

# **A Comparative study of location attractiveness of BRIC nations for O&G Engineering Services Outsourcing (O&G ESO) and strategic growth options for India's O&G ESO industry**

## **EXECUTIVE SUMMARY**

The strong demand for energy saw the price of Crude Oil soaring past the all-time record high of USD 130 a barrel mark in mid-2008 propelled in significant part by the economic growth in China, India and other emerging economies. This has reawakened fears of energy and product shortages in the decades ahead. Once again, there are hectic activities taking place globally to develop additional Oil and Gas (O&G) sources: Exploration, Production, Refining, Distribution, Petrochemicals, Liquefied Natural Gas (LNG) and Research and Development (R&D) are attracting quantities of capital they have not seen in a decade or more. The contribution of Engineering Service (ES) companies is crucial to making these new investments successful and profitable. These companies provide a large part of the vital design, engineering, construction and management skills and personnel to make these projects a reality and also to maintain the production assets. Whether as a member of the engineering and project management team for a petrochemical plant in India, designing an offshore platform in Russia, or developing operating procedures for prototype technology exploiting the Alberta Oil sands, the ES industry is instrumental in turning prospects into projects and further into products.

Historically, the main clients of the O&G services industry have been International Oil Companies (IOCs), such as British Petroleum (BP), Shell and Exxon, and National Oil Companies (NOCs), such as Indian Oil Corporation, Kuwait National Oil Company, Petronas in Malaysia, and China National Offshore Oil Corporation. More recently, other state enterprises, for example in the LNG and petrochemical sectors, have become increasingly prominent clients, as have large private investors or joint ventures between local national or private concerns and international companies, such as Reliance Industries Limited, Jamnagar or SECCO, the Shanghai Ethylene Chemical Company (consisting of BP, Sinopec - the China National Petrochemical Company - and Shanghai Petrochemical Company). The O&G ES industry's relationship with International Oil Companies (IOCs) and other clients used to be relatively straightforward earlier. IOCs executed projects and employed armies of in-house experts and the O&G ES industry supported IOCs as consultants and contractors. But when energy prices were low in the 1990s, many O&G companies cut back their own engineering, project management and execution capacity and cut down on human resources. However, high energy prices and the consequent capital investment have sharply raised demand for O&G services across the whole value chain of designing, delivering and supporting projects. The whole landscape has now changed for the O&G industry and the ES industry in the few years since this latest energy boom began. The dominant trend is towards O&G companies outsourcing more scope from a project to reduce overall execution time and mitigate risk thus creating tremendous opportunity for O&G Engineering Services Outsourcing (O&G ESO) companies around the world, especially in emerging economies like BRIC nations. This is especially true of IOCs, but is also becoming more evident among National Oil Companies (NOCs) and a wide variety of other, national or local, enterprises. The O&G ESO industry's response to these challenges is dominated by the global skills shortage. The energy boom of recent years has exposed the underinvestment in the O&G industry in the 1990s and poor prediction of future demand for people and services. The reversal in the fortunes of energy markets in the new millennium has caused an overlap of generations of projects: working

assets need to be serviced, old ones decommissioned or extended and new assets developed. Nor, barring an equally unexpected fall in demand for energy, will the picture alter soon. Although global energy demand is rising by three to four per cent a year, the proportion contributed by O&G is thought unlikely to change significantly over the next 30 years from the present two-thirds. New oil provinces such as Vietnam and Caspian region are under development and the thrust into frontier areas shows no sign of abating. Contractors and clients are still coming to terms with new markets and relationships characterized by a global skills shortage which is unlikely to ease soon. O&G ESO companies have the opportunity not to just be project integrators but also to build the capability to support O&G assets throughout the life cycle.

The last two decades have also seen the emergence of Brazil, Russia, India and China (BRIC) as the principal offshore destinations for Information Technology (IT), Information Technology enabled Services (ITeS) and Business Process Outsourcing (BPO) industries. A combination of positive factors - the favourable wage differential in comparison to developed countries being one of the reasons - have helped aid this growth. While the IT/ITeS/BPO industry is entering a phase of maturity, the Engineering outsourcing industry is still in its nascent stage and emerging as the new trend or growth area. Though the Engineering Services Outsourcing (ESO) industry in BRIC countries started off in an unorganised way not much behind the BPO and IT/ITeS outsourcing industry, the revenue generated by the ESO industry is much lesser than the BPO/IT/ITeS counterparts.

