

MASTER THESIS

# Project procurement in the Oil and Gas industry

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Towards improving the project supply  
process for a market entrant in Oil and Gas  
contracting

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Public version

Final

## Master Thesis

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## Preface

Before you lay the final version of my thesis for the TU Delft Master of Science program of Construction Management and Engineering at the Civil Engineering and Geosciences faculty. I wrote this thesis in the period from June 2012 to June 2013.

The starting point for this thesis was provided by challenges encountered by the Company in the project procurement part of tendering for integrated offshore Oil & Gas projects. The aim of this thesis is to make recommendations to improve the project supply process for offshore Oil & Gas tenders for the Company. With a thorough problem definition, a literature research and a case study, powerful insights on project supply were generated. Finally, a project supply process was designed to improve quality of supplier proposals, thus bringing the Company closer to successfully entering the offshore contracting market.

This thesis would have never come to be without excellent supervision and support. Within the Company, I would like to thank Erik de Haas for giving me the opportunity to investigate a significant and real world problem and his tireless support. From its engineering company, I would like to thank Jorrit de Groot for his advice and feedback during the project. Furthermore I would like to thank everybody within the Company who contributed to my interviews and questions over the past months.

From the TU Delft I would first like to thank Mohammad Suprpto for his daily support. Also, many thanks to Herman Mooi for his guidance and Jeroen van den Bos for his feedback and advice. Finally, I would like to thank Alexander Verbraeck for chairing my graduation committee.

Ties van der Horst,  
Amsterdam, June 2013

*This public version of my thesis is made a little toothless after review by the commissioning company. Some body-text paragraphs have been removed, possibly leading to out of context statements here and there. If the reader has additional questions or comment, please do not hesitate to contact the author. Specific permission to share the full version could be applied for.*

*Ties van der Horst  
Amsterdam, January 2014*

## Summary

### Introduction

The Company is a specialist subcontractor and faces heavy price competition in its established markets. It is therefore looking to expand up the value chain. *[classified]*

### The problem

As part of the company strategy, the Company started tendering for integrated EPC O&G projects as main contractor. At the time of writing, the Company has tendered for three such projects. Despite serious efforts and investments, none of the projects were awarded. The lack of competitiveness of the tenders was considered a contributing factor to the failure to acquire the projects. As subcontractor in previous projects, the Company has experienced rigid control from the main contractor. A lack of control that the Company currently has over subcontractors was considered the main reason for difficulties with the project supply.

This study was commissioned to explore this control asymmetry. In order to further define the problem, an extensive problem definition was formulated based on various interviews with employees across the Company and a workshop studying the symptoms for the difficulties with project procurement in one of the lost O&G tenders. The main symptoms for the difficulties in project supply where:

- Virtually no compliance to the requirements in the RFQs
- High proposal price variations, especially for integrated scopes
- Quality of technical proposals not in line with the Company's expectations
- Unwillingness to work for the Company
- Suspicion towards the intentions of the Company

Based on these symptoms, the problem statement was drafted: *the Company currently does not have a system in place to secure supply for EPC type projects in the offshore O&G contracting industry, thus greatly hindering tender competitiveness and the aim to become an integrated main contractor. This problem statement led to formulating the main research question in this thesis: What are the characteristics of a project supply system for a market entrant in the O&G contracting industry?*

### Research approach and reading guide

Several research actions were performed. Firstly, academic literature was studied to investigate 1: The characteristics of contracting in the Oil & Gas industry, 2: The background of project procurement and 3: A theoretical layout of a project supply process. This research action is discussed in chapter 2.

Secondly, the project supply process that is used by oil & gas contractors was explored with a case study. This generated data to verify and expand the theoretical process. Additionally, it provided insights in the methods and techniques that are used in practice. Little literature was available on project supply processes in a project based company in the Oil and gas industry. From two similar Oil and gas contractors, project supply professionals were interviewed. The interview proceedings were used to make a case study report for each of the two Oil and gas contractors. The two cases were then compared during a cross case comparison. For this comparison, a case report on the project supply system for the Company was synthesized based on the information collected from the problem definition. This research action is discussed in chapter 3.

Thirdly, triangulation was used to discuss the project supply process for a market entrant in Oil and Gas contracting. This research action is discussed in chapter 4. Chapter 5 contains the conclusions

regarding the theoretical characteristics of a project supply process and recommendations for further research.

The more pragmatic conclusions specific to the Company’s problem situation can be found in chapter 6. This chapter also contains recommendations towards improving the project supply process of the Company.

**Findings**

The case study proved that due to the increasing size and complexity of offshore Oil and Gas projects, capacity of the limited number of highly specific suppliers is getting strained. As a result, contractors become more dependent on suppliers for serving their clients. Competitive tendering forces contractors to depend even more on its suppliers. Literature and practice showed that to win a tender in Oil and Gas contracting, the supply or procurement part should convince the client that the contractor has access to the right goods and services at the right price. This requires that the suppliers, which are included in the bid, need to have decent proposals. However, suppliers have limited capacity to prepare proposals and often receive RFQs from multiple contractors bidding for the same tender. Resources have to be prioritized. Therefore, proposals for main contractors that are expected to have a high chance of winning the contract, receive more attention and a better price. The mechanism showed when the Company itself is tendering as a subcontractor.

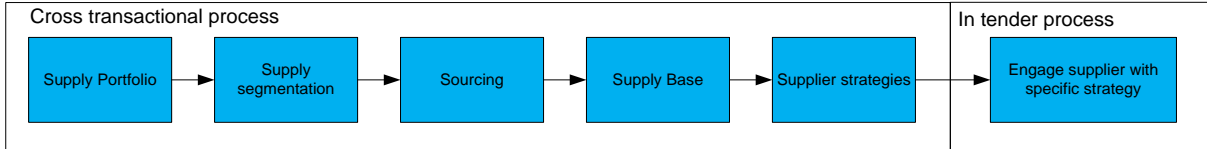
This creates a problematic situation for a newcomer without established relationships with strategic suppliers. No relationship means less attention from suppliers, resulting in higher prices and lower quality procurement scopes, making the main tender less competitive. This decreases the chance a contract is awarded and yields no transactions for strategic suppliers. Transactions are a powerful mechanism to build relationships with suppliers.

Two general approaches can be discerned to turn this effect around. Firstly, a contractor could low-bid for a project. The possible hiatus in the supply scope is negated by offering a project for cost price, thus building relationships by forcing transactions. The second approach depends on building supplier relationships before even being in a tender process. Relationships are shown to improve quality and reduce price of supplier proposal, thus increasing overall competitiveness of the bid. It enables winning a project without running the huge financial risks attached to low-bidding a project.

This second approach is the starting point for a project supply process for a market entrant in Oil and Gas contracting: The goal of the process is to secure supply of strategic and bottleneck items by building supplier relationships. This approach is described in literature and actively practiced by both companies from the case studies.

**Conclusions**

The main conclusion of the thesis is that a market entrant in Oil and Gas contracting should run a project supply process aimed at securing strategic and bottleneck supplies by building supplier relationships. A conceptual design for such a process is presented in Figure 1. The process has its roots in literature but was significantly adapted with the case study findings.



**Figure 1 Project supply process**

The cross transactional process prepares supplier strategies which are executed in a tender for a project in the new market. In the supply portfolio, the project supply part of example projects for the market to be entered is broken down in industry standard supply categories. These supply categories are segmented for project profit impact, supply risk and engineering content. For the high supply risk categories, suppliers are sourced. The suppliers for each category are ranked for capabilities, past performance, fit of core competencies, culture, communication and behavioural fit. For the three highest ranking suppliers per category, a supplier strategy is devised.

