



The Landscape of Business Growth for Oil and Gas Upstream Companies: A Case from Japan

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ABSTRACT

Why is Japan, the 4th largest oil consumer in 2016, unable to develop a globally competitive oil and gas upstream company? This paper suggests that the Japanese government should merge two oil companies, which are both under governmental control, Inpex and Japex. The analysis revisits the 2008 debate on strategies between Cambridge Energy Research Associates, Inc. (CERA), an esteemed energy consulting company in the US, and a group of Japanese scholars. CERA suggested that Japanese energy companies should acquire a large equity stake upfront in new exploration projects and sell to new investors as the potential identified by exploration grows. Alternatively, a group of Japanese scholars suggests Japanese energy companies should acquire oil and gas upstream projects that are close to the end and adapt Japanese technology for increased and enhanced oil recovery. Desk research and interviews with four experts were conducted for this study and it was found that both strategies are necessary.

Keywords: Japanese Oil and Gas Upstream Companies, Growth of Business, Merger and Acquisition

JEL Classifications: Q40, Q48

1. INTRODUCTION

Scholars and practitioners in Japan have been debating why Japan could not develop a globally competitive oil and gas upstream company. Japan was the 4th largest oil importer in 2016 (IEA Atlas of Energy, 2019); it is important for the economy to secure access to oil and natural gas. Thus, being able to develop an internationally competitive oil and gas upstream company is vital for Japan.

Geographically, Japan is slightly smaller than California (Central Intelligence Agency, 2019). The country has limited natural reserves of crude oil and natural gas¹ so it is important for Japan to use crude oil and natural gas efficiently (Vorobevea and Kolesnikov, 2016). Moreover, the Great East Japan Earthquake,

followed by the tsunami that hit nuclear power plants in Fukushima on March 11, 2011, also had a lasting impact on the issue of energy use and security in Japan. The disaster occurred when ex-Prime Minister Naoto Kan from the Democratic Party of Japan (DPJ) was in power. Prior to that catastrophic disaster, the DPJ was in favor of increasing nuclear power supply to manage greenhouse gases (Valentine et al., 2011). After the Fukushima disaster, Japan's energy policy needed to be reconstructed based on the question of what role nuclear power should play in Japan (Duffield and Woodall, 2011; Joskow and Parsons, 2012; Vivoda, 2012). In the past, the notion of diversifying the supply source for crude oil and natural gas has been discussed (Lesbirel, 2004). Motomura (2004) argues for increasing crude oil and natural gas imports from Russia as Japan's main source of import is from Middle Eastern countries.

More recently, renewable energy sources have received a significant amount of attention (Moe, 2012; Huenteler et al., 2012). This is because hydrocarbons, such as crude oil and natural gas, are one of the underlying causes for greenhouse gas (Duffield and Woodall, 2011).

1 The Japanese Government is carrying out an investigation into whether the methane hydrate, embedded in nearby seas, can be recovered economically. One of Japan's government agencies, JOGMEC, has been facilitating the project since 2000.

The situation in Japan is becoming more difficult because the country must decrease greenhouse gases, while also addressing the question of dependence on nuclear power (McLellan et al., 2013; Hong et al., 2013; Hayashi and Hughes, 2013a; Hayashi and Hughes, 2013b; Pereira et al., 2014). The self-sufficiency ratio for Japan in 2016 was 8.5%, while it was 20.2% in 2010 (Ministry of Economy, Trade and Industry, 2017). According to the government, Japan could develop Liquefied Natural Gas (LNG) (Lam, 2000; Hegaret et al., 2004; Kumar et al., 2011) but the development of LNG requires access to natural gas from upstream resources. Tanaka (2013) warns that Japan is on the “crossroads” of a major energy policy change. It is essential to have a mechanism of securing oil and gas for Japan. The author has 20 years of experience in a variety of energy business segments, and has long been facing the question: Why is Japan unable to develop a globally competitive oil and gas upstream company? Japanese energy companies, especially oil and gas upstream companies, have a vital role to play in securing oil and gas for Japan’s economy.

2. REVIEW OF THE STATUS-QUO IN THE MARKET AND PAST RESEARCH

2.1. Players in the Market

Abo et al. (2008) identified three kinds of oil and gas upstream companies in Japan: (a) Japanese government owned companies, (b) private petroleum companies, and (c) Japanese general trading firm-led companies. Thorarinsson (2018) pointed out that private petroleum companies’ upstream entities are driven by their downstream business, such as refineries.

