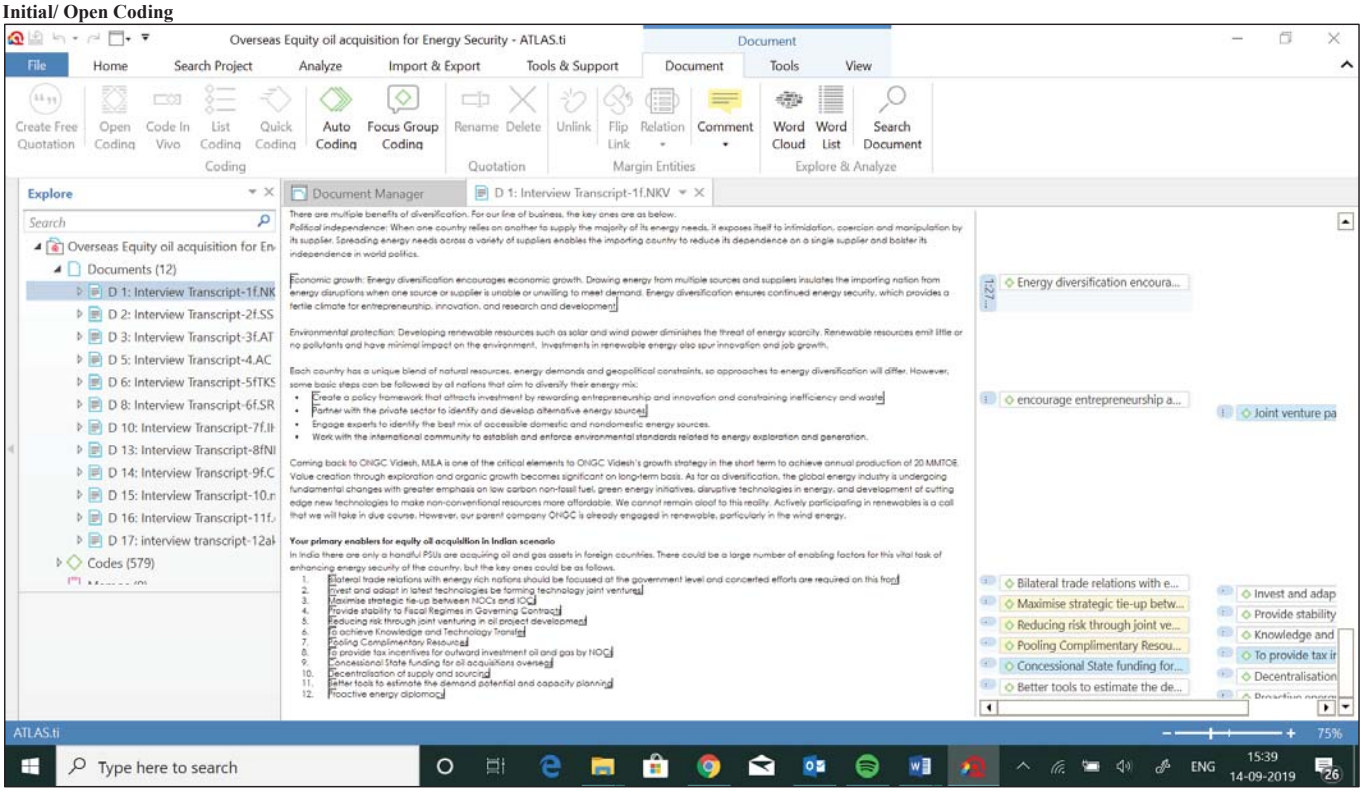

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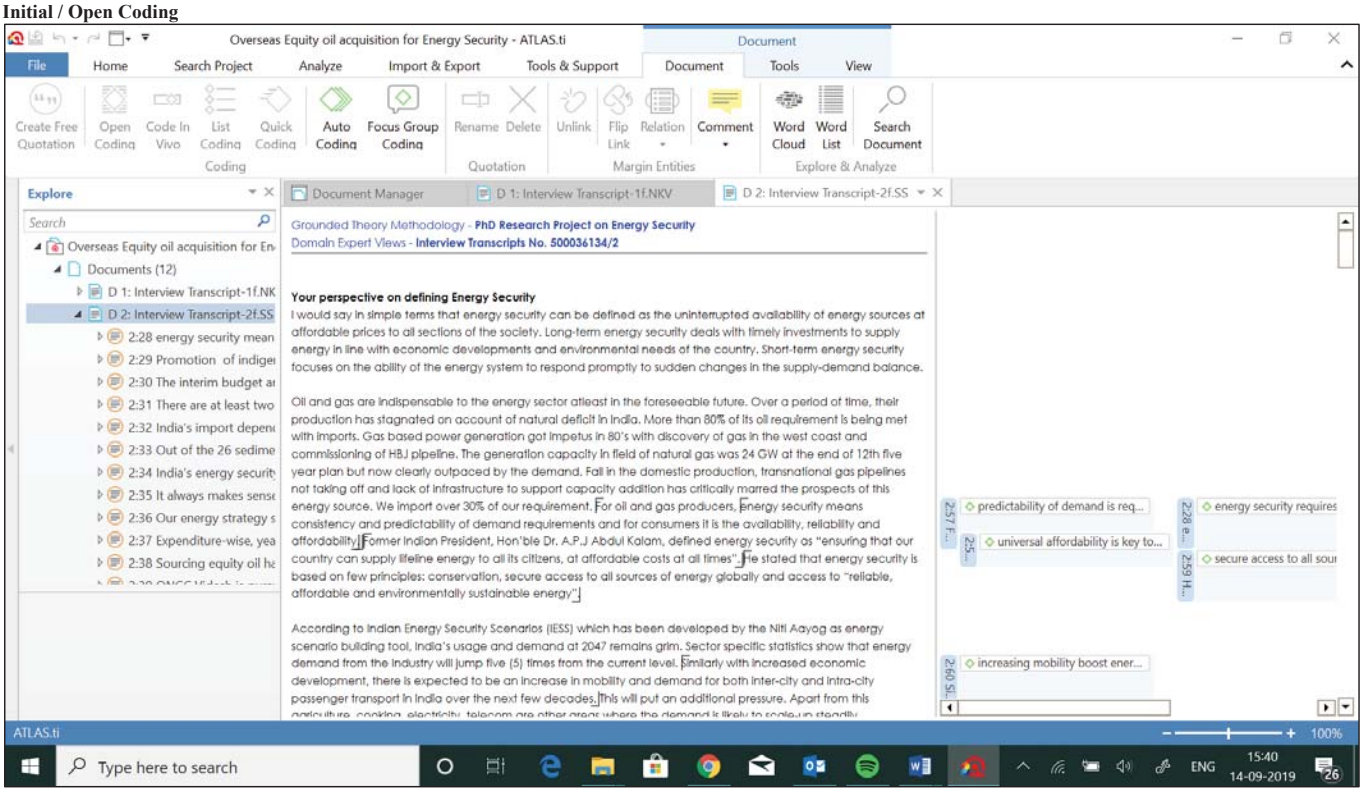