The main aspect of supplier strategies and an important conclusion of this thesis in itself are the methods found to build supplier relationships; a selection:

- Clearly communicate the intention to enter the new market.
- Show commitment to win tender and update suppliers regularly on the tender progress.
- 'Spirit of contract' tendering. Do not force contracts and back to back liabilities in the tender phase.
- Strive for highest possible quality in RFQs and tailor these towards supplier core competences. Be knowledgeable about their product.
- Minimize requesting budget estimates. Engage suppliers to actually secure supply.
- Involve senior management in interactions with the suppliers.

### Recommendations for further research

The main recommendation for further research is to expand the case study. For this thesis, only two O&G contractors were interviewed, both were active in the SURF market. The O&G contracting industry is not nearly spanned by these two cases, generalizing towards reality is therefore not possible. Also, in each company only one respondent was interviewed. The validity of the cases could be improved by interviewing more respondents for each case.

### Recommendations for the Company

*[Classified]*

## Glossary

<i>Abbreviation</i>	<i>Definition</i>
O&G	Oil and Gas
E&P	Exploration and production
EPC	Engineer, Procure & Construct, The term EPC is used as proxy for integrated projects in this thesis
SPM	Single Point Mooring. An oil transfer Buoy.
IOC	International Oil Company
NOC	National Oil Company
EC	Engineering and Construction contractor
RFP	Request For Proposal
RFQ	Request For Quotation
ITT	Invitation To Tender
LLI	Long Lead Item
EPIC	Engineer, Procure Install & Commission
SOW	Scope Of Work
T&I	Transport and installation
SURF	Subsea/Umbilical/Riser/Flowline; a niche in O&G contracting. Equipment needed to get the oil from seabed to surface.
GoM	Gulf of Mexico
SCM	Supply Chain Management
<i>Word</i>	
Scope	Specific part of a project
Upstream	Segment of the Oil & Gas value chain, strictly from exploration to bringing the product to the surface but mostly used to designate everything before refinery
Supplier	Party offering either a good or a service
Item	Good or service

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# 1 Introduction

## 1.1 Background

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*Classified*

## 1.2 Problem definition

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### 1.2.1 Methods used in the problem definition

The initial question points into the direction of difficulties with subcontracting in the tender phase of EPC O&G projects but is still open to many interpretations. To clearly define the problem, the questions to what the symptoms are, what the problem is and why it is a problem need to be answered. Certain, often concurrently executed research steps were taken to come to a specific and well founded problems statement on this issue:

#### ***Immersion***

To gain initial understanding in the problem, the immersion approach was used. The best way to understand a company is to work for it. To that effect, the researcher worked as an intern at the Company's Tender Department for two months. An important weakness of this technique is the lack of objectivity towards the commissioning company. This weakness is inherent to writing a master thesis at a company instead of in an academic environment.

#### ***Interviews***

With the insight from the internship, exploratory and unstructured interviews were conducted with key personnel throughout the organization. These interviews served to collect different viewpoints on the extents, background and symptoms of the problem. Some general interview questions were prepared:

- Why become an offshore contractor?
- What characterizes the way of working?

#### ***Desk research***

During the desk research, the nature of the control difficulties encountered in tender procedures was further investigated. The goal was to gather evidence for the perceived lack of control over subcontractors. Email correspondence with subcontractors from one of the three recent EPC tenders was available as data source. The full research set-up with raw data outcomes is available in Appendix E.

#### ***Workshop***

A workshop was organized to investigate the causes for the perceived lack of control and validate the researchers understanding of the problem. Personnel who contributed in preparing the tender for the *[classified]* project were invited to participate. The full set of outcomes is again available in Appendix F.

### 1.2.2 Results from the preliminary interviews

*[classified]*

### 1.2.3 Results regarding the current procurement approach

*[classified]*

## 1.2.4 Conclusion

The three recent tenders for EPC O&G projects are in line with the strategic direction of the Company. As such, the transition from specialist subcontractor to offshore main contractor is inevitable. Also, O&G projects have a completely different procurement profile than the traditional projects. The difference lies in two main aspects: the sheer value and size of the project procurement scope. Secondly, the nature of the goods needed. Procuring off-the-shelf goods may be expensive but the items themselves are straightforward. For O&G projects, a variety of highly complex goods and services need to be purchased. Besides the complexity of the items, their markets are often supplier driven, thus posing another challenge.

The symptoms at hand are not a matter of "a lack of control over subcontractors" but the consequences of a company that is set up to do specialist subcontracting works, now tendering for major offshore O&G projects. As such it, amongst others, simply lacks the capabilities to procure the required third party items. This insight allowed formulating the problem statement below:

The Company currently does not have a process in place to secure supply for EPC type projects in the offshore O&G contracting industry, thus greatly hindering tender competitiveness and the aim to become an integrated main contractor.

The term 'securing supply' is used to surpass the non-committal stage of quotes and proposals. A sharply priced quote in the tender phase does not necessarily mean that the supplier can deliver if the project is awarded. Comforting the client by showing that the third party supply is secured is an important aspect that was clearly lacking in the [classified] tender.

## 1.3 Research design

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### 1.3.1 Objective

Conduct research to find the characteristics of project supply in the O&G contracting industry and make recommendation towards improving the project supply process of the Company.

### 1.3.2 Research questions

The main question in this thesis is:

*What are the characteristics of a project supply process in the O&G contracting industry?*

The following research questions are formulated to support answering this question:

1. What are the specifics of contracting in the oil and gas industry?
2. What is project supply?
3. How could a literature-based project supply process for an Oil & Gas contractor look?
4. How does the project supply process of an Oil & Gas contractor look?
5. What recommendations can be made towards improving the project supply process of the Company?

### 1.3.3 Research framework

This research is characterized by a complex problem situation, asking to be investigated in depth before attempting to solve the problem. This requires for a conceptual design that places emphasis on analyzing the problem situation but is not fully descriptive in nature. The Company, of course, is looking for a solution for the problem as stated earlier. To that effect, elements of the research process framework of Ahlemann, El Arbi, Kaiser, and Heck (2013) are used. This framework combines a

descriptive approach for analyzing the current situation and a prescriptive approach for designing solutions.

