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Exploring Cooperation Opportunities for Oil and Gas Firms in India and Japan: Learning from a Case of Quick Competitiveness Evaluation

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Abstract

Challenges of energy problems, pollution, and climate change and carbon reduction can open up opportunities for the focal energy firms, if they can evolve strategies and rapidly enhance flexibility. Achieving and sustaining success with such strategies often demand technological capabilities. This exploratory paper quickly reviews the overall and technological competitiveness of select firms in India and Japan over 2005-2009 to identify areas of cooperation. The research reveals the strengths of the firms and points to directions of further work.

Keywords: Cooperative strategies, Energy Sector, Oil and gas, India, Japan, Low carbon green technologies

Conference Topic/sub-theme: International competitiveness

Introduction

Emerging challenges at turn of century demand strategies that offer more flexibility. Recent global economic crisis has given a glimpse of huge problems with our systems, institutions and organizations (e.g. economic, social). In light of the changes after the oil crises and the outlook in the next 30-years, it can be comprehended that the international energy market is facing a major structural change owing to various elements concerning both supply and demand conditions (METI, 2006). There is a high possibility that the existing tight supply-demand structure in the international energy market may drive the crude oil prices to further higher levels. Most developed countries have evolved long-term strategies to cope with the challenges (e.g. Japan, for year 2030; Korea's new energy act, 2009) and are evolving strategic alliances/partnerships to progress fast.

Despite much bigger challenges then many countries, there are bigger opportunities also for India, if potential of cooperation is leveraged strategically. Several local dimensions of context make task of strategic implementation very challenging in India, particularly in

context of energy security and sustainable use for competitiveness. With huge and growing population and hunger for consumption fuelled by free market economy, targets of energy reduction make little impact, whatever effects of that on climate, pollution and trade balance (which is setting new records of deficit every year) or even personal health and finances.

Major transformation and rapid scale-up in capacity has made India achieve some balances through exports, the challenges are becoming much bigger and the need for a bolder strategy has been felt by many in industry (e.g. Butola, 2007).

Challenges of climate change and carbon reduction can open up opportunities for the focal firms, if that can evolve strategies and rapidly enhance flexibility. Focal firms are often close to the centre of production networks and can be first points of impactful initiative due to influence they can have on whole ecosystem of an industry. Design of industry value systems (for examples see Momaya, 2001), supply chains and many operational elements can provide rich opportunities for differentiation. Achieving and sustaining success with such strategies often demand technological innovation capabilities.

Our basic study explores cooperation opportunities using the framework of "taxonomy of cooperative strategies" (e.g. Momaya, 2008; Asakawa, 2007). Since competitiveness is a key decision variable of the taxonomy, this exploratory paper reviews the overall and technological innovation competitiveness of select focal firms over a period (e.g. 2005-09) to identify areas of enhancement. We also try to compare the same with leading Japanese energy firms, who seem to be pioneers in leveraging technological innovation for the climate change challenges.

While for some energy giants consolidation and rationalization may be a key strategic need, firms from Asia may have different thinking. In the past, "bigger is better" ruled the world's oil companies (McKinsey, 2010). As the industry matures, consolidation has created some of the largest and most sophisticated companies on earth. Now, however these companies need to assess which pieces of the business they actually need to retain. Making right strategic choices on big things is a necessity and choices about cooperation are very critical.

Rather than theories and empirical methods, this practice focused paper adapts a data driven approach to explore reality by quick competitiveness evaluation. Some elements of case study method (e.g. Yin, 2004) were adapted for this exploratory case. Control of behavioral events and focus on contemporary events (Yin, 2004) also supports case study strategy. The main unit of analysis is firm. The paper is

organized as follows. First we give a brief summary of the sector. We discuss the findings from the evaluation and finally we discuss future areas of research.