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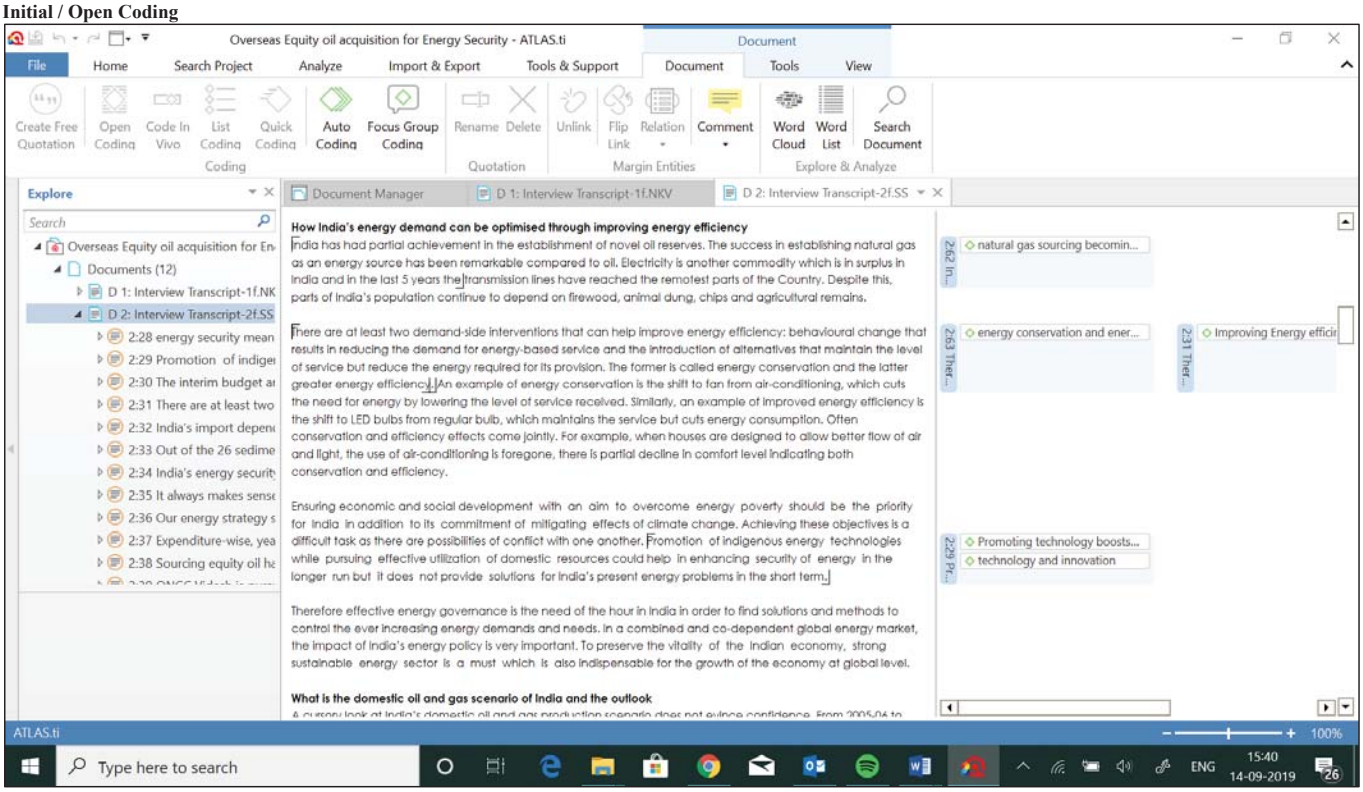

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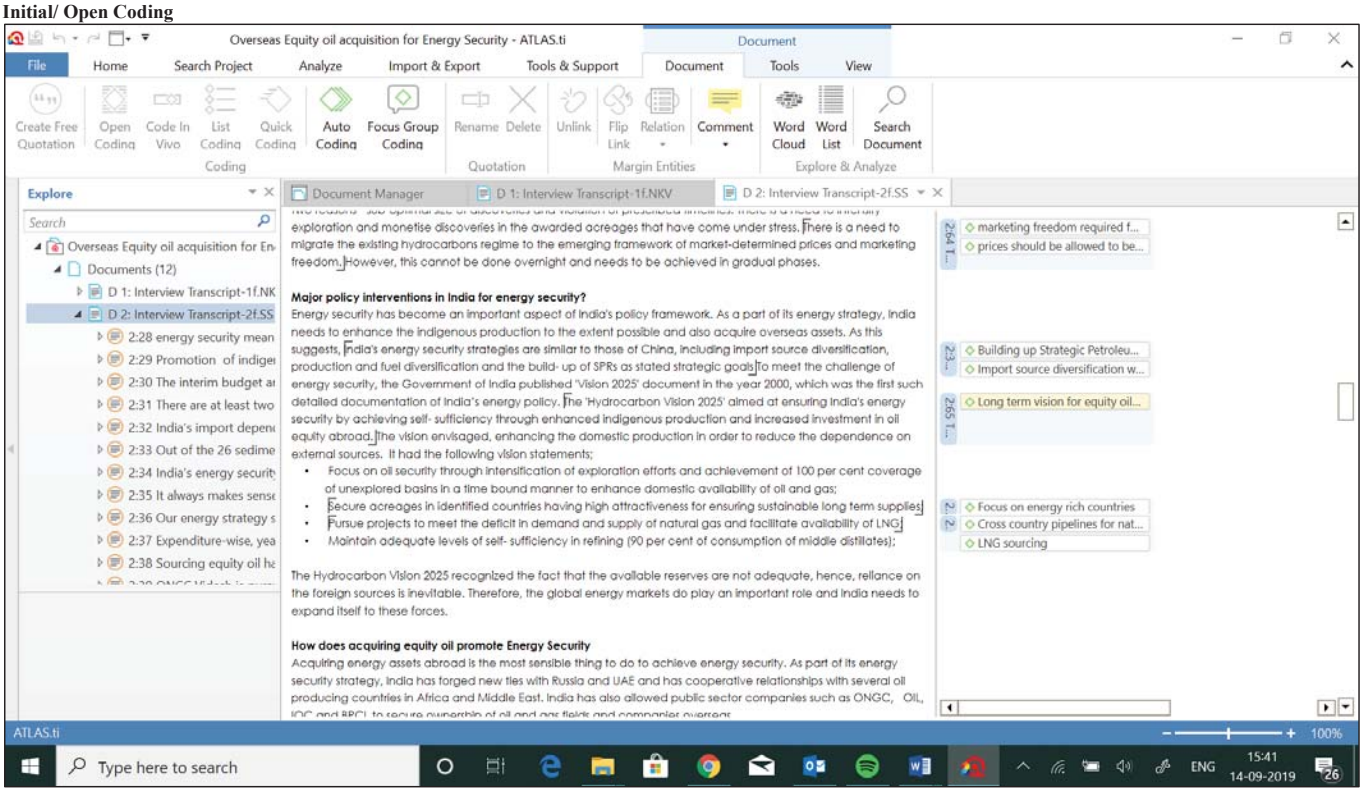