1.3.4 Research method

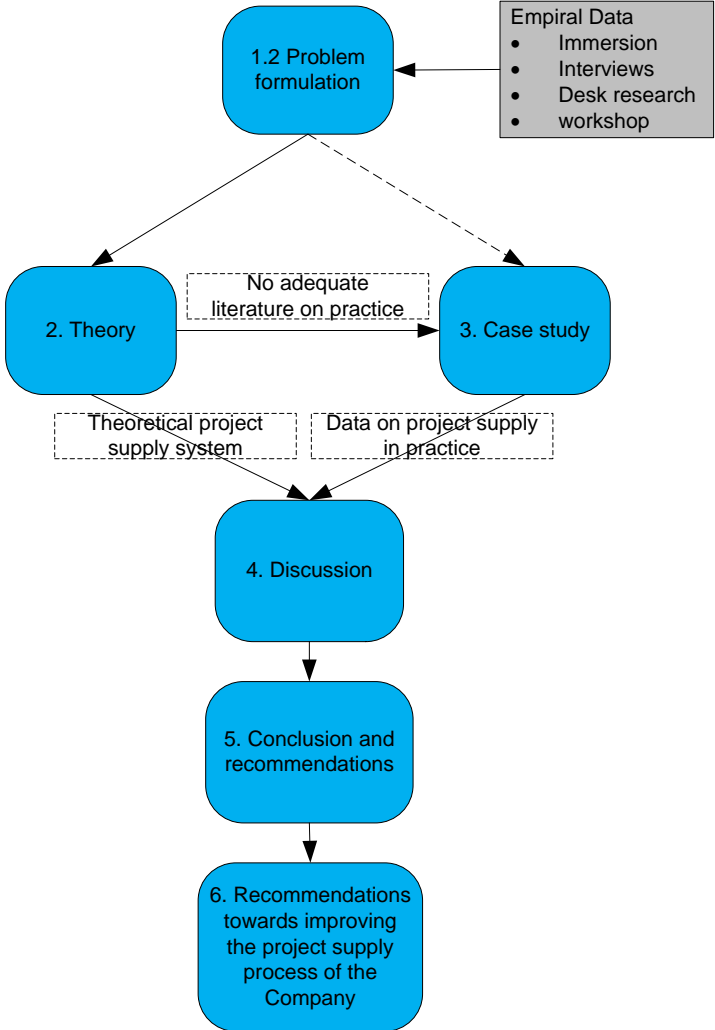


Figure 2 Research method

1.3.4.1 Problem definition

The method used in the problem definition is discussed in paragraph 1.2.1.

1.3.4.2 Theory

Initially, academic literature is studied to answer these questions. The first two sub questions serve to set the context of both O&G contracting and project procurement/supply. In question three, based on existing supply management frameworks, a selection of functions is made. Existing supply management frameworks are mostly aimed at production based organizations and consequently do not fit the project based contracting business. Project based procurement is characterized by large and intermittent transactions while production based procurement features regular transactions of smaller size. The selected functions are then discussed in detail. Based on the selection of functions, the O&G contracting context and the background of project supply, a theoretical project supply system is formulated in conclusion of answering questions one, two and three. This system is directed towards a market entrant in O&G contracting.

### 1.3.4.3 Case study

Next, the project supply system actually used by O&G contractors is explored in sub question four. Exploring practice serves two goals: First, it generates data to verify both the selection of functions and general characteristics of the theoretical supply system. Second, it provides insight in what operational methods and techniques are used in practice.

Very little suitable literature on project supply systems at offshore O&G contractors is available. Consequently, the decision was made to collect data in the field by performing a case study. In multiple companies, a single project supply professional is interviewed. The interview proceedings together with publically available sources are then used to make a case report per company. The case reports are then compared in a cross case analysis.

#### 1.3.4.3.1 Case study methodology

A multiple case design with the project supply system of offshore O&G contractors as unit of analysis is proposed because the goal of the study is to explore how other O&G contractors approach their project supply management. A multiple case design is a multiple replication of the same experiment (Yin, 2003, p. 47). With more data available, a more balanced generalization from a single phenomenon to general theory can be constructed. A replicative design has the benefit of being able to fine tune interview questions and fill gaps in the theoretical background. While great care was taken in selecting elements for the literature study, practice could still offer some surprises. Because of the feedback to theory after each replication, case selection and data selection can be adapted. As a result, collected data fits better to the desired scope of the research.

#### Validity

Validity of the case study is based on triangulation of the outcomes with multiple sources of data. The literature study is the first data source. It sets the context for supply related research and served as the starting point for the case study and the interview questions. The second source of information are public, non-academic sources like company project sheets and websites, Offshore Technology Conference case studies, O&G news sites etc. Finally, the third source of information consists of the interviews. The interviews will be meticulously reported to establish a chain of evidence. Reliability is gained by indeed using a case study protocol and case study database.

#### Case selection

The choice for a multiple case design has implications for the nature of the selected cases. They must either predict similar results or contrasting results but for predictable reasons (Yin, 2003, p. 47). the Company aspires to become an EPC contractor in the oil and gas industry. Therefore, in that sector companies are solicited for interviews. Finally, the interview questions are also answered for the Company itself. All material collected on the Company throughout the thesis is used to formulate case study proceedings for their situation.

Company	Market	Respondent(s)
<b>Company A</b>	EC	Supplier relationship manager
<b>Company B</b>	EC & T&I Contractor	(project) supply chain manager
<b>the Company (O&amp;G contracting niche)</b>	Seabed intervention specialist	2 from central procurement, 4 from the Company, 2 from estimating.

**Table 1 Case selection overview**

#### 1.3.4.4 *Discussion*

In the discussion chapter, the triangulation principle is used to compare and discuss data from three different sources to generate new knowledge and insights on the characteristics of a project supply system for a market entrant in O&G contracting. The three sources of data in this thesis are the preliminary research into the Company, the literature study and the case study.

The four topics from the case study interviews are used to structure the comparison: trends in project supply in O&G contracting, organization of project supply system, methods and techniques used and set up of the tender processes.

#### 1.3.4.5 *Conclusions and recommendations*

Where the discussion chapter serves to analyse and interpret the available data, the conclusions & recommendations chapter presents clear and founded conclusions based on the insights gained in the discussion chapter. The conclusion aims to answer the main research question as formulated at the start of this research process.

Recommendations for the academic world are presented in the second paragraph. The chapter concludes with a paragraph with a reflection on research process and results.

#### 1.3.4.6 *Recommendations towards improving the project supply process of the Company*

Chapter 6 will answer the fifth and final research question. The discussion here serves as input to design a project supply process for the specific market and organizational context the Company is currently in. To improve clarity and readability of this thesis, the choice was made to present the results for the academic community and the commissioning company each in a separate chapter.

## 2 Theory

### 2.1 Introduction

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This paragraph shortly discusses the approach to answering the research questions.

#### *What are the specifics of contracting in the O&G industry?*

This question helps to build an image of the market in which the Company wants to grow. Paragraph 2.2 will discuss both topics.

#### *What is project supply?*

Supply management and its related topics have increased greatly in popularity in project management and general business in the last two decades with influential scholars like Robert Monczka (Monczka, Choi, Kim, & McDowell, 2011; Monczka & Petersen, 2011) of the Institute of supply management and Prof. Van Weele of the NEVI Chair of Purchasing and Supply Management at Eindhoven University of Technology. As a result, many supply management improvement and optimization methods have been developed. Those publications provide very interesting views on using supply strategies to create a competitive advantage and advanced supplier management methods. However two elements stand out: firstly, the vast majority of these publications are aimed at supply in industrial production; secondly, a fully functioning supply management organization is assumed. In the context of project supply for a market entrant in O&G contracting, both are not applicable.

#### *How could a literature-based project supply process for an oil & gas contractor look?*

This question is harder to answer than the relative straight forward questions above. The second half of this literature study is therefore used to do just that. In paragraph 2.4, a selection of functions is presented together with rationale behind those specific choices. The remaining four paragraphs of chapter 2 contain in depth explanations on each of the functions. This chapter concludes with a concise description of a project based project supply process.

### 2.2 Specifics of contracting in the Oil and Gas industry

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#### 2.2.1 History

Up until the 1970's, IOCs ran most of their integrated construction projects themselves. Small and medium sized projects (up to 500 million dollar) were executed by local subsidiaries while the large projects, often called Large Engineering and Construction Projects (LECPs), were executed by the central engineering and project management department. The actual work was contracted out to local companies or labour was contracted on a direct hire basis.

In the 70's these EPC capabilities, as in literally Engineering, Procurement and Construction capabilities, started to shift from the exclusive domain of the IOCs to Engineering Contractors (ECs). At first, their involvement was limited to some detailed engineering. But when the profit of the IOCs plummeted, cost reductions and focus on core competences lead to the large scale outsourcing of engineering activities. Over time, the ECs expanded their services to include procurement and finally construction management as well. The construction work itself is often executed by large international construction companies which integrate several technical disciplines. In large projects, a number of ECs often work together in a joint venture to share risks.

