

Offshore Outsourcing Practices of United Kingdom Engineering Services Companies; Focused
on Oil and Gas Sector



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Chapter 1- Introduction

1.1 Research Background

The economist, Smith (1776) discussed the idea of offshoring he stated "If a foreign country can supply us with a commodity cheaper than we ourselves can make it, it is better to buy it off them." Outsourcing has emerged as key option of reducing cost of operation during these days of competitive business environment. The recent global recession and credit crunch in a highly competitive world bringing about change of economic condition around the globe. Along with other countries Britain has also officially declared the current recession one of the worst recession of their times, BBC (2008) quotes CBI a business group research estimates that the UK economy will shrink by 1.7% in 2009, the group added that unemployment rise to 2.9 million by 2010. This UK recession has badly affected retail service sector leading to Woolworth closing down, Banking sector with nationalization of Royal Bank of Scotland and that has made history in last few month. The economic downturns affected the pace of service industries or change the way they do business. Due to increasing unemployment in UK, companies may prefer to outsource within the country as the currency is weakening companies may not be able to save much as they were used to be.

Along with retail, banking and financial services sector, consulting engineering is one of the important industrial sectors in UK economy, it serves the national companies and also attracts around £2.45 Billion. Mintel (2008) notes that total value generated by consulting engineer sector reached £14.16 billion in 2007. According to Mintel (2008) the income derived from overseas increased by 30% to £2.45 billion in 2007. The strongest international growth potential for work is reported to be in India, China, Middle East and the United States. Cost reduction has always been important to profitability for any firm. Since the consulting engineering sector of UK is involved not only inshore but attracting foreign exchange from various countries.

The understanding of an important options of cost reductions such as offshore outsourcing is found interesting, these days phenomenon of economic downturn, decreasing oil prices and credit crunch cause intense competition so this study is an attempt to understand factors that what are the driving forces for offshore outsourcing in engineering services industry.

This project studies the factors of offshore outsourcing practices of engineering services companies in the UK. The scope of study limited to industrial engineering services primarily in oil and gas industry, so this project is also aimed to understand offshore outsourcing practices of UK engineering services sector.

The purpose of research is to review the available literature on offshore outsourcing and understand offshore outsourcing situations. This research will focus on knowledge in these fields. The discussions on finding would be focus on why “company” needs offshore outsourcing and “how” different factors help engineering services companies to take offshore outsourcing decisions.

1.1.1 Popular Offshore Outsourcing Jobs

The scope of this research is limited to outsourcing practices by United Kingdom Engineering, Procurement and Construction (EPC) Companies including Engineering Services (ES) companies in Oil and Gas sector.

Although engineering services outsourcing has many dimensions ranging from process engineering to building and construction to project certifications: however some Engineering Procurement and construction (EPC) or engineering services (ES) company equipped with one or many disciplines of project management but not necessarily all. The Projects includes soft engineering aspects such as material, energy balances, layouts, P&I diagrams and details engineering to hardcore engineering such as facility fabrication and installation of highly sophisticated equipments. According to most of the literatures found, following are some popular engineering services jobs that can be outsource from offshore.

As engineering companies works on project to project bases ranging from building infrastructure to oil and gas production facility. Mintel (2008) noted that Engineering firms operating in UK engaged with power, waste water management, oil and gas, construction and project management and ports, harbours, airports and canals so forth.

Engineering firms often outsource non core engineering jobs for example in mechanical engineering services, drawing conversion services, 2D drafting, 3D modeling, reverse

engineering, piping design and drafting, manufacturing support and process planning, value engineering, design and development, design for manufacturing . In architectural services following jobs are outsourced such as architectural design services, architectural drafting and detailing (CAD) Services, architectural animation services, 3D rendering, landscape design and architecture, building information model. Incase of civil engineering services, paper to CAD conversion, construction drawings, land development and design, construction cost estimation services, plumbing design services and outsourcing HVAC services are popular. Chemical engineering offshore outsourcing services include detail engineering, concept design and project feasibilities. (Outsource2india, 2008)

Mintel (2008) noted that the general consulting engineers market is depends upon general economic climate, corporate profitability and construction trends. The growth of engineering services sector is proportional to the government expenditure; the forthcoming projects in major sectors are also influenced by changes in the world environment such as global warming, and natural disasters for e.g. Tsunami. Other than this many micro economic factors also influence the consulting engineering market.

The United States has never been an important area for the UK consulting engineering sector; however, American engineering services companies competing head to head and become more aggressive in international market as a response to their own economic difficulties following the Iraq War and recent recession following credit crunch and unemployment. It is worthy to note that America is the UK's strongest competitor for consulting engineers. (Mintel, 2008).

It is worthy to note that engineering services companies do not specialize in any single industrial sector rather they manage projects in many sectors at a time most of the large engineering and design firm for example Jacob's , Bechtel or FosterWheeler are handling infrastructure and industrial projects at a same time (EPC Global, 2008). To understand the engineering services potential, oil and gas sector of UK is chosen as sample. There would be a limitation to account numerical values such as project value or consulting fee, however subjective issues are more significant to the purpose and objectives of the study.

1.1.2 Oil and Gas Sector United Kingdom

Thomas (2008) notes most oil and gas operators not only in UK but in the global oil industry, have the financial resources to maintain their exploration and development programs, however the decrease in price of crude oil would have an impact on future strategies of companies but it does not have any impact on existing development plans. There are estimates that current worldwide oil production is depleting by 4.5% to more than 9% a year, the full utilisation of all of the offshore rig fleet is required to meet current production levels. There is a potential growth of engineering services in new production facilities, maintenance operations and alternative energy areas. Due to lower oil prices companies are also stressed to control the project costs while developing a new oil production facility.

The operations of engineering services in oil gas can be estimated from the fact that the Oil and gas is a key industry in United Kingdom and according to oil and gas UK (2008) the industry has paid £7.8 billion in direct taxes to the UK exchequer (fiscal year 2007-08). The UK is the 13th largest oil and gas producer overall in the world and 8th largest gas producer (after Algeria and Saudi Arabia) and 18th largest oil producer (after Brazil and Angola). Oil and gas from the UK Continental Shelf (UKCS) provided around 70% of the nation's total energy demand in 2007.

The UK produced 2.8 million barrels of oil equivalent (BEO), which is equivalent to 583 million barrels of oil or 70 billion cubic meters of gas and it is enough to meet the whole of the UK's oil demand and around 75% of its gas demand from indigenous production.

The UK will rely on oil and gas to provide around 80% of primary energy needs in 2020 and the UKCS has the potential to provide 20-25% of UK gas demand and 60-65% of UK oil demand in 2020 (oil and gas UK, 2008). However the North Sea is one of the most expensive oil and gas provinces in the world due to harsh marine environment and small size of discoveries, cost increases have matched the increase in oil price seen in recent years, unit operating costs rose almost 30% from 2006-07 and the average technical costs of new developments have reached \$29 per BOE for projects coming on stream over the next three years, 70% higher than in 2005.

According to Mintel (2008), process plant have seen increased in gas supply expenditure by an estimated 4% to £263 million in 2006/07 consolidating the 18% increase recorded in the previous year. It is worth to note that revamping or extension in the old process plant has also contracted out through engineering services companies. In 2007, 21 projects have been approved which includes 6 oil fields, 2 condensates, 7 gas fields, 3 oil incremental, 1 condensate incremental and 2 gas incremental. However, oil prices are fluctuating unexpectedly and companies aspire cost reduction and development of economically viable projects.