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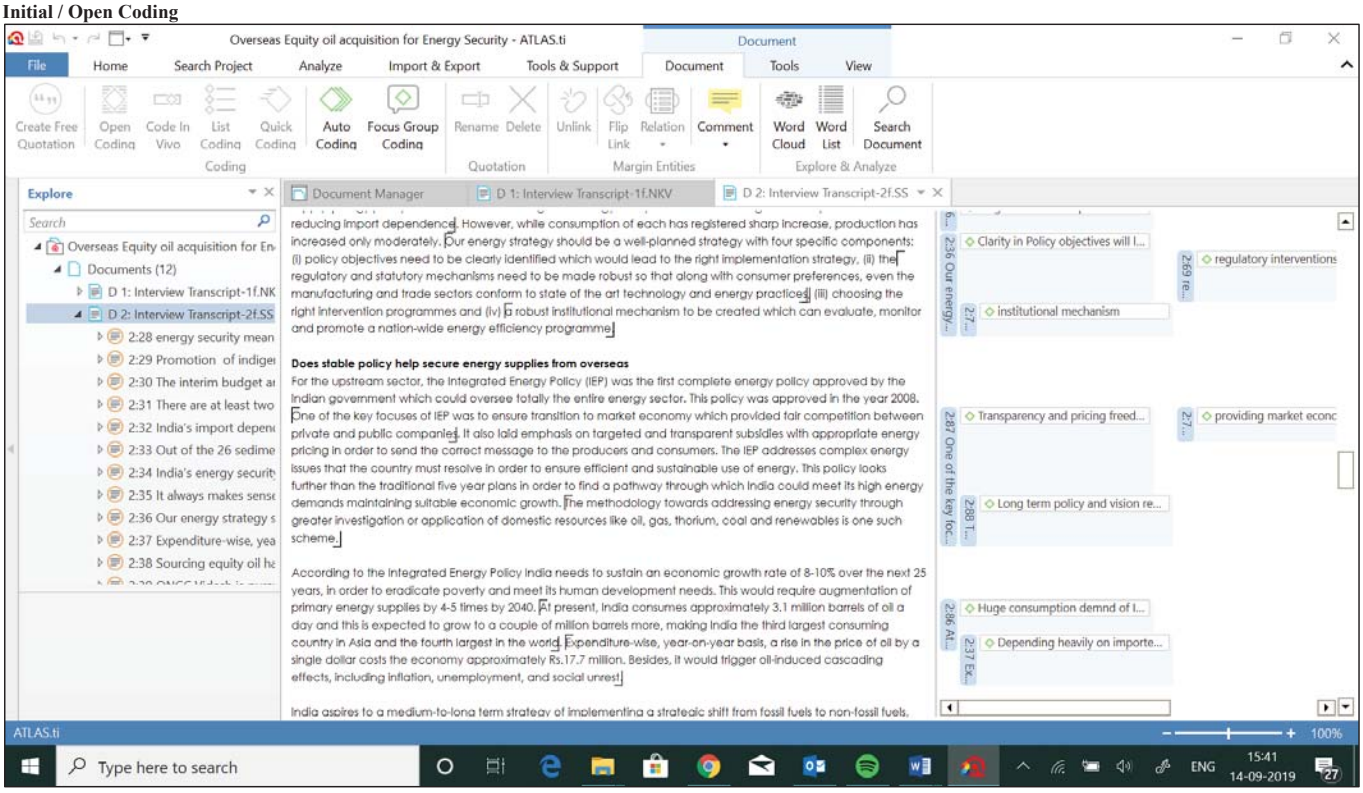

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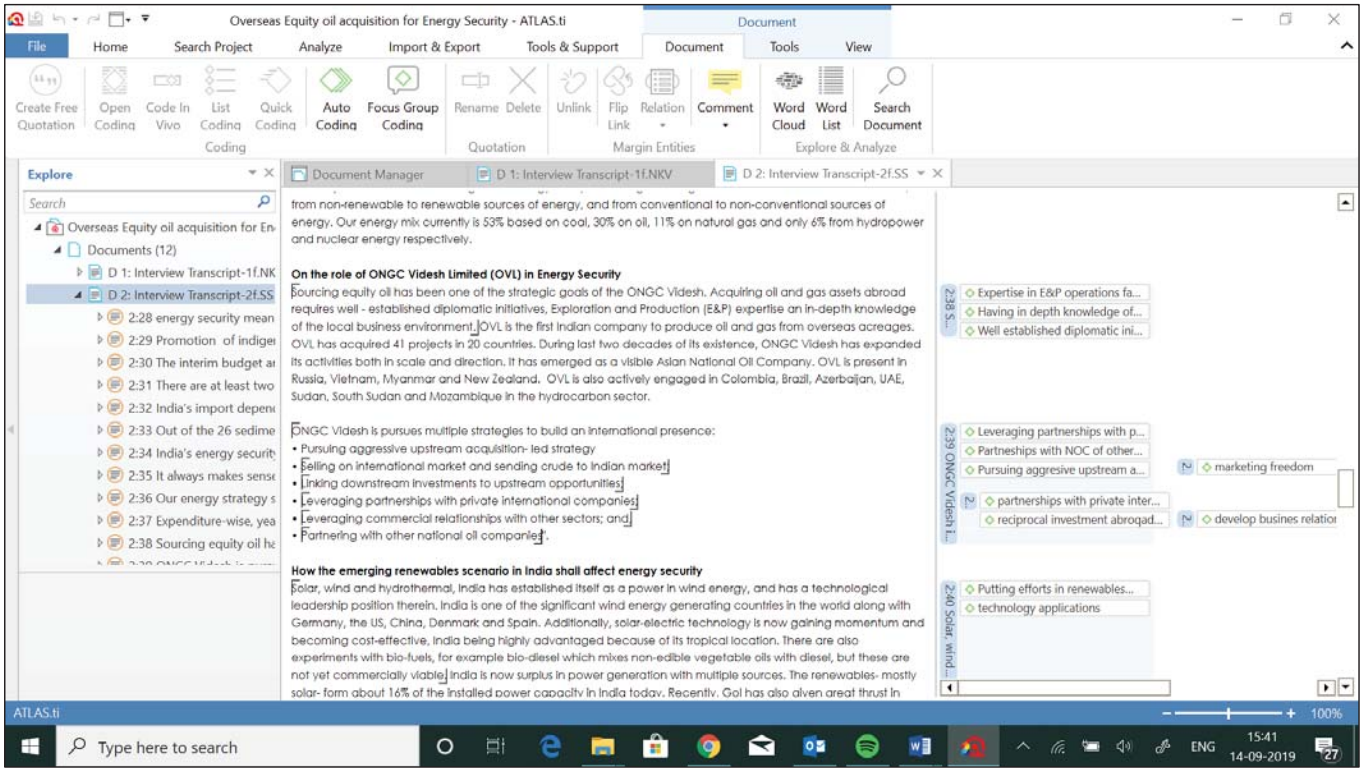