In the 80's, a huge consolidation round swept to the EC market. Due to reduced spending in the O&G industry, 75 ECs merged or disappeared. Nowadays, less than 20 large engineering

contractors are capable of executing large engineering and construction projects. Figure 3 shows the typical role of the EC in oil & gas construction project (Berends, 2007, pp. 22, 23).

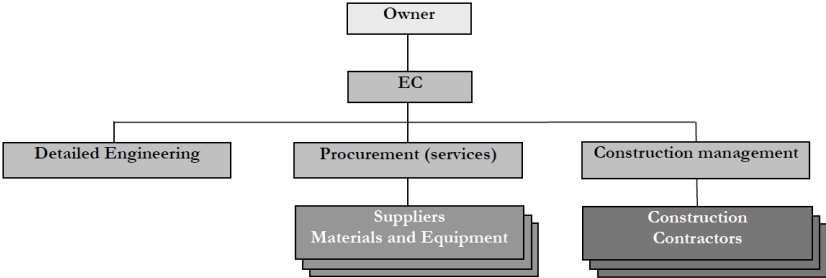


Figure 3 Typical set-up of large construction project in the O&G industry. (Berends, 2007, p. 13)

### 2.2.2 Project life cycle

As mentioned earlier, division of roles in O&G contracting is changing over time. Contracting is getting ever more integrated by a push to improve project performance, increasing client risk adversity and reduction of project engineering en management capabilities with clients (Bakker, 2010) . The next step in O&G contracting includes early contractor involvement and even more symbiotic cooperation and aim for total cost of ownership and pay per availability (See Figure 4).

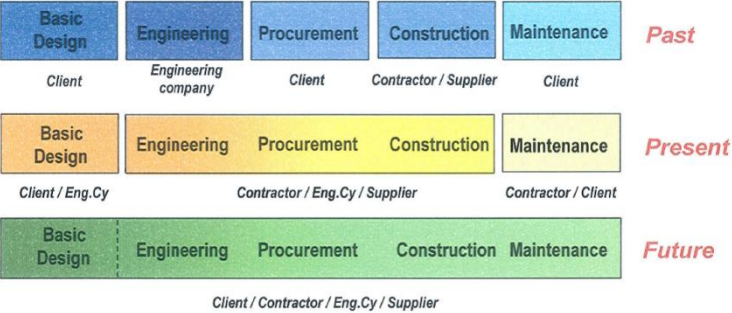


Figure 4 Evolution of role division in O&G contracting (Bakker, 2010, p. 16)

#### 2.2.2.1 Contracting activities

A range of epc-like acronyms is used in oil & gas contracting. These acronyms indicate what activities or scope is provided by the EC. The type of contract under which the works are being executed is closely related to the scope. However, especially for executing the integrated scopes (EPCm, EPC), a range of contract forms can be used. The list hereunder mentions the least integrated scope to the most integrated scope.

- EPCm: stands for Engineer, Procure and Construction management. In this construct, the contractor executes engineering and procurement, but the actual placement of the purchase orders and hiring of subcontractors is done by the client. The main contractor provides advice and services and manages the project for- and on behalf of- the client (Schramm, Meißner, & Weidinger, 2010, p. 35) (Loots & Henchie, 2007).
- EPC: An acronym for Engineer, Procure and Construct. It means that a certain company is offering all three activities, integrated as one.
- EPCI: Engineer, Procurement, Construction and Installation. Often used for offshore platforms. The EC is also responsible for installation of the constructed works.
- EPIC: Engineer, Procurement, Installation and Commissioning. The EC is also responsible for commissioning the installations he has just constructed. EPIC is the most integrated scope and often contracted under a Lump sum turnkey basis (LSTK). After handover, the client can start immediately with her operations.



### 2.2.2.2 Contract types

EPC projects can vary in different types of contract:

- Cost Plus Fee
- Fixed price, Incentive
- Lump Sum, Fixed Price: All project risk is borne by the EC. The client pays a fixed price for the delivery of the agreed works. The works itself contains engineering, procurement and construction activities.
- Lump Sum Turn Key: A turnkey project also includes operational spares, training etc.

### 2.2.2.3 Project phases

Huge investments, far reaching financial consequences in case of non performance and high engineering complexity made the ECs and their clients to partly develop their own nomenclature for the construction project life cycle. To clarify, these steps will shortly be discussed Figure 5.

#### *Business planning and project strategy*

In this phase, the decision to start exploring the feasibility of developing a project is made. Reasons to start a project could be a future lack of capacity in a certain installation or the indication of a producible oil field.

#### *Front end development*

The main goal of FED is to provide the owner with a sufficiently complete image of the project to enable them to decide whether or not the project is worth investing resources in (van der Weijde, 2008, p. 21). In the oil and gas industry, it is common practice to divide the front-end development phase in three stages, aptly called: Fed1, 2 and 3. Depending on the source used, the Fed steps are respectively assessment, selection and definition of project.

The rationale behind the extensive FED is that the impact of changes on project cost in an early stage is minimal, while changes in the course of the project have a much higher influence on project price. The FED phase should eliminate changes and optimize project schedule, cost effectiveness, safety and functionality. In short, it is an approach to make the project risk for both client and EC more manageable.

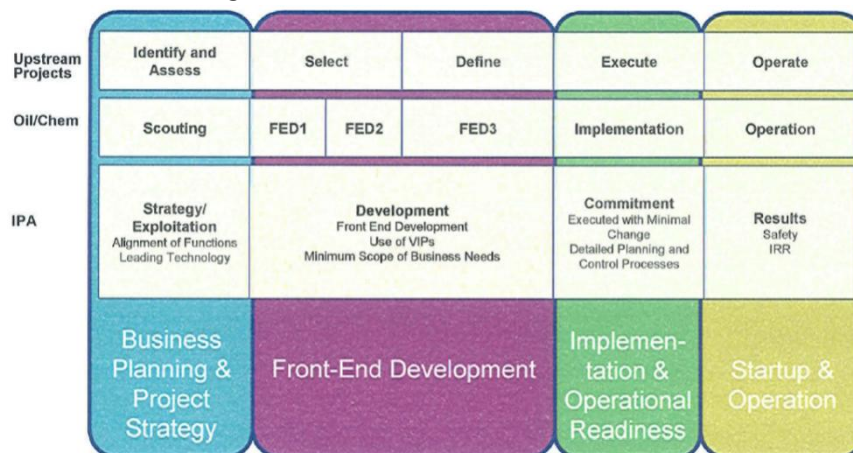


Figure 5 Nomenclature in the O&G project life cycle (Bakker, 2010, p. 7)

#### *Implementation and operational readiness*

In this phase, actual construction takes place. Often a project is placed on the market as a competitive tender. The Fed3 or FEED package, drafted by an external EC, serves to communicate the requirements from the customer. A feed package is typically detailed to a functional level. It is to the construction

company to specify exact materials, methods and machinery. The delineation to where the FEED stage stops and where tendering by a construction company starts, depends on the client, type of project and envisaged contract form for the works (see Figure 5).

### ***Start-up & Operation***

The commissioning or start-up of an oil & gas installation is not to be taken lightly. All systems, for instance, have to be coded and signed off by third party bureaus for compliance to regulation. Run in of a large and complex installation can take several months (Speirs et al., 1999, p. 8).