According to a National Association of Software and Service Companies of India (NASSCOM) and Booz-Allen Hamilton (BAH) study published in August 2006, it is estimated that the global annual spending on Engineering Services is currently valued at 750 Billion USD (BUSD). This market is expected to grow and exceed a Trillion USD (TUSD) by the year 2020. However, only a very small percentage of around 2% (15 BUSD) of the Engineering services spend finds its way to offshore locations. The O&G industry is a key end-user with projects involving intense engineering activities which are either done in-house or by engineering consultants or Erection, Procurement & Construction (EPC) contractors. Engineering work related to the O&G industry has started finding its way to destinations like Brazil, Russia, India, China, Israel, Poland, Mexico and East European countries in the last one decade.

In this proposed study on 'A Comparative study of location attractiveness of BRIC nations for O&G Engineering Services Outsourcing (O&G ESO) and strategic growth options for India's O&G ESO industry', O&G sector companies are defined as those companies that primarily have business interests in O&G, Refining, downstream petrochemicals, terminals and pipelines. The term Outsourcing or (Offshoring) primarily implies the process of 'packaging' engineering work and getting this executed from an offshore location or country.

## **OBJECTIVES OF THE STUDY**

The following objectives of this study are addressed in the thesis:

1. To determine the variables to compare the location attractiveness between Brazil, Russia, India and China as O&G ESO service provider locations.
2. To determine the current ranking of each country in the BRIC block and rate them as HF-Highly Favourable, F-Favourable, MF-Moderately Favourable or UF-Unfavourable as service provider destinations for O&G ESO.
3. Evaluate the current status of O&G ESO industry in India and what service providers in India are currently doing to garner maximum market share against competing firms in

other nations. Understanding the status-quo of the O&G ESO services provided by Indian firms is a starting point from where the directions for improvement can be identified.

4. Evaluate the contribution of the government in helping the O&G ESO service providers in India to tap the available market potential.
5. Recommend steps industry players in India must take in order to gain market share in the O&G ESO field and build strategic capabilities amongst competing nations.
6. Recommend priority actions that the policy makers and the Indian government require to take in order for the Indian O&G ESO service providers to sustain competitive advantage and consequently position India as a global hub for O&G ESO services.

Earlier researchers on similar subjects have not looked at outsourcing/offshoring specific to the O&G industry and were conducted primarily for IT/ITeS and BPO industry. No public study has quantified or rated the individual countries with specific reference to the O&G industry needs. Therefore, it was vital to identify and rank the individual countries and determine the ranking of India among the four countries as an important step in the research process.

## CHAPTER SCHEME OF THE THESIS

This thesis is organized as described below:

**Chapter-1** of the thesis introduces the Global O&G ESO industry and presents the objectives of the study.

**Chapter-2** presents the details of research methodology adopted and spells out the research strategy, data collection methods and detailed research process.

In **Chapter-3**, a detailed review of literature has been presented that covers works on Outsourcing industry, works on location attractiveness, Engineering Services Outsourcing (ESO), emerging economies – Brazil, Russia, India and China (BRIC) and engineering services outsourcing related to the O&G industry.

**Chapter-4** presents the country overview of BRIC nations from a macro perspective about the scale and size, economic scenario, educational system and services outsourcing industry in each country. A brief on the O&G industry in each country is also included in this chapter. Assessment of the global spending on O&G ES and the market opportunity for O&G ESO companies is also presented in this chapter.

**Chapter-5** presents the Comparative Case Study and the analysis to arrive at the location attractiveness of BRIC nations for O&G ESO. The variables for comparing Location Attractiveness (Objective No. 1 of this study) of BRIC nations for O&G ESO are arrived at in this chapter.

In **Chapter-6** a Statistical analysis of the survey data to determine location attractiveness of BRIC nations as O&G ESO service provider destinations is presented. The activities in India of twenty five select O&G ESO companies are also presented in this chapter to gain an understanding of the current industry trend. This chapter covers the result of the Objective Nos. 2, 3 and 4.