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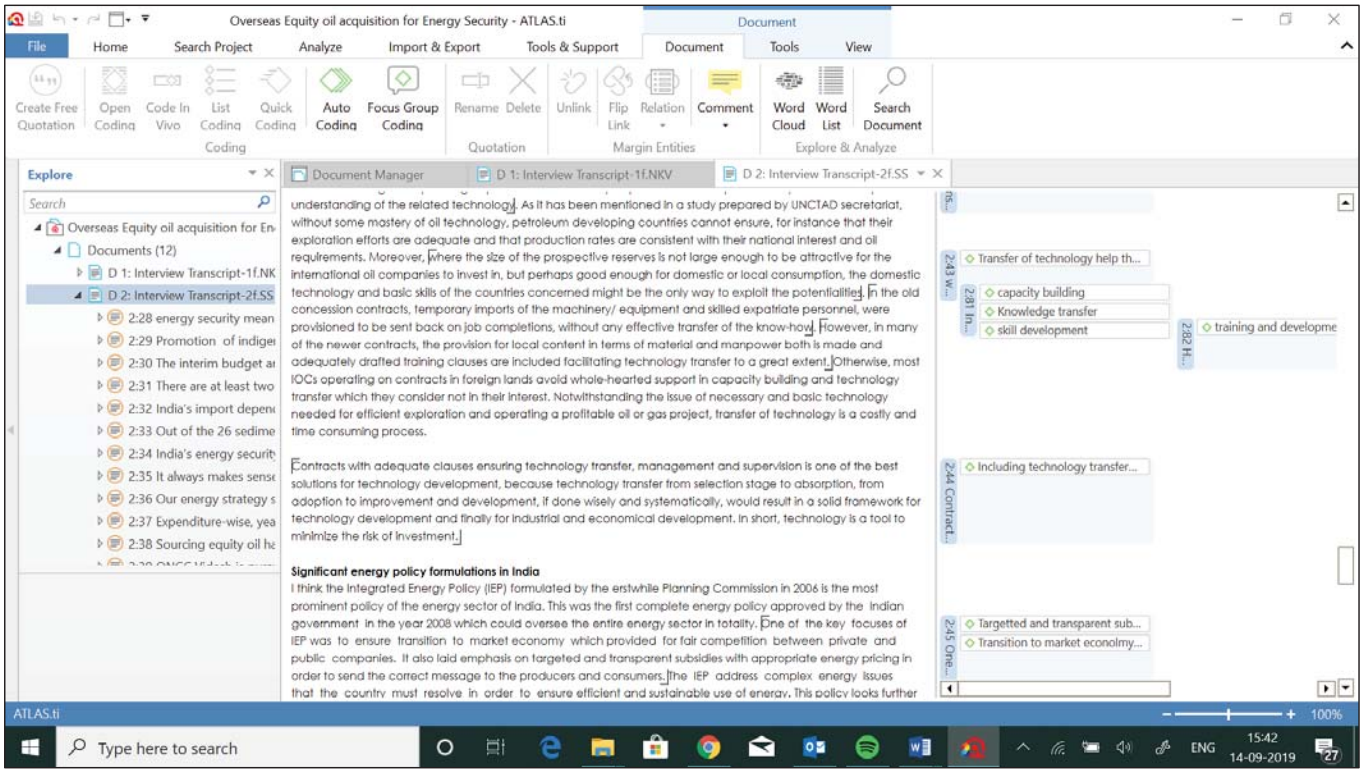

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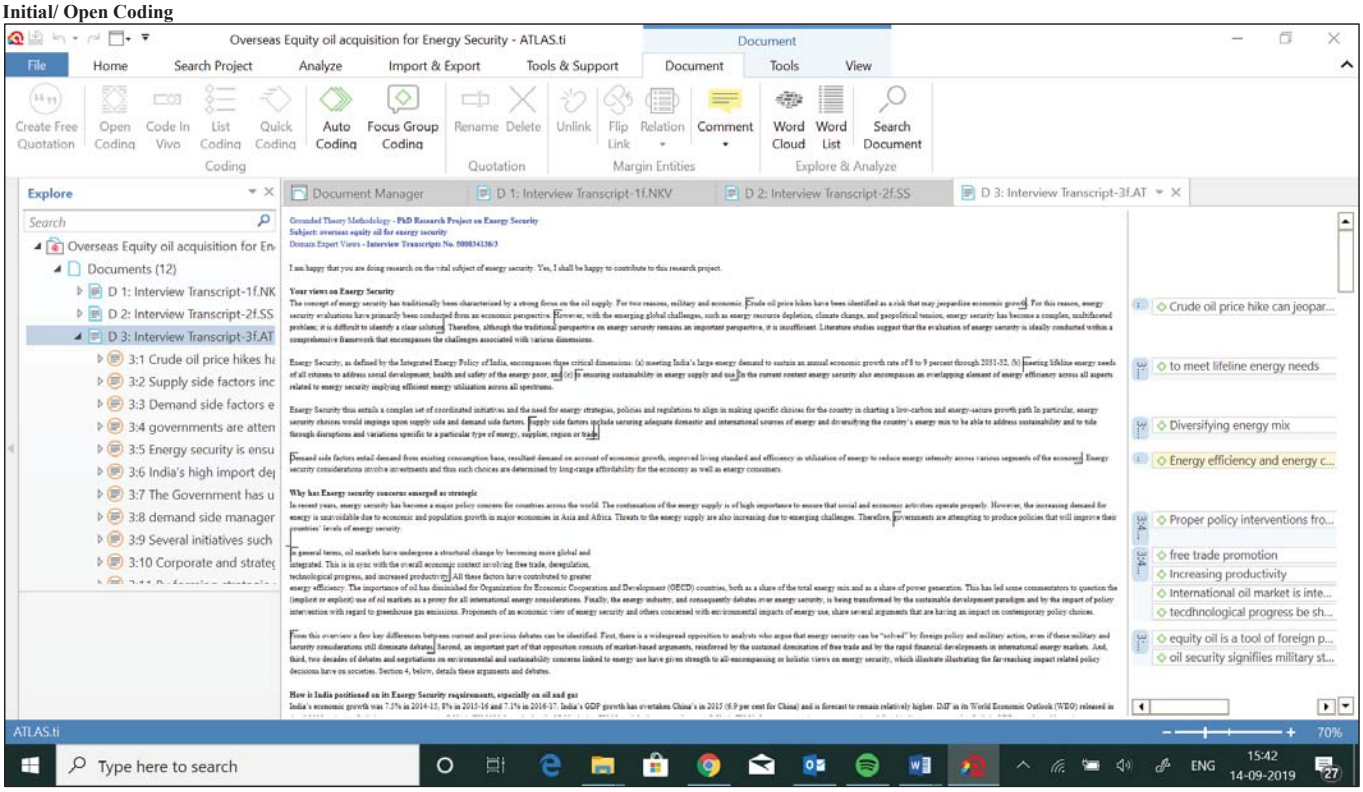

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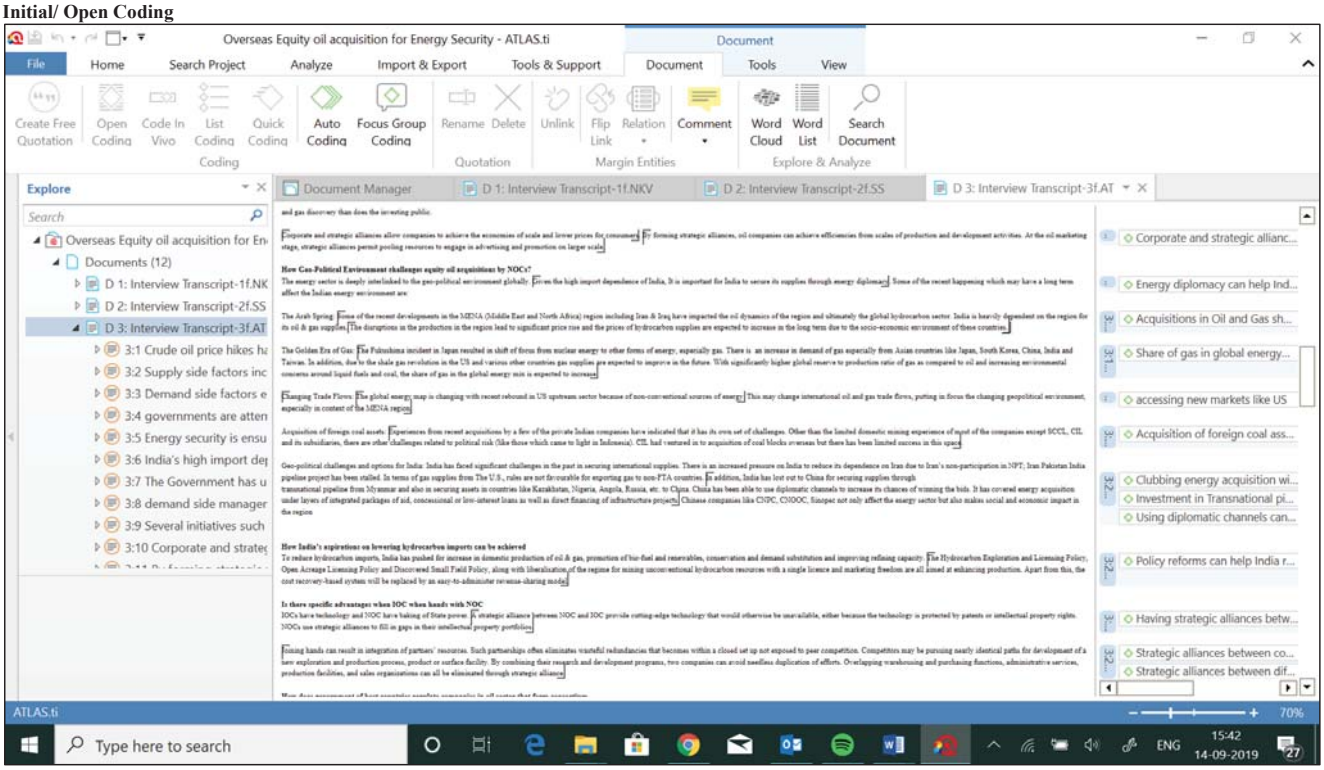