## **2.2.3 Role of engineering**

Every item in the oil and gas industry is project specific; procuring it will therefore require engineering. This means that every initiative towards building supply capabilities for whatever supply segment has in-tender detailed engineering as prerequisite. In paragraph 2.1 was described that the offshore industry is engineering driven. This is a result of the unique complexity of each single installation. Even for the acquisition of low supply risk items, detailed drawings or specifications are an absolute prerequisite. A small detail can make a huge difference on the price for a certain item. So the lack of vendor and market intelligence only comes into play when all engineering prerequisites are met in the first place. A very general RFQ with ambiguous specifications can be regarded as useless. The complex nature of the goods make that a supplier is unable or unwilling to calculate a price if detailed specifications are not available.

## **2.3 Project supply**

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### **2.3.1 The supply function**

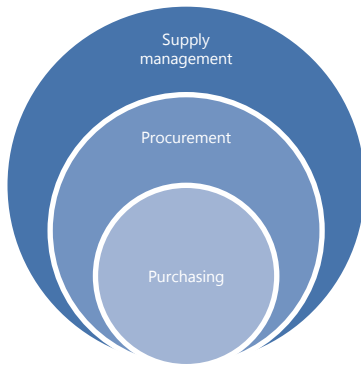
Every organization needs suppliers. Acquiring goods and services before World War II was mainly seen as clerical; as something everybody who could read and write was able to do. Because of the almost unlimited demand in World War II, success of a firm did not depend on how much it could sell. It did depend, however, on the ability to secure raw materials, supplies and services to keep production going. Consequently, attention was given to the organization, policies and procedures of the supply function.

In the 50's and 60's, large producers such as car companies further developed the supply function into a recognized managerial activity. Chief Purchasing Officers were elevated to top management status. The 70's were characterized by a shortage of almost all raw materials and its resultant increase in prices. The oil crisis only intensified these trends. These developments made acquiring goods for competitive prices critical for business success. (Johnson, Leenders, & Flynn, 2011)

The 90's showed the advent of the global market place, putting even more emphasis on the supply function for business continuity. Currently, raw materials, services and goods are more and more valued as strategic assets. Acquiring them has become an even bigger challenge because of scarcity and international production. (Johnson et al., 2011)

### ***Evolution of supply***

The supply function evolved significantly the last 60 years. A powerful but maybe oversimplified way to show the historic evolution of the supply functions can be found in Figure 6. Basically, it developed from operational purchasing to tactical procurement and currently, strategic supply management. Scotti (2007) states it as follows: "Procurement is evolving into far more strategic discipline driven primarily by a greater awareness to financial implication of executing the function well".



**Figure 6 evolution of the supply function**

In recent literature however, scholars agree to use procurement and supply management interchangeably to indicate the supply function required for modern times. This thesis uses the definition of Kaufmann (2002): “all processes of supplying the company with direct and indirect materials, services, rights, and machinery and equipment from sources external to the organization, aimed at contributing to the achievement of sustainable competitive advantage”. It stands clear that these definitions go beyond the classic seven stage process of Table 2. This operational process is what many people still see as ‘procurement’.

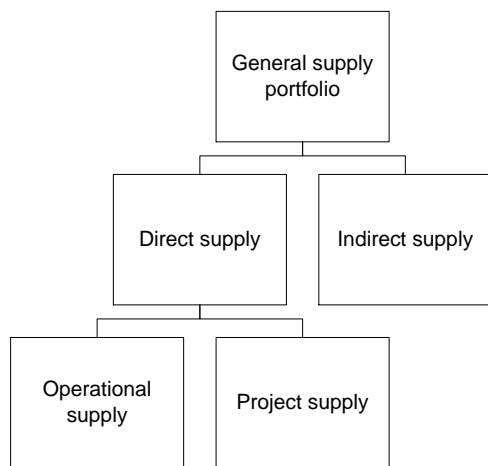
1.	<b>Recognition of need</b>
2.	<b>Translation of need into commercial description</b>
3.	<b>Search for potential suppliers</b>
4.	<b>Selecting a suitable source</b>
5.	<b>Agreement of order</b>
6.	<b>Delivery of product or service</b>
7.	<b>Payment</b>

**Table 2 A classic procurement process cycle. Adapted from (Johnson et al., 2011) (Monczka, Handfield, & Giunipero, 2008, p. 43)**

### 2.3.2 Types of supply

The direct vs. indirect perspective as shown by Johnson et al. (2011, p. p) is best suited to describe the contribution of the supply function in a project based organization. Direct supplies are items in function of the primary process of an organization. Think for the Company of rock, fuel, crew, tools and parts. Indirect supplies are items supporting this primary process. For instance, ICT, offices, lease cars, pens, heating etc.

This thesis focuses on supply in a project based environment. This makes things a little more complicated. I propose to subdivide direct supply into two categories: operational and project supply. Operational supply does not in itself create value for the customer and is not directly bound to a project cycle; for instance maintenance and fuel for equipment. Items directly offering value to customers in projects are classed under project supply.



**Figure 7 proposed supply classification (adapted from: Johnson et al., 2011, p. 9)**

Care is taken to not to use any of the more familiar terms like purchasing, subcontracting and procurement. These terms are interpreted differently in each organization; unwanted preconceptions could be connected to them. For the discussion on this subject, please see paragraph 2.6.3.

## 2.4 Selecting functions for a literature-based project supply process

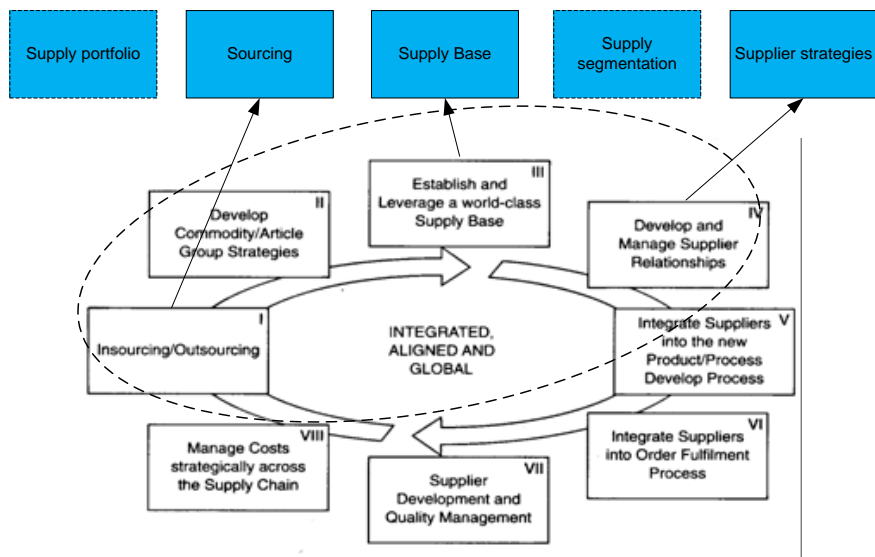
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### 2.4.1 Background

Literature provides several supply management frameworks which have their roots in academic research amongst industrial conglomerates like Siemens (Wagner & Boutellier, 2002) and Akzo Nobel (Kraljic, 1983). These frameworks are not suited however for a project based contracting environment. The main difference between project based and production based supply management is the value and frequency of the transaction. In production, many relatively cheap items are purchased constantly, while for O&G projects, a range of very expensive items are needed only once a year. Furthermore, substitution is very difficult and non-performing suppliers can have a huge impact on project success. Last but not least, the question of “what functions should constitute a project supply process” is to be seen in the context of market entrant in the offshore O&G contracting. To summarize, functions that constitute a project supply process for a market entrant in the offshore O&G contracting industry are sought for. No such premade process was available in literature. Consequently, the next step was to devise a combination of functions from literature to suit the situation at hand. Selection of the functions was an arduous and iterative process that was done concurrently with the literature study and conceptual design of the supply process.