2.1.1. Japanese government owned oil and gas upstream companies

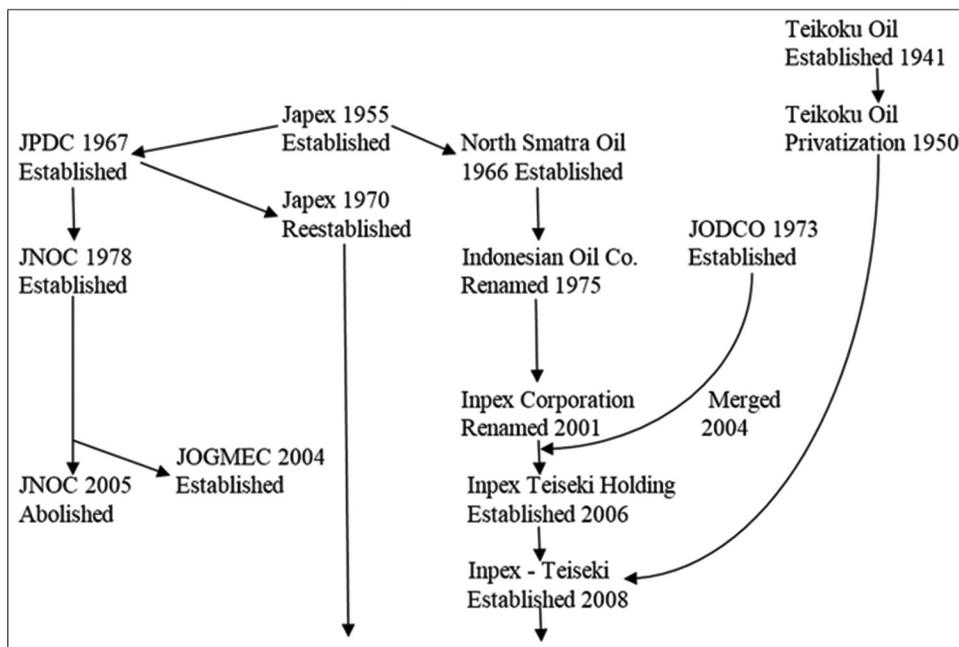
Two companies, Inpex Corporation (Inpex) and Japan Petroleum Exploration Co., Ltd. (Japex) were formerly wholly owned by

the Japanese government. Though they are currently partially privatized, they are Japanese government owned oil and gas upstream companies. Japan Oil, Gas and Metals National Corporation (JOGMEC), which is also owned by the government, also falls into this category. JOGMEC’s role is different from Inpex and Japex. The main purpose of the latter two companies is to support private companies financially, in their research and development activities for new technology, and in oil stockpiling (Koike et al., 2008). These authors also noted that JOGMEC was not designed to become a profit-oriented company but was established as an incorporated administrative agency that did not enjoy the privilege of government guarantee for fundraising (Koike et al., 2008). The restrictions placed on JOGMEC have historical reasons. The Japan National Oil Corporation (JNOC), the former government owned oil and gas upstream company, was established for the purpose of securing oil and gas supplies in Japan (Eguchi, 1980). However, JNOC could not deliver good results after spending time and taxpayers’ money (Koike, 2008). Thus, the Ex-Prime Minister, Junichiro Koizumi, carried out a reform, and JNOC’s role was taken over by JOGMEC in 2004 (Koike et al., 2008). Figure 1 shows how Japanese government owned oil and gas upstream companies have been evolved.