1.1.3 Engineering Companies at Glance

There engineering companies do simple engineering design contracts or Engineering, Procurement and Construction (EPC) contract among the clients. Incase of oil and gas EPC contract, the operating company defines the scope and the specifications of the plant, quality, project duration, and cost. An EPC contract is a complex phenomenon. The EPC contract, especially in global context, needs thorough understanding of location (where the plant will be located) market conditions for the materials supply and labour availability and performance, local code, availability of local supervisory personnel, availability of local and global engineering services and local and global contractors. An EPC contract in general has no price increase clause. Foreign exchange fluctuation and variation in the prices of materials and labour and services are inherent risks in any EPC contract. (EIC, 2008) (The Energy Industries Council (EIC).www.eic.com)

1.1.4 Offshore Outsourcing Trend

Sehgal, Hamilton and Dehoff (2007) noted that U.S. engineering firms initiates outsourcing from non core activities such as documentation; basic simulation and basic computer-assisted design work and step by step develop understanding with partners for value added processes that reduce costs. In comparison European companies are less forward to outsourcing they are more strategic and less cost-driven. European is slower than U.S. in offshore outsourcing approach but there is a growing trend and in their engineering needs offshore. As the cost of operation increasing in amid economic crisis companies are thinking beyond traditional legacy of noncore outsourcing and willing to shift offshore core process.

Companies are still pushing forward to implement effective cost reduction strategies by overcoming the current economic challenges. This research aims to better understand the rationale behind the offshore outsourcing strategy.

1.2 Aims and Objectives

The aim of this research is to explore the concepts of offshore outsourcing in operations management. A single case study based on engineering services industry U.K. is carried out and oil and gas sector have been chosen as representative sector. This research is focus on “why” and “how” questions about engineering services companies in UK a series of three research questions follow from the aim:

1. Investigation of critical factors of effective offshore outsourcing. Finding about offshore practices in engineering services, the objective is to evaluate the critical factors and analyses their implications for offshore outsourcing.
2. Study of interdependencies among factors of successful relationship among outsourcing partners. The evaluation of critical factors and findings will help to study the dependencies among engineering services companies and their offshore partners.
3. Analyse of opportunities and threads in relation to employment and business etc as well as examination of organization competency in longer and shorter including straight and weakness of outsourcing.

1.3 Structure of Research

According to aims and objective of research, this thesis has been organised into following five chapters. Then follows appendices referred to in the text of supplement the Author's findings. The text and sources of references and bibliography and embodied at the end.

Chapter 1 Introduction provides related background of project. Firstly, current economic situations and challenges for companies in the UK. Secondly, the potential of growth in engineering consultancy sector of UK especially in oil and gas sector. Thirdly, offshoring outsourcing as a concept of cost reduction and its growing practices. Chapter 2 Literature review have discussed the offshoring phenomenon. It will discuss the different concepts of offshoring outsourcing types and available models. The pros and cons of offshore outsourcing and its historic development, however, study of operations and supply chain concepts of engineering services and offshore outsourcing implications have been researched. Chapter 3 Research Methodology discussed in details and discusses how to conduct research to achieve the objectives. Qualitative research method is used to research questions of why and how offshore outsource have been practiced by engineering services company. The reason to select engineering services sector in oil and gas industry as the study case is that it has in immense competition due to depleting oil reserves, financial crisis and its importance in UK economy.

Chapter 4 is Research Findings & Discussion, in this chapter finding of the research are presented and research questions are evaluated in discussion. Chapter 5 Conclusion, it pulls together the finding, exploring how the thesis has developed understanding of concepts of offshore outsourcing in engineering services companies. Chapter 6 Reflection on Learning includes the experience of the research that had been worthwhile. The research has been guided through valuable advices given by the research supervisor and it was taken in constructively. What is more important is that the author could now carry this experience over to future research with higher confidence. Although paid more attention to the validity of the research, there were still several weaknesses. The experience of thesis is reflected in this section in details.

Chapter 2 Literature Review

Many different theoretical frameworks have been used to study outsourcing and offshoring. Agerfalk and Fitzgerald (2008) noted that there are three popular outsourcing theories, agency theory (Aubert *et al.* 2005, Cheon *et al.* 1995), relational exchange theory (Cheon *et al.* 1995, Goles and Chin 2005) and transaction cost theory (Aubert *et al.* 2005, Cheon *et al.* 1995; Grover *et al.* 2002; Wang 2002).

According to Agerfalk and Fitzgerald (2008), Agency theory is based on the assumption that the agent (vendor) and the principal (company) share common goals and accept the same degree of willingness and reservations (Gottshalk and Solli-Sæther 2005), agency theory has limitation in open sourcing since partner may not indulge in relations instead keep relations for project to project basis. While relational exchange theory has capacity to recognize the importance of interactions, interdependencies, reciprocities, and informally negotiated rules of business between parties, relational exchange theory accommodates a formal contract (Goles and Chin 2005) and it gives protection to the right and interests of both the parties (Gottshalk and Solli-Sæther 2005).

The terms offshoring and outsourcing are often used almost as synonyms in most of the academic literature. Offshoring is defined as an activity that is performed in a different location to the main operation (Agerfalk and Fitzgerald, 2008, Davis *et al.* ,2004) and outsourcing is about governance, when an activity is performed by another organization , as opposed to in-house by the organization itself. However, an activity can be performed either offshore or onshore and can be performed in-house or be outsourced.

Business Process Outsourcing (BPO) is most popular type of offshore outsourcing, this generally means that an entire function, including computer systems, corporate assets and employees, are transferred to a business service provider (Kobayashi-Hillary, 2004). This is becoming an increasingly popular strategy. Although outsourcing is not new, offshore outsourcing and BPO are a relatively new phenomenon. Kobayashi-Hillary (2004) describes BPO as “the hot ticket in outsourcing in this early stretch of the twenty-first century”. Due to advances in global telecommunication and internet, it is possible for complex services to be provided in India.

Without the Internet and instantaneous global telecommunication systems, it would be impossible to work with teams of people in offshore locations (Kobayashi-Hillary, 2004). One of the main driving forces behind outsourcing is the existence of differences in factor prices across national borders. Unskilled labour-intensive stages of production tend to be shifted to unskilled labour-abundant developing countries, while more technologically advanced stages remain in skilled labour-abundant developed countries, the attractiveness of several nations for offshore outsourcing. This is shown in the table below

Figure 2.1: Attractiveness of Outsourcing Locations

Gartner Country Ratings	India	China	Israel	South Africa	Northern Ireland	Ireland	Czech Republic	Poland	Hungary	Russia
Government Support	E	F	G	F	VG	VG	P	F	F	P
Labour Pool	E	G	G	F	G	G	F	G	G	VG
Infrastructure	F	P	VG	F	VG	VG	F	F	P	P
Education System	VG	F	VG	G	VG	VG	G	G	F	VG
Cost	E	E	F	VG	G	F	VG	G	VG	E
Political Stability	F	F	P	F	G	E	VG	G	F	F
Cultural Compatibility	F	P	VG	E	E	E	VG	VG	VG	G
Data/IP Security	G	P	VG	G	E	E	F	F	F	P
Overall Climate	VG	P	F	F	G	G	F	F	P	F

Key: P –Poor; F -Fair; G –Good; VG –Very Good; E –Excellent

(Source : Kobayashi-Hillary, 2004, Gartner, 2003)

The above table clearly states that India and China are far ahead in terms of cost reduction in comparison to eastern European countries and large pool of labour, low cost of operations, government support and education are the basic parameter of giving competitive edge as attractive offshore destination.

Apart from banking, telecommunication, UK engineering services sector also practices the offshore outsourcing. As the engineering cost plays significant role in the overall context of any project, technically design has the capability of saving money in construction, operation and maintenance cost (Sturts and Griffis, 2005). The project owner also seeks the commitment of the contractor in relation to meeting project timelines and ownership of risks in Engineering, Procurement and construction contracting of any project.

Tomback (2003) notes that outsourcing is giving more choices, flexibility and comprehensive services to employers in producing goods or services. Outsourcing is evolving between the increasing challenges for employers and pressures of competition in the market. Businesses are leveraging outsourcing as an opportunity to reduce costs and it is a viable option. On the other hand it has been noted that in many cases, outsourcing does not affect the bottom line in a measurable way. Since some organizations are focused on the effectiveness of management process and gaining the passive benefits from outsourcing such as meeting deadlines, avoid repetitive and transactional processes, less resources allocation to manage vendor, but primary motivation and the purpose of outsourcing is to reduce costs.

