Market Opportunity Analysis and Partner Selection in the Offshore Construction Market

A study performed at Greatship (India) Limited

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Management summary

This report describes the research performed at Greatship (India) Limited. Greatship (India) Limited is a subsidiary of India's largest private shipping company Great Eastern Shipping Company and it services the offshore logistics market. Due to high oil price and high oil demand expectations, the entire offshore market appears to become a thriving market. Greatship (India) limited is especially interested in the possibilities of expanding operations into the offshore construction industry. In order to determine the feasibility of such an expansion a research has been performed by using the *Market Opportunity Analysis Framework* (Woodruff and Gardial, 1996). This framework suggests five phases for the evaluation of market opportunities: environmental analysis, market definition analysis, identification of market opportunities, market demand forecasting and evaluation of market opportunities. During the research it also became clear that market entrance would only be possible in cooperation with a partner. Hence, aside from the application of the MOA-framework, considerable attention had been paid towards partner selection.

The first phase of the *MOA*-framework clarified that in the coming years demand for offshore construction services will outgrow the supply, thereby creating favourable business environment. The second phase clarified regional differences and further segmentations within the offshore construction market; namely offshore platform construction, offshore pipeline construction and offshore major maintenance. These results were used in the customer analysis (demand analysis) in phase 3. It became clear that offshore construction industry is expecting high demand, which the current supply will not be able to meet. The main growth areas are South East Asia, the Middle East and West Africa. A comprehensive overview of the characteristics of suppliers to the offshore construction industry was then created. Noticeable is that few companies aim to provide services for the maintenance sector only.

The expectations of the oil price, the oil demand and the aging of the current fleet (which will be absorbed by the market) and taking into account that competition in the current offshore logistics market will increase, leads to a positive advise with regard to taking further steps to start in the offshore construction industry. It is recommended that Greatship (India) Limited starts with a small subsea or pipeline project or in maintenance activities. A corresponding investment therefore would be in a Diving Support Vessel or a Multi Service Vessel.

With regard to partner selection the first step included performing a SWOT analysis. It followed that immediate attention would have to be paid to the creation of a department that is dedicated to developments and services in the offshore construction sector. Consequently, partner selection criteria such as size, location, experience and business orientation were added to select a set of nine companies that fit the needs and goals of Greatship (India) Limited in order to start business in the offshore construction industry.

The results of this research should provide the management of Greatship (India) Limited with a view on the offshore construction industry. Further research is recommend to focus on a quantitative support of investment decision. Furthermore, this report should be seen as an intermediate step and should activate the management the make more concise plans on where it envisions Greatship (India) Limited to be in the long term.

Preface

This report is the result of my goal to graduate for the bachelor Industrial Engineering & Management at the University of Twente. In favor of spending some part of my studies abroad, I chose to combine this assignment with my minor "International Management." By now already two years ago, I have spend April 2007 until September 2007 in India, at Greatship (India) Limited.
I reckon this time to be one of the most exciting times of my life and truly value the great deal of influxes I learned to deal with. India is an amazing country that shows enormous differences not only with the Netherlands, but also within the country itself. I hope to visit the country more often in the future, and view the enormous changes the country and Mumbai in particular are going through.

Before getting in touch with Greatship (India) Limited I was new to just about the entire oil industry. Especially from my arrival in India I have made a jumpstart in gaining knowledge and insight in the industry. In this report the entire research that has been performed will be reviewed. It is a final result of my stay in India and the efforts I have spend working on it in the time thereafter back in the Netherlands.

Acknowledgements

During the entire process of the research I have been fortunate to receive support from various people. First and foremost I would like to thank both Martin Stienstra and Jeroen Kraaijenbrink for their support and critical viewpoints that made it possible to create a research of academic level. Furthermore I would like to thank Greatship (India) Limited, and in particular Mayank Jain and Rajesh Gopali for supporting me during my stay in India. I enjoyed my relationship with each of the employees and value the times we have spend together.
I would further like to my AIESEC friends in Mumbai for the fun we have had together.

Last but not least I would like to thank my family, my mother in particular and, friends for supporting me and motivating me to finish this report.

Enschede, December 2009
Joep ter Avest

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Chapter 1: Introduction

1.1 General introduction

This report will describe the procedure and results of a research performed at Greatship (India) Limited[1]. Greatship (India) Limited is located in Mumbai and is a subsidiary of India's largest private shipping company: The Great Eastern Shipping Company. Founded in 1948, it has actively built towards the global reputation that it enjoys today. The company has two main businesses: Shipping and Offshore.
The shipping business is characterized by dry bulk carriers and tankers. This part of the business is involved in transportation of crude oil, petroleum products, gas and dry bulk commodities. Great Eastern Shipping owns and operates a fleet of 40 vessels to serve this market and has been certified ISO 9001:2000. In 2005 Great Eastern Shipping was awarded "Best under a Billion" by Forbes Asia.

The offshore business is carried out by her wholly owned subsidiary Greatship (India) Limited. Greatship (India) Limited has started services in April 2006 and is rapidly expanding her business activities since. Greatship (India) Limited consists of a team of about 25 people (onshore) of whom most have extensive experience within the industry. Her vision is as follows:

Greatship (India) Limited will be an integrated offshore oilfield services provider, and shall, through technology leadership, excellence in execution and an unrelenting focus on delivering value, be the first choice of our present and prospective customers, and the partner of choice in the markets we operate in.

The main services provided currently is the operation of Platform Supply Vessels (PSVs) and Anchor Handling Tugs (AHT)/ Anchor Handling Tug Supply Vessels (AHTSV) in order to:

1) Deliver drilling supplies, fuel water and food
2) Move personnel to, from, and between offshore installations
3) Tow rigs from one location to the next and placing or retrieving its anchors

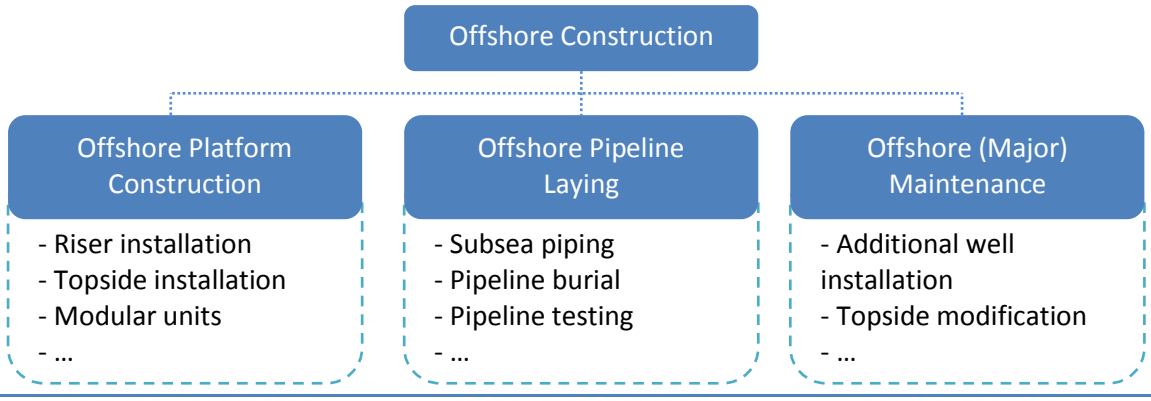
Greatship (India) Limited's owns and operates (as per September 2007): 5 Platform Supply Vessels, 6 Anchor Handling Tug Supply Vessels and 1 drilling rig. Other than these vessels Greatship (India) Limited frequently operates chartered rigs and vessels. Greatship (India) Limited has a strategy that covers rapid expansion and Greatship foresees to have about 75 employees and 20 vessels (AHT/ATHS/PSV) by 2010. Currently the order book contains 16 new building Offshore Supply Vessels (2 mid-sized PSV's, 8 AHTSV's, 6 MPSSV's) and 1 new building 350 feet Jack up Rig.

Lately, the management of Greatship (India) Limited has noticed changes in the business environment. Expectations of high energy demand and high oil prices have lead to the need to explore opportunities in other market segments than offshore logistics in which it currently operates. Due to several reasons, most of which will be described in the particular section "environmental analysis", special interest lies in the market segment of offshore construction. Thus, a structured analysis of business development opportunities in the offshore construction sector has taken place.

[1] Greatship (India) Limited hereafter will also be referred to as GIL or Greatship.

The offshore construction industry can be divided into three major segments: offshore platform construction, offshore pipeline laying and offshore (major) maintenance.

Figure 1: Segmentation of Offshore construction market



Each of the segments is distinct by virtue of life cycle, technology, assets required and expertise.

This research has been executed in order to analyze trends for the market segments and to clarify the gap between the demand and supply, in order to assess the attractiveness of entering the offshore construction market.

1.2 Problem identification & formulation

Currently Greatship (India) Limited is not offering services within the offshore construction industry. In anticipation of an expected increase in the market need of such services, Greatship (India) Limited has required a research to determine the feasibility of such an effort.
The starting point of any form of research is that the management of Greatship (India) Limited asserts to have hardly any knowledge about the offshore construction industry. Initially, the purpose of the study could be described as serving the following two purposes. The first is to determine the feasibility of entering the offshore construction industry. The second, and strongly related, is to gain significant knowledge about the offshore construction market in order to create a business plan. The motivation for the latter is that the creation of a business plan is required in order to convince the management of GE Shipping and other investors to invest in this industry. The following goal definition encompasses these two main objectives:

Initial goal definition: "To gather and analyse the information required for the preparation of the creation of a business plan to enter the offshore construction market"

Essentially, this business plan will follow from the identification of market opportunities within the offshore construction industry and matching those opportunities with the capabilities of Greatship (India) Limited.
During the internship in India several meetings with the management of Greatship (India) Limited, and executive director Venkatraman Sheshashayee in particular, have lead to adjustments of the goal definition. These adjustments were urged by an interim result in the research. This result stated that for Greatship (India) limited to be able to get awarded orders in any segment of the offshore construction industry, it would need to enter into an alliance with an established and experienced offshore construction service provider. This has lead to a second phase added to the initial research in order to identify a suitable partner.

Hence, the problem definition was refined to comply with the changed needs. It is defined as follows:

Retrospective problem definition: "How should Greatship (India) Limited anticipate future developments in the offshore construction market and which potential partners should they cooperate with?"

This refined problem definition takes into account both the initial research basis as well is its refinement further along. Furthermore, it encompasses the identification of the market, its players and the strengths Greatship (India) Limited can use to create business opportunities. The answer to the problem will result in a partial solution for the goal set.

1.3 Research project

In line with the previous description of the research, the objectives that have been defined for the research project are the following:
To provide:

a. *Status of the market today - definition, size, structure, trends, regional anomalies, products/services*
b. *Market players - globally - number, names, sizes, assets, presence, plans, financials*
c. *Demand-supply equation, including prognosis over next five years*
d. *Recommendations for GIL in each market segment/sector*

During the progress of the research the author more often worked with the management and/or direct supervisor in order to clarify the actual needs in more detail. This has lead to emphasis on several aspects such as platform construction and pipeline laying and less on major maintenance activities. Furthermore, it should be noted that partner selection has become an important share of the research.

1.4 Research strategy & research questions

In order to assess the main problem in a structured way, a framework for the analysis of market opportunities is used. The framework itself will be introduced in chapter 2. The research questions are an operationalization of the aspects characterizing the general Market Opportunity Analysis-Framework. The framework was used as a guidance and allowed for adaptation to the Offshore Construction industry. Aside from the research questions below, that distinctly belong to phases in the MOA-framework, operationalization of the framework is done in chapter 2. Note that the last research question is added to cope with partner selection and the last phase of the MOA framework corresponds to a partial answer to the problem definition.

- What are the major developments in the offshore construction industry and what will be their expected impact in the coming years?
- Which segments does the offshore construction industry consist of, and what are the characteristics of these market segments?
- How can the competition, customers and suppliers in the offshore construction market currently be characterized with regard to size, location, assets and activities?
- What are the forecasts for the market segments in the coming years?
- Which companies are suitable for cooperation with Greatship (India) limited in the offshore construction industry?

1.5 Limitations

The following aspects will not be reviewed within the scope of this research:

- Technical specifications

Technical specifications related to both vessels as well as platforms or pipelines will not be reviewed in depth. For the purpose of this research it is sufficient to mention only the main techniques in offshore technology. These may lead to a starting point for further research on a technological basis. It is advised that in a later stage Greatship (India) Limited would acquire more in-depth knowledge about the latest and most popular techniques available.

- Financial rational

Although this information is vital for the investment decision, it could not be collected and thus is a major limitation for the project. Although a part of such information has been gathered by other organizations it can only be bought at a price Greatship (India) Limited was unwilling to pay. In the concluding sections of the report further comments will be given on this aspect. The report itself will suffice by indicating which information is required, and how such information could be used to support decision-making.

- Worldwide demand

This report will mostly focus on South East Asia and the Middle East and to a lesser extent West Africa as regions for business expansion. The main reason here for is that during the research a start in both America as well as West-Africa was discouraged by industry experts and excluded by the management of Greatship (India) Limited.

- Socio-demographic issues

As part of the theoretical framework used, the socio-demographic issues should be evaluated. However, due to the setting of priorities and expected impact on the end result it has been chosen to leave this aspect out of the scope of this research.

- Vessel suppliers

It has been decided not to elaborate upon the suppliers of vessels for Greatship (India) Limited in the offshore construction industry. In the report it is indicated that a scarce amongst vessels that are compliant with the needs of the offshore construction industry will arise. For this research, this aspect will not be dealt with extensively.

- Other market opportunities

Last but certainly not least it should be noted that the urge for this report has arisen from expectations of the oil industry. These would in turn drive the demand for offshore construction services. However, these expectations do not limit the expected increase in demand to offshore construction services. For example, the operation of mobile high-depth drilling is expected to rise as well. These market opportunities other than the offshore construction industry are not reviewed.

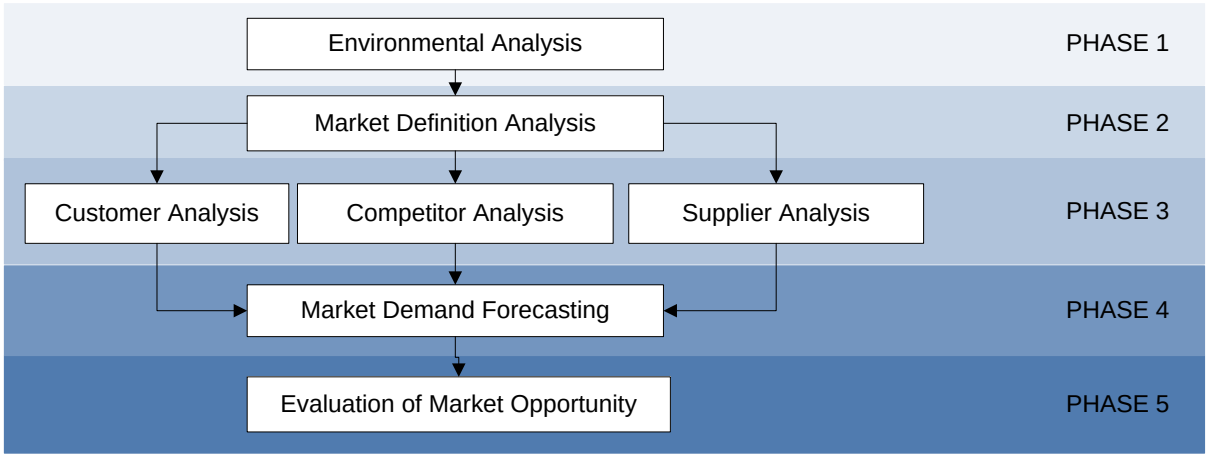
Chapter 2: Theoretical background

This chapter will introduce the theoretical framework that will be used for answering the problem definition (*"How should Greatship (India) Limited anticipate future developments in the offshore construction market and which potential partners should they cooperate with?"*).

2.1 Framework for analyzing market opportunities

In order to be able to make a decision regarding expansion of offshore services, Greatship (India) Limited needs to comprehensively assess the offshore construction market to determine the feasibility of such an expansion. A method well suited for this assessment is called Market Opportunity Analysis (MOA). The application of this method is chosen since it is in line with the (management) need to get a broad perspective of the market, both from a historical viewpoint as well as future trends, as well as a more narrow view based on specific companies' abilities. The MOA framework applied here meets these needs by reviewing market by assessing the external market-potential demand, current players in the market, and customers' need along with the internal capabilities of the company to determine the feasibility of pursuing expansion of operations into the offshore construction market. A graphical representation is presented below in figure 2.

Figure 2: The Market Opportunity Analysis (MOA) Framework



Adapted from: Woodruff and Gardial 1996. 22-48

Phase 1: Environmental Analysis

The first step involves analysis of the macro-environment, which includes forces outside the control of the organization that can substantially impact market opportunity. The major forces to examine include economic, technological, social, political, and regulatory (Lehmann and Winer 2002; Cadotte and Bruce 2003). Firms should recognize susceptibility to changes in macro environmental forces, and position themselves to minimize negative impact and leverage positive impact.

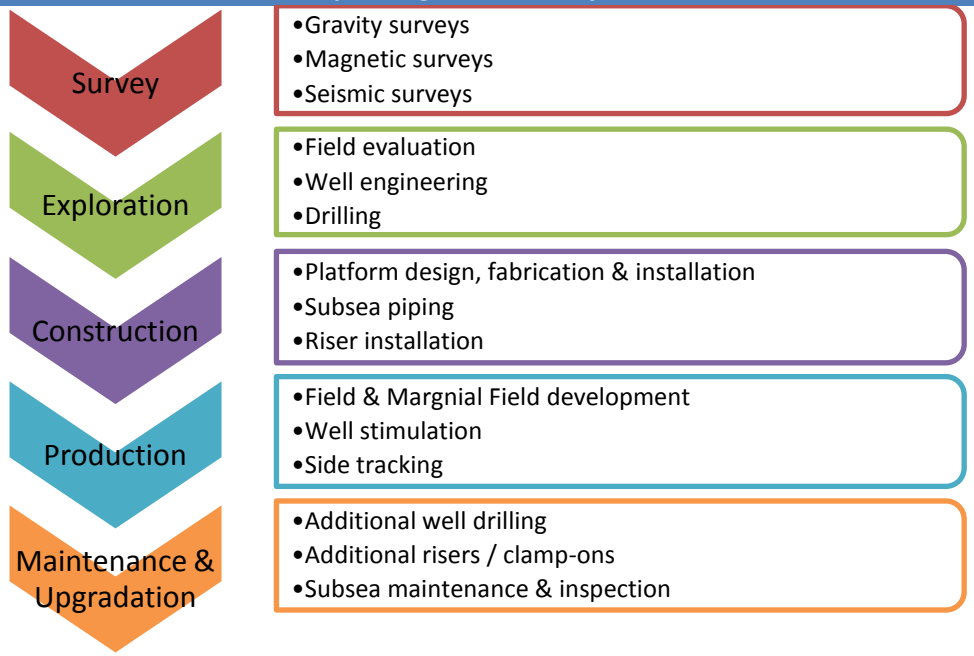
Choi (Choi, 2009) supports the importance of this phase. Northeast Asia's rapid economic growth in the past two decades tremendously impacted the region's oil and natural gas consumption and its dependence on non-regional energy supplies. Growing energy demand is a preeminent security issue for Northeast Asia because of its distinctive energy vulnerabilities and geopolitical location.