2.1.2. Private Companies: Petroleum Company (Refinery)-Led Groups

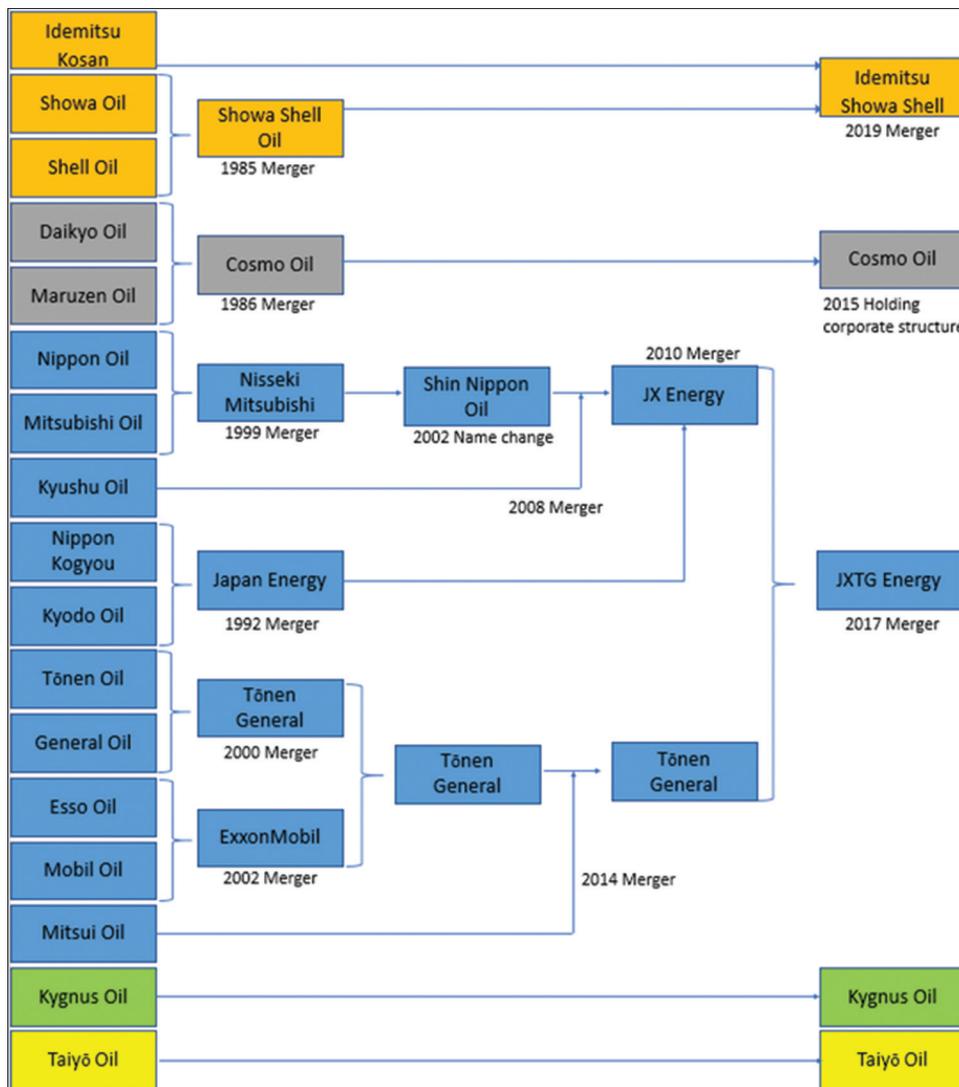
Thorarinsson (2018) pointed out that some of the private oil and gas upstream companies in Japan are driven by downstream business, such as refineries. The refinery-led groups evolved as detailed in Table 1 and Figure 2 and some of them, such as JXTG, Idemitsu, and Cosmo, entered the oil and gas upstream industry based on their experience with refineries. It should be noted that downstream oil and gas companies are overcoming “too little for too many” issues by carrying out mergers and acquisitions because of governmental initiative (Kikkawa, 2015). The same cannot be said for upstream companies.

Figure 1: Evolution of Japanese government owned oil and gas upstream companies



Source: Arranged by the author based on the information provided by Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (METI)

Figure 2: Evolution of refinery companies in Japan



Source: Arranged by the author based on information from the Petroleum Association of Japan (2018)

Table 1: Daily oil and gas upstream production for the three largest refinery companies in Japan

Company names	Idemitsu	Cosmo oil	JXTG energy
Production (1,000 BOED ²)	37	53	130
Government share (%)	0	0	0

Source: Annual reports and the respective company’s web pages. Idemitsu: Idemitsu Kosan Co., Ltd (2018). Cosmo Oil: Cosmo Energy Holdings Co., Ltd. (2018). JXTG Energy: JXTG Holdings, Inc. (2019)

2.1.3. Private oil and gas upstream companies: Japanese general trading firms

Abo et al. (2008) identified a unique feature of the Japanese oil and gas upstream industry, namely, the industry has the Ex-Zaibatsu, banking-led industrial conglomerate groups. In these groups, there are Mitsubishi Corporation, Mitsui & Co, Marubeni, Itochu, Sumitomo Corporation and Sojitz. These companies are involved in the oil and gas upstream business. The Ex-Zaibatsu groups develop the oil and gas upstream business from the standpoint of a trading business. Pollio and Uchida (1999) categorized the Ex-Zaibatsu group, such as