The study of the outsourcing is more focus on economic approaches, but organizational behaviour has a major impact on outsourcing decisions (Espino-Rodríguez and Padrón-Robaina, 2006).

Baitheimy (2003) further notes that in the services sector, outsourcing the non core activities and basic support is a common approach of companies. Some firms also use outsourcing as transition strategy to business reorganisation. According to economist survey Baitheimy (2003) quotes that 34 percent of companies Outsourcing all or part of its information technology (IT) in 1997 and the proportion is expected to reach 58 Percent in 2010. Similar increases are expected telecommunications, accounting and human resources functions. The empirical evidence

indicates the financial performance and growth of a company can be geared through the well thought outsourcing strategy.

Historically, many activities have been carried out internally since there were very few external suppliers and markets were more localised in nature. The growth of supply markets as result of technological advancements and comparative advantages of origins the companies needs to rework the opportunity and make appropriate decisions that what activities should stay at home and what should be outsourced.

Baitheimy (2003) has noted that selection of wrong suppliers, writing a bad contract, overlooking personnel issues, losing control over the outsourced activity, failing to plan an exit strategy (with a view to the hidden costs of outsourcing) are main reason of failure of outsourcing strategy.

The literature is evident that companies tend to outsource either the main supply chain activities or support activities. Lonsdale and Cox (2000) explained that high financial costs of updating every activity in the supply chain is one of the reasons, companies tend to outsource some of its major activities in the supply chain. It helps companies to focus on development of its competitive advantage. Outsourcing is a tool to focus on the core activities, reduce costs, convert fixed costs to variable has benefits such as developments on supplier's investment, innovation and improvements in lead time.

Lonsdale and Cox (2000) also notes that after second World War many academics and consultants have emphasised on horizontal integrate or vertically integration of businesses. These strategies were aim to achieve economies of scale. It provides the opportunity to exercise greater market power, it gives control over raw materials sources or distribution channels and easy to diversify product line. By the 1970s, however, these large and diverse corporations were started underperforming and exhibiting disappointing rates of return (e.g. Lonsdale and Cox, 2000; Rumelt, 1974). By the 1980s global recession has further worsen the performance, then a new approach has been adopted in the industries that corporate strategies should go into reverse and that firms should focus on fewer activities. The refrain grew up that firms should "stick to their knitting" (e.g. Porter, 1985; Skinner, 1974). The old story may be repeated again and industry would found new approach in managing their supply chain during this recent global recession.

According to Economist (2008) some outsourcing groups claim that the financial crisis affects in short term but in long term it helps their business. Outsource group claims that business becomes more forward looking in reducing operations cost and jobs flow increase during and after recession times.

Now the recent economic climate has affected the business across global markets and firms are buying out, shrinking profits so history is repeating itself and advocates about focus on more localise competitiveness through operational excellence rather than integration of activities or efforts to achieve economy of scale. The companies who have developed capacities by the time falling short of demand from export markets and become uncompetitive in local markets due to rise in operation costs. The companies having ad hoc capacities have changed their focus according to changing market needs and more flexible in offerings in different price segments and varieties. Lay offs of employees may not result efficiency since it increases per capita infrastructure expense and collapse the entire system of achieving productivity.

According to (Rajabzadeh, Rostamy, and Hosseini, 2008) there are four models of offshore outsourcing , captive direct, Joint venture, direct third part and indirect third party.

‘Captive Direct’: In this type of business model, firms set up their own low-cost, captive centres offshore. Captive centres require large investment to start. Management from the parent company is used to directly oversee the offshore operations (Sehgal, Hamilton, and Dehoff, 2007). Some firms engaged in the captive direct business model examples are ABN Amro, American Express, General Electric, JP Morgan Chase, Mellon Financial, Standard Chartered, and Citibank. In engineering services sector large firm such as Jacobs, Bechtel and fosterwheeler are few example that run captive centres in India and China (www.jacobs.com: www.bechel.com: www.fosterwheeler.com, 2008).

‘Joint Venture’: A joint venture offshoring business model occurs when a domestic company become partner with a foreign company purchase shares and take operations control. Joint ventures have higher risks than the captive direct model because control of operations is shared with the foreign firm. However, joint ventures have lower risks than the direct and indirect third-party models because of the ability to exercise control through majority ownership, or partial control with a 50 percent or less share of ownership.

‘Direct Third Party’: The firm outsources business operations to a third-party vendor located low cost destination. Because the firm has no ownership authority in this business model, all controls of the working arrangement translated by contract terms with the third-party vendor. However, the direct third-party business model carries more risk than the captive direct or joint venture models. Currently, firms such as Bank of America, Deutsche Bank, and Merrill Lynch are engaged in third-party contractual arrangements with vendors in India. Many small and medium size engineering companies practice direct third party contract on project to project basis.

‘Indirect Third Party’: The indirect third-party business model occurs when the firm contracts with a domestic data vendor, who then subcontracts all or part of the work to an offshore company. Data can be sent offshore at the discretion of the third-party vendor without notification to the domestic firm. Indirect third-party has the highest risk potential

However, it is evident that offshore outsourcing is very popular phenomenon in America and Europe. On one estimate, America accounts for over 70% of all offshoring business. The second biggest market is in Britain. Economist (2003) notes that In late October 2003, the HSBC banking group announced that it was taking 4,000 jobs from Britain to India, and earlier that year, Aviva (the Norwich Union insurance group) said it is transferring 2,350 jobs, also to India. India appears most attractive offshoring destination for some time. China and Malaysia are the main competitors with India. Sanjukta Pal, a consultant with PricewaterhouseCooper, said that the cost of operations in India is currently 37% lower than in China and 17% lower than in Malaysia. The Philippines may also compete in the future since it produces almost 300,000 college graduates a year, all of them English-speakers. India is largest since every year, it has output of 2million college graduates and 80% of whom speak English (The Economist, 2003).

Maskell *et al.* (2007) noted that initially offshore outsourcing has very less benefits in comparison to the potential disadvantages of increased risks, less control and reliance on the cooperation with new partners and increase in cognitive distance. However after learning phase benefits are handful. Lower wages and the improvement in the quality and price of international telecommunications are the main benefits of offshoring. Economist (2003) quoted report by HSBC says that the cost of a one-minute telephone call from India to America and Britain has

decreased to more than 80% since January 2001. Moreover, saving on wages is high with lower-grade ones but not promising with high-grade jobs. It is worth to note that an IT professional with three to five years' programming experience earns \$96,000 in Britain, \$75,000 in America and \$26,000 in India (Economist 2003, NASSCOM, India's National Association of Software and Service Companies, 2003).

However, the benefits of offshoring are not confined to lower costs. An article in a recent issue of the Mckinsey quarterly (cited in The Economist. 2003) says “that many companies that move their back-office functions offshore miss huge opportunities to reap efficiencies beyond those that come from using cheaper labour. Companies are merely replicating what they do at home, where labour is expensive and capital is relatively cheap, in countries in which the reverse is true. For one thing, offshoring allows companies to work round-the-clock shifts, ferrying data back and forth from one place to another as the sun sets. For another, it allows them to rethink the way they solve IT problems”. Economist quotes (2003) that American Express, for example, paid local programmers in India \$5,000 to write some software that require. To buy same purpose software the company would have cost to spend several million dollars.

Until recently, many companies reluctant to outsource their engineering activities as they believe engineering are a core technology that should remain in-house. Industry experts are calling engineering “the last frontier of business-process outsourcing” and estimated the markets reached \$19.5 billion by 2008 that was \$4 billion two years ago. Most engineering functions can be outsourced successfully ranging from design to production to maintenance.