**Chapter-7** is the concluding chapter of the thesis. This chapter covers the result of the Objective Nos. 5 and 6. This chapter distills the issues discussed in earlier chapters and also

examines the strategic growth options for India's O&G ESO service provider industry so that a clear lead can be maintained over existing and emerging players from competing nations. The chapter presents a comprehensive set of recommendations to the O&G ESO industry and policy makers so that the market opportunity is addressed through a structured approach.. This is the main contribution of this study. The chapter ends with sections on limitations of the study, contributions and directions for future research.

## RESEARCH METHODOLOGY

After finalization of the topic for research, the data collection for the study started for which data from both the sources: primary as well as secondary have been gathered. Main sources of primary data were interviewing, observing and analyzing documents. For the interviews, a blend of unstructured, semi-structured and structured interview techniques has been followed. Three approaches were applied in this study for arriving at the Country location attractiveness of BRIC Nations – Comparative Case study method (primarily relied on data from secondary sources), Multi-Vari graph and One-Way Analysis of Variance (ANOVA).

The Research process was divided into two phases. In Phase-I of the Research process, a list of 18 industry experts representing 14 different companies participated. The company list was drawn randomly from the Top 200 International design firms listed in McGraw-Hill Construction Engineering News Record (2008). The primary objective of the Phase-I study was to determine the factors that could be used to compare the location attractiveness for outsourcing Engineering and Design work to destinations in the scope of this study - Brazil, Russia, India and China. 4 among these executives who participated in the Phase-I data collection study were from the 'outsourcer' side (Multinational Design firms with Overseas offices) and the rest of the senior executives interviewed were from the service provider side with operations in one of the BRIC nations. Wherever, two interviewees were from the same company, it was ensured that both of them are not from the same office and belonged to different geographical locations of the same company. The senior executives comprised of top management executives from O&G ESO service provider companies operating in one or more of the BRIC nations and also senior executives (not less than a General Manager designation), from Multinational (MNC) O&G design and engineering companies that outsource engineering/design work to Brazil, Russia, India and/or China. This 'mix' ensured that a blended and holistic view from both sides was obtained and that the in-depth interview and survey results are unbiased. The author has personally spoken to all these 18 executives during the in-depth interview process to gain further insight about specific aspects of the research. The in-depth interviews began with a round of preliminary unstructured interview followed by a session of interview using a structured survey questionnaire for determining the elements/variables required for comparative case study to determine the location attractiveness. After completing the semi-structured interview with all the 18 Experts, the survey using a structured questionnaire was conducted. All elements/variables that were mentioned by more than 60% of the participants (11 out of 18 respondents) are considered for the comparative case study. All selected variables are considered to have equal weightage in determining the country location attractiveness for O&G ESO.

In the second phase of the research process, a total of 27 industry experts representing 25 companies operating in the O&G ES field participated. This list was randomly drawn out from the Top 200 International design firms listed in McGraw-Hill Construction Engineering News Record (2008) to perform a deep dive on current status of O&G ESO industry in India and the recommendations to be made for growth. A survey questionnaire was administered to all the executives in the Phase-II study seeking their scores on identified elements of location

attractiveness of BRIC Nations for O&G ESO service provider industry. The author has personally talked to all these 27 executives for the in-depth interview and survey process – either telephonically or in person. These 27 executives are top management executives and business leaders from O&G ESO industry and are Subject Matter Experts in the field of O&G Engineering Services with relevant domain expertise in the O&G engineering industry. The survey questionnaire also covered questions on strategic growth options and recommendations for the industry and government.

The statistical analysis of survey responses on questions related to strategic growth options and recommendations for the industry and government were analyzed based on single-variable statistics. This method identifies the frequency of each response. Both the frequency distribution and percentage distribution are shown in this thesis for the results of most of the questions in the survey. In order to validate the ranking of individual countries on elements of location attractiveness that was arrived at using the Comparative Case study method (that primarily relied on data from secondary research) the scores of the 27 industry experts was further tested statistically using the Minitab Software deploying Muti-Vari Analysis (MVA) and Analysis Of Variance (ANOVA) methods. This ensured that the rankings were arrived at by using quantitative methods deploying statistical tools.