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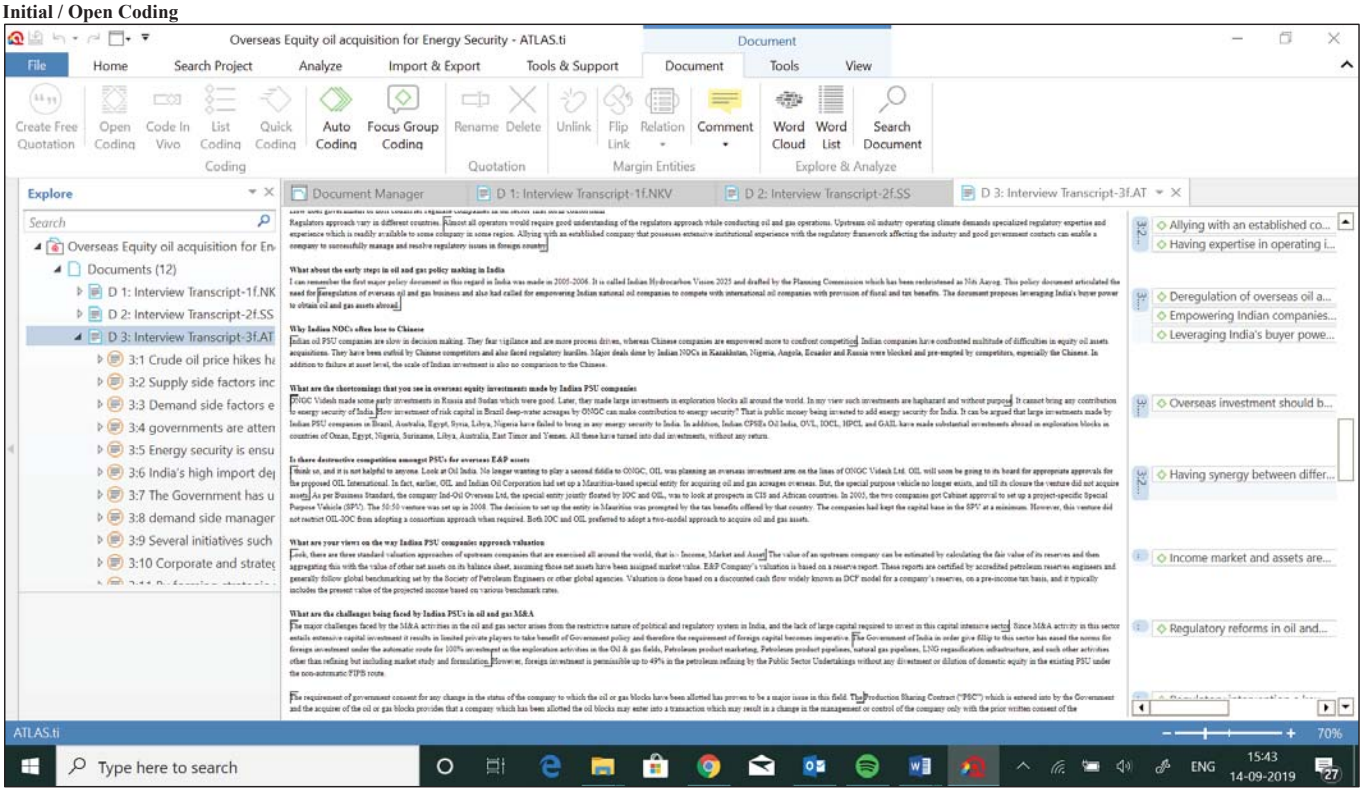

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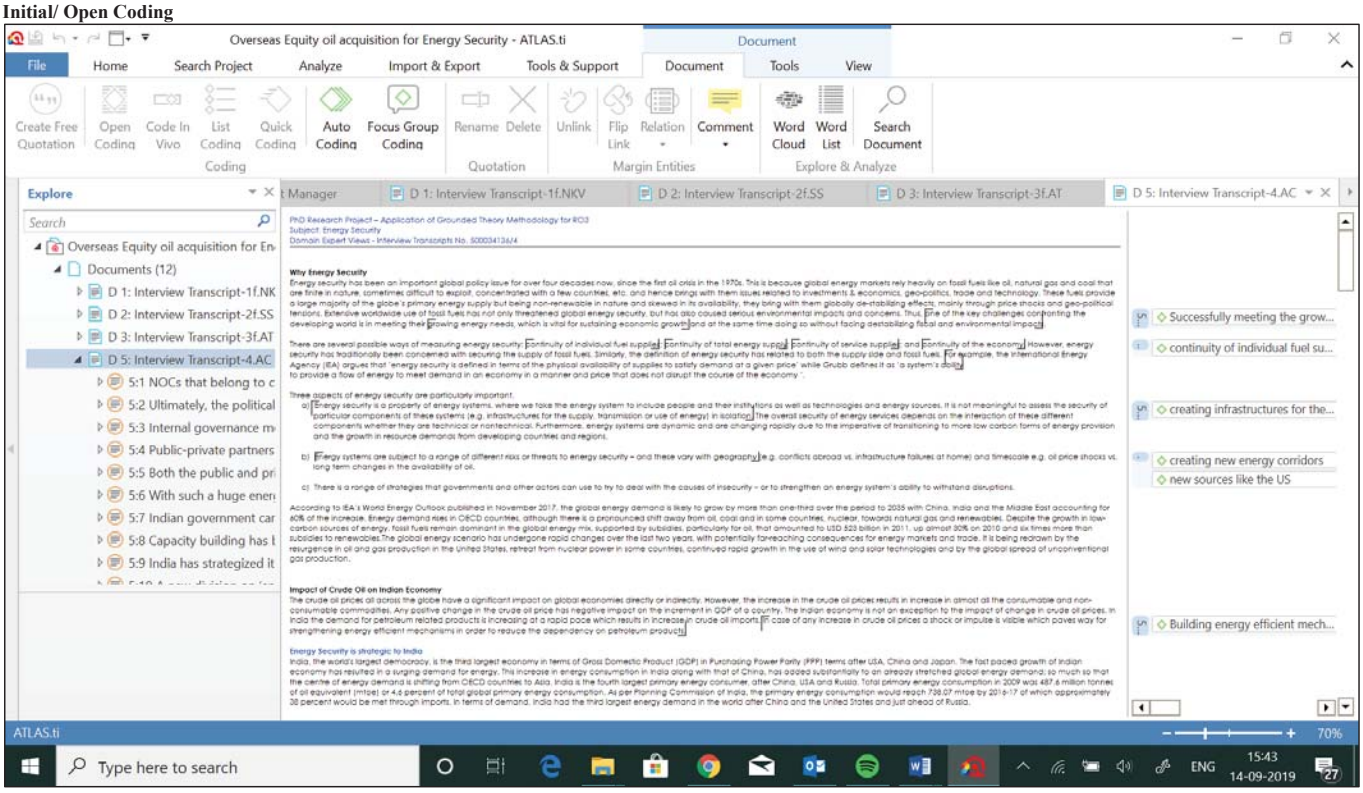