Mitsubishi, Mitsui, Sumitomo and Fuji/Fuyo, as “national project companies.”²

2.2. Problem Definition, Recommended Strategies for the Japanese Oil and Gas Industry, and Research Questions

According to previous studies, the vulnerability of the Japanese petroleum industry is due to several reasons. First, there are too many undersized companies in the oil and gas upstream industry. The formation of the industry is often referred to as the “one-project, one-company structure,” where a project company is established for a specific project and does not participate in other projects (Abo et al., 2008; Kikkawa, 2012; Thorarinnsson, 2018). A split between too many undersized companies leads to a loss of bargaining power. The lack of bargaining power may be one of the underlying causes of the “Asian premium” (Kikkawa,

2 BOED is the abbreviation of “Barrel of Oil Equivalent”. Since the natural gas is not liquid, it is measured by cubic feet. The BOED is used to combine crude oil and natural gas, using the conversion rate of one barrel of oil to be 6,000 cubic feet.

2003). The “Asian premium” means that a higher level of oil and gas prices prevails in the Asian market, as compared to the US and European market (Ogawa, 2002; Doshi and D’Souza, 2011; Zhang et al, 2018). Second, Abo et al. (2008) and Kikkawa (2012) identified that the separation between upstream and downstream is the root of vulnerability for Japan’s petroleum industry. A split between the upstream and downstream business means that the upstream business is vulnerable to a low price environment as the upstream companies would only sell crude oil for a low price. It also indicates that the downstream business would be vulnerable to a high price environment as their feedstock for refined oil products become costly. Third, Pollio and Uchida (1999) and Koike et al. (2008) pointed out that the limited number of new college graduates of geoscience engineers is a fundamental issue that makes it difficult to create internationally competitive oil and gas upstream companies. Fujita (2015) argued that Japan’s high exchange rate and the country’s efforts to improve energy efficiency were two further underlying causes.

In terms of business strategies for addressing this situation, one of the major points of academic discussion in the past was regarding acquiring a percentage of shares and considering the timing of acquisitions (Abo et al., 2008). Hayashi (2006) summarized and reported the speeches made by two scholars from Cambridge Energy Research Associates, Inc. (CERA), Dr. Peter Jackson and Mr. David Hobbs, who advised energy companies on strategy at that time. They recommended that Japanese oil and gas upstream companies acquire larger shares at the initial stage of a new oil and gas upstream project, rather than acquiring a small percentage and trying to increase it at a later stage. Jackson and Hobbs (2006) reached this recommendation based on the analysis of top performers in other countries in terms of (1) the portfolio focus and depth, (2) capital discipline, (3) acquisition strategies, and (4) the long-term view. In addition to the point of acquisition size and timing, they recommended that Japanese oil and gas upstream companies (5) take an operatorship and (6) work to acquire or consummate strategic alliances with large independent oil and gas companies.

Taking a different approach, Abo et al. (2008) recommended Japanese oil and gas upstream companies acquire interests in assets at a later stage of the project life cycle. Abo et al. (2008) further recommended that Japanese oil and gas upstream companies should aim to enhance the recovery ratio of hydrocarbons by using their competitive advantage in different technologies where Japanese manufacturers have been good historically.

The two strategies, one recommended by CERA and another recommended by a group of Japanese scholars, proposed completely different directions since one recommended large size and initial stage, that is a highly speculative strategy, while another recommended later stage and enhancing the recovery, that is a safer, steady but slower growth business in nature. This leads to the following research questions:

Research question (1): What can the Japanese government do to raise an internationally competitive oil and gas upstream company in Japan?

Research question (2): Which strategy, CERA or Abo et al., should Japanese oil and gas upstream companies pursue and why?

To shed light on these questions, the author intends to conduct data analysis of financial statements and top ranking data of international energy companies between 2012 and 2016 from Petroleum Intelligence Weekly (Energy Intelligence 2013; 2014; 2016), which is published by Energy Intelligence. The author also intends to carry out four interviews with industry experts, two Japanese citizens, one US citizen and one Russian citizen.

3. DISCUSSION AND ANALYSIS FOR RESEARCH QUESTION (1)

Top-tier energy companies are ranked by PIW. The PIW top 50 ranking is known by scholars and practitioners in the oil and gas industry as one of the common tools for measuring the performance of energy companies. PIW generated its own measurements and ranked the oil and gas companies by production of oil and gas, reserves of oil and gas, sales of refined products and refining capacity (Petroleum Intelligence Weekly, 2013). These 4 years have been chosen due to: 1) the accessibility of data as PIW does not disclose rankings in a public domain every year, and 2) the oil price dropped significantly in 2014 from over US\$100 per barrel of oil to less than half. The business environment changed drastically before and after the oil price collapse in 2014. Among the top 50, Inpex is merely ranked 43rd in 2016.