Operationalization of this stage towards application at Greatship (India) Limited resulted in a focus on economic developments and developments in the offshore oil market. The other factors indicated by Lehmann and Winer are expected to have a smaller impact an due to time limitations it was chosen to leave these aspect out of the scope of this research.

Phase 2: Market Definition Analysis
The second step is the definition of markets. This task involves identifying the major markets in which the product or service competes, and segmenting the market into a product-market structure. Not only does this phase establish boundaries for all subsequent analysis, it is also crucial to help to understand the organization of the market and delimit the segment(s) in, and products/services against, which the firm will compete.

According to a presentation by Greatship (India) Limited (Presentation on the offshore industry, 2007) the activities in the lifecycle of an oilfield can broadly be defined into the following categories/stages: survey, exploration, construction, production and maintenance & upgradation.

Figure 3: Overview of main activities per stage in the life cycle of an oilfield



Offshore construction includes activities in the third and the fifth phase. Commonly offshore construction is divided into: Offshore platform construction, offshore pipeline laying and offshore (major) maintenance. Since this is common segmentation to make for the offshore construction industry, this research will use this segmentation. Operationalization of this phase leads to the following characteristics that will be reviewed for each market segments:

- Involved technology/equipment
- Operational circumstances
- Regional differences
- Seasonal influences

Because no additional literature was found that can support whether the research should limit itself to the above mentioned segment characteristics, the management of Greatship (India) Limited was consulted for advise. They agreed that from a business perspective these were the elements they were interested in.

Phase 3: Customer, Competitor and Supplier Analysis
Following the definition of markets, the MOA process involves collection and analysis of information to determine market opportunities. Collection and analysis of information regarding customers, competitors, and suppliers reveals the size and share of market and historical cost and profit data, as

well as identifies long-term trends and short-term changes in the market (Lehmann and Winer, 2002). Results from this stage establish the minimum requirements necessary to enter the market.

The aspects that are researched with regard to customer analysis are the number of projects per region, the type and size of the projects and main contractors.
With regard to competitors the aspects that are reviewed are the market segment in which they perform operations, the company name and market share, the geographic locations in which it operates, the company's activities and assets.
With regard to the supplier analysis the vessel suppliers are reviewed. Due to the scope of the research this is limited to a qualitative discussion.

Step 4: Market Demand Forecasting
While step 3 involves a historical view of sales and market share, step 4 requires estimating the potential for future market demand and the share of demand to be captured by the organization.
The information collected in step three is often in both quantitative and qualitative form. Therefore, demand estimation techniques suited for analysis of both types of data must be adopted.

Without a sales forecast, in the short term, operations can only respond retroactively, leading to lost orders, inadequate service and poorly utilized production resources (Fildes, 1994).

Step 5: Evaluation of Market Opportunity
The final step in the MOA framework is a two-stage process entailing identification of new opportunities, such as creating new ways or means for satisfying buyer needs that are consistent with core competencies, and matching those opportunities with organizational capabilities. In this stage a SWOT (strengths, weaknesses, opportunities and threats) analysis is recommended to focus attention between an organization's internal capabilities and its external environment.

2.2 SWOT Analysis

The SWOT analysis will be used during phase 5 of the MOA-framework. The SWOT analysis is usually applied to identify the internal and external critical points of an organization to support the best strategies to focus on the strengths, minimize weaknesses, to mitigate the threats, and take the greatest possible advantage of the available opportunities (Balamuralikrishna, 1995). The result of the SWOT analysis can be summarized as in the following table:

Figure 4: SWOT Analysis

	Helpful to the organization	**Harmful to the organization**
Internal	Strengths	Weaknesses
External	Opportunities	Threats

Strengths: Attributes of the organization that are helpful to achieving the objective.
Weaknesses: Attributes of the organization that are harmful to achieving the objective.
Opportunities: External conditions that are helpful to achieving the objective.
Threats: External conditions that are harmful to achieving the objective

Strategic options have their own place in the process of strategic analysis after the SWOT analysis is done and the strategic issues are identified. In other words, the SWOT analysis summarizes the outcomes of the internal and external analyses; it does not yet contain strategic actions. First, the strategic issues need to be identified. Strategic issues are all the matters of strategic importance that stem forth from the SWOT analysis. Strategic issues can be derived from the lists of Strengths, Weaknesses, Opportunities, and Threats. Strategic issues can be Weaknesses that need to be addressed in order to avoid failure, Threats that need to be countered, or Opportunities that need to be captured before rivals do.

Strategic issues can also stem forth from a SWOT confrontation matrix, in which Strengths and Weaknesses are listed on one axis and Opportunities and Threats on the other. All combinations of S & W on the one hand, and O & T on the other are reviewed to see if failure is to be averted or success is to be created. After the issues have been defined, alternative courses of action can be formulated: the strategic options. This is largely a creative process (van Raaij, RSM).

One method used to gain more insight into correlations between strengths, weaknesses opportunities and treats is by creating a table to indicate correlations. Correlations between strengths and opportunities (relating to offensive strategies for these factors) can be evaluated "+" or "++" whereas relations for threats and weaknesses (corresponding to defensive strategies) can be either "-" or "- - ". For the other quadrants relations can be either "++", "+","-" or "- -" with an extra "*" indicating this aspects requires immediate attention.
The resulting relationships can be clustered. For these relationships the following table characterizes the strategic behaviour recommended per segment.

Figure 5: SWOT Confrontation Matrix

	Strengths	**Weaknesses**
Opportunities	Offensive Make the most of these	Defensive Watch competition closely
Threats	Adjust Restore strengths	Survive Turn around

2.3 Partner selection

In addition to the MOA-framework additional literature is used with the purpose of gaining insight into market entry strategies. During the research, several interviews with industry experts pointed out the need to enter into an alliance when entering any part of the offshore construction market. The crucial argument here is that in order to be able to get awarded construction orders, experience and status in the market are a prerequisite.
The expertise generally resides in established companies or if advances in technology are needed, can most easily be acquired by them. It is difficult therefore for new entrants to break into the business on their own and to develop or acquire the necessary skills. Firms enter into collaborative relationships because these are expected to yield superior value relative to alternate organizational forms in certain situations, offering potentially synergistic combinations of complementary resources and capabilities (Madhok, 1998). More concisely for smaller firms (Hitt et al., 2000) argue that alliances are often developed to enhance a firm's own status and image by tapping into the reputation of more established partners.

In their study on alliance partner selection decisions, Hitt *et al*. (2000) found support for resource-based reasoning. In particular, developed market firms sought partners with complementary resource endowments such as local market knowledge and access to distribution channels, which offered potential for strategic development. Similarly, emerging market firms sought partners that helped them secure access to resources that they lacked, namely financial and technical resources, and strategic positions in the marketplace. Alliances enable sharing of complementary resources among firms, making synergy creation possible.

According to Hitt et al. (Hitt et al, 2000) little is known about factors that lead to success in alliances, and research suggests that a substantial number of alliances produce dissatisfactory results (Madhok & Tallman, 1998). Hitt et al. have therefore performed a research that has focussed on the importance of partner selection criteria, while differentiating between emerging market firms and developed market firms. The figure on the next page provides an overview of their results.

Figure 6: Priorities in Selecting Alliance Partners by Market Type

Importance/Priority	Emerging Market Firms	Developed Market Firms
Important and differential priority	Financial assets	Unique competencies
	Technical capabilities	Market knowledge/access
	Intangible assets	Previous alliance experience
	Willingness to share expertise	Cost of alternatives
	Capability for quality	Industry attractiveness
		Special skills to learn from partner
Important and similar priority	Complementary capabilities	Complementary capabilities
	Managerial capabilities	Managerial capabilities
Important but differentially lower Priority	Unique competencies	Financial assets
	Industry attractiveness	Intangible assets
	Market knowledge/access	Capability for quality
	Previous alliance experience	Willingness to share expertise
	Special skills to learn from partner	
Unimportant	Cost of alternatives	Partner's ability to acquire skills
	Partner's ability to acquire skills	Technical capabilities

Source: Partner selection in Emerging and Developed Market Contexts: Resource-Based and Organizational Learning Perspectives, Hitt et al. (2000)

Chapter 3: Methodology

In this chapter the research design and the methods used to conduct the research and acquire the data will be clarified. The research design provides an outline for the arrangement of this report, which will be described at the end of this chapter.

3.1 Research design

The problem definition aims to clarify *what* is going on in the offshore construction industry. It may thus be described as descriptive research (Saunders 2007). De Vaus (2001) defines guidelines to help to narrow down the descriptive research.

Scope of the core concepts, abstractness and aspects

The offshore construction encompasses an enormous range of activities. This research has both quite abstract as well as detailed objectives. Abstract goals regard the discovery of trends in the offshore construction industry and the identification of regional similarities. On the other hand, it also aims to provide insights into suitable partners for Greatship (India) Limited, which occurs on a detailed level. The aspects that are of interest differ per phase of the MOA framework, and recommendations per phase are used as a guideline for the aspects to be reviewed.

Time frame

The interest of this research lies not just at the current levels of offshore construction but to a large extent on the future developments to be expected over the coming years. Preferably the information over a period of 30 years is reviewed, in order to create information for an economically underpinned investment decision. However, with an increase in time, the increase in variability will become tremendous and inherently to the industry context such large time horizon projections are not available. Hence, for the largest part of the research expectations for the coming five years are taken as a basis, since information regarding this period is fairly reliable.
Note: The working out of this report has taken a large amount of time. During this time the data has been checked for consistency with newer information a few times.

Geographical location

The main geographical locations of interest for this report are South East Asia, the Indian subcontinent in particular, the Middle East and West Africa. In this report the choice for these regions will be dealt with more thoroughly.

3.2 Preparation for the research

Preceding the start of the research at Greatship (India) Limited the preparation focused on three aspects. The first was the *cultural preparation*. In order to prepare for the cultural differences and how these could influence the internship a report was written. A structured approach was reached by using Geert Hofstede's cultural dimensions for international business.
The second aspect of the preparation consisted of *clarifying the research goals* Greatship (India) Limited had for the project. This involved communication regarding the current knowledge level at Greatship (India) Limited regarding the offshore construction market, as well as their main objectives for this research. The third aspect was *aligning these business objectives with university's objectives*. Because the research would become the basis for the bachelor thesis, it had to be made sure that the research would be of academic level. In order to ensure this would happen a research proposal was written and in an early stage of the research the goal formulation was revised.
The second and the third aspect mentioned here are closely related. Apart from communication with Greatship (India) Limited and the use of industry related articles the main focus in this stage was a literature review.

3.3 Systematic Literature Review

The literature study is based on the Systematic Literature Review. A systematic literature review can comprehensively identify, track down, and appraise all the literature on a topic (Petticrew, 2003). To perform the literature research a combination of search engines have been used.

Figure 7: Systematic Literature Review		Search Entry	
Include	**Exclude**	**Include**	**Exclude**
Offshore platform, pipeline construction and offshore maintenance	Onshore construction and maintenance	Offshore platform construction	Oil market developments
Market opportunity analysis	Quantitave models	Offshore pipeline construction	Offshore construction
Demand forecasting	Articles before 1990's	Offshore mainten*	India oil market
Competitor analysis	In- depth construction issues	Offshore construction demand forecasting	Offshore projects
Market entry	Exploration & Production	Competitor, supplier analysis	Demand forecasting
		Market Opportunit* Analy*	Oil forecast

A selection has to be made regarding the articles that will be reviewed. Figure 7 summarizes the guidelines that have been used to determine the usability of articles. Most articles that were excluded were either quantitative models containing a high amount of variables that were not easily determined within this project or they were concerned with fundamental construction issues such as specific techniques to foster oil recovery. Although highly interesting for the industry, this was not the emphasis of this study and therefore excluded from the article search.

The literature search has been performed by using the Quicksearch search engine offered by the library of the University of Twente. This searches simultaneously in three databases: Picarta, Scopus and Web of Science. Searching in those databases, the 25 best-rated journals in Operations Management are covered (Olsen 2005). The search results are consequently selected on appropriateness and relevance by skimming the article and reading the abstract and the conclusion. In case the article turned out to be highly valuable, a forward-backward search was used to check if there are more useful articles regarding the subject.

3.4 Format of data collection

During the internship the targets of the management were made more specific on numerous occasions and the market opportunity analysis was executed following guidelines proposed by literature. The purpose of these meetings was redefinition of the priorities of the management of Greatship (India) Limited. During this process more often it turned out that information knowledge of certain topics already existed amongst employees, but because there was no formal documentation or comparable solution there was no awareness of this knowledge. Results of these meetings lead to additional requirements regarding market entry requirements and more detailed partner identification.

Besides these employees of Greatship (India) limited, who often turned out to be a valuable source for the research, other main sources were interviews with industry experts from renowned companies in the offshore industry, newsletters of the offshore industry, annual reports of oil companies and company reports.

The interviews with industry experts were conducted in an in-depth interview manner. This method is very suitable for a one interviewer, one interviewee setting. The interviews took place according to a loosely structured list of questions. The method is valid to use because it is very suitable to find out motives and backgrounds.

While structuring the information acquired during the research an iterative process has taken place in which the output per stage as specified by the Market Opportunity Analysis model is compared with the output found for Greatship (India) Limited. Consequently, for missing or incomplete information it would be determined whether it would be feasible to acquire the information within the scope of the research. Using the MOA-framework offered a great advantage of being able to structure an enormous amount of data and information in a relatively easy way. At the discussion-section at the end of this report some pitfalls of the model will be mentioned.

3.5 Credibility of research findings

Unfortunately there are some aspects that have a negative impact on the reliability of the research.
More specifically, since the author was relatively new to the field of offshore construction, the information collected could have been interpreted in a wrong way. For example, the author could have judged activities not corresponding to offshore construction while in fact they were. However, this effect has been minimized by frequent contact with employees to solve questions and uncertainty.
Furthermore, during interviews, subject bias has possibly influenced the results of this research. Several interviews have been conducted amongst industry experts. These experts work at rival firms, which might has resulted in strategic behaviour from their side. However, no major contradictions were established.
Also, initially this study was characterized as a cross-sectional study: a study of a particular phenomenon at a particular time (Saunders 2007). However, due to the large time frame in finalizing the project certain variables might have changed. This may have lead to statements loosing value. This effect is regretted, but contact with sources was maintained even whilst returned in the Netherlands in order to minimize its impact.

3.6 Structure of report

The Market Opportunity Analysis, as introduced in the previous chapter, will be used as a guideline for a large part of the report. Each of the five phases that belong to the MOA-framework, will receive its own attention in chapter 4 " results". The first section of the results deals with the first stage of the framework: environmental analysis. In this section the major trends, drivers and threats will be described. In the second phase of the framework, market definition analysis, market segmentation will occur. This will be done by differentiating between the different offshore construction services, the vessel requirements per market segment, regional discrepancies and seasonal influences. Consequently the next section regards the third phase of the framework: identification of market opportunities. This section will emphasize aspects such as competitor and supplier status. The next section is related to the fourth phase of the framework: Market Demand Forecasting. The next section deals with the final phase of the MOA-framework and elaborates on the evaluation of market opportunities. Consequently results of the partner selection are elaborated upon. The report will conclude with conclusion regarding the initial problem definition, a discussion and recommendations for further research.

Chapter 4: Results

4.1 Results MOA-framework phase 1 – Environmental Analysis

A multitude of environmental factors have lead to the need at Greatship (India) Limited to further explore the offshore construction industry. Most evident are the expected growth in energy consumption and the high rise in the oil price since the start of the century. However, figure 8 summarizes industry drivers and threats. The following causes influence not only the offshore construction industry but the entire offshore industry.

Figure 8: Industry drivers and threats	
Main industry drivers	**Main industry threats**
Growth in energy consumption	Industry volatility (based on perception of oil price)
High oil price	Operational risk
High utilization rates/low spare capacity	Trend towards deeper water extraction
No scalable alternative to oil	Seasonality of offshore construction industry
Rising number of rigs in use	Legal regulation
Global upstream companies have significantly raised Exploration & Production spends to secure new oil reserves	Local and international political and economic conditions
	Risk of alternative fuels
	Risk of changing competition
	High competition
	Order books fabrication yards full

Industry drivers

Growth in energy consumption

The global oil consumption is expected to rise from 85 million barrels a day in 2006 to 118 million barrels a day in 2030.[2] The rise mainly stems from emerging Asia (including China and India), who take account for 45% of the total world increase in oil use.

High oil price

Oil prices are estimated not to fall under $50 dollar per barrel between now and 2030 (based on business as usual, any disruption such as war, terror or weather will have an adverse impact). This is a considerably higher (average) rate than seen over the last 30 years. Due to this higher oil price, oil companies are willing to invest more in order to produce more oil.

Low spare capacity

The low spare capacity the offshore industry is currently facing has several causes. Two of them stand out in importance. Firstly, the low spare capacity is a result of a decrease in investment in the offshore industry over the period 1980-2000. As a result of a high oil price in the beginning of the 80s, large investments were done in offshore vessels. But because of the non-increase in oil price, these investments decreased in the years thereafter.

[2] Source: EIA (Energy Information Agency)

Secondly, because of technological developments and the trend towards deep-water exploration, the current (aged) vessels are unable to meet the requirements of the offshore industry. Thus, now that demand has accelerated rapidly, the industry is facing high utilization rates, while at the same time a lot of vessels will need to be replaced. It is thus expected that the market will absorb new build vessels. Together with the high oil price this leads to attractive charter-rates for all offshore industry servicing vessels (see figure 9).

Figure 9: Consequences of a high energy demand and a high oil price

Rising number of rigs in use/ offshore leases
The rig-utilization rate is at a all-time high. Since the exploration of oilfields is a highly risky and capital intensive operation, a high utilization rate of drillings is an indication that high demand for construction vessels can be expected. Several oil companies have announced that they are in the early stages of multi year growth in E&P spending, which will thus lead to a higher demand for construction services. Due to the time required to drill a well and fabricate a production platform, demand for construction services usually lags exploratory drilling by six to eighteen months.