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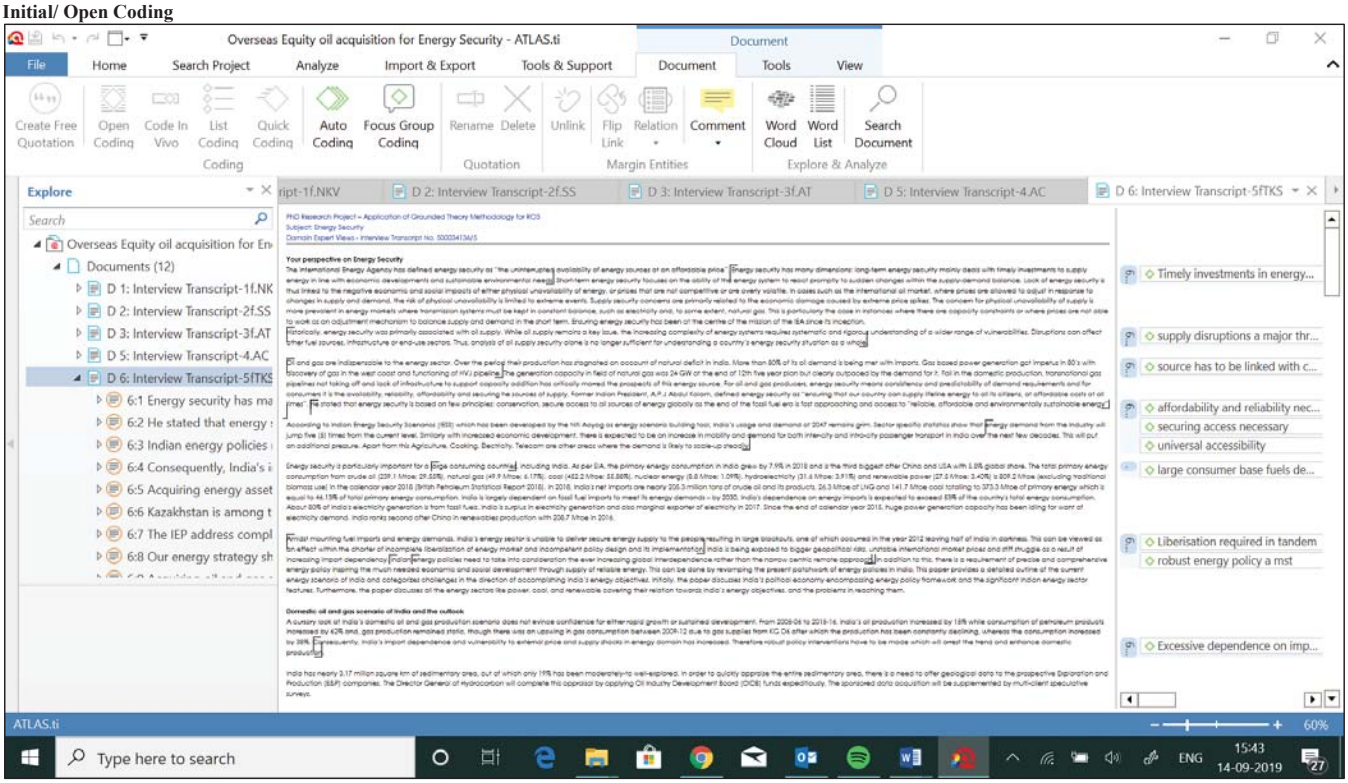

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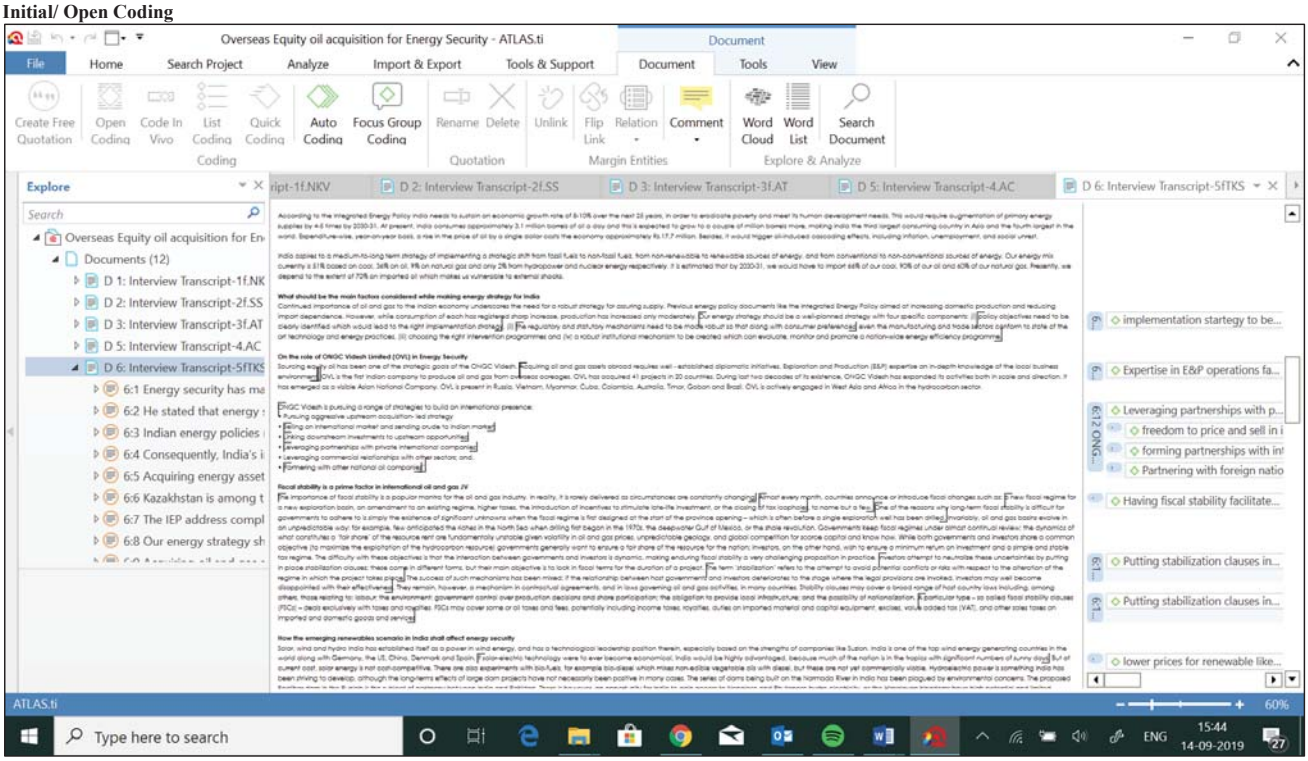