Figure 3 depicts the top 50 companies identified by PIW, categorized according to the level of government ownership. The author divided 50 companies into four groups: international, privately-owned oil companies, national oil companies (NOCs: Export oriented, government owned companies), national flag oil companies (import oriented companies that represent a particular nation) and independent companies. Here, ExxonMobil, Shell, BP, and Chevron are the major oil companies. All four companies were transformed from companies belonging to the “Seven Sisters³” companies that once dominated the oil and gas industry (Mitchell et al., 2012). “Seven Sisters” is the term to identify a group of international oil companies that included Exxon, Mobil, and Chevron and the remaining four companies which were Gulf Oil, Texaco, British Petroleum, and Shell. NOCs refer to companies for which the majority of their shares are held by the respective national government and the surplus energy balance is exported. National Flag Oil Companies refer to energy companies whose origin countries are net energy importers. National Flag Oil Companies are under governmental influence to facilitate a nation’s energy policy and are considered as the representative of a country in the energy market (Kikkawa, 2015). Total in France is considered as one of the major oil companies; however, it is intentionally categorized as one of the National Flag Oil companies because more than 30% of Total was owned by the French government until the early 1990s.

3 The precise names of the seven companies were: (1) Anglo-Persian Oil Company (now BP); (2) Gulf Oil, (3) Standard Oil of California (SoCal) and (4) Texaco (now combined in Chevron); (5) Royal Dutch Shell; and (6) Standard Oil of New Jersey (Esso) and (7) Standard Oil Company of New York (Socony) (now combined in ExxonMobil).

Table 2: Daily oil and gas upstream production for the big six general trading firms

Company names	Mitsubishi	Mitsui	Marubeni	Itochu	Sojitz ⁴	Sumitomo
Production (1,000 BOED)	244	244	34	32	13	6
Government share (%)	0	0	0	0	0	0

Source: Annual reports and respective company's web pages. Mitsubishi Corporation: Mitsubishi Corporation (2018). Mitsui & Co.: Mitsui & Co. (2019). Marubeni Corporation: Marubeni Corporation (2019). Itochu Corporation: Itochu Corporation (2019). Sojitz Corporation: Sojitz Corporation (2018). Sumitomo Corporation: Sumitomo Corporation (2018)

Table 3: PIW top 50 between 2012 and 2016⁵

2012	2013	2014	2015	2016	Company	2012	2013	2014	2015	2016	Company
1	1	1	1	1	Saudi Aramco	31	36	34	37	30	Repsol
2	2	2	2	2	NIOC	33	32	31	32	30	CNOOC
3	3	4	4	3	Exxon Mobil	34	33	32	30	32	Kazmunaygas
4	4	3	3	3	CNPC	32	30	30	31	33	Libya NOC
5	5	5	5	5	PDV	37	34	33	33	34	PDO
6	6	7	7	6	BP	38	37	37	34	35	Novatek
19	16	8	8	6	Rosneft	39	42	35	36	36	Ecopetrol
7	7	6	6	8	Shell	42	38	40	38	37	BG
10	8	8	9	9	Gazprom		48	46	40	38	CNR
8	10	11	10	10	Total	36	38	35	39	39	Uzbekneftgaz
8	9	10	11	11	Chevron	46	44	38	35	40	Anadarko
14	14	15	13	12	Sonatrach			49	44	41	YPF
15	13	12	12	12	Petrobras	44	41	39	41	42	Devon Energy
12	11	13	14	14	KPC				50	43	Inpex
18	18	17	17	15	Adnoc	50			(54)	44	Reliance
16	15	16	16	16	Lukoil	(53)	47	44	42	45	Chesapeake
17	17	18	18	17	QP			48	46	46	EOG
11	11	13	15	18	Pemex	40	45	47	48	47	Suncor
20	20	20	20	19	Petronas	46	42	43	47	47	Occidental
21	19	19	19	20	Sinopec	48	46	45	43	47	BHP Billiton
22	21	21	21	21	INOC				(53)	50	Tatneft
25	23	23	22	21	NNPC	30	27				TNK-BP ⁶
22	21	22	23	23	Eni	35	35	40			Socar
27	26	25	25	24	Surgutneftgas	41	40	40			Apache
29	28	28	26	25	ONGC	43					SPC (Syria)
24	24	24	24	26	EGPC	44	48	50			OMV
28	28	27	27	27	Pertamina	49					Hess
26	25	26	28	28	Statoil	(54)	50				PTT
12	31	28	29	29	ConocoPhillips				48		Bashneft

Source: Energy Intelligence (2013; 2014; 2016)

Another category was created for the remainder of the companies, namely "Others" (independent oil and gas companies).