## **OPPORTUNITY ASSESSMENT FOR O&G ESO**

The combined design/engineering spend of O&G companies for in-house technical services/R&D projects, Technology Licensing companies, OEMs, Global EPCs and O&G design firms exceeds 100 BUSD annually which is the total market opportunity available currently for the Engineering Service companies in the O&G domain. Many of the International companies have begun to recognize the capabilities and talent available at offshore locations and are increasingly tending to outsource activities like product design, plant design, process engineering, enterprise asset management and plant automation services. A study by NASSCOM and Booz Allen Hamilton (2006) reports that only 2% of the total engineering spend by International firms reach the emerging markets – a tiny fraction of the total opportunity. Brazil, Russia, India and China are major markets that have the capacity and size to capture a larger share of this engineering spend. NASSCOM estimates that the overall Engineering Services outsourcing pie is expected to grow to 15 to 20% by year 2020. India currently has a share of 12% in the Global ESO market and had a share of 240 MUSD in year 2006 in the O&G ESO market. India's biggest competitors in the ESO business are the BRIC nations since other players like Israel that have significant domain expertise in certain areas are restricted by lack of scale. The O&G Engineering services spend is estimated to grow from 100 BUSD currently to 150 BUSD in Yr 2020 as the global engineering services spend grows from 750 BUSD to 1.1 TUSD in the same period. The NASSCOM-BAH study reports that India's share in the global ESO market could be as high as 50 BUSD in the year 2020. In order to achieve this, India must aim for a higher share (25 to 30%) in the available O&G ESO market space too (estimated at 20 BUSD in year 2020). Going by this analysis, India's O&G ESO share in year 2020 could be as much as 6 BUSD if the right actions are in place.

## **COMPARATIVE CASE STUDY AND STATISTICAL ANALYSIS RESULTS**

The study identified 10 variables against which the Comparative Case study and Statistical Analysis was performed. The study concluded the following on Location Attractiveness for Brazil, Russia, India and China for O&G ESO.

- The Comparative Case Study Analysis results, Graphical (Multi-Vari) analysis and the Statistical (ANOVA) analysis complimented each other.
- India has highest mean and lowest rating spread.
- The Statistical analysis was duly done and further corroborated the rankings of BRIC nations for O&G ESO done using the Comparative Case study method
- India emerged as the most preferred location (HF) for O&G ESO industry closely behind by China (F) and then Russia (MF) and Brazil (UF) in decreasing order of location attractiveness.

## **EXAMINING THE O&G ESO OFFSHORING LANDSCAPE - PROFILE OF KEY INDIAN PLAYERS**

To gain an understanding of the current industry trends in O&G ESO industry in India, detailed interviews were conducted with the 27 industry experts in Phase-II of this study using a structured questionnaire. The summary of the findings on the steps that the Indian O&G ESO service provider industry is currently adopting to maintain its markets share are as follows:

1. Providing 'low cost' resources for O&G Engineering Services
2. Delivering 'low' and 'medium' complexity Engineering Services
3. Maintaining established and loyal client base
4. Increasing range/bandwidth of services
5. Expanding global footprint

To the survey question on the support that the O&G ESO industry derives from the government 89% of the respondents replied in the negative and opined that the Indian government has not identified O&G ESO as a sweet spot that requires focus and attention. The Indian government has been supportive of the IT/ITeS/BPO industry and there are a number of steps being taken both at the State and Central government levels to boost FDI and investment by domestic players. These incentives are also extended to Knowledge Process Outsourcing (KPO) and ESO sectors and the O&G ESO industry is also a beneficiary of these policies. However, these policies lack a special focus on O&G ESO taking into account the potential of this business to grow to 6 BUSD by 2020.

A detailed study of 25 key Indian O&G ESO service players corroborated the survey results that most Indian O&G ESO players are currently engaged in 'low' and 'medium' complexity services. Other points that emerged in the study of the 25 key Indian O&G ESO players were that Indian O&G ESO industry is currently focusing on supply of resources at a lower cost to Oil Field Service (OFS) companies, EPCs and detailed engineering consultants for overseas onsite projects. United States and Western Europe are the main revenue sources for Indian O&G ESO service providers; however a few players are expanding to other regions including Middle East, Africa and Eastern Europe. All the companies that were studied deployed resources for onsite projects and this formed a significant chunk of their revenues. Only four companies out of the list of 25 that were researched focused on cutting edge research and innovations from their Indian centres. Most companies are focusing on global project implementation but not covering the full-service required throughout the O&G asset life cycle. There are, however, a few companies that are moving up the value chain and providing asset care services for O&G end users during the asset operational phase.