### 2.4.2 Theoretical support

The diagram below shows the strategic supply management framework of Robert M. Monczka. Its sources lies in Monczka and Trent (1991). Over time, it has been embraced by amongst others, the NEVI (the Dutch procurement association) as main framework. The model describes a cycle to implement strategic purchasing in a globalized *production* environment.



**Figure 8 Origin of the selected functions (adapted from Monczka and Trent (1991))**

The supply portfolio is a construct of Wagner (2000). The selection of this function was driven by the use of the final model by a market entrant. When entering a new market, a range of new activities is offered. A contractor needs to know precisely what third party items he needs for each of his offered activities. Also, these items need to be categorized in industry recognized scopes.

The second function not stemming from the Monczka and Trent (1991) framework is supply segmentation. Supply segmentation is a very influential idea in supply management from Kraljic (1983). It is basically a method to assess the required approach to purchase a certain item, therefore very valuable in developing and managing supplier relationships.

Finally, a part of the structure of the supply framework from Kaufmann (2002) is used (see also Appendix C). He makes the distinction between cross-transactional processes and transactions specific processes when practicing supply management. The supply functions and the resulting process will be setup as cross-transactional processes. Cross transactional processes are thought to coincide with the traditional tender phase. The choice to aim the project supply process at the cross-transactional phase thus serves as delineation. In other words, the project supply process is aimed at supporting tendering for O&G projects.

## 2.5 The supply portfolio, sourcing and the supply base

### 2.5.1 The supply portfolio

The first step in developing any supply process is analyzing the portfolio of supply. A company needs to know what it procures today and what it will procure in the future, and what quantities are involved. (Wagner, 2000, p. 25) Ideally a make-or-buy decision is made in that stage. The items need to be scoped into work packages that are in line with the general capabilities of the suppliers in the industry. This requires knowledge of the way of working in each of the supply markets.

The term supply category is proposed to be defined as a part of a project scope that needs to be acquired; delineated in accordance to its specific market.

### 2.5.2 Sourcing and supplier selection

Sourcing is another ambiguous term often used in the supply (chain) management literature. Searching articles on sourcing yields a colourful array of supply management related terms: low cost

country sourcing, strategic sourcing, in sourcing, outsourcing, single sourcing etc. Moser (2007, p. 21) defines sourcing as: *"...all process activities directly necessary to supply a company with all required products, services and capabilities including activities such as demand identification and bundling, standardization, supply market research, supplier selection or supplier development."*

This definition is very broad and spans almost the entire project supply management scope. The activities mentioned are interesting however. Demand identification is already covered in the supply portfolio. Supplier development is covered in the supplier strategies. This leaves three activities for the sourcing function, which for this thesis is proposed to be defined as: 'Sourcing is the process of matching the supply portfolio to the best suited suppliers given the context of the project'. The three activities are:

1) Demand bundling serves to translate the supply portfolio of different projects into industry standard scopes. 2) Markets for all supply categories need to be researched for available suppliers, capabilities, way of working and standing relationships with other main contractors. The supply market is a key source of supply risk (see 2.6.2), specific knowledge is required to identify and manage these risks. 3) Supplier selection is also an ambiguous topic on which scholars also not agree on definition. It sometimes takes the place of how Moser (2007) defines sourcing; *"the process by which the buyer identifies, evaluates, and contracts with suppliers."* According to Beil et al. (2010) it is: *"...the process by which the buyer identifies, evaluates, and contracts with suppliers"*. I ascribe supplier selection a more modest role: the process in which a selection of suppliers of the global list for a certain category are selected to be engaged with a supplier strategy. Selection criteria could for instance be: stance towards the company in question, geographical location, capabilities etc. These suppliers are notified of their role and asked to prequalify, all still outside the tender phase. The number of (if any) suppliers to be engaged with a supplier strategy depends on how the category of supply is segmented. In pure strategic supply categories, engaging one supplier with a strategy aimed to build a partnership would be sufficient. As with becoming partners in real life, a match in company culture and philosophy is important for developing a successful supplier relationship.

### 2.5.3 Supply base

All businesses engaged in value-adding activities purchase goods and services from a group of suppliers. This group of suppliers is called the "supply base". (Choi & Krause, 2006, p. 637) A supply base contains current suppliers, minor suppliers and potential suppliers according to Melnyk, Bixby Cooper, Griffis, and Phillips (2010).

The result of the sourcing process is a supply base with, depending on supply segment, a selection or single supplier of interest that will be developed with a supplier strategy. Sourcing is supposed to be a continuous process because supplier capabilities can improve or deteriorate the supply portfolio can be expanded with items for extra activities

## 2.6 Supply segmentation

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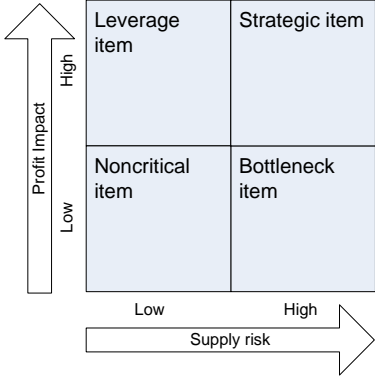
The preliminary investigation showed that not all supplies in a project are equally important or challenging to acquire. It is therefore a logical step to categorize the suppliers in different classes. In supply management literature, this process is called segmentation.

### 2.6.1 Supply segmentation according to Kraljic

The influential 1983 paper of Kraljic (1983) arguably initiated the evolution of the supply function into a respected project management discipline. Supply segmentation is one of the many influential concepts of the famous "procurement must become Supply management paper". Kraljic found that

different types of goods of services have a different impact on a company. He devised a simple matrix with two axes along which supplies can be classified. The first axis is 'supply risk'; an assessment of the availability, number of suppliers, competitive demand, opportunities to make it yourself, and possibility of storage and substitution of the supply. The second axis is 'profit impact'; defined either as volume purchased, percentage of total purchase cost or impact on product quality or business growth. In the case of a project based company, it makes sense to define profit impact as percentage of project cost.

Kraljic (1983) argues that each of the four classes requires a distinctive purchasing approach whose complexity is in proportion to the strategic impact of the good in the company.



**Figure 9 The Kraljic segmentation matrix (adapted from Kraljic (1983, p. 111))**

Some scholars (Rezaei & Ortt, 2011) expanded on this concept by devising their own axis and classes. For this thesis, the Kraljic criteria are used, as they are the 'purest'. Supply segmentation in a project based company is not a very well documented niche, so it is best to begin at the start. Kraljic devised its matrix for large multinational, production companies like Akzo Nobel and Chrysler. The original development that led to the need of supplier segmentation was the increasing globalization and subsequent opening of the global market for large industrial organizations. The goal of the method was: "ensure long term availability of critical materials and components at competitive cost" (Kraljic, 1983, p. 110) This has a bit of the same feel of the way the offshore construction sector has been evolving; larger projects, scarcity of suppliers and seeing project supply security as a strategic asset.

Lastly, supply segmentation is context dependent. High costs or supply risk is thus related to the entity at hand, be it a project risk portfolio or the complete company supply portfolio.

**2.6.1.1 Supply or supplier segmentation?**

There is a difference between supply- and supplier segmentation. The method as described above segments the different functional supply categories. Usually, a supplier will be segmented according to the classification of the items it supplies. It is not unthinkable for one item to have different classes of suppliers, for instance when proprietary technology come into play. A company having such technology but not the capacity to sell it on large scale is a bottleneck supplier. The market leader for the same supply category is regarded as the strategic supplier. This difference in nuance will be left outside the scope of this thesis as it better suits improvement processes in high maturity supply organizations.