Facing the problem of "too little for too many" issues, mergers in the Japanese oil and gas industry should help to mitigate the problem of Japanese companies being undersized. Kikkawa (2012) analyzed the data source of the Agency for Natural Resources and Energy in Japan and found that the total production volumes for all Japanese oil and gas upstream companies, both domestically and internationally, would have been 680 thousand barrels per day and 1646 million of cubic feet per day in 1997. This was almost equivalent to the production levels of Total in France or Eni in Italy at that time. In 2018, the total production volume for Inpex and Japex together is smaller than other National Oil Flag Companies in G7 countries, such as France (Total) and Italy (Eni).⁴⁵⁶

Except for China, no country has more than two National Flag Oil Companies, while Japan has two National Flag Oil Companies:

4 Sojitz stops disclosing the information of oil and gas production as of 3rd quarter of fiscal year, March 2018.

5 PIW published top 50th only but it included below 50th if a company ranks up within 50th for the next year.

6 TNK-BP was acquired by Rosneft in 2013.

Inpex and Japex. It seems logical to consider merging the two National Flag Oil Companies into one company. On May 15, 2015, Kaname Tajima, who is a member of the House of Representatives from Chiba prefecture, posed the question about the possibility of merging Inpex and Japex to Prime Minister, Shinzo Abe (The House of Representatives, Japan, 2015). Abe responded by saying the government is not in a position to lead a merger as the government is merely a minority shareholder for Inpex and Japex. The government did not seem to pay serious attention to the question raised by Tajima. In fact, the government owns the "golden share" of Inpex with veto rights to certain proposals (Inpex, 2018) and more than one third of the shares of Japex (Japex, 2018). The top management for both Inpex and Japex came from the Ministry of Economy, Trade and Industry (METI). The government seems in exactly the right position to consider a merger in order to mitigate "too little for too many" issues for the oil and gas upstream industry in Japan. The combined production from five general trading companies, two oil and gas upstream companies and three refinery-led companies is about 1.3 million BOED (Figure 4), which is still less than that of Eni and merely less than half of that by Total (Table 4). The Japanese government is advised to consider mitigating the "too little for too many" problem by merging some of the oil and gas upstream companies, such as Inpex and Japex.

Figure 3: Categorization of the top 50 companies by PIW

0%	1 - 49%	50 - 99%	100%
National Flag Total(8 ↓ 10), Repsol(31 ↓ 30), BG(42 ↑ 37)	National Flag Petrobras(15 ↑ 12), Eni(22 ↑ 23), Inpex(below 50 ↑ 43)	National Flag Sinopec(21 ↑ 20), ONGC(29 ↑ 25)	National Flag CNPC(4 ↑ 3), CNOOC(33 ↑ 30)
Major Oil ExxonMobil(3→3), BP(6→6), Shell(7 ↑ 8), Chevron(8 ↓ 11)		National Oil Rosneft(19 ↑ 6), Gazprom(10 ↑ 9), Statoil(26 ↓ 28), PDO(37 ↑ 34), Ecopetrol(39 ↑ 36), YPF(50 ↑ 41)	National Oil Aramco(1→1), NIOC(2→2), PDV(5→5), Sonatrach(14 ↑ 12), KPC(12 ↓ 14), Adnoc(18 ↑ 15), QP(17→17), Pemex(11 ↓ 18), Petronas(20 ↑ 19), INOC(22 ↑ 21), NNPC(25 ↑ 21), EGPC(24 ↓ 26), Pertamina(28 ↑ 27), Kazmunaygas(34 ↑ 32), Libya NOC(32 ↓ 33), Uzbekneftgaz(36 ↓ 39)
Independent Lukoil(16→16) Surgutneftgas(27 ↑ 24), ConocoPhillips(12 ↓ 29), Novatek(38 ↑ 35), CNR(below 50 ↑ 38), Anadarko(46 ↑ 40), Devon(44 ↑ 42), Reliance(50 ↑ 44), Chesapeake(below 50 ↑ 45), EOG(below 50 ↑ 46), Suncor(40 ↓ 47), Occidental(46 ↓ 47), BHP Billiton(48 ↑ 47), Tatneft(below 50 ↑ 50)			