Industry threats
Industry volatility
The industry is highly influenced by perceptions of future oil and gas price. All fall in the oil & gas price or oil demand will lower E&P expenditure and ultimately platform construction. If such a fall should occur after a couple of years, there is a risk of sudden oversupply.

Operational risk
Offshore construction involves a certain degree of risk, such as suffering from weather conditions. Another important source of risk is the overall risk related to the type of activity performed. QHSE (Quality, Healthy, Safety and Environmental) issues are of utmost importance for both oil companies as well as for companies servicing the offshore oil sector.

Competition
Current market players in the offshore construction sector have established strong relationships with contractors and oil companies. This, and the knowledge and capital intensiveness have created a highly competitive environment, with high entry barriers for new market players.
Next to that, the competition is likely to change over the coming years. Because of for example the depletion of the North Sea, it can be expected that the vessels that were previously contracted here will find new contracts in other regions worldwide. Hence, these experienced companies might become competitors for Greatship (India) Limited as well.

Other than the competition in the offshore construction market, the competition in the offshore logistics sector is of importance. Unlike the market entrance barrier in the offshore construction industry, the market entry in the offshore logistics sector is relatively low. Hence, it may be expected that the competition in the current core business of Greatship (India) Limited will further increase.

Next to the above description a full explanation regarding all aspects mentioned in this table is added to Appendix B – Industry history and trends.

4.2 Results MOA-framework phase 2 – Market Definition Analysis

This chapter is concerned with identifying and characterizing the major markets in which offshore construction is offered. In section 4.1 the market segmentation will take place. The subparagraphs describe the main activities per market segment. Following in section 4.2 are the subsequent segmentations. These are based on the segmentations pointed out in interviews. Subsequently, the characteristics of the segments will be regarded: in section 4.2.1 the vessel requirements per market segment and section 4.2.1 the regional discrepancies are discussed. Consequently, in section 4.2.3 seasonal influences are treated.

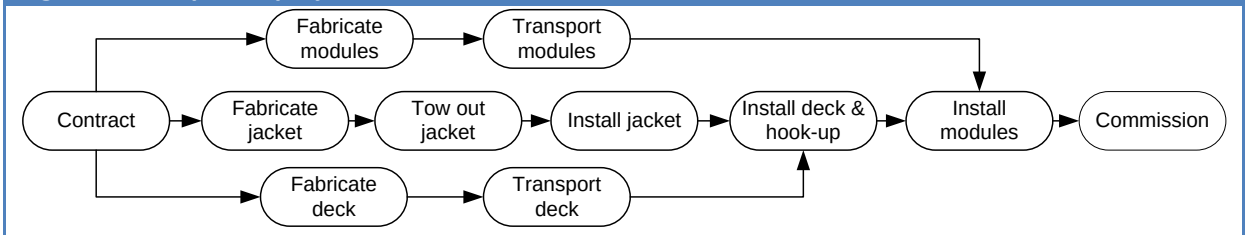
4.2.1 Offshore Construction Services

This section will provide more insight in the processes and products that characterise the different sectors: offshore platform construction, offshore pipeline laying and offshore maintenance activities. Note however that these are not the specific subject of study and hence depth of research will be limited. Figure 4 (below) emphasizes the stage in which the activities take place.

Offshore platform construction

The major activities in offshore construction are the installation & hook-up of the jacket, deck and subsequently the modules (see relation below in figure 10).

Figure 10: Simplified project network for the installation of an Offshore Oil Platform



Adopted from: Weather Risk in Offshore Projects, Bowers & Mould (1994)

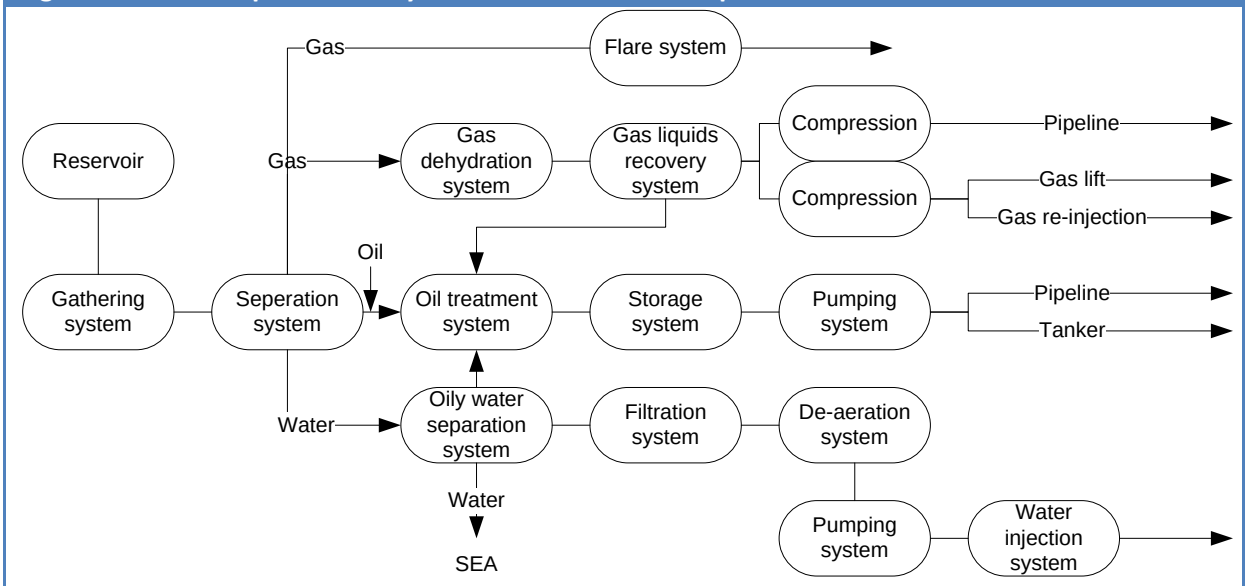
Other main activities include heavy load-outs and offshore heavy lifts and equipment installation and erection. Paradoxically, the offshore activities tend to be characterized by relatively simple operations; most of the 'difficult' activities are performed onshore[3], and parts are foremost installed in readily assembled modules. One of the major influencers for performing offshore operations are weather circumstances and environmental regulation. More on this subject will follow in the section "seasonal influences".

Components of an offshore oil platform

Next to figure 10 above, which displays the sequence of the main activities in offshore platform construction, a general view of possible production systems (components) of an offshore oil platform can be given (see figure 11 below). This figure displays only general functions, since platforms differ in size and purpose. For example, wellhead platforms may be set up differently than process platforms.

[3] Source: Interview with George Duke, Duke Offshore.

Figure 11: Possible production systems on an offshore oil platform



Source: Speaking Oil & Gas, Rick Wilkinson (2006)

Consequently, due to the differences in the platforms the construction timeframe differs per project. For example, while the installation of a process platform takes 30 days, a wellhead platform might only take 20 days. For pipelines (also see next section) and indication is a laying speed of 1.2-1.5 km per day[4].

Offshore pipeline laying

Several aspects characterize the pipeline laying process. These are: the length, diameter and depth of the pipeline, the technique applied for the actual pipeline laying, additional requirements such as burying of the pipeline and all related feasibility studies.
The length, diameter and depth mainly determine the technique that will be used for the pipeline laying. The most well known techniques in pipeline laying are conventional (S-lay) pipeline laying, J-lay pipeline laying and REEL-pipeline laying.

Conventional pipeline, or S-lay, installation involves the sequential assembly of pieces of pipe through an assembly line of welding stations that run the length of the pipelay vessel. Welds are then tested and coated on the deck of the pipelay barge. The pipe is then supported off the stern and into the water via a ramp that is referred to as a "pontoon" or "stinger." The ramp supports the pipe to some distance under the water and prevents over-stressing as it curves into a horizontal position downward toward the sea floor. The barge is then moved forward by its anchor winches and the pipeline is laid on the sea floor. The suspended pipe forms an elongated "S" shape as it undergoes a second bend above the contact point on the sea floor. During the pipelay process, divers regularly inspect the pipeline to ensure that there are no obstructions on the sea floor, that the ramp is providing proper support and that the pipeline is settling correctly[5].

Instead of welding the pipeline pieces horizontally, the J-lay assembly technique welds the pieces vertically. This technique is applied in deeper depths, were the application of S-lay pipeline laying would lead to too much stress on the pipeline, resulting from the higher weight that has to be supported. However, this technique is more expensive to execute.

[4] Indications provided by Rupchand Lohana, Manager – Domestic Marketing, Larsen & Toubro Limited
[5] Horizon Offshore

In another technique, REEL-Lay Pipeline Laying, the actual assembly of the pipeline occurs onshore. This pipeline is consequently rolled of a gigantic carousel. With this technique a higher laying speed can be achieved but the maximum diameter of pipelines laying with this technique is lower.

In some areas it is required to bury the pipeline. Therefore pipeline barges can tow jet sleds that used a high pressure stream of air and water, pumped from the barge, to create a trench into which the pipe is then layed.

Offshore maintenance activities

Although there is no clear definition of offshore maintenance activities, the activities under the heading of maintenance activities are most similar to those in platform construction. Smaller, ongoing, maintenance activities are not covered by this category[6]. Activities that are common for this category are those activities that can be performed in order to boost the lifecycle dramatically, either halfway the lifecycle of an oil platform or near the end it. For example, the additions of modules or wells, topside modification/refurbishments, bigger ongoing maintenance jobs such as Non Destructive Testing.

4.2.2 Operational circumstances

Vessel requirements

The most accurate information available (Mainly ODS-Petrodata information) shows a registration of 190 construction vessels (March 2007). The characterizations of these vessels leads to an overview of the composition of the current fleet (in terms of vessel type and capabilities), the modernity of the current fleet and trends in the composition of the fleet.

Out of the 190 registered construction vessels 108 have a conventional mooring system, 72 have a DP (Dynamically Positioning) mooring system[7] and for the others the mooring system is unknown. A noticeable difference is that the newer DP moored vessels are commonly equipped with more capabilities, thereby making them suitable for more diverse tasks.
Because of the investment peak (resulting from the high oil price) in the 70s it is expected that just as the then-build platforms, the then-build vessels will need to replaced/refurbished within the coming years. This makes it more difficult to forecast how many vessels will be active on the market in the coming years (there is no information that covers which vessels will be replaced and which will be maintained). However, a clear trend is that the newer vessels will be equipped with a DP system and will generally be capable to perform more diverse tasks.

Information about the new-build program of different shipping yards was not available for the project, thereby hindering thorough analysis of supply growth. More research about exact trends in requirements, and how the current and future vessels will bridge the gap that can arise from these trends, needs to be done.
Because GIL maintains close contact with brokers it was decided at his point that the focus would not lie on what the exact requirements of the vessels will be.

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[6] Also, according to Arun Tarkar of J. Ray McDermott after the project delivery there usually is a period of say 2 years "*free warranty*" translated as 2 years of free spare parts. Thereafter small maintenance activities are done by the operator.

[7] Dynamic positioning (DP) is a system to automatically maintain a ship's position and heading by using her own propellers and thrusters. This allows operations at sea where mooring or anchoring is not feasible due to deep water, congestion on the sea bottom (pipelines, templates) or other problems.
(source: http://en.wikipedia.org/wiki/Dynamic_positioning)

Besides the actual current fleet characteristics, a brief analysis of how these vessels relate to different geographic areas was done. In case of pipeline laying activities the following observations were made[8]:

- In the Middle East water depths for pipeline laying activities are relatively small (200ft). This goes for both the Persian gulf and the Mediterranean region. Egypt has some projects with water depths up to 2000 feet and is thereby an exception for the area.
- South-East Asia shows more variety. Most projects in Malaysia, Indonesia, Thailand, Vietnam, India, China, Vietnam, Australia and New Zealand are in water depths between 100 ft and 500 ft. However, in Malaysia, India, Indonesia, China and especially Australia there is also deepwater pipeline laying activity.
- In West Africa water depths are generally deeper. Mainly because of deepwater activity offshore Congo, Angola and Nigeria, with average water depths exceeding 2000 ft. Offshore Ghana and Gabon the water depths are however much lower (and thus older vessels are suitable here as well).

Resulting from this information, it can be concluded that for an average project in West Africa the depth is significantly higher than for a project in either of the previously mentioned areas. Thus, conventional pipeline laying methods would not be suitable for this region; instead J-lay could be applied. Furthermore, in the Middle East conventional pipeline laying techniques can be used, based on this information only.

Regional investment discrepancies

Greatship (India) Limited currently focuses on the North Sea, the Middle East, and South-East Asia for delivering her services. As per the desire of Greatship (India) Limited's management the research also focussed on only several regions, namely: South-east Asia, the Middle East, and West Africa. The Figure 12 supports this choice: It indicates that these are the main growth regions. Note that the Caspian Sea is the highest growth region in terms of both platforms & modules as well as on pipelines. However, focus will not lie on this region, because the Caspian Sea is actually a gigantic lake and is not connected to the sea. This involves a risk of dependence of only one market Greatship (India) Limited is not willing to take. Other than that the author found that this market is particularly dominated by few well-known market players.

Figure 12: Expenditure levels – Offshore Construction

	Platforms & Modules		Pipelines	
	2001	**2010**	**2001**	**2010**
North America (GoM)	1675	720	1440	520
South America	525	490	115	75
Europe -UK	1225	1045	985	435
-Norway	2420	975	420	475
-Mediterranean	170	230	100	80
Middle East	**1225**	**645**	**120**	**575**
Caspian Sea	85	1545	15	490
South-East Asia	**1615**	**2490**	**345**	**695**
West Africa	***1280***	**2015**	**225**	**505**
	Adopted from: Mackay Consultants, provided by Scottish Enterprise (2006)			

[8] Exceptions (peak values) not taken into account

Seasonal influences

According to company documentation of Horizon Offshore, a major market player in the offshore construction industry, the demand for their service is primarily a function of the level of oil and gas activity, but it is also tied to seasonal impact.
Since offshore construction can only take place during moderate weather circumstances, the typical weather circumstances for the regions South East Asia, Middle East and West Africa need clarification. As Bowers and Mould report (1994): All major (offshore) projects are buffeted by risk. "The problems of poor specification, subcontractors failing to deliver and exchange rate movements will test the project's defences, threatening to drown it in overspend or overrun. Offshore projects are also subject to a more physical buffeting from the environment, with the weather and sea state introducing a major source of uncertainty and so demanding special planning[9]."

With regard to the weather conditions the following characteristics are relevant: wind (speed), swell, surface current, bottom current and water depth. Unfortunately, it was not possible within the scope of this research. Furthermore, the variables differ per season and within the regions itself, so acquiring such information is estimated to be a difficult job and whilst its actual value is uncertain.

Based on the paper "weather risk in offshore projects" (Bowers & Mould, 1994) indications for the required information can be given. The article argues that a variety of parameters are used to describe the offshore environment. The wave height, period and the wind speed can all be critical to operations. The significant wave height is a common measure. This is defined as the average height of the one-third highest waves. The significant wave height reflects the general state of the sea. High values indicate a large relative motion between floating structures, preventing any lifting, piling or coupling operations. The safe working conditions for many weather sensitive activities may be approximately specified by critical values of significant wave height.

However, next to the significant wave height, which relates to vessel requirements, knowledge about the presence of seasons during which offshore certainly can or cannot take place is of interest. As far as India and the Middle East are concerned, sources confirm that during monsoon (Mid of May until end of October) offshore construction cannot take place in India. However, the operating circumstances in the Middle East are very favourable then. These regions thus complement each other's seasonality. Since operations are likely to start in India for GIL, it is thus of great interest to acquire projects in the Middle East in the complementary seasons. Appendix F will cover more weather information.

[9] Further investigation into the latter subject is not within the scope of this project.

4.3 Results MOA-framework phase 3 – Customer, Competitor and Supplier Analysis

The first section of this chapter will focus on the demand or customer analysis. Herein the method used for acquiring information as well as the results found will be explained. The second section of this chapter focuses on the competitor analysis and the third on supplier analysis

4.3.1 Customer Analysis

Method

The demand analysis focused on the regional areas of South-East Asia, the Middle East and West Africa. Within these regional markets, the different sectors were reviewed separately. Firstly, a segmented overview will be given for the major activities that comprise the segment. Subsequently, an overview of the demand will be given, on region wise bases. The section will conclude with final remarks and observations.

Note: A distinction can be made between the installer of the jackets, the deck installer and the hook-up contractor. However, leaving hook-up temporarily out of view, in most cases the installer of the jackets is the same as the installer of the deck. Because most information is known about the jacket installer, remarks here stem from this information. This makes logical sense because they are likely to be the same (because of extra cost of for example transport in case of multiple contractors). However, the other scenario with multiple contractors can also be true when the installer of the jackets doesn't have the proper equipment to install the deck.

Results customer analysis

Figure 12: Overview of results for demand in offshore platform construction segment

Middle east

- *Persian gulf* (130 projects, 73 of which the jacket install contractor is known, 46 with known deck installation contractor)

The information covering the Persian Gulf states that 6 jacket installer contractors will complete the 73 projects currently under construction or in planning phase. Among these J. Ray McDermott stands out as dominant market player; it is involved in 41 out of the 73 jacket install projects with known contractor. Other contractors are NPCC and IOEC with respectively 13 and 10 projects. Others contractors are Seaway Heavy Lifting (5 projects), HHI (3 projects) and JGC Japan (1 project). Most of the projects have early due dates: J. Ray McDermott is expected to finish 22 projects by 2007.
Out of 130 projects, a large part (53) is offshore Saudi Arabian waters. Other countries with a lot of activity are Qatar (43) and Iran (22).

- *Caspian sea* (7 projects, 2 with known jacket installer, 7 with known deck installation contractor)

The Caspian sea has 1 major market player: Saipem. Saipem is involved in all projects.

- *Red Sea and Gulf of Suez* (1 project, no contractors known)

One project is in planning phase but the contractor is yet unknown.

- *Mediterranean / Black Sea* (14 projects, 1 with known jacket installer, 1 with known deck installation contractor)

For only one project information about the contractor is known. This is Micoperi.

South-East Asia

- *South-East Asia* (184 projects, 52 with known jacket installer, 44 with known deck installer)

The overall impression of the SE-Asian market is that the number of contractors makes the market more diverse. Known are 14 contractors of which Nippon Steel Corporation (including Thai NSC) is clearly the biggest, handling 15 projects. Saipem is second largest and is with 7 projects also a large contractor. Other than that the rest of the contractors typically handles 1-6 projects.
The projects are allocated mainly in Indonesia (72), Thailand (51) and Malaysia (45).

- *Far East* (30 projects, 3 with known jacket installer, 1 with known deck installer)

Clearly there is too little information available to suggest conclusions would give a representative image of the market. The only known contractors are COOEC[10] and Saipem. Also notable is that 27 out of the 30 projects are in Chinese waters.