Brief Overview of the Energy and Utilities/related Sector in India

India faces an enormous challenge in meeting its energy requirements to support a growth rate of 8 percent. This challenge can be met with a coherent approach which develops all her energy resources (PC, 2005). India has bit lower energy intensity than China and the USA (Table 1), it is bound increase rapidly as industrialization and income levels grow. Growth without too much adverse impact on environment and trade balances is a real challenge for a populous country such as India.

Table 1: Trends in Energy intensity / billion GDP of select large countries

Country	Kt Oil Equivalent / Bn $ GDP (Year 2000)	Kt Oil Equivalent / Bn $ GDP (Year 2007)
Brazil	293	177
China	911	578
France	191	102
India	**994**	**505**
Japan	111	117
Russia	2349	519
UK	152	75
USA	234	170

Source: Composed based on data from World Bank (2010)

The energy policy of India is characterized by trade-offs between four major drivers (Wikipedia, 2010) :

- Rapidly growing economy, with a need for dependable and reliable supply of electricity, gas, and petroleum products;
- Increasing household incomes, with a need for affordable and adequate supply of electricity, and clean cooking fuels;
- Limited domestic reserves of fossil fuels, and the need to import a vast fraction of the gas, crude oil, and petroleum product requirements, and recently the need to import coal as well; and
- Indoor, urban and regional environmental impacts, necessitating the need for the adoption of cleaner fuels and cleaner technologies.

In recent years, these challenges have led to a major set of continuing reforms, restructuring and a focus on energy conservation.

Diverse stakeholders in the industry and authors provided rich variety of questions from which key questions were evolved. In first round of brainstorming, we begin by evolving few basic questions: what seems to be key elements of structure of the industry in India and internationally? What are key segments of broadly defined energy sector and key players? Are there any clear strategy groups? Which groups seems to have been more successful? Are there clear networks?

More focused questions in context of collaboration were evolved in next phase. Since competitiveness is a key factor influencing strategic choices on key

dimensions of collaboration (e.g. Momaya, 2008), the paper addresses a basic question: how to evaluate competitiveness? Building on several ideas that are discussed and used in past (e.g. Momaya, 2001; Ajitabh and Momaya, 2004), we will focus on slightly longitudinal views (e.g. 5 year horizons). The paper will also address questions such as: what are the relative strengths of the oil and gas firms in the two countries? The reason for focus on only oil and gas firms as focal firms is that the selected nine firms in India may account for more than 80 % revenue of energy sector in India. Many of them have vertical integration and hence are capable of enhancing innovation across the ecosystem of energy sector.

Key Findings

Several interesting findings emerged from quick benchmarking. Riding on rapidly rising domestic demand, key oil and gas firms from India have started achieving size comparable to firms in Japan, but they are no match for size of international oil majors from China, EU, USA (e.g. Royal Dutch Shell at US $ billion 458, Exxon Mobile 442, BP 367 and Sinopec 207; Fortune, 2010). Here is a glimpse of key findings:

- Within the sample, firms from Japan have relatively better overall performance (please see overall score in Table 3 in Appendix), despite almost all having negative standardized score due to much lower profitability compared to firms from India (FFI).
- In terms of average revenue jump per firm over the period, FFI are quite comparable to Japan.
- Key differentiator seems to be long term competitiveness factors, particularly higher productivity (Table 4 in Appendix). This can partly be attributed to innovation and technological capabilities (captured on proxy R&D spending).
- Operating under price regulation regime, most firms in India focus on cost competitiveness. That does not mean that many have high operational excellence, real low cost positions or flexibility.
- Benefits of oligopolistic situation in India may fast disappear, as many international majors have increased focus on India.
- Considering quite comparable size of firms in both countries, low R&D spends in many FFI is a cause of concern. They seem not able to address challenges such as development of more environment friendly energy sources and technologies, a necessity for low carbon growth.
- Quick review of technological capabilities in terms of patents hints very low positions of most FFI.
- We tried to assess areas of technological strength using quick patent analysis. Unfortunately,

difference in levels between firms in India and Japan in terms of patent applications was so wide (e.g. about 253 for India and 24,283 for Japan in terms of patent filing in worldwide database of WIPO) that comparison seemed distorted. Several firms from India have not a single filing and best of India has less filing than the least active player from Japan.