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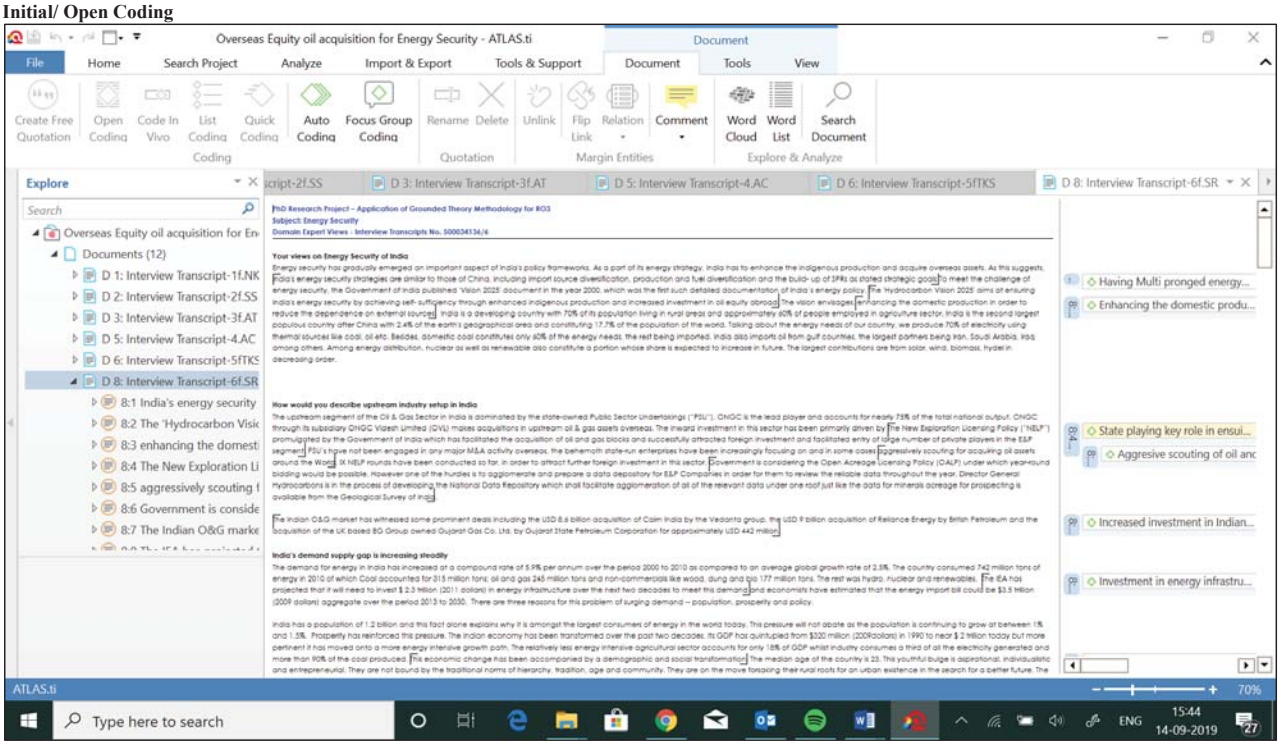

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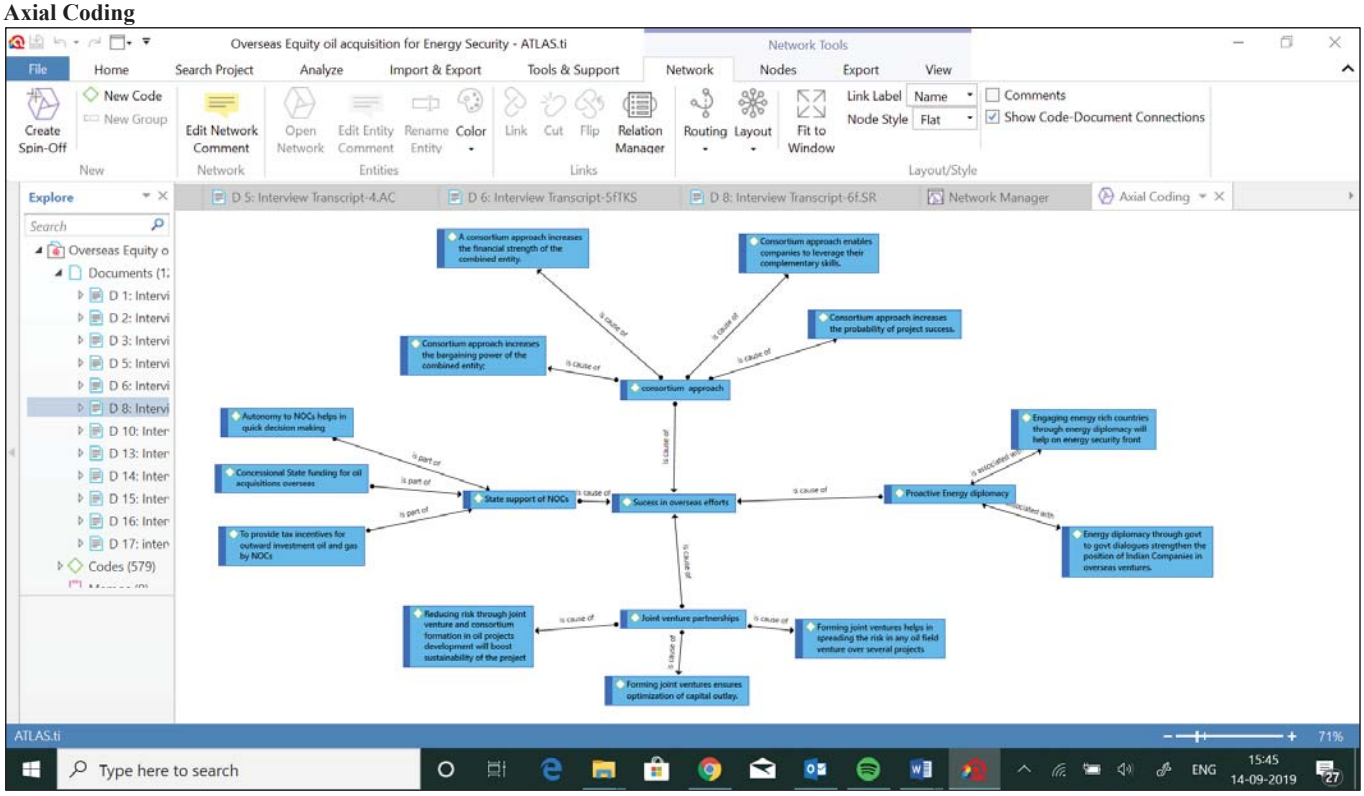