- *Indian subcontinent* (32 projects, 18 with known jacket installer, 14 with known deck installer)

There are 5 known jacket installers: J. Ray McDermott, Punj Lloyd, NPCC, CUEL and Clough. J. Ray McDermott has the largest number of known projects in planning phase or under construction.

- *Australia / New Zealand* (23 projects, 5 with known jacket installer, 4 with known deck installer)

Unfortunately the amount of information available is not sufficient to claim an ideal representation of the market can be given. Market players are Technip[11], Saipem, J. Ray McDermott and Dockwise. 21 out of 23 projects take place in Australian waters.

West Africa (58 projects, 10 with known jacket installer, 10 with known deck installer)
Firstly, the amount of information has to be commented. The amount of information available is not sufficient to claim an ideal representation of the market can be given.
Saipem (including Saibos) seems a major contractor with 6 contracts. Other contractors are Global Industries Offshore, Acergy and Deawoo.
Out of the 58 projects 38 projects take place in Nigeria, due to which Nigeria is far ahead of second largest: Angola (9).

Consequently, a similar overview has been drawn up for offshore pipeline laying. For the purpose of ensuring structure in this report these will not be mentioned in detail here. The overviews have been added in *Appendix C – Competitor database*.

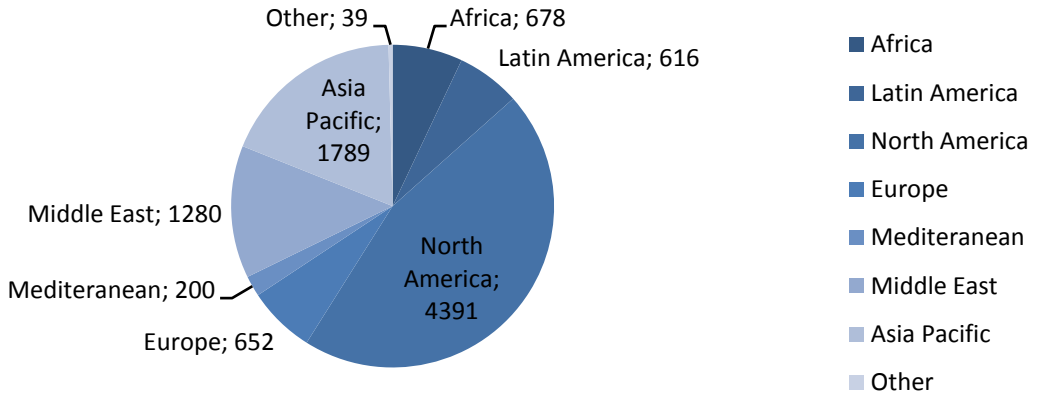
With regard to the offshore maintenance and modification activities, severe additional problems have been encountered. Namely, no data is available about the amount of maintenance jobs forecasted over the coming years. To achieve a useful output it was concluded, in consultation with the management of Greatship (India) Limited, that the best indication would be given by an overview of the current number of platforms per region and the (average) age of these platforms. The underlying thought here is that the common lifetime of a platform is about 30 years. Generally speaking a decision can be made after these 30 years to either perform major maintenance activities to boost the lifespan of a platform, or to quit operations and decommission the platform.

In practise detailed information about the amount nor the region of these platforms was (fundamentally, due to the interests of the oil companies) available, nor did any of the interviewed industry experts had an idea of how to make a robust indication of the expected demand.

[10] COOEC: China Offshore Oil Engineering Corporation Ltd.
[11] Taking pipelay activities also into account it can be concluded that Technip is important player in the Australian and New Zealand offshore waters.

However, the current number of platforms per region in a more abstract sense has been retrieved and the results are stated in the diagram below (Figure 13). The largest number of orders for major maintenance will stem from North America, mainly the Gulf of Mexico. Restricting to the Middle East, South East Asia and West Africa, most likely most demand for maintenance activities will come from South East Asia.

Figure 13: Current number of offshore platforms per region
(total Number of platforms: 9644)



April 2007 data; Source: Tom Kellock

Observations customer analysis

Middle East

According to the figures presented the total expenditure in the offshore sector in the Middle East is expected to grow. However, there seems to be a shift in the destination of the spending: expenditure on platforms and modules will decrease whereas expenditure on subsea systems and pipelines are expected to increase.

The data in the overview supports this previous observation in the sense that the activity level of platform construction is far higher than that of pipeline laying. It's worth noticing here that the latter is mainly information about a few years from now (April 2007) and onwards, while the construction of platforms concerns a lot of data for just the year 2007. Consequently, it should be concluded that just comparing numbers in order to determine the activity level is insufficient.

Also, it has been shown that J. Ray McDermott is a major contractor in this market and that there are few contractors known operating there. Nevertheless interviews have shown that also smaller companies are present here.

Noticeable differences exist within the type of projects that come available. Pipeline projects are likely to either be maximally 10 miles or more than a hundred miles (presumably due to some onshore distance). The average length per pipeline project is relatively high.

Southeast Asia

Platform & subsea construction, pipeline construction and maintenance activities will all rise as a result of rise in oil demand in this region and the capital expenditure that will follow from the same. This observation is supported by the data about planned platform and pipeline construction given in the overview. The region has by far the most platform and pipeline construction projects. Another important difference with the other major regions is that there are more small market players, operating smaller amounts of vessels. This implies the entry barrier is lower.

Within the South-East Asian region India, Indonesia and China seem to be major regions with rapid expansion.

West Africa
The data shows a similar situation with the South-East Asia region: rising expenditure levels and a higher average level of spending on platform construction, pipeline construction and maintenance activities. The Western-African market is largely based on Nigeria and Angola.
Saipem seems to be an important player in the offshore waters of West Africa, having an important stake in both the amount of platform construction as well as pipeline construction. Still, in must be noted that the political situation in much of West Africa remains highly volatile.

Observations regarding platform construction
Asia and the Middle East are size-wise more the more interesting markets. The size of J. Ray McDermott may cause the latter to be a difficult market to enter. However, multiple interviews conducted have shown that there are also smaller companies active in this market[12]. This clearly indicates that not all planned projects are included in the data. As has already been noted the South East Asian market consist of more, but smaller market players. These are signs that this market is generally easier to enter.
In West Africa mainly Nigeria and Angola have a lot of projects planned. For more detailed information refer to the excel document.

Observations regarding the pipeline market
In the pipeline-laying segment there is notable difference between the type and number of market players that are active in the different regions. Asia has by far the largest number of different contractors. They are generally also smaller compared to the Middle East and West Africa. Hence, this region has an advantage over the other regions regarding the entry barrier or customer acceptance of new suppliers level. Within the Southeast Asian market Indonesia is of utmost importance. However, note that the known contractors cover only about half (163/345) of total projects, and expert's insight is recommend.

Also worth noticing is the difference in length for pipeline projects in the different regions[13].
Although there are fewer projects in the Middle East area, their average length is significantly greater than both in the South East Asia region as well as in West Africa. For the large projects it is likely that one of the major companies will be contracted (and so the entry barrier for these projects is expected to be high). However, for the "small" projects multiple scenarios are imaginable. A first possibility is that the major contractors just attend to these tenders as well, but this is not so likely since their advantage lies with attaining bigger projects. More likely is that the small projects are coupled with the bigger projects. Another scenario is that smaller contractors bid for the small projects. A noticeable downside is that utilization rate of a vessel of a small contractor is under pressure in that case (consider the transportation cost to go to the region), which forms a risk when entering this market.

Figure 14: Average size of pipeline projects (excluding extreme values):

Persian Gulf	Caspian Sea	Red Sea/Gulf of Suez	Mediterranean/ black Sea	South East Asia	Far East	India	Australia	West Africa
40,29	16,59	4,34	44,21	22,07	16,05	22,42	26,8	19,51

Based on ODS-Petrodata data (april 2007)
About 1 project per region has an extreme value that most likely includes onshore production

[12] Confirmed by George Duke, Duke Offshore, M.M. Auti, Dolphin Offshore.
[13] As a rule of thumb a pipeline can be layed at a speed of about 1.2 to 1.5 km a day[13]. The average length of a pipelay project is therefore expected to be more days than the average platform construction would take.

About half of the projects in the South-East Asia region have a length of maximally 10 miles (in the Persian gulf this is less than one-third). In the Far East region this proportion is even higher. This indicates that the market-entry is easier here.
Although it cannot be proven quantitatively, the suspect is that within the South-East Asia region India and the Australian waters contain relatively longer projects on average. West Africa has a few projects in each length category.

4.3.2 Competitor Analysis

Having performed the customer analysis, the consecutive step is to perform a competitor analysis. Firstly the method will be described, where after the results will be reviewed.

Method

In order to generate a complete, but correct and concise, overview of the competitors in the offshore construction market various sources have been used. The most systematical approach was reached by using lists of companies registered at websites related to this line of business. However, ensuring a correct list is in fact a complicated task. This is caused by the different domains wherein companies operate, different partnerships in which they operate, unclearness between business operations and assets, operating areas and so on. It was noticed that there is a tendency of companies to manifest itself as "complete-solution providers", while companies actually had experience only in few fields or projects. In order to minimize the risk of this inaccurate information, the websites of the potentially relevant companies have been evaluated. Special emphasis has been put on the actual experience the companies had. Hereby the risk of inaccurate information has decreased, but the effects of inaccurate information on the websites should not go unmentioned.

C	D	E	F	G	H	I	
Category (2	**Company**	**Relevant Fields**	**Related Subsidi./divisons**	**What**	**Where**	**Assets**	**Remarks**
construction	Petra Perdana group of companies		- Integrated brownfield services - Marine - Exploration & Development	Capabilities (Turnkey basis): - Overall Project Management - **Offshore Installation** - Design & Engineering - Engineering Studies & Processes (structures, piping & equipment) - Procurement, Materials take-off, Cutting Plans, Vendor Data Compilation - Fabrication (minor structures) - **Installation (onshore & offshore plant & platform)** - **Hook-up & Commissioning** - Host Tie-ins (satellite platforms to 'mother' platforms) - **Marine Support/Transportation**	Presence in: Sudan, Singapore, Australia, Indonesia, Brunei,	5 Accommodation & crane barges, 3 AHTS, 4 fast crew boats, 2 maintenance work boats, 2 PSVs (not	
construction	Oil States special products			* **Deepwater Installations**, * **Fixed Structures**, * **Subsea Pipelines**, * Tubular Connection Systems, * Drilling Risers, * Cranes, * Winches, * **Oilfield Equipment** **Inspection, Maintainance & Repair**, * Decomissioning Fabrication Services, * Aviation and Refueling Packages, * Structural Test Laboratory			
pipeline	Global Industries Offshore L.L.C	**pipelines**	Pipeline construction	* deepwater installation * pipelay by conventional or reel methods * simultaneous lay of multiple pipelines * pipeline burial, and pipeline maintenance and repair. Global can also install large-diameter pipelines, insulated pipe-in-pipe, and bundled flow lines anywhere in the world.	GoM, UK, Norwegian, Middle East, India, Far east, Australia.	14 construction vessels, 3 Cargo-Launch Barges, 3 OSVs, 11 Dive support vessels. See Excel file	
?	Chet Morrison Contractors, Inc.		- Pipeline - Diving - Construction - Fabrication	our services, our fleet, our facilities, and our eq singlesource, costeffective solutions. Fabrication: Chet Morrison Contractors has s and New Orleans, Louisiana. Fabrication, sandl out services are available at both facilities which are purpose-designed to be workflow efficient.	Mexico, trinidad	2 bury barge, 2 pipelay barges, 2 pipelay/bury barge, 1 dive support vessel, See Excel file	owns 2 yards
pipeline	Dolphin Offshore Enterprises (India) Ltd	Fabrication and installation	Fabrication	***Topside modifications to platforms, clamp-on structures, clamp and protector installation, deck extensions, boat landing and running conductors.** *Platform revamp, including painting. *Turnkey repairs to spud-can, mud-mats, shock fo submersibles and cofferdams techniques. *Replacement of cranes, FG skids, chlorinators, d ***Piping work**, flow arm and riser piping, water in DSS, Inc Alloy and Cu-Ni. *Hook-up and commissioning. *Structural work comprising of steel modules and *Installation and revamping of accommodation q *Fabrication and installation of walk way bridges. *Electrical and instrumentation works.			
pipeline	Micoperi	installation		Structures fabrication and installation: * Detailed engineering, * fabrication of jackets, * de launching, * lifting, * installation, * hook-up, * final t Pipeline: * Pipeline design and engineering, * Pipe selection Pipeline launching, * Pipeline laying, * Shore pull ar trenching, post-trenching and backfilling, * Pigging and testing, * Spool and Risers installation and connection, * Pre and post lay Survey and as-built dossiers		barge, 1 crane and pipelay barge, 1 self elevating platform.	

14 construction vessels, 3 Cargo-Launch Barges, 3 OSVs, 11 Dive support vessels. See Excel file

GoM, UK, Norwegian, Middle East, India, Far east, Australia.

***Topside modifications to platforms, clamp-on structures, clamp and protector installation, deck extensions, boat landing and running conductors.**
*Platform revamp, including painting.
*Turnkey repairs to spud-can, mud-mats, shock foundations, and jack-up rigs using semi-submersibles and cofferdams techniques.
*Replacement of cranes, FG skids, chlorinators, deluge systems, and other equipment.
***Piping work**, flow arm and riser piping, water injection lines of carbon steel, NACE, SS, DSS, Inc Alloy and Cu-Ni.
*Hook-up and commissioning.
*Structural work comprising of steel modules and assemblies, and painting.
*Installation and revamping of accommodation quarters .
*Fabrication and installation of walk way bridges.
*Electrical and instrumentation works.

Results & observations competitor analysis

The result of the identification of market suppliers is registered in an excel file. This file lists the market segment -platform construction, pipeline laying, offshore maintenance-, the company name, related fields, related divisions, what activities the company is performing, where it is performing these activities, where the company is based[14], which assets it uses in order to perform the activities and finally other remarks such as future plans (if any found) or ownership of a yard.
Note that companies are not unambiguously reporting which activities they are involved in, and what their actual core activities are. More often they present themselves as total-solution or turnkey solution providers, while they're actually not. This is one of the main risks involved with using websites as a main source of information.

The purpose of the database is to create an overview of the current competition in the offshore construction market. Hence, the main result is the overview of the activities and related per company. However, some observations can be made:

- The database supports that there are few companies engaged in maintenance activities.
- Besides the major offshore construction companies, only few companies have worldwide experience. Most companies aim at a particular region.
- Small companies more often operate in partnerships or groups; examples of these are Woodgroup and Boa group. The woodgroup, for example, consists of over 10 smaller companies operating within this group.

Major competition stems from large firms such as Saipem, Acergy, Technip, Subsea 7, J. Ray McDermott, CUEL, Heerema Group and Allseas. All of them are servicing the entire offshore industry. Notable is that whereas over 200 companies service the offshore construction industry, about a fourth of that also registered it serviced the offshore pipeline laying industry. An even smaller part is involved in offshore major maintenance activities. These major players service the entire world.

4.3.3 Supplier Analysis

Supply is unlikely to catch up in the medium term. Low oil prices and lack of interest in fresh exploration over the past two decades offered little incentive for any investment in any offshore assets. The industry is now characterized by aging assets (as an indicator: 80% of jack-up rigs will complete their economic life of 25 years in the next five years) and acute shortage of building capacity.
The last building downturn lasted for more than 20 years. Many yards closed down because of lack of new building contracts and high overheads. The number of global yards, as a result, has come down from more than 80 in the late 1970s/ early 1980s to fewer than ten today. Moreover, system bottlenecks are causing a longer construction/delivery time. Moreover, a large part of the new orders will actually replace the aging fleet.
There is a risk however. Some countries have responded to this situation by building new yards and upgrading existing facilities to meet domestic needs. The actual number of yards that are currently build or refurbished however, is unknown.

[14] According to Arun Tarkar (Logistics Manager at J. Ray McDermott Middle East, Inc) country of origin of competitors is a major influencer when determining the bid price in a tender. The underlying reasoning is that assuming the price of material is about the same for all countries the main price difference will stem from differences in the cost of labour.

Phase 3 conclusions

With regard to demand analysis this chapter has shown that most major maintenance on offshore oil platforms is expected to come from South East Asia. Furthermore, the Middle East and South East Asia are expected to have a high demand over the years to come.

In the pipeline-laying segment there is notable difference between the type and number of market players that are active in the different regions. Asia has by far the largest number of different contractors, and this market seems to therefore have a relatively low entrance barrier.

The competitor analysis has shown a great variety of companies. Notably some smaller companies operate within groups in order to be able to provide turnkey services as a group.

Supplier analyses supports that supply will not be able to catch up with demand over the next few years, hence operating fares are expected to favor the operators.

4.4 Results MOA-framework phase 4 – Market Demand Forecasting

From phase 3 followed the demand that may be expected and to what extend competition is able to meet this demand. However, in order to assess the attractiveness of the market further information is required about the expected change in the gap between demand and supply, particularly over a longer period of time. This topic has partly been covered by the phases so far, which have communicated the following bottom line: in the coming years demand will outgrow the supply.

Forecasting the changes in the gap is a very difficult task, especially under the current market circumstances. The main reasons here fore are the uncertainty about longer-term oil prices, trends and discovery rates. While estimations of oil companies operations typically are only 'certain' for the coming 5 years, vessels have a life expectancy of about 25-30 years, which lead to the situation that investment decisions mainly stem from projects coming up in the coming years and expectations about the oil price thereafter. It is thus fundamentally impossible to make a concise and robust calculation of the expected return on investment: it is always mainly based on a period up to 5 years. For this period an estimation of the demand can be made on the basis of information provided by oil companies and information about the critical equipment (equipment with long lead times[15]) on order.

A practical example shows how Larsen & Toubro (a major Indian construction company) evaluates an investment. Basically, L&T uses a correlation graph between oil price & utilization rate. Stepwise this forecasting process can roughly be described by:

1 Making an estimation of the day rate and the utilization-rate of the barge

In order to make this estimation a day rate is set, say 250.000 dollar per day. Utilization level can be determined according to for example in which geographical areas operations are expected. These highly influence the mobilization time and cost. For the purpose of evaluation a minimum operational level is set, say for example 240 days per year.

2 Forecasting the " exact" utilization level for the coming 5 years

A calculation using operating cost, taxes, maintenance, etc. will lead eventually to a Net Present Value. Summing the Net Present Values will lead to an investment decision.

3 Performing a sensitivity analysis

Here alternative scenarios are reviewed, such as higher/lower oil prices and higher/lower utilization levels. The output of the analysis gives insight into the risk related with the investment.

As mentioned before, insufficient information has been available about the financial aspects of the investment decision. Therefore, the author likes to stress that further investigation should be performed to focus on for example the investment costs, the day rates, the amount of new build vessels, forecasts of day rates and scrap value.