Source: Table 3, Energy Intelligence (2013; 2014; 2016)

Figure 4: Selected Japanese companies’ oil and gas production (Numbers represent BOED)

General Trading Companies				Oil and Gas Upstream Companies		
Mitsubishi Corporation 244,000	Mitsui & Co. 243,800			Inpex 450,000		Japex 60,700
Marubeni 34,000	Itochu 32,000	(1)	(2)	Refineries		
				JXTG 130,000	Cosmo 53,000	Idemitsu 37,000

Source: Table 1, 2 and 4

4. DISCUSSION AND ANALYSIS FOR RESEARCH QUESTION (2)

In 2006, Jackson and Hobbs (2006) of CERA made the recommendation for Japanese oil and gas companies to acquire exploration projects, with as large a participation ratio as possible, from export-oriented NOCs directly or from underperforming companies. As exploration projects would consume significant resources, they recommend selling some portion of equity or project ownership to new investors to monetize projects. Further, Jackson and Hobbs (2006) stressed that this is the traditional path which many other oil and gas upstream companies have been taking for a long time. Abo et al. (2008), on the other hand, contested the recommendations by CERA as Abo et al. (2008) believe that their strategies are

Table 4: Daily oil and gas upstream production for selected companies

Company names	Inpex	Japex	Total	Eni
Production (1,000 BOED)	450	61	2,775	1,851
Government share (%)	18.94%	34%	0%	30.1%

Source: Annual reports and respective company’s web pages, Inpex: Inpex (2018), Japex: Japan Petroleum Exploration Co., Ltd. (2018), Total: Total S.A. (2018), Eni: Eni S.p.A. (2019)

not necessarily well adaptable to the Japanese context. Abo et al. (2008) recommend acquiring oil and gas upstream projects that are already in the later part of the production stage. Having historic evidence regarding Japanese companies’ success at improving operational efficiency for multiple industries, Abo et al. (2008) recommend that Japanese oil and gas upstream companies pursue the strategy of optimizing recovery of

Table 5: Comparison of Jackson and Hobbs (2006) and Abo et al. (2008) strategy suggestions

Scholar groups	Jackson and Hobbs (2006)	Abo et al. (2008)
Target project status	Exploration/development	Production
Timing of acquisition	Upfront or early timing	Later part of project life
Participation ratio	As large as possible	Large enough to be an operator
Acquisition	Buy from export-oriented NOCs directly or underperforming companies	Buy assets for which production is declining
Growth driver	Development of surrounding area, acquisition, strategic alliance	Optimization of operation and enhanced oil recovery, niche operations, acquisition, strategic alliance

Table 6: Comments from experts

No.	Comments
(1)	“The path advocated by CERA has been proven to be effective. However, it is also clear that the path advocated by CERA requires skillful engineers who are knowledgeable and have enough experience to carry out exploration. As Abo et al. (2008) explained, Japan may be finding themselves to be more adaptable to the technology of increased oil recovery (IOR) and technology of enhanced oil recovery (EOR)”
(2)	“Japanese oil and gas upstream companies may need to allocate their resources for oil and gas exploration as CERA advocated. It is difficult for oil and gas upstream companies to achieve enough growth without successful exploration. The exploration cost, for some cases, may not be too expensive, and once the company finds significant resources through exploration activities, it may give the company an opportunity to provide cash flow that would last for 20 or 30 years into the future. Looking back at the history of JNOC, it is essential to prepare enough skillful geo-scientists. If Japanese oil and gas upstream companies are not able to retain skillful engineers, it may be necessary to enter strategic alliances with other foreign companies”
(3)	“The exploration project is high risk in nature for any oil and gas upstream company. If one does not have prudent engineers to carry out exploration projects, it is even more difficult. If one would be comfortable with the IOR/EOR path suggested by Abo et al. (2008), it is logical to pursue that route. However, it does not mean that the IOR/EOR path would not require any engineers. It is essential to be capable and responsive to any technical challenges that one may have in IOR/EOR.”
(4)	“Both strategies are critically important. It is just like wheels for a wagon to move forward. The beauty of exploration activities is lower costs in comparison to the capital expenditure for development projects. As the potential of resources would grow, it is logical to share the risk by taking on new investors, as CERA pointed out. Thus, one would have to consider this path. The beauty of IOR/EOR is that one can increase recovery of hydrocarbon without finding new oil and gas project fields. When the oil price is low, it is important for any oil and gas upstream company to increase the recovery of hydrocarbon”

CERA: Cambridge Energy Research Associates, Inc., JNOC: Japan National Oil Corporation

hydrocarbon from projects. Table 5 summarizes strategy suggestions by two groups of scholars.