**2.6.2 Supply risk**

Supply risk is one of the segmentation axis as used by Kraljic (1983) (see above), however in the last decades, many definitions of supply risk were formulated. Kraljic (1983) emphasizes on the market component of supply risk. The influential, unifying article of Zsidisin (2003) proposes two sources of supply risk: Firstly, market characteristics, much in line with what Kraljic proposes, secondly, failure of

individual suppliers. While the scope of his study did not include project based construction companies, some of the examples in Table 3 are, however, relatable to O&G contracting.

Market risk	Individual supplier failure
Limited qualified sources	Delivery failure
Geographical concentration of suppliers	Relationship issues
Market shortages	Obligations to other customers
	Quality problems
	Inability to meet quantity demand

**Table 3 Two sources of supply risk (Zsidisin, 2003, p. 221)**

Zsidisin (2003) describes two outcomes or results of supply risk; ‘threats to customer life and safety’ and ‘inability to meet customer requirements’. The former is defined with car or aerospace companies in mind. The latter would of course be the key issue for a contractor. When working as a contractor under tight deadlines and penalties for “first oil”, a nonperforming subcontractor could cost more in damages than the value of its own scope.

Supply risk for this thesis is thus defined as the probability of an incident associated with inbound supply from individual supplier failures or the supply market occurring, in which its outcomes result in the inability of the contractor to meet client requirements. (free to Zsidisin, 2003, p. 222)

### 2.6.3 Defining the common procurement terminology

As a starting point to define more general procurement terminology, the definitions of (project) purchasing and subcontracting as currently used within the Company are stated below.

#### **Purchasing**

*“The process of buying / hiring / leasing goods and/or services from suppliers and contractors, two different purchasing processes are distinguished:*

- *By concluding a Purchase Contract for complex transactions; Purchase Contracts are concluded with large / critical supplies, or as Frame Agreement for plant rental, hire of personnel, chartering of vessels;*
- *By a regular Purchase Order (LPO/HPO) with straightforward (day-to-day) purchasing.”*

(Royal the Company Westminster NV, 2010, p. 3)

#### **Subcontracting**

*“Any agreement with a third party for execution of part of the works under the main Contract (i.e. the Contract to which the client and a the Company entity are a party). A third party in this respect could also be an affiliate of the referred the Company entity. Subcontracting shall be governed by a Subcontract and be approved by Business Unit Management.”*

(Royal the Company Westminster NV, 2010, p. 3)

A few problems arise with these formulations: Firstly, isn’t purchasing any good or service in a project context, executing a part of the works under the main contract? Furthermore, dividing purchasing between purchase contracts for complex transactions and a purchase order for straightforward items is confusing.

Two main axes are often discerned when talking about procurement: purchasing vs. subcontracting and good vs. service. The problem of calling something purchasing or subcontracting, is that many people have certain implicit assumptions on for instance what kind of items it may concern, what processes are needed and what kind of contract should govern the transaction. In short, the axis tries to express some form of sophistication in acquiring the items at hand. Of course, different items require different approaches. That is why I suggest using the Kraljic matrix to designate what



type of transaction is taking place. Consequently, it depends on the segment of supply under what legal agreement the transaction is being entered. Surely it is true that non critical items are most often acquired using simple purchase orders according to general terms and conditions, but for other segments, this is certainly not set in stone.

Furthermore, I propose to deflate the difference between good and service. By segmenting the supply according to the Kraljic criteria, the perceived difference in approach to acquire a good or service is also covered. The supply segment is leading in deciding on an approach to acquire either a good or a service. In the project context, the difference between a good and service is even more diminished as both add some value for the customer.

## 2.7 Supplier strategies

Supply segmentation serves to classify the importance of third party items for, in this case, a project. The logical next question is: how do you deal with each of these classes of suppliers? This approach, called supplier management, is an extension of the way the supply is initially segmented. Supplier management and supplier strategies are two terms used to designate almost the same topic, namely how to approach and manage suppliers is such a way to be able to secure their items in a fashion that suits the purchasing company. One can argue that supplier strategies are a form of supplier management but these delineations are not set in stone. For the sake of clarity, this thesis will focus on supplier strategy terminology. Kraljic developed four supplier strategies that prescribe how to deal with each of his four supply segments.

### 2.7.1 Kraljic' supply strategies

Table 4 shows the approach that Kraljic formulated for each supply segment.

	Non Critical	Leverage	Bottleneck	Strategic
<b>Tasks</b>	Product standardization	Exploitation of full purchasing power	Volume assurance (at cost premium if necessary)	Accurate demand forecasting
	Order volume monitoring and optimization	Vendor selection	Control of vendors	Detailed market research
	Efficient processing	Product substitution	Security of inventories	Development of long term supply relationships
	Inventory optimization	Targeted pricing		Make of buy decisions
		Contract/spot purchasing mix		Contract staggering
				Risk analysis
				Contingency planning
				Logistics, inventory and vendor control
<b>Required information</b>	Good market overview	Good market data	Medium term demand/supply forecast	Highly detailed market data
	Short term demand forecasting	Short- to medium term demand planning	Very good market data	Long term supply/demand trend information
	Economic order quantity inventory levels	Accurate vendor data	Inventory costs	Good competitive intelligence
	Short term demand forecasting	Price/transport rate forecasts		Industry cost curves
<b>Decision level</b>	Buyer	Chief buyer	Department head	Vice president

Table 4 Purchasing approach for each supply segment (Kraljic, 1983, p. 112)

### 2.7.2 Wagner supplier strategies

Wagner (2000) sees supplier strategies to “provide long term guidelines for answering the questions: “which suppliers should we work with in the future and how are we to work with them?” and provide a framework for [implementation]”. Supplier strategies can deal with a single supplier, a segment or the complete supply base.

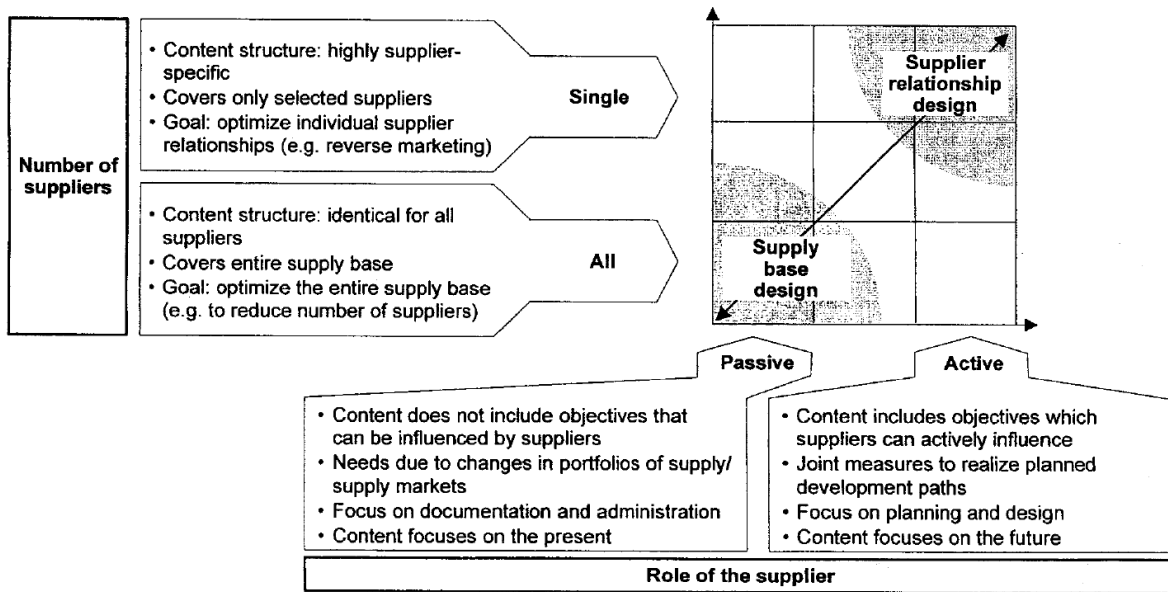


Figure 10 Wagner's supplier strategies (Wagner, 2000, p. 24)