Market share for Greatship (India) Limited

Aside from the demand that arises in the "entire" offshore construction market, it is also of interest what proportion of this demand is likely to be met by Greatship (India) Limited.

Projects in the offshore construction are usually awarded via a tendering system. For these tenders several aspects are of importance, but the following are vital[16]:

- The suitability of the barge
- The status/reputation of the contractor (crew and portfolio)

[15] Long lead items are for example compressors, turbines and special pipelines.

[16] Collected from interviews with GIL employees, Arun Tarkar, Rupchand Lohana, George Duke and MM Auti.

- Project management capabilities
- Price

In this monopolistic position, traditional theory would predict that the oil companies should exert strong pressure for price controls in their dealings with supply firms. However, of greater importance to the buyers is the ability of the firms to deliver contracted equipment on time, and the quality and reliability of that equipment in operation (Moar, 1980).

For operations within India, which are of primary concern for Greatship, one could add the national preference policy. This policy is an initiative of the Indian government to stimulate the Indian economy by preference for Indian flagged operators over foreign operators at comparable bids.

However, the interviewed industry experts are not in line about the relative importance of each criterion. On the one hand it is argued that price (bid) is actually not the most determining factor. In case more contractors qualify for a tender, the company that fits the operators schedule will have the best chances of winning the order. But, it is also argued that price is the main order winner in case of multiple bidders.
In case of major maintenance activities a new tender for these activities is opened. According to Mr. Tarkar usually companies from the construction segment apply; there are very few companies occupied with only maintenance activities. This is in line with the conclusions drawn in section 6.1.

Furthermore a general advice resulted from the interviews with industry experts for start-up companies to start operations in the Middle East or South-East Asia. While demand is also high in West Africa, this region suffers from political instability and more complicated legal and taxation issues. With Greatship (India) Limited being an Indian company, specific recommendation is to start business in India.

The industry drivers and threats have shown that there is little operational uncertainty about the question whether there will be demand for offshore construction services. However, because of several reasons sector related gaps are difficult to quantify. Here it is argued that each offshore platform construction will inherently arise the need to complete pipeline projects and, in time, maintenance activities. The data available is insufficient to quantitatively support growth of either segment over the other (!). However, it is noted that since very few companies solely perform major maintenance activities, this sector is expected to outgrow the demand in the other sectors. This expectation is supported by industry experts such as Arun Tarkar (J. Ray McDermott).

While financial information could ultimately provide more insight into attractiveness of different sectors, it has been required by the management of Greatship (India) Limited to focus on other aspects that would allow for market entry.

4.5 Results MOA-framework phase 5 – Evaluation of Market Opportunities

The final step in the Market Opportunity Analysis Framework is to assess the organization's capabilities to determine how they align with the market and customer's needs and how they compare against competitors' capabilities. This phase contains two steps; the first entailing identification of new opportunities and the second matching those opportunities with organizational capabilities.

Identification of market opportunities

In order to identify market opportunities the most important results from phase 1 (Environmental Analysis) till phase 4 (Market Demand Forecasting) are reviewed.

During the analysis of the demand it became clear that offshore construction industry is expecting high demand, which the current supply will not be able to meet. The need for offshore construction is highly dependent on the oil price and energy consumption that are expected to continually rise on the long term. The main growth areas are South East Asia, the Middle East and West Africa. Noticeable is that few companies aim to provide services for the maintenance sector only. Also, the aging of the current fleet showed that a lot of vessels are not be able to meet the future demands and hence need to be replaced. Furthermore, the complementary character of working seasons of India and the Middle East make operations is this region very attractive.

Suitability of the construction vessel, ability to schedule projects, (bid) price and status or experience of the contractor, were identified by industry experts as order qualification criteria. The consequences of the latter criterion implied that Greatship (India) Limited would have to start business by cooperating with another, well established, partner. Greatship (India) Limited would be well advised by starting with a project in India, profiting from the national preference policy.

Next to the advice to start in the business by entering into an alliance, it is recommended to start with a small subsea or pipeline project or in maintenance activities. These projects are generally smaller and easier to acquire for smaller end less experienced companies. Maintenance activities, such as pipeline maintenance, are often coupled with the pipeline laying itself.

An important milestone was the inability to acquire sufficient data on the offshore maintenance segment. Although at least age and location of the current platforms are required to come to a rough estimation of the expected work coming up, only the locations could be retrieved. The accuracy of the retrieved data was in some cases not as good as hoped for. This is caused by the confidentiality of such information and thus a detailed (quantitatively supported) analysis could not be achieved within the scope of the research.

Organizational capabilities

For assessment of organizational capabilities, the SWOT analysis is used. The SWOT analysis implies a review of internal strengths and weaknesses as well as the external opportunities and threats. The SWOT analyses will be performed in the light that should Greatship (India) Limited start business in the offshore construction industry it will do so in India, as followed from phase 3. For a more general overview of opportunities and threats in the offshore construction industry refer to phase 1.
The results of the SWOT analyses are displayed in Table 6: SWOT-analysis for Greatship (India) Limited on the following page.

Figure 15: SWOT analysis for Greatship (India) Limited		
	Helpful to the organization	**Harmful to the organization**
Internal	**Strong ability to make financial investments** Since Greatship (India) Limited is a subsidiary of a financially gigantic and healthy organization, Great Eastern Shipping Corporation, it can benefit from the possibilities of making large investments.	**Lack of Experience** The most evident weakness is that Greatship (India) Limited may suffer from her lack of experience in the industry, which can lead to difficulty in the acquisition of orders or high pressure on the bid price due to this status.
	No full dependence on offshore construction Since Greatship (India) Limited will continue to its expansion of its offshore logistics services it is less susceptible to fluctuations in the offshore construction industry	**Currently no deployable vessels** Since Greatship (India) Limited doesn't own vessels it cannot bid for orders yet. Therefore there is a risk of not winning orders when operating the vessel.
	Presence of training facility Greatship (India) Limited can make use of the highly modern educational facility of her parent company Great Eastern shipping. Potential partners can benefit from this facility by for example jointly setting up a training program.	**No department currently existing focusing on offshore construction** The lack of such a department maintains a drawback if Greatship (India) Limited is to start business in the offshore construction services.
External	**India's increasing oil demand** Urgent need to address India's oil problem to achieve targeted 10% GDP growth, leading to more certainty for demand	**Short term difficulty to acquire vessels** Orderbooks are full and vessels are difficult to acquire
	Increasing safety requirements which current fleet cannot meet The refurbishment and/or replacement of old vessels is additionally stimulated because of the new safety-requirements that the Indian shipping ministry has put out with which the older vessels/barges do not comply	**Risks of oversupply on long term** The attractiveness of the offshore construction market could lead to numerous market entrants. Estimating these chances is highly difficult
	National industry stimulation Indian offshore supply vessel companies to benefit from national preference policy	**Trend towards deepwater exploration** To a large extent the "easily" accessible shallow water oil reserves have been explored. The efforts put into deepwater exploration could result in a high increase of investment in such equipment, at the cost of offshore platform construction (suitable for shallow water only).

One can now plot these characteristics in a SWOT confrontation matrix, where one axis consists of opportunities and threats and the other of strengths and weaknesses. Recall that relations between any of those can be indicated with plusses (+/++) and minuses (-/ - -) and stars (*) indicate priority.

Figure 16: SWOT confrontation matrix

		Strengths			Weaknesses		
		Strong ability to make financial investments	No full dependence on offshore construction	Presence of Training facility	Lack of Experience	Currently no deployable Vessels	No department currently existing focusing on offshore construction
Opportunities	India's increasing oil demand	++	+				
	Increasing safety requirements which current fleet cannot match	++				+*	
	National company preference			+			+*
Threats	Short term difficulty to acquire vessels	-				--	
	Long term risk of oversupply						-*
	Trend towards deepwater exploration	-					-*

Conclusions resulting from SWOT analysis and SWOT confrontation matrix
From the confrontation matrix it follows that Greatship (India) Limited needs to create a department that is devoted entirely to operations and developments within the offshore construction sector. Furthermore its ability to make financial investments is a strength and these intentions should thus be used when searching for a partner. Its difficult to take other conclusions since it cannot easily be said that correlations exist between the other factors.

Matching opportunities with capabilities

Matching the previously indicated market opportunities with internal capabilities, it follows that doing projects for a pipeline laying company are highly recommendable. Other than that, maintenance activities prove to be a high demand market. From a small project Greatship (India) Limited can start building experience and gradually invest to obtain larger projects. A good investment therefore would be a DSV or MSV.
Should Greatship (India) Limited express that it would prefer to start in offshore platform construction, than an investment in an accommodation barge can also be recommend, considering the amount of experience a contractor will require for such an asset.

As noted before, a prerequisite for winning order, is the status or reputation of the contracted company. It was already concluded that Greatship (India) Limited should thus find a partner. Hence, matching opportunities with capabilities is not as clear-cut, since the both are subject to change depending on the company Greatship (India) Limited will find itself a good partner in.

The next section will provide an extension to the MOA-framework by evaluation of possible partners in the offshore construction industry for Greatship (India) Limited.

4.6 Partner selection

As mentioned in chapter two additional theory is used to meet the request for more concise steps to be taken in order to enter the offshore construction industry.

Since an important prerequisite in order to qualify for a tender is the reputation of the company, a company attempting a startup within the offshore construction industry will greatly improve its chances of winning an order by collaborating with an experienced company. Hence, out of the current market suppliers companies have been selected which are suitable to start up a partnership with. Various forms of alliances can be considered, such as:

Some of the factors companies consider when choosing a market entry mode are the desired level of management control, amount of equity investment, level of risk, product type, foreign market environment, market entry modes used by competitors and the company's organizational structure (Alexandrides et al., 2005). An entire study could be devoted on finding the most suitable partner; this however, lies not within the scope of the research. The management of Greatship (India) Limited has defined its preference for two specific forms of cooperation. The consequent section will be based on these types of cooperation, which are:

1 Resource tie-up
In this way Greatship (India) Limited can use one of her main strengths, the ability to invest a great sum of money, by investing in a vessel, which can be operated by a well-known contractor. According to George Duke this is can be a very profitable investment, since owning rather than operating is where most of the profit stems from.
2 Local partner
This alternative suggests a solution in which for example 10 employees of a renowned company will be employed on the new vessel. This way Greatship (India) Limited can benefit from learning from and knowledge sharing by the other organization. In return the major contractor receives a share of the profit, while incurring small risk.

According to Hitt et al. (2000) strategic alliances have become popular among firms throughout the world. There are a number of potential explanations for the formation of strategic alliances, and a prominent one is that they are a means of entering international markets. However, little is known about factors that lead to success in alliances, and research suggests that a substantial number of alliances produce dissatisfactory results (Madhok & Tallman, 1998). Hitt et al. argue that a critical step in the success of an alliance is the selection of a partner, but that there has been little past research on this phenomenon.

Hence, Hitt et al. focussed on the importance of partner selection criteria, while differentiating between emerging market firms and developed market firms. This theorem was introduced in chapter two. The results suggest that developed market firms attempt to leverage their resources to gain a competitive advantage by searching for partners with unique competencies and local market knowledge and access[17]. Figure 17 displays results derived from theorem of Hitt et al, to be used for partner selection for Greatship (India) Limited

[17] Partner selection in Emerging and Developed Market Contexts: Resource-Based and Organizational Learning Perspectives, Hitt et al. (2000)

Figure 17: Partner selection criteria

- **Size**
  Financial asset and technical capabilities are measured in terms of "size".
  Ideally the company would have either the same size as Greatship (India) Limited or smaller. A company that is evidently bigger than Greatship (India) Limited would most likely not be interested in the strengths (mainly $ and nationality) that Greatship (India) Limited can offer. They would be able to make the investment by their own. Size is evaluated by either the amount of investment the company has made or the number of vessels in use (note: construction vessels are severely more expensive than PSVs).
- **Experience/ status**
  Intangible assets, capability for quality and market knowledge/access are measured by "experience".
  A company that has more (years of) experience would obviously be preferred over a company that is relatively new to the industry and still has a lot to learn and status to gain itself. A guideline for minimum age is 5 years[18].
- **Geographic location**
  Willingness to share expertise and technical capabilities are measured by "geographic location".
  Although seemingly an odd indicator for willingness to share expertise, it is known that preferences for certain countries exist. American companies have the image of being more willing to share knowledge, whereas for example Norwegian companies are expensive partners. However of more interest even is the geographic location in which the companies have experience, be it in harsh conditions or not at all.
- **Scale of business, business orientation**
  Companies that deliver a wide range of services (for example including engineering services) or don't show any signs of being interested in expansion fail to meet the requirements needed for a suitable partner. However, a company that is engaged in both pipeline laying as well as maintenance would be preferred over a company solely engaged with pipeline laying.
- **Other**
  Special skills to learn from partner and unique competencies are comprised under the heading of "other"
  Other things of interest, such as owning a construction yard or special competencies.

As becomes clear, not all criteria set by Hitt et al. can be directly operationalized. This is obviously a pitfall of this model. Other than that it is worth noticing that the criteria cannot always be measured sufficiently either. For example, how do you evaluate the managerial capabilities of a company with whom no previous collaboration has been attempted? Well, an answer could be "by experiences of others" but the validity and practical use of such information –assuming it is available- is highly doubtful.

By using results of the third phase (customer, competitor and supplier analysis) the previously indicated criteria can be applied to select those companies that are potential partners for collaboration.

[18] The age of roughly 5 years was indicated by Arun Tarkar (J. Ray McDermott) as the minimum experience a company needs to have in order to win orders.

When selecting the potential partners it should be noted that companies are not unambiguously reporting which activities they are involved in, and what their actual core activities are. The criteria have thus been handled as guidelines in order to cope with companies that nearly meet all criteria but would otherwise be ruled out if *hard* criteria would have been used. Note that errors in the selection could have occurred because of the lack of financial information and unclearness about the investment size. Notice also that there is some uncertainty about how companies are currently performing and how their reputation is.

Using the above mentioned criteria leaves the following companies to consider:

Figure 18: Overview of potential partners		
Diamond services	Valentine Maritime	Likpin LLC
Superior Offshore	Offshore Specialty Fabricators	Con-Dive
Bisso Marine	Stemat BV	Perrott Salvage & Construction
Micoperi		

An overview of the main services of these companies is added in appendix Appendix F – Partner selection overview. However, a basic comparison can be found on the next page.

Overview Selected Companies

Company	Sector			Assets					Location
	Platform & subsea	Pipeline laying	Maintenance	# Construction Vessels	# Pipeline Laying Vessels	# Multi Service Vessels	# Other Vessels	Fabrication Yard	Region
Diamond Services	X	X	X	1	3		20	X	America
Valentine Maritime		X		2 / 3*	2		1	X	Middle East
Likpin LLC		X		4					Middle East
Superior Offshore	X					11			America
Offshore Specialty Fabricators	X			3 / 5*		2	11	2	America
Con-Dive	X	X	X		7				America
Bisso Marine	X	X		7	1		9		America
Stemat BV	X		X	1		9	4		Europe, North Africa, Middle East
Perrott Salvage & Construction	X	X	X	9*			7	X	Australia
Micoperi	X	X	X					X	Europe
***: Including cargo barges**									

Company	Experience	Strengths	Weaknesses
Diamond Services	Founded in 1962	Pipeline lay up to 48 inch	Possibly size, Possibly expansion objectives
Valentine Maritime	Founded in 1990	Yard, knowledge of ME market	Regional orientation (interest in India)
Likpin LLC	4 years in ME and India	Knowledge of ME market, willing to expand	# Vessels, age
Superior Offshore	Founded in 1985	Fleet, Background	
Offshore Specialty Fabricators	Extensive turnkey experience	Broad experience	Unclearness about size of undertaken projects
Con-Dive	Over 20 projects	Services fit start-up company	Unclearness about experience in ME and SE Asia
Bisso Marine		Size	Possibly size, Possibly expansion objectives
Stemat BV	Founded in 1986	Amount and type of vessels	Not much experience in Middle East
Perrott Salvage & Construction	25 years	Yard	
Micoperi	Almost any part of the world	Yard, experience, size	

Comments complementing the table
Note again that information provided on websites will only get you to a particular view of a company. It still has to be shown that the mentioned companies have a good reputation, what their expenditure plans are for the coming years, and in what financial condition these companies are. Such information can be gathered by talking with consultants that are more familiar with the industry and by getting in touch with the companies itself.

Brief overview strengths and weaknesses of selected companies

- Valentine Maritime

Although it is unclear whether Valentine maritime also performs maintenance operations, it surely has a couple of strengths (though it is unlikely it would not be involved in maintenance activities). The ownership of a yard, for example, is a big strength. Other than that Valentine Maritime has more than 15 years of experience, and is located in the Middle East, so it will have knowledge about this market.

- Likpin LLC

Although this company is only 4 years old, it is selected as a preferential partner. That is, it is located in UAE and is familiar with the local regulation. Other than that it shows to have plans for expansion.

- Superior Offshore

Superior Offshore seems to be a very interesting company to start a partnership with. It has experience in UAE and in West-Africa, seems expansion oriented. It owns 11 MSVs, so it has sufficient knowledge to help handle the projects that Greatship should be aiming at when starting in offshore construction.

- Offshore Specialty Fabricators

A strength is the broad experience this company has gathered. However it is not clear if this company also attends smaller projects.

- Con-Dive

Not clear about experience in Middle East and South-East Asia, nor if the company has plans for expenditure here. Services seem to fit a start-up company though.

- Bisso Marine & Diamond services

Both Bisso Marine & Diamond services are bigger players on the market. With such sizes, the strengths of GIL ($) are of less relevance to these companies. This will make it more difficult to realise a partnership. Next to that, a bigger partner will also have more influence on the strategy and the day-to-day operations of the company. However, should a bigger partner be preferred than both will be of interest.

- Stemat BV

This Dutch company has quite some international experience, but mainly in European waters. However, it has been present in northern African countries. It could be interesting to find out exactly which expenditure plans this company has.

- Perrot salvage & construction Pty Ltd.

Seems like an interesting company but gives no information about the area in which it wants to work. The Fabrication yard is a strength though.

- Micoperi

Involved in all types of offshore construction, and owns a yard as well. However, according to the amount of vessels the company is quite small relative to its age. A strength however, is the fabrication yard owned by Micoperi.

Chapter 5: Conclusions and Recommendations

This section of the report will focus on the conclusions that result from the findings per phase. Furthermore, it will provide recommendations as a basis for further research and a discussion regarding the validity of this report.