However, trade conflicts, currency adjustments, communication complexity or terror and war may easily upset offshoring outsourcing process. Due to cultural distances and too many parameters there is always a risk in the process. Technological advancement in business process and current economic challenges may lead a transformation in the present business system and it will be replaced by new global nexus of suppliers and customers. The offshore outsourcing has just begun it would take leap and evolve in more stable form of its own (Maskell *et al*, 2007).

Chapter 3 Research Methodology

3.1 Introduction

This chapter discusses the methods of conducting research, resources summary, challenge and limitations of the research approach to meet the objective of the study. The study analyses the practices of offshore outsourcing by UK based Engineering Procurement and Construction companies (EPC). The research methods and process has been carefully developed according to the needs of the research questions as Marshall and Rossman (1999) has said that researcher should be familiar with the purpose of the study and (Holliday, 2007) noted that The foremost action while performing research is to evaluate the research strategies.

The discussions in this chapter will explain the strengths and weaknesses of the methodology chosen and how it facilitates in data collection, Information processing and answering the underlying questions.

3.2 Research Design and Strategy

It is evident that the first step towards any research is to make a clear plan which states that how to conduct the process of research. In academic research there are two primary techniques quantitative and qualitative are widely used. The term Quantitative research is a holistic process of numerical data collection and series of numerical data analysis and the research output either a numerical data or it use the numerical data to answer the underlying questions of research. According to Morris (2003) quantitative research aims to show you ‘what’ is happening, while qualitative research on the other hand sets out to tell you ‘how’ and ‘why’ it is happening. Both qualitative and quantitative data collection techniques have their own strengths and weaknesses (Creswell, 1994). Since the research questions contains ‘how’ and ‘why’ questions and therefore in this case study only qualitative techniques have been used during the data collection.

The qualitative research allows more in depth information which may uncover the multi facet facts about the subject. The practices of supply chain of the organisation may not be measure through only numerical value rather it depends on global business environment, changing economic conditions and tradeoffs in the business for any company.

Thus researcher used only qualitative methods through secondary data gathering, since secondary data resource build more in depth analysis of various arguments of why and how and build an argument for the subject of research.

3.3 Research Methodology

It was necessary to choose the right medium of data collection for an adequate and appropriate research. According to Yin (1989), there are five types of research strategies when conducting research: experiments, surveys, archival analysis, history, and case study. After considering the various methods of data collection and based on the objectives of the research case study method has been chosen.

A qualitative, case based approach was taken for two reasons. First, the study was intended to investigate “why” and “how” EPC companies in UK practice the offshore outsourcing practices. Case study research is an appropriate process of analysis of details of the research questions of why and how and to figure out the underpin relationships of different factors. It also evolves something which may call “unknown unknown” (Rumsfield, 2006). Thus a researcher may evaluate the answers of known questions of the research and may also find some unknown questions and their significance method of investigating explanatory (Yin, 1989).

Second, this study aims to start the process of building an argument rather than testing any theory. According to Slack and Da Silveria (2001) case research is an appropriate method especially for studying the details of subject so that an intense debate would be developed and especially when the research was focus on little empirical substantiation (Creswell, 1994). Since the focus of this research is to study the practices of offshore outsourcing practices of an EPC industry so the data collection for the subject is consist of four steps

1. Collections of data through EPC company website
2. Collections of data through about offshore outsourcing, trade offs, supply chain management and other relevant academic journals such as EBSCO, Emerald, Mintel.
3. Collection of data through news reports, survey reports and formal and informal internet resources and Social media forums of EPC and alike industries that also have practices of offshore outsourcing such as telecommunication, banking and Software houses.
4. Informal talks with people working in EPC industries.

The case company investigated termed here as Case “A” as the research aim is to understand the questions of “why” and “how” about the offshore outsource practices of the EPC industry in UK so the primary assumption is that the Case “A” is the represent the EPC industry in UK. The data is primarily gathered from four EPC companies in UK all have the offices in London and two have operating share of U.S. based parent companies and one has Australian parent company and one is a British Company. The companies have been carefully selected from the one of ten biggest companies in EPC business and situated in London and operating all over the world.

The Case has a global track record for excellence in concept design, technology evaluation, master planning, front-end design, project management, engineering, procurement. The procurement department within an organization manages all the major purchases. Company deliver cost-effective and innovative solutions for revamps, upgrades or new facilities. Complex projects in challenging locations are particular strength. Company also specialize in the provision of operation and maintenance management services to improve safety, operational reliability and overall performance.

3.4 Research Questions

The purpose of research is to gain knowledge of offshore outsourcing scenarios with the help of literature review during this research will focus on knowledge in these fields. It requires the understanding of the theories of supply chain and outsourcing. Understand the why “company”

needs offshore outsourcing and “how” different factors effecting functions of offshore outsourcing in engineering services. Later on research will study the interdependencies among factors and derive suggestions of offshore outsourcing in engineering services and Study the limitations of suggestions.

3.5 Limitations of Data Collection

There are some limitations as the study would not be able to address the empirical details such as spending of company’s on outsourcing and impact of current economical downturn of world economy on the EPC business, the turn over of the companies and overall project handling costs and so forth.

This research is solely fund by researcher and limitations of budget with tight schedule do not permit to visit the companies and gather data through face-to-face interviews. However, telephonic interviews and postal questionnaires were considered to be the best method to bring forth sufficient responses in order to arrive at an analytical conclusion.

There is a limited academic literature available related to offshore outsourcing in engineering services business so research has reference and collected through wide variety of publish resources such as company website, news websites, publish articles and surveys from industry magazines and so forth.

3.6 Data Analysis

The collected data is qualitative form and would be sufficient to develop an argument for research objectives. The purpose is to analyse and investigate critical factors of an effective offshore outsourcing in comparison to the other services industries that have similar factors of operations. Study will surface the interdependencies among factors of successful relationship among outsourcing partners, it refers the explanatory nature of research and evolve only through multidimensional quantitative data not only confine to facts of origin of the case company but

the destination partner of the supply chain. Data analyses also discuss the appropriateness of suggestions for factors of effective offshore outsourcing and encircle the research through implications of research study and with conclusion and critical evaluation.

Chapter 4 Research Findings and Discussions

In this chapter finding of the research are presented and research questions are evaluated in discussion.

4.1 Analysis and investigation of critical factors of an effective offshore outsourcing

According to Ågerfalk & Fitzgerald (2008) cost saving is the main force behind the offshore outsourcing practices, outsourcing to a global workforce is a phenomenon of offshore outsourcing. (Ågerfalk and Fitzgerald 2008, Carmel and Tjia 2005). Considering case 'A' it has been found in literature that outsourcing engineering procurement function across the board can reduce costs of services and material by 15 percent where upgrading the standard of purchasing process from 60 percent to 95 percent can decrease the cost of goods sold by only 4 percent (Parry *et al.* 2006, Favre *et al.*, 2004). The selection of right partner and proper systems are important factors of successful outsourcing, costs of employment and transactions are the tradeoffs in outsourcing process (Evans, 2008).

4.1.1 Types of engineering firms

In 2007, total value generated by consulting engineering sector reached £14.16 billion. Reports suggests that income derived from overseas increased by 30% to £2.45 billion in 2007. In 2007, overseas fees accounted for a 17% share of the total fees rendered. The sector has seen the major growth potential in India, China, the Middle East and the United States. The UK consulting engineers is expected to grow progressively from 2008 to 2012. The value of market is projected to reach £ 20.38 million in the latter year (at 2007 prices). It would be 44% in real terms compared with 2007 (Intel, 2008).