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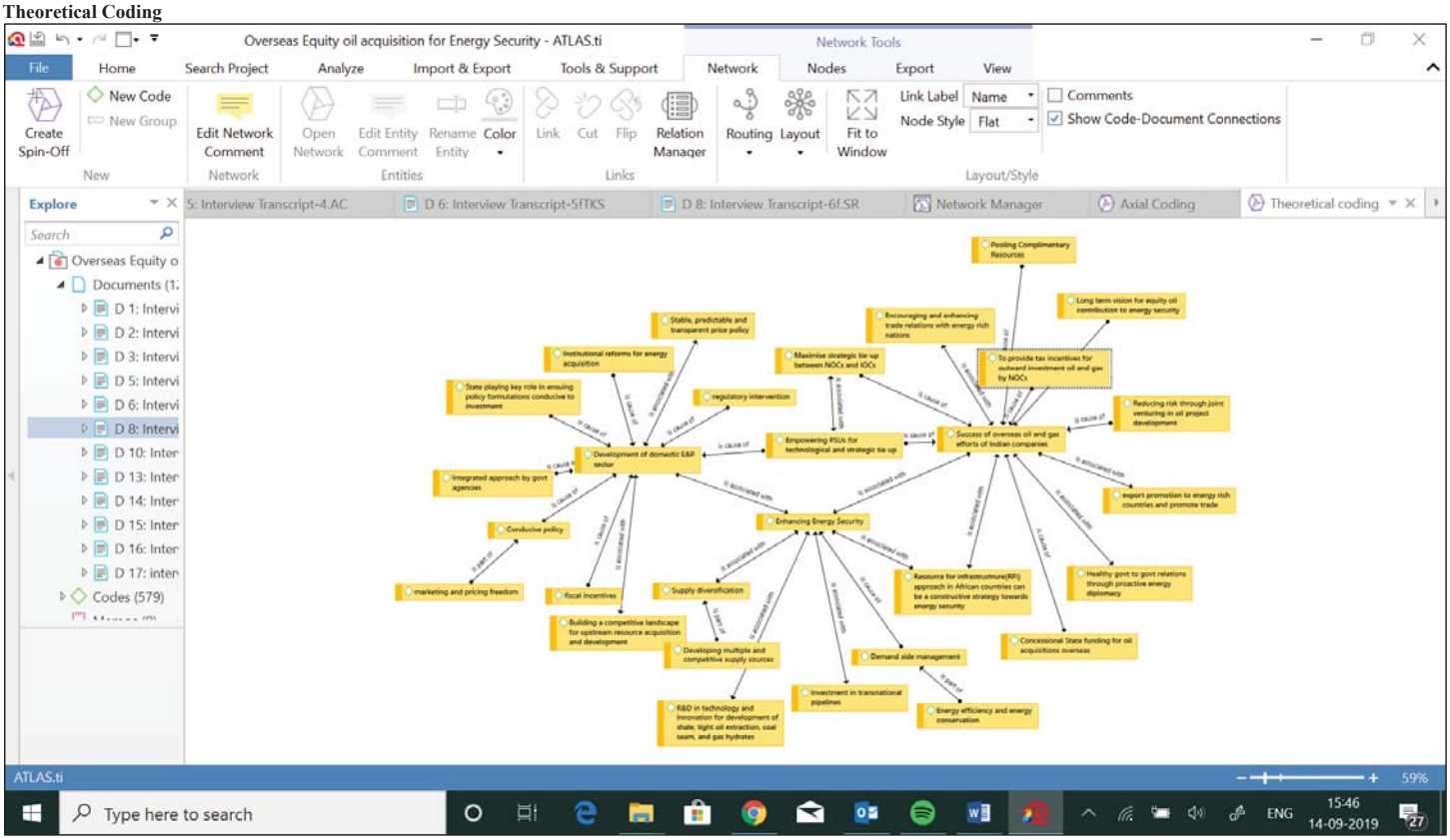

Dulal Halder
Brief Profile of Scholar

Dulal Halder is a General Manager – Corporate Planning and Strategy at ONGC Videsh in New Delhi and is currently working as Executive Officer to the Managing Director, ONGC Videsh. He has been working in ONGC Videsh (c. 280,000 boe/day of daily production of oil and gas, 20 countries) from its inception days and has anchored building up its international oil and gas assets portfolio for nearly two decades.

As project manager of large and complex international transactions, he led delivery teams of multinational MDTs comprising the world's top energy law firms, merchant bankers and petroleum consultants. He is a recognized specialist in technical, legal and financial due diligence; economic evaluation, DCF modelling, sensitivity analysis, zero based risk analysis, and contract negotiations for international acquisitions. Mr. Halder worked in finalizing petroleum industry agreements across the world like joint venture agreement, joint operating agreements, sale and purchase agreement, HoA, MoU; and was member of negotiating teams for finalizing production sharing contracts in Nigeria, Sao Tome Principe, New Zealand, Cuba, Venezuela and Qatar amongst other countries.

Mr. Halder served as the resident Country Manager in Nigeria and lived in Lagos from November 2006 to April 2010 with responsibility for ONGC Group's activities in Nigeria, Sao Tome Principe, Angola, Cameroon, Equatorial Guinea and other African Countries. He managed joint venture operations with TOTAL E&P, Sinopec, Addax Petroleum and OMEL for three offshore exploration blocks, ensuring local establishment management, expat hiring, JV meetings, host government coordination, budgeting and overseeing contractual and statutory compliances.

He established overseas offices of ONGC Videsh at Khartoum, Amsterdam, Doha, Lagos, Calgary and Wellington. He was interview panel member for hiring expatriate staff in overseas projects in Sudan, Qatar, Amsterdam, Nigeria and Venezuela.

Mr. Halder is the recipient of ONGC Chairman's Award for exemplary performance in international business development, and a host of other merit awards.

In Corporate Planning & Strategy, he led the planning, implementation and supervision of ONGC Videsh's strategies with major role in writing the strategic plan, internal policy making for global E&P business, forecasting resource issues and assisting the Executive

Committee of Directors and MD to ensure the Company achieves its targets for quality and energy security.

Mr. Halder has wide exposure in G2G dialogues in the energy sector where he has participated, provided resource inputs and coordinated bilateral Ministerial meetings for Hon'ble Petroleum Minister of India. He represented ONGC Videsh at G2G and bilateral CEO level meetings at major energy summits of World Petroleum Congress, International Energy Forum, NOC-IOC Forum, IHS CERAWeek and OPEC summits in Vienna. He has been core team member for organizing overseas participation at the Petrotech, Urja Sangam and India-Africa Hydrocarbon Conference.

Mr. Halder has written a number of policy papers on hydrocarbon energy security of India including the Government's Sub-Committee report on 'Acquisition of Oil and Gas Abroad by India' for the 12th Five Year Plan (2012-2017). He authored the paper "Overseas investment in upstream Oil and Gas - rational, policy, current situation and assessment of strategy" which was used by the International Energy Agency in preparing its 2012 report "Understanding Energy Challenges in India-Policies, players and Issues". He has published papers in international journals on energy policy i.e. 'Application of Portfolio approach towards Energy Security: A case study of Japan and implications for India' (*available at http://www.journaljemt.com/index.php/JEMT/article/view/30151*), and 'Evaluating the Key Determinants of India's Energy Security and Overseas Equity Oil Investment' (*http://dx.doi.org/10.19085/journal.sijmd060301*).

He has been a distinguished Invitee Speaker at international energy conferences.

Mr. Halder holds a B.Tech Degree in Petroleum Engineering from IIT (ISM) Dhanbad and MBA from Narsee Monjee Institute of Management Studies (NMIMS), Mumbai. He has attended management development and leadership courses at leading B-Schools like MDI Gurgaon, Stanford University, IFP School, Vienna University and Frankfurt School of Finance and Management.

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