- Contributing to R&D will become more challenging in future as competition drives down profitability. Even if we neglect abnormal years 2008-2009, the downward trend in net profitability hints at some structural problem in the industry that was ranked very high in terms of growth in 2009 Global-500 report (Fortune, 2010); in terms of % change from 2007, energy was ranked no. 2 (34.9 %) and petroleum refining no. 3 (27.8 %) among 34 industries.
- There are several reasons for relatively higher profitability of FFI. Key reason may be better business model.

Areas of Cooperation

Environmental and sustainability issues become more serious for populous countries and collaborations can help address them. Comparison of India and Japan hints that while energy intensity (Kg Oil Equivalent used per $1000 GDP PPP, - 2004 figures) for India (186) and Japan (154) are bit comparable, the intensity in India is likely to rise rapidly as incomes grow. More glaring differences are on emission side. For instance, CO_2 emissions per GDP ('000 MT per Bn USD) in India is more than five times higher than the same in Japan (Table_2). Firms and organizations in India either need to acquire or develop technologies to rapidly improve or consider major changes in lifestyles etc., a very difficult task. Hence, the learning need to happen fast and Japan with its leadership position in low carbon economy can provide good opportunities of collaboration.

Table 2: Example of differences in carbon emissions, 2008

Country	India	Japan
Annual CO_2 emissions (in '000 MT)	1,510,351	1,293,409
GDP (Bn of USD)	875	4,364
CO_2 emissions per GDP ('000 MT / Bn USD)	1,726.12	296.38

Source:http://en.wikipedia.org/wiki/List_of_countries_by_ratio_of_GDP_to_carbon_dioxide_emissions

Success, or even survival, for some will depend on achieving challenging goals of cost competitiveness and differentiation, at least in smaller niches. Productivity is very important for cost competitiveness. Quick competitiveness evaluations hint that most firms in the sample have made significant improvements in terms of revenue productivity.

Cooperation can happen across levels, different parts of connected international

industry ecosystem, production networks, firms and organizations. Between India and Japan, cooperation at macro level seems to have accelerated recently, but at firm and institution level it has lagged. Quick review of India-Japan collaboration hints that efforts of collaboration from Japan are quite significant (e.g. TERI, 2009). As a developed country, Japan possesses the technological capabilities for environment and energy conservation. Hence a business rationale for India and Japan to collaborate and work together exists. The partnership collaborations can prosper due to the existing complementarities between the two countries - India can provide skilled professionals and workers at a affordable cost and India can deploy these technologies. Firms and organizations in both the countries should be working towards creating and diffusing energy efficient technologies to combat climate change. There are enormous opportunities for the governments and companies of both the countries in this sector. These technologies have the potential to define the commercial success. Focal firms such as one listed in this paper and institutions such as IITs have an important role to play and should evolve proactive strategies.

Limitations and Future Directions of Research

This exploratory paper has several limitations and many opportunities for further research. Key limitations of the paper are due to more qualitative nature of methods. Future directions of research may help other researchers:

- This pattern of high profitability despite relatively lower technological capabilities seems to be common for India and seems quite contrasting to Japan. Some experts attribute it to differences in business models. More specific comparative elements can help identify areas of cooperation.
- Since patents seem less relevant criteria, some other factors and criteria, where comparable data about firms in many countries are available need to be identified and tested.
- Segment level analysis of the vast energy sector is necessary to identify more specific areas of cooperation. Prior work in context of other sectors (e.g. ICT, Momaya et al., 2009; Bio-Pharma, Momaya, 2008) can give several clues.
- Systematic assessments, technology audits and mapping of technology capabilities and strength of key stakeholders in both the countries (can be more countries if collaborators are keen) can be useful for strategic decisions.

Many such collaborations demand human capital that is skilled and experienced to handle complexities (e.g. cross-cultural differences). Current pool of such researches in India seems too inadequate.