5.1 Conclusions

The intention of this section is to provide an answer to the problem definition: "*How should Greatship (India) Limited anticipate future developments in the offshore construction market and which potential partners should they cooperate with?*"

During the analysis of the demand in the offshore construction sector it became clear that offshore construction industry is expecting high demand, which the current supply will not be able to meet. The main growth areas are South East Asia, the Middle East and West Africa.
The comprehensive overview of the suppliers shows that few companies aim to provide services for the maintenance sector only. Also, the aging of the current fleet showed that a lot of vessels are not be able to meet the future demands and hence need to be replaced.
These factors, combined with the expectations of high oil prices, lead to high attractiveness of the offshore construction industry. This, and taking into account that competition in the current offshore logistics market will increase, leads to a positive advise with regard to taking further steps to start in the offshore construction industry.

With regard to the segments Greatship (India) Limited should focus on it is recommended to start with a small subsea or pipeline project or in maintenance activities. These projects are generally smaller and easier to acquire for smaller end less experienced companies. Maintenance activities, such as pipeline maintenance, are often coupled with the pipeline laying itself. So a good start could be to do such projects for a pipeline laying company. From a small project Greatship (India) Limited can start building experience and gradually invest to obtain larger projects. A corresponding investment therefore would be investing in a Diving Support Vessel or a Multi Support Vessel. Should Greatship for what reason whatsoever prefer to start in offshore platform construction, than an investment in an accommodation barge can also be recommend, considering the amount of experience a contractor will require for such an asset. Under all circumstances start-up of activities should be in India and expansion thereafter could be in the Middle East.

For the identification of suitable partners firstly Greatship (India) Limited's own strengths and weaknesses were reviewed. Aside from perspectives on strengths and weaknesses this resulted in points of immediate attention and provided input into the partner selection process. It followed that immediate attention would have to be paid to the creation of a department that is dedicated to developments and services in the offshore construction sector. With regard to partner selection results were added to earlier findings. Because it had turned out that the suitability of the construction vessel, status or experience of the contractor, ability to schedule projects and (bid) price are order qualification criteria, a prerequisite for offshore construction market entry is engaging into an alliance. With the use of partner selection criteria such as size, experience, location and business orientation potential partners were identified.

This research had both rather broad targets with regard to characterising the market as well as detailed targets with regard to partner selection. Needless to say, this has resulted in choices on issues to be dealt with. In the next section recommendations for further research will be made and discussion about the results found will take place.

5.2 Recommendations

This chapter will conclude with recommendations for further steps to be undertaken by Greatship (India) Limited.

Acquire financial data

Vital for the investment decision is a function of investment versus expected income and risk involved. This data has not adequately been found (!!). Financial data that is of utmost importance are: the investment costs, the current day rates, expected new build vessels, forecasts of day rates, expectations about amounts and types of new build vessels and scrap value. Remember here that the data provided in this report mostly covers only the years up to 2011, while the investment will concern a lifespan of considerable longer length: 20 to 30 years. It is recommend to make use of the contact with the brokers to collect more information on this issue.

Define partner criteria more precise and corporately

While considering which companies would be interesting for future cooperation, the author was (intentionally) hardly influenced by colleagues for the choice of companies. However, these partner criteria should be selected on a more corporate level, inspired by the business philosophy and strategy. It will allow Greatship (India) Limited to create an image of the "ideal" partner, for which currently no one vision exist.. Doing so will allow Greatship (India) Limited to take the lead in the future cooperation. Also, Greatship (India) Limited needs to discuss possible consequences of entering into an alliance on an organizational structural level. It needs to define corporate procedures for the handling of knowledge management in order to improve the network effectiveness.

Invest on the basis of a long term vision

Basically this encompasses both relatively small investments such as those on Industry magazines so that Greatship (India) Limited can better forecasts utilization rates and expected returns for vessels. Also fundamental decisions such as hiring employees who specifically focus on this market opportunity should be taken.

Perform research on regional information and vessel requirements.

Further investigation has to be done about all shipping and business related regulation for business in foreign countries. This is not only to make sure that business is performed in the most favourable country, but mainly to ascertain that Greatship (India) Limited will not run into high cost because of unawareness of certain laws and regulation. Similarly, possibly in cooperation with the future partner it has to be decided what type of vessel will be acquired by Greatship (India) Limited. Of course such a decision should mainly be driven by (forecasted) day rates and (forecasted) demand, making the need for financial data even more clear.

Get in contact with partnering companies

In order to start up in the industry it has been pleaded that a partnership is essential. Greatship (India) Limited should eventually get in touch with the candidates and decide on the type of partnership, after having determined whether the investment will yield the required returns.

5.3 Discussion

The following section deals with some issues that have arisen and potentially harm the quality of the performed research. The first to be mentioned here are the advantages and disadvantages of using the MOA-framework. In general the MOA framework has provided a guideline for determining the required steps for a profound research. However, generality of the framework left a lot of space for interpretation. Because it describes the use of each phase, but does not specify the steps to be taken and the output indicators, the quality of the usage of this framework in differing situations or by different people is not guaranteed.
Embroidering on the latter, one could argue that a defect of the framework is actually the abstractness. The original framework was applied in a reasonably small setting, in which less than 10 competitors had to be evaluated. As it turns out, application of this framework to the offshore construction industry is a complex job and you may well wonder whether its completeness is worth all the extra effort. In my opinion the framework is currently not applicable to all market opportunity analyses. For example, due to the large amount of information that needs to be processed the model will take too much time to benefit from a *hype* in a certain market. Also, for larger industries the results of the framework become difficult to analyze if the framework is not limited to analysis of for example 20% of all competitors.

Furthermore, without explicitly mentioning to do so, the model recommends to evaluate the external environment twice. The first being the most obvious in the first phase “environmental analysis” and second less obvious when Hitt et al recommend to use SWOT as a technique in phase 5 for evaluating market opportunities. I reckon Hitt et al should be more specific in their advice that such an external review should be done only after it has been determined where the company would want to be on a longer term.
There is also some error because this specific framework was used from a retrospective point of view. If I would have known I would be using this framework right from the beginning, and if I would have known right from the start that Greatship (India) Limited wanted to identify potential partners, I would have spend my time more wisely and would have spend less time mapping environmental aspects. In another context, if I would have acted more boldly right from the start, I would have find myself spending less time searching information my colleagues already knew was unable to track.

As paradoxical as it might seem, even though the research is broad by nature, there were still other related investment decisions that should be reviewed. Since world oil demand will increase one could also argue Greatship (India) Limited should invest in a business expansion that supports an even longer term, namely: deep-water exploration. Deepwater exploration is fundamentally different from offshore construction since deepwater oil production takes place on an “attached” floating storage and production vessel/structure. Greatship (India) Limited could also invest in this industry and there are actually some interesting arguments that support such an act. To be more concise, Greatship (India) Limited could use an old vessel owned by Great Eastern Shipping Company and modify it for it to be able to produce in deep-water regions.

The research has taken place within a for the author different and sometimes difficult (office) culture. Although this mostly contributed to exciting and astonishing situations, it has also slowed down the research project. Not only because of problems relating to language and the resulting difficulties in mutual understanding, but even more by the counter-productiveness of the higher power distance in India. Due to the higher power distance some of the author’s questions were left unanswered. Furthermore, employees at Greatship (India) Limited had foreseen problems the author would run into, but had not adequately warned him about these problems beforehand. This has resulted in a loss of time.
Also, sometimes the progress of the project was slowed down, due to the fact that regular business was given a higher priority by some of my colleagues. Although this was sometimes aggravating it was also explicable because these activities had a higher short-term impact on their business.

Chapter 6: Reflections and Evaluation

This part of the report is not directly related to the research goals. In this chapter I will describe how I have experienced the execution of this project. For this I will make use of my objectives for the bachelor thesis, for my stay in India and my personal performance.

Personal objectives
The bachelor project has been one of the largest projects I have completed in my career at the University of Twente. It is a difficult project and, concluding afterwards, it is actually not the project I am as much proud of as I would have hoped to be. I believe that the experience altogether, going to India, working for a company and mainly depending on myself for the success and the completion of the project have truly been enormously valuable. Point 1 and 2 from my personal objectives (see table below) are thus definitely covered.

Personal objectives – from preparatory report
1 To experience the differences between daily life in India and daily life in the Netherlands.
2 To experience the bigger differences between wealthy and poor population, religion and caste system.
3 To learn about the way Indian firms are managed.
4 To apply my (study-related) knowledge and learn to individually set up and carry out a project.
5 To discover personal learning points

I also believe that I have been able to make a valuable contribution to Greatship (India) Limited. This is actually on two dimensions. The first is the professional dimension. During the research I asked a lot of questions and found a lot of answers. By doing so I have created knowledge and a certain attitude towards the business expansion in the offshore industry. Secondly I would also like to mention the informal contribution I have made. I believe that I have boosted the working atmosphere by my social interaction with the group of employees.

However the last personal objective mentioned is the point I believe I have made most progress towards. Discovering my personal learning points has been a tremendous learning experience which I hope I can use during researches to come. I believe it is of importance to clarify major

I have come to know myself to be quite inconstant. I notice that where I usually perceive myself to be quite a stable person, when it comes to motivating myself I more often become inconstant. This more frequently occurred during the research. This implies that I've found myself both working on an amazing project as well as in the situation where I was unsatisfied with a great part of the report.
Especially regarding the search for relevant literature, I find it difficult to motivate myself. I've learned that it sometimes is just a process of forcing yourself to work. Setting deadlines for myself and having an overview of the positive consequences it would have on my curriculum if I were to finish the project were giving me the required motivation to finish the project.

Another aspect I've learned is about the way I communicate. More specifically, it is about the timing of my communication and the intention. I tend to communicate decisions, where I might be better of communicating that I am considering things and welcome help to make a better trade off. This would also result on a more positive attitude from persons guiding my. I believe that I could have done a far better job regarding the communication with my supervisors.

There are two other things I have learned from this project. The first is about optimism in general. I have found myself sometimes struggling to work on the project, mainly because I was upset it has taken up so much time in the first place. After I had set again to make a new feasible planning I not only saw the importance of finishing the assignment, I also become more relaxed and worked with more pleasure to finish the project.

The last point I would like to mention is that I am more aware of the need to finish an assignment in time, not just because of the validity of the research (data might become outdated) but also because in time I found myself to have learned things. As a result, when I read parts that I had written before, I started to change and reformulate. Although essentially this has probably increased the quality of my report, it prevented me from quickly progressing, since I was rewriting over and over.

Bachelor objectives

The fourth personal objective is highly related to the bachelor objectives as defined by the University of Twente. Unfortunately, I can only conclude that I have done sufficient (as opposed to excellent). There are some aspects I would like to mention:

The first is that I would say that I could have done a better job at communicating more often and more timely with my supervisors (refers to fourth bachelor objective). When for example, I was struggling on deciding which literature to use, I could have just taken the literature to my supervisors and ask for their advise.

With regard to the first until the third objective I believe I did a good job. It has been a very difficult job gathering and analyzing the data, inherent to the problem situation. I believe that I have shown creative ways to find new information and that I was not easily satisfied with poor solutions or data.

Looking back, I would have to say that I could have done a better job restricting the project to a certain scope. Due to my wish to satisfy the management of Greatship (India) Limited I spent a lot of time gathering information that did not attribute to this research in any way. Thereby it has jeopardized the time I have spent on the research.

Bachelor Objectives – School of Management and Governance, University of Twente.
1 Show sufficient knowledge and insights in your own field of study and actual developments in it
2 Be able to collect, interpret and judge relevant data, also based on the weighing of the relevant social, scientific and ethical aspects
3 Fulfill a task of certain academic level of difficulty, related to your curriculum
4 Show a certain level of independence in the preparation and execution of the project
5 Making a clear, structured and to people of different education level understandable presentation

With regard to the level of independence I've learned quite a lot. I believe I've limited myself by not getting in touch with my supervisors more often. I could have done a far better job with regard to involving them better about the plans I had for my report. In the end I think I would have been able to benefit from that, because my supervisors would be able to judge if my plans would have made sense. I think that in the end it comes down to the way I saw my supervisors, what their role would be. Instead of seeing them as people who could help me make a high quality report, I saw them as people who would just have to "give a green light signal". Perhaps that if I would have listened to them better right from the start I would have sooner understood which structure the report should have and why that structure would be the best. I believe this is something I will definitely take forward to my Master thesis. Practically, that even implies that I will chose 2 supervisors with whom I'm both familiar, to ease the burrier.

Concluding I would say that I am happy to have done and to have finished this project. I believe it has contributed to my academic development and I think it made me better prepared for finishing projects such as the master thesis in the future.

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Arun Tarkar, Area Logistics Manager
J. Ray McDermott Middle East, Inc.

Mr. George Duke, Managing Director
Duke Offshore Ltd.

Mr. M.M. Auti, General Manager (Fleet operation)
Dolphin Offshore Enterprises (India) Ltd.

Rupchand Lohana, Manager – Domestic Marketing
Larsen & Toubro Limited

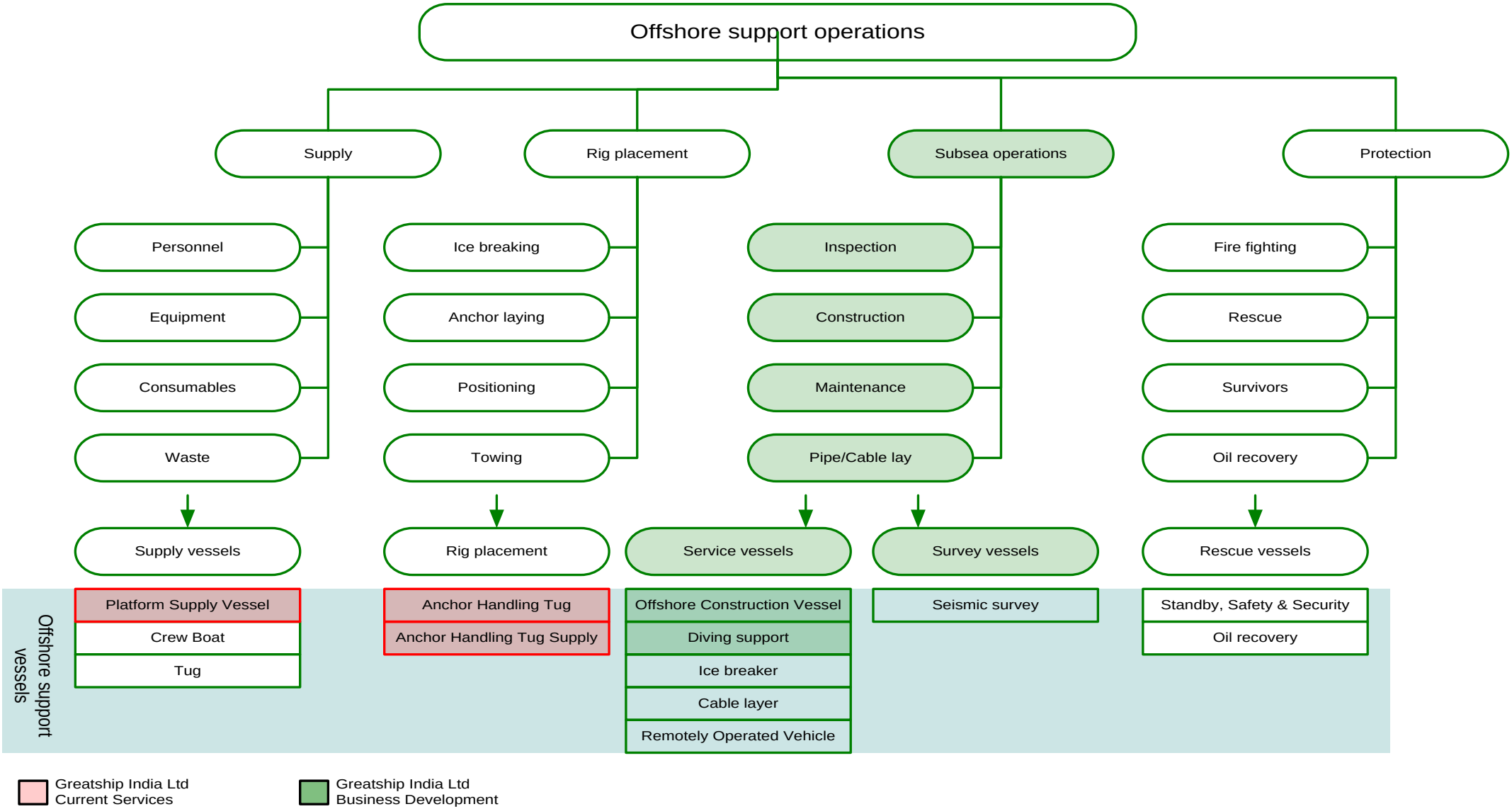
Tom Kellock
Head of Consulting and Research, Houston ODS-Petrodata

Alastair McLennan
Aker-Kvaerner Oil & Gas - MMO

Maikel Laukens
Operations Manager, Weather Forecasting Services Fugro GEOS

Greatship (India) Limited employees
Mayank Jain
Manish Jani
Pooja Salian
Rajesh Gopali
G. Shivakumar
V. Sheshayayee
Ravi Mathur

Appendix A – Offshore Support Operations



Appendix B – Industry history and trends

Main industry drivers

- Growth in energy consumption

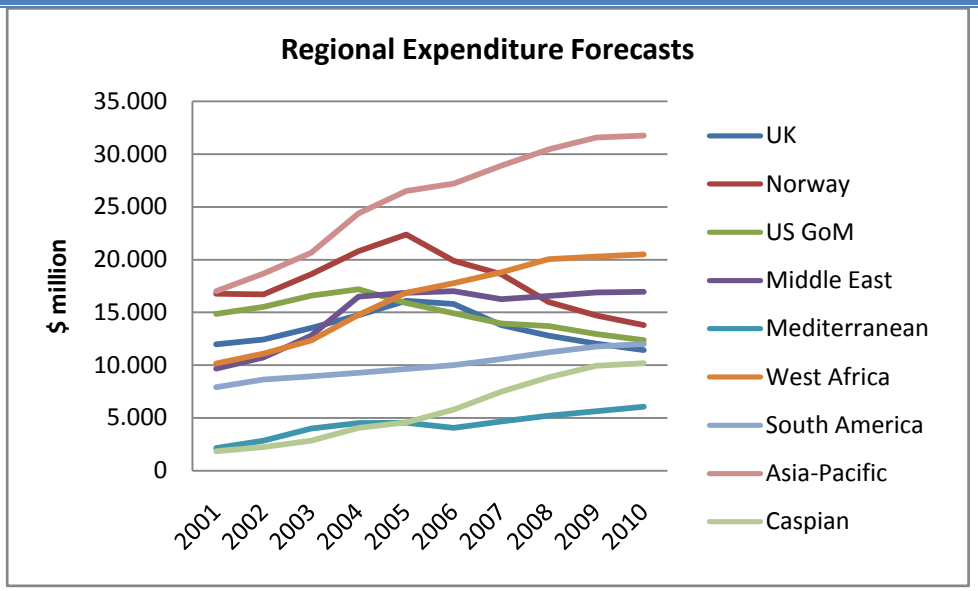
The global oil consumption is expected to rise from 85 million barrels a day in 2006 to 118 million barrels a day in 2030.[19] The rise mainly stems from emerging Asia (including China and India), who take account for 45% of the total world increase in oil use.