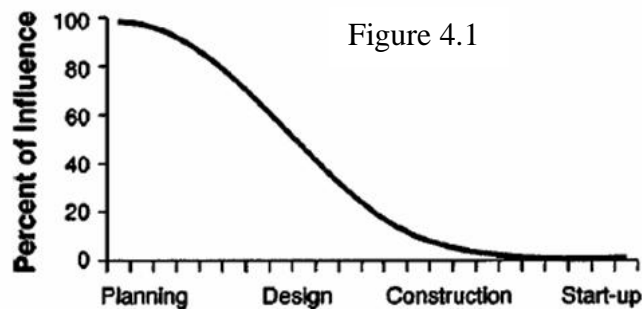
There are more than 300 companies in UK consulting engineering sector, some of which are multi-disciplinary, and others specialise either in industrial or geographic markets (Intel, 2008). To understand the implications of cost of engineering services it is essential to understand

the process of project contract for engineering services company. The case “A” practices following methods of contracts, there are mainly three categories of design engineering firms in Case “A”. (Sturts and Griffis, 2005, Stasiowski 1993).

1. Traditional design firms. These companies give prime importance to quality and reliability and often slow to adopt new technology. However, they exhibit good engineering practices and carefully price services to compete with other traditional companies.

2. Service-based design firms. These companies are very much customer oriented and respond to clients changing needs. These companies are more reactive in strategy rather than proactive and anticipate the needs of market so their projects and profitability depends on traditional projects, these firms priced as per clients expectation and manage projects to secure profits.

3. Industry leaders. This group of engineering companies put emphasis on research and development and led the market place with technological innovations. They establish prices for front-end work that saves on construction costs and they keep competitive advantage. These firms price all traditional design service in accordance with client’s requirements and having the capability to make realistic profits on new services and stay out of competition. (Sturts and Griffis, 2005, Stasiowski 1993). This group is more forward looking and practice offshore outsourcing in some of design engineering activities in both national and international activities and construction activities in international projects. The further analysis of design engineering fee will reflect the importance of design activity in any project. Tender prices for UK construction/infrastructure work are anticipated to soar over the next five years, driven by a continued rise in raw material prices and fuel costs (Mintel, 2008).



Degree of influence project participants have on construction cost and schedule (data from Griffis and Farr 2000)

“Source: Sturts and Griffis, (2005) “

According to above mention figure the design aspect in any project accounts 60 percent to 30 percent fluctuation in construction cost and thus having a vital importance for any engineering company to select the design partner in outsourcing considerations (Sturts and Griffis, 2005, Griffis and Farr, 2000).

4.1.2 Dimensions of Design engineering

According to Pellicer (2005) effective cost control is essential for consulting engineering firms that ensure the profitability and productivity. It enables firms to secure profits and even the cost of contract or project changes from initial estimations. The profit in any project or contract depends on the term fixed among client and engineering services firm either the contract is lump-sum basis or price is not fixed it is cost plus fee contract.

However, the classical method of pricing engineering services has been labour hours, critics argue that labour hour pricing undermine the significance of available technological tools. If the design job's price is function of time it can eventually reduce project durations and the profitability of firm would be less. The second old but popular method is the estimation of design fee on the basis of certain percentage of construction fee. Bidders add up 7 percent to 12 percent on estimated construction cost to evaluate the design cost of the project (Sturts and Griffis, 2005, Vest and Crown, unpublished interview, 2000). Even then the tighter control of design fee is essential for consulting engineering sector and it is an important factor to outsource the jobs to low cost locations.

In general, estimation of the design is normally about 6 percent to 9 percent of the construction cost (Townsend 1988; "Fees '98" 1998; Veshosky 1994), upon spreading the design cost it comes about 1.5 percent of the total project cost for a building and as higher as 5% for an industrial project (Sturts and Griffs, 2005, Hampton 1994). So the engineering companies would have capability of lowering the cost of entire project through essentially good engineering that saves money in procurement, construction, operations and maintenance costs (Sturts and Griffis, 2005). It is established that design engineering is the core function that influence the profitability of other functions of contractors and operating company. It has been observed that many

engineering firms account the economic implication of designing function as the biggest obstacle in outsourcing to low cost locations. A relatively new approach in pricing is ‘value pricing’ that determine the value of services and not necessarily depend on the direct labour hour cost or percentage on construction cost. (Sturts and Griffis, 2005, Nagle and Holden 1995) The industry leaders practice this pricing method and deliver value engineering as proposition, this group of case ‘A’ had also taken advantage of first movers and established their offshore low cost centers in India, China, Middle East and Pakistan.

Kren (2005) notes that some recent articles in Business Week has suggested that, it is the creativity and innovation era ahead, and U.S. companies alone moving out of the knowledge era into the creativity era. This has true for engineering services.

Joseph (2005) has noted that as a significant part of detail design engineering has been considered commodity so companies address the cost control issues by primarily two offshore models. In some cases many EPC companies have developed the offshore centers and defined as Low Cost Engineering Centers (LCEs). In some other cases companies develop an offshore partner and outsource the relatively general part of detail design engineering.

According to a report published in human resource management international digest by 2020 3.3 million jobs in servicing will have moved into offshore markets from the USA alone, which accounts for \$136 billion in wages.

4.1.3 Cost of Labour

Different pricing strategies have been discussed in above section. However, the personal costs are always vital for any pricing strategy for engineering services firm. Pellicer (2005) notes that in any engineering services company, the human resource costs shared 70% or 80% of the total cost of the project (McDonald and Stromberger, 1969, Pellicer 2001, Kreitl *et al.* 2002).

In Table.1 typical per hour wages has been mentioned for an engineering firms in west, including U.S. and United Kingdom (Pellicer, 2005). The comparison of engineering labour hour wages

with low cost locations such as India revealed that “fully loaded costs for offshore work and offshore development centers in India are between 30% and 50% lower than those in Europe and the US” .(Chandrima, Manish and Dharma, 2008).

Figure 4.2.Labor-hour cost in a middle size engineering consultancy firm
Source: Pellicer (2005)

Breakdown	Description	Cost (\$)
1st	It is assigned to each employee per foreseen costs and divided by the billable hours (technical personnel) or working hours (administrative personnel):	
	Draftsmen (30,000/1,400)	21.43
	Junior Engineers (45,000/1,400)	32.14
	Senior Engineers (60,000/1,400)	42.86
	Project Manager A (75,000/1,400)	53.57
	Project Manager B (90,000/1,400)	64.29
	Accounting Staff (30,000/1,800)	16.67
	General Manager (120,000/1,800)	66.67
2nd	It is assigned to each work post and divided by the company personnel’s working hours:	
	1 Infrastructure costs: (110,000/36,000)	3.06
	2 Running costs: (40,000/36,000)	1.11
	3 Consumable material costs: (30,000/36,000)	0.83
	4 Capital finances costs: (80,000/36,000)	2.22
	Total 2nd Breakdown	7.22
	Cost per hour of the administrative personnel:	
	Accounting Staff: $16.67 + 7.22 =$	23.89
	General Manager: $66.67 + 7.22 =$	73.89
3rd	Absorption of administrative personnel costs, distributing their cost among the hours of technical personnel: $(23.89 \times 3 + 73.89 \times 1) \times 1,800 / (16 \times 1,400) =$	11.70
	Cost per hour of the technical personnel:	
	Draftsmen: $21.43 + 7.22 + 11.70 =$	40.35
	Junior Engineer: $32.14 + 7.22 + 11.70 =$	51.06
	Senior Engineer: $42.86 + 7.22 + 11.70 =$	61.78
	Project Manager A: $53.57 + 7.22 + 11.70 =$	72.49
	Project Manager B: $64.29 + 7.22 + 11.70 =$	83.20

The other emerging investments hotspot in Asia such as Pakistan is another low cost engineering services destination with its competitive advantage of wide spread oil and gas industry, costs offshore work as low as 40% to 50% in comparison to Europe and U.S. an industry analyst comment.

Figure 4.3 Average Annual Base Salary of Engineers by Region,	
	Average Annual Salary
North America	\$93,351
Europe	74,493
Japan	69,210
China	9,250
Asia	47,585

(Source: EDN magazine)

“Source: EDN.com , Nov 2008”

The difference in average salary among engineers from North America, Europe and Japan with Indian and Chinese engineers suggests that the offshore outsourcing of engineering consultancy may be an option of cost saving for engineering service companies.