Research on approaches to enhance the same can accelerate this vital process.

Concluding Remarks

"Low Carbon, Green Growth" is suggested a solution to vexing problems related to economy, energy and environment. The solution cannot progress much without major changes in several systems and technological capabilities can play a key role.

The exploratory study showed that resource constrained Asian countries such as India and Japan have quite limited share in the world oil and gas industry despite their large economic size. International competitiveness of oil and gas firms from these countries is yet to be fully reflected in competitive performance, at least in terms of revenue. Challenges of energy shortages, climate change and carbon reduction can be converted into opportunities as energy industry shifts away from oil and gas. While India already achieved 6 % of its energy generation from renewable the real challenges are less addressed. That will demand major innovations, green technologies and collaborations. Due to huge growth of pent–up demand in large domestic market, firms from India have started reaching size of firms in Japan in terms of revenue, but their technological innovation capabilities are still quite limited. Several emerging frameworks of collaboration (e.g. Momaya, 2008; Momaya and Kuroda, 2008) hint at high potential of collaboration between firms in the two countries, if complementary capabilities can be leveraged to overcome barriers. Firms in India can also learn about how firms in Japan bridge gaps through in-house and collaborative technology development across industry eco-systems. Leadership in corporate and government world can benefit from glimpse of comparative picture evolved in this paper. To accelerate the green growth and collaborations for that, there is an urgent need of large number of professionals who have experiences in both countries. Will corporate and governments (incl. state or local) come forward and support initiatives for that ?

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References

Acharya K. K., 2007, Energy security policy: Areas for focused attention, Survey of Indian Industry, Hindu, pp 168-170.

Ambastha A. and Momaya K., 2004, "Challenges for Indian Software Firms to Sustain their Global Competitiveness", *Singapore Management Review*, Second half, Vol. 26, No. 2, pp. 65-77.

Asakawa K, 2007. Metanational Learning in TFT-LCD Industry: An Organizing Framework, Discussion Paper, 07-E-029, Research Institute of Economy, Trade and Industry (RIETI).

Butola R. S., 2007, Oil: Time for a bolder strategy, Survey of Indian Industry, Hindu, pp 163-166.

Keeyoon J., Cooperation on Acquiring Green Technology: Focusing on Renewable Energy, SERI Quarterly, January, 2010, pp. 28-33.

McKinsey 2010. Executive Insight: www.mckinsey.com/clientservice/oil_gas/insight.asp (12 January 2010).

METI, 2006, New National Energy Strategy (Digest), Ministry of Economy, Trade and Industry, Tokyo, May.

Momaya K., 2001, *International Competitiveness: Evaluation and Enhancement*, Hindustan Publishing Corporation, New Delhi, pp 171

Momaya K., 2008, "Exploring Cooperative Strategies for Innovation: Case of Biopharmaceutical Firms from India and Japan", *The Journal of Science Policy and Research Management*, 23 (4), pp. 327-338.

Momaya K. and Kuroda M., 2008, *Cooperative Strategies for Innovation: Exploring Untapped Opportunities in Context of India and Japan in ICT Industry*, 会学画計術技究研, The Japan Society for Science Policy and Research Management, 会大術学次年回２３第, Tokyo, 12-13 Oct.

Momaya K., 2009, *Cooperative Strategies for India and Japan: Glimpse of Opportunities with Focus on ICT Industry*, ISDSI, IITB SJMSOM, Mumbai 3-5 Jan.

PC, 2005: Draft Report of the Expert Committee on Integrated Energy Policy, Planning Commission.

Ramanathan S., 2007, Energy security policy: Areas for focused attention, Survey of Indian Industry, Hindu, p. 158-162.

TERI, 2009, Nikkei Inc. and TERI strengthen India - Japan alliance through the first Global Eco-Business Forum in India, The Energy Resources Institute, Press Release, New Delhi.

Wikipedia, 2010, Energy policy of India, last accessed on Jan. 2.