- High oil price and low spare capacity

Oil prices are estimated to remain within a band of US$ 50 – US$ 60 between now and 2030 (based on business as usual, any disruption such as war, terror or weather will have an adverse impact). This is a considerably higher (average) rate than seen over the last 30 years. Due to this higher oil price, oil companies are willing to invest more in order to produce more oil.

The low spare capacity of offshore vessels is a result of a decrease in investment over the period 1980-2000. As a result of a high oil price in the beginning of the 80s, large investments were done in offshore vessels. But because of the non-increase in oil price, these investments decreased in the years thereafter. As a result, now that the demand comes to a new high, utilization rates (of these aging vessels) are extremely high. The expenditure levels are expected to remain high for the coming years (see figure below):

Total expenditure level in the offshore construction industry



Source: Mackay Consultants, provided by Scottish Enterprise (2006)

- No scalable alternative to oil

The currently existing alternatives suffer from a lack of energy density and inability to scale. Other than that they're often inappropriate as a transportation fuel. All renewable resources account for about 10% of the world oil demand.

[19] Source: EIA (Energy Information Agency)

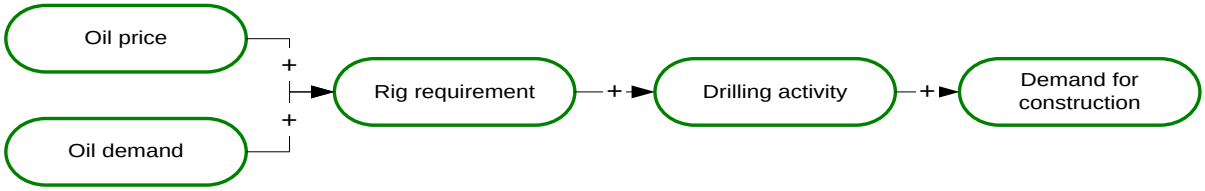
- High utilization rates / high amount of vessel orders[20]

Current utilization rates are at an all-time high, resulting in high day rates. This in turn is a result of (1) Aging of the vessel fleet and (2) requirement for larger, more capable, specialized vessels required for the much more challenging and harsher environments

Due to a lack of investments in vessels over the past 20 years a large part of the offshore vessel fleet is currently more than 20 years old. Since the average use-life of vessels is about 30 years, a lot of vessels will need replacement over the coming years (1). So even though the number of vessels on order is high, a large part of these vessels is expected to replace currently aged vessels and therefore not add to the amount of vessels available for use. Next to that, changing extraction circumstances such as the increased depth lead to an increasing requirement for specialized assets (2). While in 1980 the average depth of an offshore oil well drilled was 2.800 feet, in 2005 this average depth had increased to 7.100 feet.

- Rising number of rigs in use/ offshore leases[13]

The rig-utilization rate is at a all-time high. Since the exploration of oilfields is a highly risky and capital intensive operation, a high utilization rate of drillings is an indication that high demand for construction vessels can be expected. Due to the time required to drill a well and fabricate a production platform, demand for construction services usually lags exploratory drilling by six to eighteen months[21].



- Overall rise in offshore activity/ number of offshore leases[22]

The number of offshore leases have risen. The lease of offshore blocks implies that production from these blocks will start. This is both caused by the risk of the exploration process (oil companies will only lease a block if economic viability is guaranteed) and contractual obligations from the government to produce oil from the field within a certain term.

Other than that, since 1998, 18 new countries have commenced the search for and exploration of oil.

- Global upstream companies have significantly raised E&P spends to secure new oil reserves.

Several oil companies have announced that they are in the early stages of multi year growth in E&P spending, which will lead to a higher demand for construction services.

Main industry threats:

- Industry volatility[23]

The industry is highly influenced by perceptions of future oil and gas price. All fall in the oil & gas price or oil demand will lower E&P expenditure and ultimately platform construction. If such a fall should occur after a couple of years, there is a risk of sudden oversupply.

- Operational risk

Offshore construction involves a certain degree of risk, such as suffering from weather conditions. Another important source of risk is the overall risk related to the type of activity performed. Quality, Healthy, Safety and Environmental issues are of utmost importance for both oil companies as well as

[20] Source: ODS-Petrodata, the Offshore International Newsletter
[21] Source: Horizon Offshore, Inc.
[22] Source: DGH, Directorate Generate of Hydrocarbons
[23] Source: Emkay research report offshore industry

offshore servicing companies. Any accidents relating to these can therefore influence the companies' performance and status tremendously.

- High competition/market entry barrier
Current market players have established strong relationships with contractors and oil companies. This, and the knowledge and capital intensiveness have created a highly competitive environment, with high entry barriers for new market players.
Note: This applies to the offshore construction industry. In the offshore logistics industry, wherein Greatship (India) Limited is currently operating, this barrier is considerably lower.

- Seasonality / Cyclinity of the offshore construction industry
The scheduling of much of the offshore construction work is affected by weather conditions, and many projects are performed within a relatively short period of time. Market players try to compensate for this influence by orienting on different geographic locations.

- Legal regulation
The influence of (new) legal regulation can effect the performance of offshore construction companies severely. Examples of regulation that is of major importance are requirements applying to environmental settings, safety regulation and cabotage regulation.

- Orderbooks full[13]
In addition to the 'high oil price and low spare capacity' mentioned as a market driver on the previous page, it should be noted that there is a risk involved here as well. Because of the low investments in the past 20 years several shipping yards have gone bankrupt (Out of the 81 yards in the 80s only 8 survived)[24]. Because the strong charter rates have fuelled new build construction boom, the yards are at a full utilization. Due to this under-capacity and the requirement for technically more advanced yards, waiting list will occur. This might stall the E&P activities and as a result the demand for Offshore construction vessels. Consequently, to acquire a new vessel will require a premium.

- Risk of changing competition
The competition as it currently is, might not provide a representative image for it's evolvement over the coming years. A risk for example is concerned with the depletion of for example the North Sea. In the coming years it can be expected that fewer platforms will be constructed, so the vessels that were previously applied here (and therefore shouldn't have to be seen as a competitor for for example Indian companies) might apply their resources in other regions worldwide, thus becoming a competitor.

- Risk of alternative fuels[25]
For completeness, the risk of alternative (durable) fuels should be mentioned as well. However, the as mentioned currently only a small part of the total energy supply is handled by durable sources. It has to be taken into account that even these alternative fuels will only influence the demand for oil by so much.

- Trend towards deeper waters
There is a clear shift towards deep and ultra-deep waters for the extraction of hydrocarbons. The main reasons for this are technology improvement, which allows for such deep- and ultradeep water exploration, and the potential of finding more rewarding reservoirs, since these deep-water locations have traditionally been less explored. However, a sudden redundancy of *fixed*[26] oil platforms is far

[25] Greatship India Limited presentation to investors
[26] Be aware that at deep and ultra-deep water locations fixed oil platforms cannot be used, these require floating installations. For a more concise overview see appendix B.

from realistic. As far as can be overseen there will always be a need for fixed offshore oil platforms; they will not be abundant. Current technology cannot transport oil directly from a deepwater location towards shore without the mediation of a fixed offshore oil platform.

- Local and international political and economic conditions
The political and economic conditions are both a threat as well as a market driver. Events such as a natural disaster or war will likely, how mournful as it is, stimulate oil prices to go up, and thereby drive the industry. However, the adverse, such as the hostility already influencing the operation for oil companies in the niger delta area[27], will increase the risk of operation and may lead to impossibilities for operating in this local market.

Although estimated at lower risks the following threats should also be taken into account:
- Contract bidding risks
Inherent to the tender process with which order can be won, bidding risks are associated. This results in uncertainty in expected future returns.

- Discovery rates of new oil and gas reserves in offshore areas
This refers to the risk of delayment or decrease in the discovery rate of new reserves.

- Dependence on key personnel

Indian market entry influencers:
Aside from the previously mentioned that apply for the entire offshore construction industry, there are influences relating more specifically to the entry of the Indian market. Amongst these are the following:

Additional drivers:
- Urgent need to address India's oil problem to achieve targeted 10% GDP growth[28]
In order to be able to achieve India's economical growth level, and thus decrease to amount of energy imported, India has determined to increase spend in oil production. The Directorate General of Hydrocarbons (DGH) has supported this as follows: Although only 58 offshore wells were drilled in India during 2000-2004, NELP[29] envisages 498 wells to be drilled through 2006-2012.

- Indian offshore supply vessel companies to benefit from national preference policy
Domestically, Indian offshore supply vessel providers enjoy preference over foreign competition, if both meet the technical requirements. This is to protect them from competition from foreign vessels. Even if a foreign owners emerges as a lowest bidder, the Indian owner is given an option to match the lowest bid if his bid is within 10% of the lowest bid. This implies that continuing E&P spends in India will ensure high utilization rates for the Indian offshore service providers.

- **The(refurbishment and/or replacement of old vessels is additionally stimulated because of the new safety-requirements that the Indian shipping ministry has put out with which the older vessels/barges do not comply**[30].

- **Volatility towards market entrants**
Note that the market drivers mostly do not only pertain to the offshore construction industry; they will drive the offshore supply industry as well! Hence, a consideration of investing in a new versus investing in the current industry can be made.

[27] Source: www.NRC.nl → http://www.nrc.nl/W2/Lab/Shell/000802a.html
[28] Source: Emkay research report
[29] NELP: New Exploration Licensing Policy
[30] Source: Interview with Arun Tarkar

By entering the offshore construction industry Greatship (India) Limited will lower the dependency on the current business. Due to the lower technical complexity of the operations in the offshore supply industry the entry barriers in the offshore supply industry are lower than for offshore construction. Hence it may be expected that the number of competitors is more likely to rise in this sector. Note however, that also for these vessels the delivery times are long and also here the need for the replacement of vessels is high.

- Risks of currency fluctuations
Appreciation of the Indian rupee against the US dollar will decrease the cost advantage companies would have by awarding contracts to the otherwise (significantly) cheaper Indian companies.

- Risk related to international operation
As this argument is not obvious (after all, the argument is for Indian market entry) it actually is an extension of the threat of seasonal influences, which doesn't only apply for Indian operation. Due to influences of the monsoon the offshore construction industry in India is highly characterized by seasons. In order to be profitable, it is required to evaluate and operate in other regional markets as well. One cannot be dependent on the Indian demand only. The chapter "seasonal influences" will view more information regarding this issue. A major consequence is that in preparation for a bid, contractors will have to take the mobilisation and demobilization cost of moving the vessels to other geographic regions into account, which can take up a significant part in the total contract.

Appendix C – Competitor database

An overview of the main market players is based on data concerning the upcoming projects in the regions. Because of managements interest and market capital expenditure expectations the focus will lie on the Middle East, South-East Asia and West-Africa.

General notes: It has to be taken into account that for a large part of the projects the contractor is not (yet) known. Consequently, projects that are due earlier will be better documented and therefore the propositions are mainly based on a shorter term. Hence, seasonal influences must be taken into account! Also note that the information is nearly completely based on one source: ODS-Petrodata, dated April 2007.

Platform Construction
Note: A distinction can be made between the installer of the jackets, the deck installer and the hookup contractor. However, leaving hookup temporarily out of view, in most cases the installer of the jackets is the same as the installer of the deck. Because most information is known about the jacket installer, remarks here stem from this information. This makes logical sense because they are likely to be the same (because of extra cost of transport and other in case of multiple contractors). However, the other scenario with multiple contractors can also be true when the installer of the jackets doesn't have the proper equipment to install the deck.

Middle east

- *Persian gulf* (130 projects, 73 of which the jacket install contractor is known, 46 with known deck installation contractor)

The information covering the Persian Gulf states that 6 jacket installer contractors will complete the 73 projects currently under construction or in planning phase. Among these J. Ray McDermott stands out as dominant market player; it is involved in 41 out of the 73 jacket install projects with known contractor. Other contractors are NPCC and IOEC with respectively 13 and 10 projects. Others contractors are Seaway Heavy Lifting (5 projects), HHI (3 projects) and JGC Japan (1 project). Most of the projects have early due dates: J. Ray McDermott is expected to finish 22 projects by 2007.
Out of 130 projects, a large part (53) is offshore Saudi Arabian waters. Other countries with a lot of activity are Qatar (43) and Iran (22).

- *Caspian sea* (7 projects, 2 with known jacket installer, 7 with known deck installation contractor)

The Caspian sea has 1 major market player: Saipem. Saipem is involved in all projects.

- *Red Sea and Gulf of Suez* (1 project, no contractors known)

One project is in planning phase but the contractor is yet unknown.

- *Mediterranean / Black Sea* (14 projects, 1 with known jacket installer, 1 with known deck installation contractor)

For only one project information about the contractor is known. This is Micoperi.

South-East Asia

- *South-East Asia* (184 projects, 52 with known jacket installer, 44 with known deck installer)

The overall impression of the SE-Asian market is that the number of contractors makes the market more diverse. Known are 14 contractors of which Nippon Steel Corporation (including Thai NSC) is clearly the biggest, handling 15 projects. Saipem is second largest and is with 7 projects also a large contractor. Other than that the rest of the contractors typically handles 1-6 projects.
The projects are allocated mainly in Indonesia (72), Thailand (51) and Malaysia (45).

- *Far East* (30 projects, 3 with known jacket installer, 1 with known deck installer)

Clearly there is too little information available to suggest conclusions would give a representative image of the market. The only known contractors are COOEC[31] and Saipem. Also notable is that 27 out of the 30 projects are in Chinese waters.

- *Indian subcontinent* (32 projects, 18 with known jacket installer, 14 with known deck installer)

There are 5 known jacket installers: J. Ray McDermott, Punj Lloyd, NPCC, CUEL and Clough. J. Ray McDermott has the largest number of known projects in planning phase or under construction.

- *Australia / New Zealand* (23 projects, 5 with known jacket installer, 4 with known deck installer)

Unfortunately the amount of information available is not sufficient to claim an ideal representation of the market can be given. Market players are Technip[32], Saipem, J. Ray McDermott and Dockwise. 21 out of 23 projects take place in Australian waters.

West Africa (58 projects, 10 with known jacket installer, 10 with known deck installer)
Firstly, the amount of information has to be commented. The amount of information available is not sufficient to claim an ideal representation of the market can be given.
Saipem (including Saibos) seems a major contractor with 6 contracts. Other contractors are Global Industries Offshore, Acergy and Deawoo.
Out of the 58 projects 38 projects take place in Nigeria, due to which Nigeria is far ahead of second largest: Angola (9).

Subsea construction
Middle East: No data

South-East Asia

- *South-East Asia* (17 projects, 2 with known diving contractors)

Out of the 17 projects 9 are taking place in Indonesian waters. The only known diving contractors are Acergy and Vietsovpetro. This

- *Far East (5 projects, 1 with known diving contractor)*

Only 5 projects are known for the far east region. Out of these 5 projects 4 are taking place in Chinese waters. Diving operations for the project known will be performed by COOEC.

- *Indian subcontinent (3 projects, 1 with known diving contractor)*

The information for subsea activities reaches only to 2009. There are only 3 projects registered, and for only 1 project the diving contractor is known, which is Clough.

- *Australia / New Zealand (33 projects, 5 with known diving contractor)*

29 out of the 33 projects take place in Australian water. Only for 5 projects the diving contractor is known. They are Technip, Acergy and J. Ray McDermott.

West Africa (44 projects, 14 with known diving contractor)
In west Africa the highest amount of subsea projects is planned/under construction. 44 projects will take place in the period 2007 – 2010. Out of these 14 have known diving contractors. Subsea 7 and

[31] COOEC: China Offshore Oil Engineering Corporation Ltd.
[32] Taking pipelay activities also into account it can be concluded that Technip is important player in the Australian and New Zealand offshore waters.

Technip have most presence, but Saipem and Stolt are also there. Over half of the projects (25) take place in Angolan waters, and Nigeria follows with 8 projects planned or under construction.

Pipeline laying

Middle east

- *Persian Gulf* (32 projects, 25 projects with known contractor)

The Persian Gulf counts only a few number of contractors, of which 3 major contractors have sizeable numbers of projects. These are: IOEC[33] (8 projects), J. Ray McDermott (8 projects) and NPCC[34] (5 projects). The countries with most projects are Iran (12 out of 32) and Qatar (13 out of 32).

- *Caspian sea* (8 projects, 7 projects with known contractor)

Remarkably, there are only 2 players in this area: McDermott (including subsidiaries) and Saipem.

- *Red Sea and Gulf of Suez (1 project, 0 projects with known contractor)*

The Red Sea and Gulf of Suez area has 1 project planned for 2007, but the contractor is not known.

- *Mediterranean / Black Sea* (21 projects, 11 projects with known contractor)

Saipem has been awarded most projects: 6. This is probably related with Saipem's roots in Italy. Other contractors are Acergy, Allseas, Edison and Valentine maritime.

South-East Asia

- *South-East Asia* (118 projects, 51 projects with known contractor)

The major players in the South-East Asia pipeline market are Saipem (7 projects), Intra Line / Horizon (7 projects) and APECS (6 projects). In total there are 20 market players (contractors) of which 11 are contracted for only 1 project.
Most pipelines have the same originating country as destination country (about 114 out of 118). Indonesia has most planned pipeline projects (57). Second largest is Malaysia.

- *Far East* (23 projects, 7 projects with known contractor)

Firstly it should be noted that the number of projects with contractor known is likely not to give a realistic representation of the Far East market. There are only 4 market players: Global Industries Offshore, COOEC, Saipem and PT Kari Raya.
China is involved in 14 out of 23 projects, and thereby of big importance for this subregion.

- *Indian subcontinent* (22 projects, 16 projects with known contractor)

The information available shows 8 different contractors. They're almost all of the same size. By name they are: Allseas, Clough, Global Industries Offshore, HHI[35], J. Ray McDermott, NPCC, Punj Lloyd and Valentine Maritime.

- *Australia / New Zealand* (36 projects, 12 with known contractor)

This market shows only several market players. Amongst them: Technip (and Technip / Subsea 7), J. Ray McDermott, Acergy and Saipem. It is notable that Technip plus the combination Technip/Subsea 7 together have 6 projects running. They seem to be the largest market player in this region.