## STRATEGIC GROWTH OPTIONS FOR THE INDIAN O&G ESO INDUSTRY AND RECOMMENDATIONS TO THE GOVERNMENT

Based on discussions with industry experts the Strategic growth options for the Indian O&G ESO service providers that have emerged from the in-depth interviews and survey with industry experts are as follows:

1. Migrate from 'Low Cost' to 'High Value' Service offerings
2. Accelerate pace of global expansion
3. Leverage from alliances & partnerships within the O&G ESO industry
4. Partner with R&D and educational institutions
5. Partner with Indian domestic O&G and Petrochemical industry

The five key recommendations to the Government and policy makers to support the O&G ESO service provider industry to garner maximum market share from the available market opportunity are as follows:

1. Rationalise tax incentives
2. Promote India as a trusted sourcing hub for O&G ESO
3. Invest in higher education & advanced degrees related to O&G engineering
4. Open the doors of PSU & R&D institutions for collaborative research
5. Promote Innovation & R&D

## CONCLUSION OF THIS STUDY

This study has identified ten elements to compare the Location Attractiveness of BRIC nations for O&G ESO industry and have ascertained the following using a complementary approach of Comparative Case study as well as from the Statistical analysis of primary data surveyed.

- India emerged as a **Highly Favourable** location for O&G ESO industry in all the three types of analysis techniques (Comparative Case study MVA and One-way ANOVA) used in this study.
- India has a marginal lead from its nearest competitor China among the block of BRIC nations as a service provider destination for the O&G ESO industry that has been ascertained by the Highest Median and Lowest Standard Deviation. The variables used for this analysis are identified in Section 5.1 of Chapter-5.
- Russia ranked behind both India and China as 'Moderately Favourable' destination and Brazil emerged an 'Unfavourable' location in the comparison of Location Attractiveness for O&G ESO.
- The increasingly heated competition for talented and skilled workers globally is resulting in an overall shortage of technical personnel with specialised skill sets related to the O&G domain consequentially resulting in higher wages for the fewer resources available.
- India takes a commanding lead in the overall outsourcing business as compared to other BRIC counterparts in general owing to its long association of over two decades with

IT/ITeS and BPO industry. In addition India also has established presence of several ESO companies operating in the Automotive, Aerospace, Hi-Tech (Semiconductor, Telecom, Consumer Electronics, Industrial Automation, Medical devices, Computing systems) and Utilities domain.

- Every year, the Indian educational system graduates around half a million technical professionals. India's top technical institutions, led by the Indian Institutes of Technology and the Indian Institute of Science, Bangalore are renowned globally as institutes that produce world's best technical brains. India is also setting up specialized universities like University of Petroleum & Energy Studies, Dehradun, Uttarakhand; Pandit Deendayal Petroleum University, Gandhinagar, Gujarat and Rajiv Gandhi Institute of Petroleum Technology, Rai Bareilly, Uttar Pradesh.
- The labour force in India is familiar not only with the job content, but also with the work ethics, processes, quality and productivity expectations of major global clients due to the long association with established Multinational O&G ES companies in India.
- While on the people front, India clearly leads amongst the BRIC constituents, infrastructure weaknesses pull down India's ratings on the 'Operations technology and Infrastructure' variable.
- Data security and intellectual property protection are growing concerns for companies with offshore operations. However, India scores better against both China and Russia but trails behind Brazil on this front.