4.1.4 Shortage of Engineers

According to a survey report by Henley Management College for The Royal Academy of Engineering, more than 400 UK engineering are concerned with the output of engineering institutions about the diminishing number of UK engineers every year. Report suggests that declining number of UK students pursuing engineering career is affecting country’s industrial performance and economic growth. According to report the number of engineering graduates is

stand still at 24500 engineering graduates each year and growth rate is going down from 11% to 8% university entrants from 1994 to 2004.

Carroll (2007) notes that engineering jobs trend suggest there would be a 44 percent increase over next ten years, the engineering firms are concern with the labor shortage as if no engineer retire and number of engineering graduates would be constant over a decade time the situation of labour shortage will still persist in the markets. The shortage of skilled labor in engineering, especially design engineers are driving companies to move forward to global engineering resources through setting up new offices in destination such as Asia and Eastern Europe. (Teresa Carroll, the engineering labour shortage facing the challenge, power engineering august (2007). Case company “A” is also seeking offshore outsourcing as a globalization of work force as there are reasons beyond cost savings in offshore outsourcing only.

4.2 Study of Interdependencies among Factors of Successful Relationship among Outsourcing Partners

It is evident that off shoring outsourcing trend is growing due to constant pressure on the bottom line and moving forward to globalization. Apart from direct cost benefits, contingent approach towards business and developing inimitable competitive advantages there are some factors beyond cost controls in engineering services offshore partnerships.

4.2.1 Dependencies on Outsource Partner

Outsourcing is a phenomenon of interdependence, Perry, James-Moore and graves (2006) notes that outsourcing might left an opportunity for supplier to use price fluctuations between the deals at the cost of quality of services, however, can reduce the risk by procedures due to its size and reputation. Its implications are severe incase of any project management company or manufacturing company (Perry, James-Moore and graves, 2006, Leavy 2001).

Kren (2005) notes that studies suggest that 25 percent to 30 percent of lifetime profitability eroded due to three month late launch of a product to manufacturer, this argument led the outsourcing as a vital option and on the other hand also argue if vendor do not fulfill the job on time then it will hit financial implications for client.

Kumar and Markeset (2007) noted while conducted a case study research of UK oil and gas industry that companies tend to outsource either non core activities or special expertise and tools from companies that can deliver cost saving and quality of services. The delivery of services on time is also an important factor of considering outsourcing as an option.

Either it is inshore or offshore outsourcing practice, the service performance is the focus of each party. The client and vendor relations are contractual and regulated based on the needs and wants, the deliverables were clearly stated and an active coordination is essential. However systematic framework is not popular in industrial practices whether most of the contracts were developed to fulfill the basic need (Kumar and Markeset 2007).

Figure 4.4 Risks of outsourcing

Main negative outcomes	Main references
1. Dependence on the supplier	Alexander and Young (1996), Aubert <i>et al.</i> (1998)
2. Hidden costs	Earl (1996), Alexander and Young (1996), Aubert <i>et al.</i> (1998), Lacity and Hirschheim (1993), Barthelemy (2001)
3. Loss of competencies	Bettis <i>et al.</i> (1992), Martinsons (1993), Quinn and Hilmer (1994), Khosrowpour <i>et al.</i> (1995), Alexander and Young (1996), Aubert <i>et al.</i> (1998), Doig <i>et al.</i> (2001)
4. Service provider's lack of necessary capabilities	Earl (1996), Aubert <i>et al.</i> (1998), Kaplan (2002)
5. Social risk	Lacity and Hirschheim (1993), Barthelemy and Geyer (2000)
6. Inefficient management	Wang and Regan (2003), Lynch (2002)

Source: Adapted from Quélin and Duhamel (2003)

Table I.
Main risks identified in the literature

“Source : Hoecht and Trott, 2006”

Figure 4.4 Illustrates that when it comes to interdependencies among project partners, Cicmi, (2007) has noted that the principle source of concern are poor understanding and selection of the inappropriate vendor. Communication gaps or inadequate specification of project requirements and project constraints; consequently, setting up unrealistic project timelines. It could be

organizational culture, structure, performance and associated behavior of groups and individuals. The other factor conditions could be less empathy on project dynamics and change or poor implementation and assessment of project speed.

4.2.2 Loss of Competencies

Many companies do not intend to offshore outsource as they believe on core competencies to be develop and preserve and outsourcing partner may take benefit out of active relationship among them, critics argue that the ability to generate profit resides in the inimitability of its competencies and secrecy of its technological asset. (Hoecht and Trott, 2006, Hamel and Prahalad 1990). It been noticed in the industry that engineering services companies out source basic engineering functions that are common such as utility designs, general designs, 3D, 2D modeling , architectural drawings and various other common design jobs. The basic technology of production is always a source of royalty and consider inappropriate to surrender to outsource partner.

4.3 Case Study

In view of above investigation and study, nine (9) open interviews have been conducted with staff in the industry of oil engineering. These interviews use the template provided in appendix A. These interviews are qualitative basis and gather information from operational management through to engineering outsourcing decision makers to executive. Most of these interviews have been conducted over phone and apart from one which uses post. The telephonic interview varies with conversation time from 15 minutes to 20 minutes. Most of the participants' response relevant to research question and investigation. The answers help in analyzing and understanding the situation of outsourcing within oil industry of UK. The open questions support in enquiring the based on their previous answers and help in gathering decision makers experience relevant to this study. However, few starting questions are close questions.

The nine (9) responders are including operation management, decision makers involve in outsourcing decisions and executive. Among nine (9) participants, 1 participant doesn't involve in outsourcing operation and decision as participant's organization doesn't use outsourcing at all. However, 5 participants among remaining eight (8) participants are involved in outsourcing operations such as defining work package individual job each time. The rest of 3 participants are

decision makers and executives; 1 participant is executive manager of outsourcing contracts and 2 participants are decision makers for outsourcing, these decisions includes number of partners for each type of job, partners pool utilization with appropriate balance in shorter and longer run, and partners' rating based on quality and costing.

The summary for response of the questions (appendix A) are as follows:

- 1- "Do you use outsourcing in your organization?", helps in finding the relevance of the organization for this study and relevant weight of the participant within this research. The 8 out of 9 response was "Yes" which enables us to provide high weight to these interviews and supply worth qualitative data and relate with other questions.
- 2- "If "Yes" for 1st Question, Do you involve in outsourcing procedure directly or indirectly?", this question helps in identifying the participant relation with outsourcing process. In this question most of the answer is "Yes". The relevance of the question is very important and the answer of these questions is "Yes" for all 8 yes responses for question 1. Half are involve directly in outsourcing operation/management and half involve indirectly as far as those 8 participants are concern. It shows the straight of these interviews and participants' relevance with outsourcing processes.
- 3- "Do you thing outsourcing is opportunity or thread for organization?", this question provide the understanding for internal affairs and personal connections in decision making for outsourcing. If it is thread then, it can start internal affairs and conflicts within organization. If it is relatively opportunity for organization then it enables more outsourcing functions and processes within organizational operations. 7 answered as opportunity and 2 answered as thread. Among 7, it also includes one organization, who is not involved in outsourcing. It shows the benefits, generally and provides the less conflict basis, if organizations use outsourcing for their operations.
- 4- "If "Opportunity" for 3rd Question, Do you think benefits can achieve in longer run or shorter run? Please explain", this question supply the starting point for building argument about benefits, if so. As most of the participant answered yes for question 3 then this question really make sense for further depth understanding and classifying benefits of outsourcing in view of the personals involve in it. In this connection, staff of outsourcing organization explains various things including the staff involve from organization not involved in outsourcing. The various explanation for this question can be summaries as follows:

- a. Most of the staff things that benefits can be achieve in sorter run, 5 out of 9 participants. However, upon argument that why not longer run. Their understanding is that organization should build human resource and other resources including infrastructure and management to fulfil organizational need rather just rely on outsourcing which can be a thread in which if outsourcing providers work with their own term and conditions. It could be more difficult to overcome the problem in longer if organization doesn't have infrastructure for supply organizational needs. However, on the other hand it can increase the cost. So, in comparison to cost, the longer run cost automatically can be divided into several years turnover and might not significantly affect individual financial year.
- b. In relation to shorter and longer run benefit the argument and emphasis are mixed, although most participants says shorter run but the different in number is not significant. The argument for longer run is more stable and concrete then shorter run. The participant, voted for shorter run can't deny the higher cost. The longer run benefit was more stable as it supports that outsourcing even more stable because organization can get the experience and maintain long relationship with outsourcing providers and enjoy the continuous lower cost without any overhead. On the other hand, they supported their argument that outsourcing engineering can be enhanced quality and put sourcing provide need to main their thresholds due to other compotators. However, same engineering (in house) can be questioned for various procedures at any given time.
- 5- "If "Thread" for 3rd Question, what kinds of thread such as domestic, employment, business, or quality? Please explain", this question included in the series of questionnaires in case most of the participant agree for outsourcing as thread. However, in the study, it is found that most of the participant emphasis for its benefit. In this connection, the relevance of this question is reduced in comparison to detail benefit understanding. Anyway, few participants says as thread in form of minim human resource, less in-depended capabilities, reduce power and less control over organizational operations.
- 6- "Do you think outsourcing most often involve with hidden cost? If so, would it matter if outsourcing function change supplier very frequently? Please explain", most of the participant says yes for hidden cost. Especially operational management staff involve in this study, consider that the hidden cost involve in most cases or overhead. It is most of the time

depend on the term and conditions and how much time organization got for negotiation with outsourcing supplier. In longer run, it is not a significant problem but in shorter run or in the event of change of supplier, organization experience differently. In longer run organization is more stable with known processes and finite number of supplier and well defined functions but in shorter run the agreement of partnership can be complex enough to increase the overhead (hidden cost). However, upon co-relation answer of these questions with qualitative analysis of benefit question. These two are related appropriately. As the previous question, most significant number of participant agree with longer benefit with quality argument and in this question it is again the cost is reduce in connection to overhead in longer run which is in favour of outsourcing.

- 7- “Do you think, organizations loss their competency in longer or shorter run or compromise their quality for outsourcing? Please explain”, again this question is related with quality of organizational operations. Most of the participants in favour of “organizational competency loss” which is a thread for an organization but upon argument, it is analysed that this problem can be overcome with careful organizational policies such as core engineering infra-structure, and learning and attachment with outsourcing suppliers for each transaction can overcome this problem. However, if organizations review their competencies regularly then this thread can be reduced and organizations can still enjoy their benefits of outsourcing.
- 8- “If straight and weakness of outsourcing over direct labour are equal, which mode of operation would you prefer? Please explain”, one of the participants says that it depends on future risks. However, the other participants are voted for half each (outsourcing/direct operations). The participant in favour of outsourcing provided the explanation that outsourcing provide long term benefit with experience and continuous relationship with outsourcing firms. They explain that this can provide the cost cutting benefits for future if not now. On the other hand, the participant voted in against explained that self-competency can reduce the future risks if straights and weaknesses are equal.
- 9- “In general, do you think, administration of outsourcing is more complex and involves more administration cost as compare to in-house labour management?”, No, ninety person of the participant agreed that administration cost is much lesser for outsourcing conditions. This indicates that organization can certainly save administration cost by outsourcing. However,

the decision and agreement of outsourcing required significant expertise and experience for getting much of it.

10- “Any other comments (related or unrelated to outsourcing in engineering services)”, none of the participant responded to this question apart from one participant. Participant responded for general comment; according to participant’s opinion outsourcing minimize risk in longer run due to better relation with providers and better management experience for outsourcing in connection for planning alternatives.

4.4 Analysis

In the case study, the diversified participants with respect to their duties (operational to strategic) provide across the spectrum data with the help of questionnaires build for this purpose. The open questionnaires build purposely for getting the quality data. This data not only help in recognizing the offshore outsourcing factor but also provide the understanding in relation to proposition and risk highlighted in literature review. It is help to co-relate (within qualitative analyses) between case study finding and cost saving and risks highlighted/discuss in literature review.

The literature review chapter 4 discuss the comparison of engineering labor hour wages, the case study results support this phenomenon and upon argument, participants thinks, it is relatively opportunity for organization then it enables more outsourcing functions and processes within organizational operations. However, very few participants says, it can start internal affairs and conflicts within organization. These show the quality functions of offshore outsourcing necessity without thread and show the support of this function. The cost benefit discuss in chapter 4 supported in case study and provide the shorter run cost benefit functions by more then half participants. However, few thinks that the cost benefit can achieve in longer run as well but the risk of losing competency (which is discuss in chapter 4 by Hoecht & Trott, 2006) is still there in longer run. The cost of engineering activities can be saved but it also increase administration and maintain outsourcing function cost, it can vary in shorter and longer run. However, overall cost can be reduced and benefit to organization due to significant engineering operations (main cost) by engineering firms and having main product (sometime).

The risks discuss by Hoecht & Trott, (2006) in chapter 4 are still highlighter in case study findings such as dependence on the suppliers, hidden cost, lost of competencies and ineffective

management. The argument of these qualitative risk discuss can be found across almost all questionnaires discussion.

In the literature review, it is investigated that the main driving forces behind outsourcing is the existence of differences in factor prices across national borders. Figure 2.1 in chapter 2 revealed that the attractiveness of several nations for offshore outsourcing. It shows rating from poor to excellent for various nations for outsourcing attractiveness. Those rating provide with against various factors such as Government support, infrastructure, cost and political stability. Cost is considered as one of the main aspect of outsourcing, however, the benefits of offshore are not just impound to lower costs. McKinsey (2003) articulate that organisations of developed countries replicate the techniques upon labours of developing counties for efficient procedures as well as cost saving. They learn new ways of dealing these factors such as capital and labour. So, there is a significant opportunity of learning which is beyond the cost saving through cheaper labour. One of the examples is IT industry where better project management techniques can be applied for producing software in developing countries. This software could be used for advance marketing practices in developed countries. So, literature shown that outsourcing is not just about cost saving but also efficient management, better applications and effective results. Same factors investigated in the case study, it is learned that participant also highlighted these aspects. However, participants also provide remark on risk of outsourcing and show their concerns for outsourcing which is also studied in chapter 4. This risk could be inappropriate selection of vendor and getting poor services. Detailed contract and communication is really important for sustainable and effective outsourcing. Outsourcing benefits can be spoiled if project have not receive timely response from contracted firm of outsourcing. It is difficult to articulate realistic project/task timeliness for offshore firms. Contrary, it is important to get commitment for every task for overall project efficiency. These types of joint venture may vary due to organization structure, and performance can be affected by organizational culture, individual situation, associated groups at different layers. These issues have been rise in case study investigation and participants show their concern for these factors. If firms articulate and handle these issues priore to involve in long term with offshore contracts. Though, most of the factors organizations learn during execution of these contracts. However, if organizations have experience of outsourcing with existing vendors then it provide the benefit to articulate realistic consideration of these issues prior to involve in new contracts.