West Africa (84 projects, 34 projects with known contractor)

The West African pipeline market is dominated by the majors. The most important player is Saipem, which including Saibos has 10 projects under construction or in the planning phase. The other contractors (Stolt Offshore, Acergy, Subsea 7, Technip, Horizon Offshore and Global Industries) have

[33] IOEC: Iranian Offshore Engineering and Construction Company
[34] NPCC: National Projects Construction Corporation Limited (India)
[35] HHI: Hyundai Heavy Industries

4 projects running on average and there are no big differences among them concerning the amount of projects running. The majority of the pipeline contracts is for Nigeria (38) and Angola (27). The forecast is running for period 2007 – 2010.

Running Projects
Note: Projects may consider both platform as well as pipeline construction. Do take this into account when comparing figures. Thus a total of 5 platform construction projects and 8 pipeline construction projects may well be possible in a region with a total of 5 running projects.

Middle East

- *Persian gulf*

For the Persian Gulf Area there are 9 projects running, with 5 projects concerning the study of the construction of a total of 11 platforms. Installation years vary between 2009 and 2011. The platforms are accompanied by a total of 10 pipelines. Another 3 pipeline projects for 2007 and 2010 are under study as well. Most projects are located offshore Iran (6), and other activities are planned for Oman (2) and Kuwait (1).

- *Caspian Sea*

Studies are running for two projects for the construction of a total of 3 platforms. Due years are 2009 and 2010 and there are 3 pipeline projects involved.

- *Red Sea / Gulf of Suez*

No information available on projects under study.

- *Mediterranean / Black Sea*

There are 21 projects running. A total of 9 platforms are being considered. Next to that there 15 pipeline projects for a total of 18 pipelines. Also, 9 Subsea systems are being considered.
The projects relate to 9 different countries, of which Italy and Egypt clearly have more projects running.

South-East Asia

- *South-East Asia*

There are 39 projects running in this region. Of these, 24 projects are concerned with the possibility of building a total of 44 platforms. There are 28 projects that evaluate the construction of 35 pipelines. Further the construction of 12 subsea systems is being considered. Most of the running projects are in Indonesia (17), but Thailand, Malaysia and Vietnam also have considerable amounts of projects running with respectively 8, 5 and 5 projects.
The project due dates are quite equally spread between 2007 and 2010. However, few projects are planned for as far as 2014.

- *Far East*

There are a total of 13 projects running in this region. 6 of them consider the construction of platforms (6). Also 11 projects consider the construction of pipelines and 5 consider the construction of subsea systems (5). The projects are due between 2007 and 2011, with 2007 and 2010 being peaking years.

- *Indian subcontinent*

A total of 8 projects are running in this region.3 of them consider the construction of total of 6 platforms. 5 projects are evaluating a total of 8 pipelines. Also, 1 subsea system is under evaluation. Due dates vary between 2008 and 2011, with 2010 being a peak year. Next to India, other construction takes place in Myanmar.

- *Australia / New Zealand*

A total of 32 projects are running in this region. Of them, 9 projects are evaluating the construction of a total of 12 platforms. Also, 29 projects are evaluating the construction of a total of 30 pipelines. Construction of another 23 subsea systems is also evaluated. Construction is planned till as far as 2017, but most projects of course are due earlier: mainly 2008. Out of the 32 projects only 2 are not in Australian waters, they are in New Zealand and Papua New Guinea.

West Africa

A total of 43 projects are running in this region. Of them, 10 evaluate the construction of a total of 12 platforms. Also 31 pipeline projects are evaluating the construction of 35 pipelines. Construction of another 27 subsea systems is also evaluated. A notable difference is that the evaluation involves the construction in years more ahead of now (2012 high activity). Far most projects concern waters offshore Angola (25), and Nigeria is second with 7 projects.

Appendix D – Vessel classification

Vessel classification derived from ODS-Petrodata information:

The amounts of the different DP moored vessels are as follows:

Type of vessel	#	Type of Vessel	#
Construction	1	Flex lay/MJ-lay/DiverLess	1
Construction/pipelay	2	Flexible pipelay ship	1
Deepwater mooring	1	Flex-lay/ J-lay	1
Derrick barge	2	Heavy Lift	1
Derrick pipelay	1	Multipurpose barge	1
Derrick / J-lay	2	Multiservice vessel	20
Derrick/Pipelay	5	Multiservice/bury	1
Derrick/Reel pipelay	1	Multiservice/flex reel	1
Diving support/flex lay	4	Multiservice/Pipelay	2
Diving support/Reel lay	1	Multiservice/Reel pipelay	2
Diving support /Well ops	1	Pipelay	9
Flex lay	2	Reel pipelay	4
Flex lay/ bury	1	Rigid pipelay	1
		Trenching	1

The following amounts of vessels with a conventional mooring system

Type of vessel	#	Type of Vessel	#
A-Frame Derrick	1	Derrick/Pipelay/Bury	2
Bury	1	Jackup	1
Crane	2	Multiservice	4
Derrick	24	Pipelay	8
Derrick lift boat	1	Pipelay/bury	14
Derrick pipelay	2	Sheerleg	5
Derrick/bury	1	Sheer-leg Derrick	1
Derrick/J-lay	1	Stiff-Leg Derrick	4
Derrick/Pipelay	35		

Appendix E – Weather related information

India
East-India
The normal wind, wave and surface current conditions offshore East India are dominated by the seasonal monsoon system that impacts the Indian Ocean and South-East Asia. However, extreme wind and wave conditions in the Bay of Bengal are associated with the occurrence of Tropical Revolving Storms (TRS).

The South-West Monsoon occurs between May and September as the ITCZ[36] migrates northwards. The tropical moist air within the ITCZ, originating over the western Indian Ocean, covers the whole of the region. Conditions are characterized by moderate to fresh south-westerly winds, although higher speeds are frequently encountered. In association with these winds there is a south-east originating from the northern Indian Ocean. Swell wave heights range between 1m and 4m, and periods between 10 and 12 seconds. Extreme swell waves are known to occur, with wave heights exceeding 6m and represent the worst operating conditions, other than Tropical Revolving Storms.

From mid-October to March the less severe North-East Monsoon occurs when the ITCZ returns southwards as the Asiatic landmass cools and surface pressures rise over northern Asia. Conditions off the east coast of India are less severe during the North-East Monsoon, and are dominated by moderate north-easterly winds between $2ms^{-1}$ and $8ms^{-1}$. Wave conditions are characterized by a low swell from the north and North-East, with wave heights rarely exceeding 3m. Wind wave heights in both the North-East and South-West Monsoon are more variable than the swell conditions, with wave heights in the region of 1m to 2m.

Between the two monsoon there exists a “transition period” when wind speeds are more variable and normally lower than during the monsoons. Similarly, wave heights are variable and predominantly less than 2m. During this period’s there is more chance of Tropical Revolving Storms. These consist of a moist, convective, rotating mass of air. Clouds and precipitation elements tend to form curved or spiral bands, often in a symmetrical pattern with a circular or elliptical wall cloud around a central region of relatively calm and cloud-free air, known as the eye. In general, the more intense the TRS the smaller the eye. The strongest winds are concentrated in narrow bands around the eye, just beyond the edge of the wall cloud, and can exceed $30ms^{-1}$.

Due to the monsoon, during the period of about 15th of May until the end of October there is typically little construction activity on the west coast offshore India. For the period of November of December the weather conditions are still bad at the east coast, thereby not allowing for construction activity during this period. Thus the best season for construction offshore India would be November/December until halfway May.

[36] ITCZ: The Intertropical Convergence Zone is the name given to a broad band of tropical air that separates the Northern Hemisphere, subtropical, north-easterly winds from the Southern Hemisphere, subtropical, south-easterlies

Middle East
The wind regime of the Gulf, and so the climatic conditions, can be divided into winter and summer seasons, with very strong winds, squalls and thunderstorms likely during the transition between the two.

Winter
The winter season extends from mid-October through to mid-April. The "Winter Shamal[37]" winds develop in the Gulf as depressions move eastwards from the Mediterranean, across Iraq and into Iran. Associated with these depressions are troughs of low pressure preceded by south-easterly winds. These winds can reach strong force in the north and usually last for 3-5 days.
During November the Gulf is prone to squalls. Vigorous thunderstorms and hail are often accompanied by very strong winds, occasionally exceeding storm force in the more violent squalls. There is also a high probability of poor visibility in associated sandstorms.

Summer
The summer season extends from mid-April through to mid-October when high daytime temperatures over the Arabian Peninsular generate strong land and sea breezes along the coastal region of the Gulf. There is a renewed risk of equinoctial squalls forming again in early April, although, generally, the frequency and strength of Shamals decrease through April and May.

In June and early July, the arise of the "Summer Shamal" in the Zagros mountains and the simultaneous arise of increasing north-west winds on the Saudi side of the Gulf result in what is called the "40-Day Shamal". Although the direction is usually constant, the strength varies and the thermal gradient "pulses" several times a month. The strength and frequency of these pulses depend on many complex factors, but each pulse sends a fresh burst of North-West winds down the Gulf. Late July to September is usually a quiet (but uncomfortable) period with very high temperatures, slack winds and low seas. There are, however, occasional brief increases in wind speeds due to weak areas of low pressure forming offshore, mainly near the Iranian coast.

By October, the cycle begins to repeat as the first of the "Winter Shamals" develops in the northern Gulf. Initially, these early Shamals rarely affect areas south of Qatar. However, as the month progresses, they extend successively further toward to the Emirates, often with blowing sand and poor visibility.

The Summer Shamal is usually accompanied by high downtime because of the successive periods of wave generation, although the seas rarely reach the levels of the Winter Shamal and 1.5m to 3.0m significant height would be a representative range during this phase.
As in the rest of the Gulf, the two most energetic times of year are December to January and June to July, when Hs exceeds 3m for 1.5% of the time (compared with 3.5% to the north of the Qatar peninsula in the central Gulf.

Concluding, there are some contradictions between the information based on Fugro GEOS and with statements made by mr. Rupchand Lohana in an interview. The latter praised the months between April and October most suitable for offshore construction in the region, but data by Fugro GEOS also suggests that June and July are among the most energetic times of the year.

[37] The Arabic word for north is "Shamal" and this is the name given to the north-west winds that prevail in the region.

West Africa
The climate of Equatorial Africa is controlled by the North and South Atlantic Subtropical Highs and Equatorial low pressure system. These features combine to create the North-Eastern and South-eastern Trade Winds and the Equatorial Trough, also known as the Inter Tropical Convergence Zone (ITCZ), that occurs between these two wind belts.

The strongest winds (mean monthly speeds about $5ms^{-1}$) occur during the Northern Hemisphere summer and are sometimes referred to as the South-West Monsoon. The weakest winds (mean monthly speeds around $2.5ms^{-1}$) occur during the Northern Hemisphere winter.
The major meteorological feature impacting offshore operations is the passage of line squalls[38].

Thunderstorms are a regular feature of Equatorial West Africa and their high frequency may severely disrupt weather-sensitive operations. The greatest frequency of thunderstorms occurs around the equator, from Cameroon to the Congo, with around 100 to 150 thunderstorms a year.
'Squalls' are sudden increases in wind speed that last for several minutes and are associated with the leading edge of multi-cell thunderstorms.

The wave climate offshore Equatorial Africa is benign with relatively low significant wave heights. During the summer month's significant wave heights are generally 1 to 2 meters; during the winter months this decreases to 0.5 to 1.5 meters. The dominant wave process in the area is long-period swell generated in the Southern Ocean and moving towards the north and Northeast to impact the region's offshore operating areas.

[38] Line squals: A line of thunderstorms

Appendix F – Partner selection overview

- **Diamond services** (www.dscgom.com/)
Sector: (Platform construction, pipeline construction, maintenance)
Services:
- Marine transportation
- Pile driving
- Dredging
- Pipeline
- Equipment rental

Diamond services owns 3 lay/bury barges and a construction/bury vessel. It has the capability of lying pipes up to a diameter of 48 Inch, but it is also involved with small size offshore pipe laying and related services.
Other than these it owns 10 Crewboats, 6 tugs and 2 workboat/tug, 1 Lift boat with 65' legs and one 120' 4-point mooring vessel.

Diamond services was founded in 1962 and is located on 41 acres of waterfront property along Bayou Boeuf in Amelia, Louisiana.

- Valentine Maritime (www.vmgulf.com)
Sector: Pipeline laying
Services:
The company specializes in the construction, installation, maintenance and sub-sea inspection of offshore platforms and submarine pipelines, as well as the chartering of barges and marine vessels.
Thus: Pipeline Laying, Installations, Hook-up, Testing, Pre-commissioning, Sub-sea works, Inspection survey, Salvage

Valentine Maritime has several assets: 2 derrick lay barges, 1 jackup barge, 1 jackup/work barge, 1 Anchor Handling Tugboat and 1 Cargo barge.

Currently, Valentine Maritime has the following affiliate companies:
Valentine Maritime (Gulf) LLC - UAE
Valentine Maritime (Kish) Ltd. - Iran
Valentine Maritime (Saudi Arabia) Ltd. - Saudi Arabia
Valentine Maritime (Mauritius) Ltd. - Mauritius

The company has overseas offices in: United Arab Emirates, Yemen and was founded in 1990

- Offshore turnkey projects management (Likpin LLC) (www.likpin.com)
Sector: Mainly pipeline and pipeline maintenance.

Likpin LLC is a company registered in Dubai, UAE, engaged in offshore pipelay and marine construction, hydrographic survey services, ROV (remotely operated vehicle) services, vessel and project management for the offshore oil and gas industry mainly in the ME Gulf and India.

Services include:
Offshore Pipelay, Shore pulls and shallow water pipelay, Pipeline route survey, Pipeline inplace survey, Pipe and cable tracking, Pipeline installation engineering, Pipeline hydrotesting, Hydrographic survey, ROV operations, Construction diving, Inspection, Maintenance and Repair
Riser, topsides work and hook up, Abandonment and salvage, Vessel management/marine logistics, Heavy load-outs and offshore heavy lifts, Derrick barge operations, Offshore installation of jackets decks, SBM, PLEM, etc.

Assets:
LIKPIN LLC owns/manages a fleet of offshore construction vessels:

PLB 132	(under management)	Non-self propelled pipe laying barge
HLB 5000	(under management)	Construction/heavy lift barge….
SADAF 3000	(under management)	Construction/heavy lift barge….
SAFF 400	(under management)	

Likpin LLC has experience worldwide but her focus lies on the Middle East. Likpin operates from Dubai, U.A.E.

- Superior Offshore International Inc (www.superioroffshore.com)
Sector: Mainly platform and subsea construction

(1) Commercial diving and subsea construction
(2) Construction & fabrication division
    - Platform Restoration
    - Riser Installation
    - Equipment Hook-Up
    - Structural Repair and Installation
    - Platform Maintenance
(3) ROV division
(4) Deepwater division

- Construction services include: installation, upgrading and decommissioning of pipelines and production infrastructure.
- Commercial diving services include: inspection, maintenance and repair services and support services for subsea construction and salvage operations.

The company also operates a construction/fabrication division. Superior Offshore operates a fleet of 11 service vessels and provides remotely operated vehicles (ROVs) and saturation diving systems for deep water and harsh environment operations.

Superior Offshore is based in Houston and founded in 1985.

- Offshore Specialty Fabricators (www.osfi-fw.com/)
Sector: Platform construction
Services: Platform Installation & Removal, Single Barge Heavy Lifts up to 1.765 Tons, Dual Barge Heavy Lifts up to 2.500 Tons, Load Outs & Off Loads, New Platform Fabrication & Installation, ASME Coded Vessel Shop, Platform Leasing, True Turnkey Services

Offshore Specialty Fabricators owns and operates: 3 Derrick Barges, 6 Offshore Tug Boats, 2 Inland Tug Boats, 2 Crew Boats, 2 Utility Vessels, 1 Supply Vessel, 2 Cargo Barges. Other than these it owns 2 fabrication yards.

Offshore Specialty Fabricators has offices in: Houma, LA; Houston TX; Ingleside, TX. The age of the company is not known, but the website does show the wide experience the company has with turnkey projects.

- Con-Dive (www.con-dive.com)
Sector: Pipeline laying
Services: Diving, Pipelay and ROV support. (no further information available)

Con-Dive owns 7 vessels and has offices in Houston, Trinidad and Houma. The reference projects show that it has experience in the GoM, Trininidad, west Africa.

- Bisso marine (www.bissomarine.com)
Sector: construction
Services: Bisso Marine can offer services ranging from complete installation of offshore structures and platforms, to pipeline support.

Bisso marine owns: 5 derrick barges, 1 combo barge, 1 lay barge,2 crane barges, 1 material barge, (and 3 tugs and 4 support vessels). The eldest roots of the company lead back to 1890. Expansion plans are not exactly known.

- Stemat BV (www.stemat.nl)
Sector: construction support
Services: charter, transport, project mobilization, pipe & cable pulling, hoisting & pile driving.

Stemat owns 9 Multipurpose vessels, a crane barge an anchor handling tug, 2 push flatboats, and a gravel bed laying multipurpose pontoon (?). Stemat is located in the Netherlands, in Rotterdam and has started operations in 1986. Experience mainly in Europe but also in North Africa and the Middle east.

- Perrott Salvage & construction (www.perrottsalvage.com.au/)
Sector: construction
Services: Marine transportation, underwater services, marine salvage, marine construction, submarine pipelines, mooring.

Perrot owns 6 barges, 1 workboat, 3 tugs, 1 PSV, 2 landing craft vessels, 1 crane barge and a cargo vessel. Next to that it has a shipyard. Perrott is located in Cairns, Australia. It is not clear if Perrott has experience in the Middle East. It looks like the company has 25 years of experience.

- Offshore Contractors Ltd, (www.offcon.nl**)** subsidiary of SeaTrucksGroup (therefore a smaller chance for a partnership?)
Offshore Contractors provides services for the international subsea oil and gas industry. Unfortunately, there is no company description currently available for Offshore Contractors. ODS-Petrodata data indicates that they own 1 barge, which has a DP mooring system and can lay pipelines up to a diameter of 60 Inch. The office is in the Netherlands.

- Micoperi
Sector: Platform construction and Pipeline Laying
Services include:

- Detailed engineering
- Fabrication of jackets
- Decks and modules
- Load-out
- Launching
- Lifting
- Installation
- Hook-up
- Final testing
- Commissioning
- Pipeline design and engineering
- Pipe selection and fabrication
- Pipe coating
- Pipeline launching
- Pipeline laying
- Shore pull and shallow water solutions
- Pre-trenching, post-trenching and backfilling
- Pigging and testing
- Spool and riser installation and connection
- Pre and post lay Survey and as-built dossiers.

Micoperi owns a supply vessel, an AHTS vessel, 2 AHTs, a Crane barge, a Crane and pipe laying barge and a self elevating platform. It is located in Italy, owns a fabrication yard and was founded in 1946.

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Enschede, December 2009