World Bank, 2010, GDP Data: http://data.worldbank.org/indicator/NY.GDP.MKTP.CD ; Last accessed 2.30 pm, 2010/04/21

Energy use data: http://data.worldbank.org/indicator/EG.USE.COMM.KT.OE ; Last accessed 2010/04/21

Yin R. K., Case Study Research: Design Thousand Oaks, 2003.

Biography

K. Momaya is a Professor in the field of strategy and MoT in Shailesh J. Mehta School of Management, IIT Bombay.

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Appendix

Table 3: Results of quick competitiveness evaluation of select energy firms,
Standardized Scores

	Long Term Competitiveness Factors			Short-Term Competitiveness Factors	Consolidated Score
Company Name	**Revenue Growth (Absolute Jump)**	**Productivity (Average of 5 yrs)**	**R&D expenses (Average of 5 yrs)**	**Profitability (Avg. net profitability of 5 yrs)**	
Weightage	**30%**	**20%**	**20%**	**30%**	
Bharat Petroleum Corpn. Ltd.	0.16	-0.35	-0.81	-0.62	-0.37
Essar Oil Ltd.	-0.24	-0.80	-0.91	-1.90	-0.98
G A I L (India) Ltd.	-1.11	-0.70	-0.94	1.19	-0.30
Hindustan Petroleum Corpn. Ltd.	-0.03	-0.12	-0.91	-0.68	-0.42
Indian Oil Corpn. Ltd.	1.95	-0.35	-0.33	-0.44	0.32
Oil & Natural Gas Corpn. Ltd.	-0.52	-1.16	-0.15	2.02	0.19
Reliance Industries Ltd.	0.32	-0.62	0.27	0.69	0.23
Suzlon Energy Ltd.	-0.69	-1.57	-0.82	0.76	-0.46
Tata Power Co. Ltd.	-1.03	-1.57	-0.92	0.64	-0.62
Nippon Oil Corporation	2.13	1.58	1.66	-0.71	1.08
Cosmo Oil Company	0.46	1.58	-0.13	-0.59	0.25
Japan Energy	0.13	0.94	1.46	-0.58	0.34
Osaka Gas Co	-0.84	-1.57	1.36	-0.16	-0.34
Tokyo Gas	-0.68	-1.57	1.16	0.38	-0.17

Source: Standardized score have been calculated as per method given in Momaya (2001), based on data highlighted in Table 4

Table 4: Glimpse of data used in quick competitiveness evaluation

	Long Term Competitiveness Factors			Short Term Competn. Factors
Company Name	**Rev Growth (Abs Jump, 2005-09), Mn Yen**	**Productivity (Avg of 5 yrs) Mn Yen**	**R&D exp (Avg of 5 yrs) Mn Yen**	**Profitability (Avg of 5 yrs), %**
Bharat Petroleum Corp Ltd.	1,063,877	189	587	1.55
Essar Oil Ltd.	778,966	119	132	-6.98
G A I L (India) Ltd.	157,374	135	15	13.71
Hindustan Petro Corp Ltd.	931,700	224	136	1.16
Indian Oil Corpn. Ltd.	2,338,493	188	2,801	2.77
Oil & Natural Gas Corp Ltd.	578,909	63	3,620	19.27
Reliance Industries Ltd.	1,174,693	147	5,493	10.38
Suzlon Energy Ltd.	455,993	NA	565	10.81
Tata Power Co. Ltd.	216,533	NA	118	9.99
Nippon Oil Corporation	2,465,071	486	11,828	1.00
Cosmo Oil Company	1,273,652	486	3,715	1.75
Japan Energy	1,038,797	388	10,923	1.82
Osaka Gas Co	351,445	NA	10,483	4.65
Tokyo Gas	469,379	NA	9,573	8.30

Sources: Developed from CMIE Database, Annual Reports of firms for several years etc.

Notes: 1. The table gives only summary picture. Many detailed tables were constructed and efforts were made to collect data from multiple sources for that**.**