The case study also revealed that long term offshore outsourcing practices enable good administration of outsourcing. However, it can lose competency of engineering activities. On the other hand, it can provide knowledge transfer for in-house engineers working in conjunction with outsourcing firms. It depends on contractual condition, firm size, engineering activities, working environment, organizational culture etc. Literature disclose that outsourcing can encourage dependency on outsourcing partners while in-house engineering activity, production and development enable self sustainability and minimize the risk of dependency, however, this phenomenon always seems expensive. The same points have been raise within case study investigation and participant pointed out the dependency issue for outsourcing as one of the risk and as well as considered the in-house engineering as sustainable and competent mechanism. Moreover, most of the participant agrees that this is not cost effective, though. However, it avoids risk. One of the point discuss in the literature is shortage of engineering which can be full fill with the help of outsourcing. This phenomenon is describe by the participant as one of the advantage of outsourcing but also pointed out, this as a risk, and support outsourcing for shortage of labour in shorter run and emphasis that firms should seek do develop their cor competency as quick as possible.

Chapter 5 Conclusions

This chapter interlinks the analysis of literature review, finding and discussion and conclusions are based on previously deduced results. Various best practices and critical factors were identified in this research. Since this is a broad, exploratory study so a detailed analysis of each of these factors was not performed for this research.

The underlying message from the cases studied here is to understand factors drive EPC companies to do offshore outsourcing. This research does not claim that it has covered every factor condition that led offshore outsourcing and related questions have been completely answered, but it does demonstrate the recognition of significant arguments appears in the literature related to offshoring or offshore outsourcing in engineering services.

It has been noticed that potential of growth for engineering services companies operating in UK oil and gas industry are evident. Even the recent global recession chaos and credit crunch leading to drop in oil prices and collapse of emerging economies depicted very gloomy pictures for various industrial sectors. A survey conducted year ago noted that most oil and gas companies using oil prices between \$35/bbl and \$50/bbl when considering any project. Many analysts believes that as long as oil prices maintain the price level of \$50/barrel, most exploration and production projects will proceed as planned (Thomas E, 2008).

The offshore outsourcing practices of engineering firm depends on its category (Sturts and Griffis, 2005, Stasiowski 1993) , industry leaders have the capability of establishing captive models and they do tend to establish their own low cost centers (Rajabzadeh, Rostamy, and Hosseini, 2008). The driving force is often cost reduction and diversification (Ågerfalk and Fitzgerald 2008). By establishing their own low cost centers these firms avoid risk of confidentiality and reliance. These firms also develop global engineering pool and expertise as a part of their globalization. It gives them opportunity of expand their business. Traditional and service based firms do outsource some of non core activities and follow indirect and direct third party business model (Rajabzadeh, Rostamy, and Hosseini, 2008).

The project contract is central to offshoring decisions as increasing cost due to foreign exchange fluctuation and inflation reduces profitability for company (Pellicer, 2005). The engineering firms follow dynamic process of cost control and take decisions purely for cost reduction purposes. It has been noticed that designing job (Sturts and Griffis, 2005, Griffis and Farr, 2000) has very high influence on over all project cost as it can reduce the overall project construction and maintenance cost. So expertise in design engineering is essential to offshore partner and thus engineering services firms often outsource non core design activities. With the development of engineering service partnering, some aspects of detail engineering of become commodity and companies outsource easily.

The man-hour calculations are still the basic and most significant variable of extrapolating the service cost. The difference of man-hour at different geographical locations let companies decide the offshoring options keeping other factors constant such as skill, government support and socioeconomic indicators. The increasing shortage of engineering graduates in Europe and

Britain let engineering firm to develop a pool of engineers and set up global engineering team. This challenge has also facilitates the growing trend of engineering services outsourcing.

The study noted that offshore outsourcing does exist. Joseph (2005) has noted that in last ten years large scales of multi office execution strategy in EPC industry has achieve popularity. EPC companies in next five years would have developed global execution as part of core strategy (Joseph, 2005, McQuary 2003).

Few of among the significant factors that drive companies toward the offshore outsourcing in engineering services are identified in this study are the need to reduce engineering service cost which is under pressure due to intense competition in the market, the scarcity of engineering labor in UK. Although the flip side of the issue is the dependency on outsource partner, the organizational behaviors of Partner Company affect the project executions (Perry, James-Moore and graves, 2006). Kumar and Tore Markeset (2007) notes that whether it's inshore or offshore outsourcing engineering services companies in oil and gas need to develop partnership on service performance basis, the contract should be explanatory and well stated the needs and wants of the both parties. As Agerfalk and Fitzgerald (2008) notes that offshore outsourcing partnership would follow the relational exchange theory and recognize the importance of interactions, interdependencies, reciprocities, and informally negotiated rules of business between parties, relational exchange theory accommodates a formal contract (Goles and Chin 2005).

However, (Joseph, 2005) notes that corporations are very actively investing the setting up development centers in countries with low cost, well-educated labor, such as India, Russia, China, the Philippines and Eastern Europe (Joseph, 2005). According to Lieberman (2004) Companies do contract out some of their functions to companies in developing countries for lower cost (Lieberman, 2004). Case study shows that management and practitioners of UK based organization are convenced for outsourcing. However, they indicate some risk factors such as compitencies loss but on the other hand they emphasis for comprehensive policy and its review on continuous basis can overcome this problem. Careful outsourcing agreement with outsourcing firms not only reduce these risk but also enable enterprises for getting outsourcing experience and expertise dealing with this function and enjoy the cost cutting on the same time in short-term and long-term basis.

In section 4.3, it can be seen that participants of case study are from across the spectrum which provide the quality data for investigating factors discuss in literature review and especially in early part of chapter 4 with the help of open questionnaires. These questions design for analysis of the points discuss in this thesis including cost saving and potential risk for offshore outsourcing. In detail of investigation provided in 4.3, however, last part of section 4.3 provide the analysis and concluded that offshore outsourcing is beneficial phenomenon for engineering industry. However, sometime there is risk for loss of competencies, hidden cost etc. This conclusion based on qualitative data investigated though case study (middle of the section 4.3) and detail provided of the argument discuss with interview participants which is cross verified with factors discuss in earlier part of the thesis.

Last but not least BBC (2009) as 44th U.S. president Obama and indicated in his inaugural speech that U.S. would have ambitious plans of building infrastructure and develop alternative resources of energy at a large scale. He said “We will build the roads and bridges, the electric grids and digital lines that feed our commerce and bind us together, we will harness the sun and the winds and the soil to fuel our cars and run our factories”. It has been analyse as a big opportunity for engineering services companies not only in U.S. but in UK also due to scale of the projects. This is the second infrastructure development plan that is much larger on scale compare to Chinese revamping project of railways during this global economic crisis.

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Appendix A: Interview Template

Date: _____

Time: _____

Place: _____

Staff: _____

Department: _____

Interviewer: Kamran Ahsan

This interview has been carried out to capture the understanding and analysis for the offshore outsourcing in Engineering services. It is an open and informal interview. Many questions have been put forward/discuss anonymously with the management and staff regarding current and future outsourcing prospects. Moreover, extra care for ethic issues such as anonymity, privacy

and confidentiality will be considered throughout the interview as a basis for the dialog. These interview/questions will be taken 10 to 15 minutes approximately:

Q1: Do you use outsourcing in your organization?

YES NO

Q2: If “Yes” for 1st Question, Do you involve in outsourcing procedure directly or indirectly?

YES NO

Q3: Do you thing outsourcing is opportunity or thread for organization?

Opportunity Thread

Q4: If “Opportunity” for 3rd Question, Do you think benefits can achieve in longer run or shorter run? Please explain.

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Q5: If “Thread” for 3rd Question, what kinds of thread such as domestic, employment, business, or quality? Please explain.

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Q6: Do you think outsourcing most often involve with hidden cost? If so, would it matter if outsourcing function change supplier very frequently? Please explain.

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Q7: Do you think, organizations loss their competency in longer or shorter run or compromise their quality for outsourcing? Please explain.

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Q8: if straight and weakness of outsourcing over direct labour are equal, which mode of operation would you prefer? Please explain.

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Q9: In general, do you think, administration of outsourcing is more complex and involves more administration cost as compare to in-house labour management?

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Any other comments (related or unrelated to outsourcing in engineering services):

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Thanks for your time and participation