The O&G ESO industry in India is still in a nascent stage and provides an opportunity that is capable of catapulting Indian players into a high growth orbit. The transformational impact that this industry can achieve has the potential for India to not only achieve global leadership, but also build a truly inclusive growth environment in the country together with the Upstream, Midstream and Downstream activities in the country. Achieving these ambitious outcomes will require breakthrough collaboration amongst industry players, central and state governments, and industry bodies (e.g. National Association of Software and Service Companies, Confederation of Indian Industry, Federation of Indian Chambers of Commerce and Industry etc.) - to ensure that appropriate actions required to maximize the global sourcing market potential and sustain India's superiority as the preferred sourcing destination are executed in a timely manner. To that end, this thesis outlines the policy actions required in key areas such as:

- Developing high calibre talent pool
- Developing niche service areas and 'High-end' consultancy services for O&G ESO industry
- Building adequate basic, business infrastructure
- Ensuring a favourable business policy and regulatory environment
- Collaborative approach with existing O&G ESO players
- Fostering a sustainable ecosystem for Innovation and R&D
- Establish India as a trusted global hub for O&G ESO - managing risks effectively



## LIMITATIONS OF THIS STUDY

There could be limitations of the study some of which are mentioned below:

- The scope of the study is limited in geographical terms to the four BRIC economies – Brazil, Russia, India and China. Although, in some sections of the report data and information about other developing economies have been used, this has been done solely for reference purposes only so as to present a wider comparative perspective. Otherwise, the study and analysis and recommendations are focused on the four BRIC nations only.
- There are limitations in terms of the research methodology used. Based on the Case study method, the primary data presented in the study is qualitative. The quantitative data is derived from secondary sources and carries the disadvantages typically associated with such data. For instance, some of the secondary data may be outdated, partly irrelevant or left partially unutilized for the purpose of analysis.
- Only variables that polled more than 11 votes out of 18 respondents (60%) in the Phase-I study have been used for the Comparative case study and Statistical analysis to arrive at Location attractiveness of BRIC nations for O&G ESO.
- The analytical methods used for comparative case study are deductive and discursive in nature limited to the nature of the methodology of case study used. Statistical methods have been used only to validate the results of the individual country rankings for O&G ESO obtained from Comparative Case study analysis. Single variable frequency and percentage distribution have been used to arrive at the recommendations and suggestions and action points for growth.
- Only a selected sample of twenty five O&G ESO companies have been considered in Chapter-6 to validate findings from the survey on the measures currently being adopted by the Indian O&G ESO industry.

## CONTRIBUTIONS OF THIS STUDY

The major contributions of this study can be enumerated as below.

- The immediate contribution of the study is to add to the available literature on emerging trends in the engineering outsourcing industry related to the O&G industry.
- The significant contribution of this study is to make a comparison of the investment climate with specific reference to O&G ESO in the four BRIC countries studied and reported in the study. A reading of the comparative description is likely to provide a good understanding to an observer and analyst of the O&G ESO industry.
- The study makes an in-depth and all rounded analysis of elements of location attractiveness for the O&G ESO and compares it across the four BRIC countries. This comparison is expected to provide a tangible basis to the industry observer of the factors that contribute to the location attractiveness specifically with reference to the O&G ESO industry. The relative differences between countries also help to bridge the gap and suggest corrective steps.
- The study presents a detailed list of the proposed ‘High Value’ services that the Indian O&G ESO industry could provide and strengthen itself by insulating against wage arbitrage with new countries that are trying to enter into this market space.

## FUTURE DIRECTIONS OF RESEARCH

The future directions for research to continue this study are suggested below:

- Future researchers could consider developing studies based on the framework adopted for this study. In doing so, they could replicate the study for other emerging economies e.g. the new block of countries N-11 (the Next Eleven) as christened by the Goldman Sachs Economic Research Group in a BRIC update report published in December 2005. The Next Eleven consists of Bangladesh, Egypt, Indonesia, Iran, Korea, Mexico, Nigeria, Pakistan, Philippines, Turkey and Vietnam. These countries are fast vying attention of investors and getting their acts right to emerge as manufacturing and service outsourcing engines for the world.
- Similar studies could also be done for specific regions. For instance, country specific studies could be done for Eastern European nations that are also vying for the market share in the O&G ESO business.
- Alternative research methodologies such as detailed survey questionnaires could be used to generate a lot more numerical data amenable to rigorous statistical analysis. This could lead to a different perspective of some of the issues addressed in this research.
- Research studies advancing the agenda of the present study could also offer meaningful future research directions. For instance, an extension to the study can be done by taking up individual elements of the issues discussed in this study. Such an approach could present opportunities for an in-depth analysis of the issues explored in the present study.

Overall this research study is as an attempt to push the boundaries of knowledge in the theoretical and practical areas of O&G ESO opening up opportunities for future research.