Although their strategies point in totally different directions, they both discuss the importance of being an operator. Jackson and

Hobbs (2006) emphasizes the importance of taking an operatorship and Abo et al. (2008) pointed out it is difficult for Japanese companies to be operators for exploration projects. Abo et al. (2008) also noted that the survival ratio of active projects is merely 10.7% as operators among 168 projects which Japanese oil and gas upstream companies participated in. To enhance the capability of project management, it is necessary to take the operatorship. Whittaker and Young (2013) analyzed the oil and gas upstream business from the viewpoint of non-operatorship, which is not well spotlighted in the industry. They pointed out that, globally, 23% of equity production is delivered through non-operated stakes. Non-operated ventures (NOVs) account for between 22% and 59% of major oil production; these projects are operated by other operating ventures. Shun et al., (2014) also pointed out that NOVs are a key part of the investment portfolio of upstream entities.

It has been more than a decade since two groups of scholars advocated two different strategies which point to different directions, and yet Japanese oil and gas upstream companies are still struggling to become top performing oil and gas companies. The author carried out four interviews with practitioners who are knowledgeable about Japan’s oil and gas upstream business and who have experience of working with global companies: two interviewees are from Japan, one from the US and one from Russia. Specifically, the details of interviewees in terms of nationality and experience are:

- Japanese, more than 20 years of experience in a Japanese oil and gas upstream company
- Japanese, more than 30 years of experience in a Japanese oil and gas upstream company
- US citizen, more than 20 years of experience in a major US oil company and has experienced work in a Japanese company
- Russian citizen, more than 25 years of experience in a Russian oil and gas upstream company and had experience in operating international projects with a Japanese company. Table 6 summarizes the comments from the experts.

These experts are all professional, highly ranked managers who have carried out investments for oil and gas field development amounting to several hundred million dollars in the past. According to them, both strategies are important for Japanese oil and gas upstream companies. It is also important to have prudent engineers who are capable of solving geoscientific problems in oil and gas projects. Building a strategic alliance between foreign oil and gas companies to reinforce technical staff may be one idea to implement for Japanese companies. These interviews conclude that both strategies are necessary to proceed, just like two wheels in a wagon.

5. CONCLUSION

1. Except for China, no country has more than two National Flag Oil Companies, while Japan has two: Inpex (ranked 43rd in 2016) and Japex (unranked). It is clear from previous studies that one of the issues for Japan's oil and gas upstream companies is "too little for too many." Thus, it seems quite logical to consider combining the two National Flag Oil Companies. Although Prime Minister Shinzo Abe does not seem to pay serious attention to this issue, the government seems to be in the right position to facilitate merger discussions between Inpex and Japex as the government has been sending top executive managements to both companies and owns the "golden share" of Inpex with veto rights and more than one third of Japex.
2. It has been more than a decade since two groups of scholars, CERA and Abo et al. (2008), advocated two different strategies which point to different directions and yet, Japanese oil and gas upstream companies are still struggling to become top performing oil and gas companies. To gain capability in project management, regardless of CERA's strategy or the strategy by Abo et al. (2008), the operatorship is important. The author carried out four interviews with practitioners who are knowledgeable about Japan's oil and gas business and have global experience: two from Japan, one from the US and one from Russia. According to them, both strategies are important for Japanese oil and gas upstream companies. It is also important to have prudent engineers who are capable of solving geoscientific problems in oil and gas upstream projects. Developing a strategic alliance between foreign oil and gas companies to reinforce technical staff may be one idea to improve on the weakness of Japanese oil and gas companies.

Finally, limitations of the study must be noted. First, in this study, the author used the top energy companies ranked by PIW only. Other rankings by other energy research companies exist and could be analyzed in a similar manner. Second, the author only carried out four interviews with two Japanese managers, one American manager and one Russian manager. Ideally, the interviewees should include someone who is knowledgeable about Japanese energy companies and also about French and Italian energy companies, such as Total and Eni, as they are sample companies that are discussed in the study. Future research should further investigate this point.

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