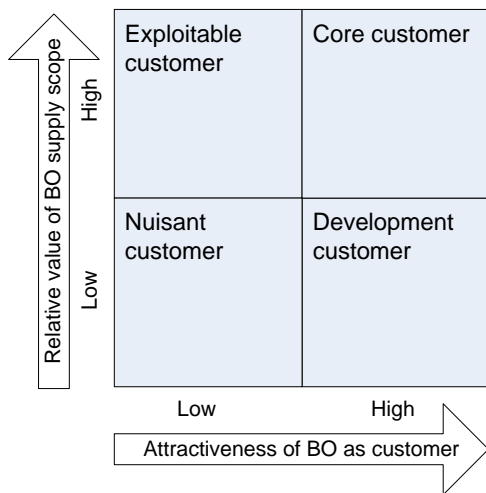
Wagner (2000) defined two axes that set the outline of a supplier strategy. These axes indicate choices to be made by the company, they are not external factors. The first axis describes whether a supplier strategy applies to a single supplier or an array of suppliers. This choice depends on the goal the company has with its supplier strategy, be it optimizing the entire supply base or optimizing individual relationships. The second axis indicates the role that a company requires and attributes to a supplier. A choice of role for the supplier depends on the criticality of its supply.

The axes of the Wagner graph above are formulated as two choices that provide the basis for a supplier strategy. The same graph also pops up in online sources and magazines with the vertical axis labelled as "market risk" and the horizontal one being "item criticality", thus being very similar to the Kraljic segmentation criteria. The two basic supplier strategies in the extreme corners however remain. One being a classic procurement approach, sending out few RFQs and choosing the cheapest, the other being a relationship approach in which the buyer and seller operate in a small, specific market and. The advantage of choosing a supplier strategy (instead of 'being put in a category') is that other reasons to engage in a close supplier relationship can always occur.

### 2.7.3 The sellers perspective

A general critique on supply segmentation models is the one sided, buyer oriented view. (Gelderman & Weele, 2005, p. 21) Suppliers are presented as fully rational systems with buttons on them labelled "strategic partnership" or "price competition". Suppliers of specialist goods and services for the oil and gas industry are perfectly aware of their important role in these projects.

Again two viewpoints are available: from the buyer's side: how are the efforts of our company to acquire certain items perceived? And from the seller's side: what kind of customer are we dealing with? A good method is presented in van Weele (2010).



**Figure 11 Customer segmentation. Adapted from van Weele (2010)**

The customer segmentation model is a conceptual representation of the importance of mutual dependencies. When a supplier is approached for a small scope, low value item by a company he has never heard of while he has to serve his key customers, no good prices or attention is to be expected. The seller does not know what the buyer is up to and what his intentions are. The buyer only needs a low value item and consequently has many substitutes to choose from and is not aware or interested in its low attractiveness to a certain supplier. A buyer that often orders valuable items and generates a large percentage of a seller's revenue would get priority over other businesses. The buyer depends on the seller for its important item while the seller depends on the buyer for its livelihood. The top left quadrant shows what happens if an unattractive customer needs a seller to supply an important part of scope. To get in the bottom right quadrant, a buyer needs to improve its attractiveness.

## 2.8 Supplier relationships

Both Wagner (2000) and Kraljic (1983) dictate supplier relationships as a requirement for securing specific or important items. However, the question as to how supplier relationships can help in securing these items is not answered. Therefore, this paragraph concisely explores the topic.

### 2.8.1 Benefits of supplier relationships

The relationship approach was popularized by the Japanese Keiratsu, or group of companies approach. (Johnson et al., 2011, p. 365) In this approach, a symbiotic relationship is maintained with key suppliers. This resulted in short lead times, direct innovation and strategic refocusing on competition and quality because the company is partly relieved from its supply chain stress.

Beach, Webster, and Campbell (2005) evaluated partnership development in the UK construction industry. They use the term 'partnership' to designate a constructive relationship, contradicting a purely market relationship. However, in this thesis, the relationship types of Tang (1999) (see paragraph 2.9.1) are proposed to be used. As Beach et al. (2005) does not discern different types of relationships, substituting their use of the designation 'partnerships' for the more generally used 'relationship' is justified.

Beach et al. (2005) acknowledge the gut feeling that relationships are beneficial in contracting. But instead of trying to uncover the underlying mechanism, they research the benefits the relationships provided in practice. In Table 5 below, a selection of those benefits of supplier relationships is presented. The selection criterion is the applicability to the tender phase. The surveys

were conducted to investigate the benefits to the construction industry performance. Many of the discovered benefits were thus left out.

Area	Improvement
<b>Cost</b>	Lower bidding prices
	Reduced cost
	Fewer disputes
	Reduced claims and litigation
<b>Construction time</b>	Improved time-scale
	Reductions in design cycle
<b>Defects</b>	Improved quality
	Improved design
<b>Intangible benefits</b>	Increased willingness to share risk
	Increased confidence of success
	Reduced exposure to project risk
	Improved co-operation

**Table 5 Benefits of partnering (adapted from Beach et al. (2005, p. 614)**

These benefits show how a relationship could contribute to securing strategic items.

## 2.8.2 Mechanism behind the working of supplier relationships

Suprpto, Mooi, and Bakker (2012, p. 2) state that the mechanism behind the supplier relationship is aligning project objectives to common business goals in order to create a more cooperative and conducive working atmosphere.

Beach et al. (2005) see the absence of direct price competition as the main mechanism behind the benefits of supplier relationships. Price competition results in continuous cost reduction, which requires defining responsibilities. Namely, every unforeseen activity means a unilateral increase in cost and a 'loss' against the other party. Drafting and negotiating these contracts lead to adversarial behaviour, worsened even more by the uncertain nature of projects.

By committing for a longer term, be it only for one project, the efforts in service of price competition and prevention of opportunistic behaviour can be reduced. These efforts could include endless contracts, terms and conditions, secrecy etc.

## 2.9 Building supplier relationships

In this paragraph, first a model for different types of buyer-supplier relationships is presented, followed by a method to build a relationship. Thirdly some techniques to increase attractiveness as buyer are discussed and finally some empirical success factors for buyer-supplier relationships are presented.

### 2.9.1 Different types of supplier relationships

By interacting with a supplier, sending RFQ's or performing a transaction, a relationship is built. It is generally a good idea to make the aspired relationship with a supplier explicit, be it internally to start with. For low supply risk Kraljic items, the supplier relationship is based on many transactions of generic, easily substitutable items. Developing a symbiotic relation with those parties is not necessary because supply can easily be secured. For specialist, high supply risk items a more intense relationship can be very beneficial; be it by price reduction due to better risk allocation and security of future business or by being the first client to be involved in a new technology. Supplier relationships thus range from purely transactional to the buyer and supplier being fully integrated. Tang (1999) captures the described range of supplier relationships in four easily understood relationship types. (see Figure 12)

Type of Supplier Relationship	Vendor	Preferred Supplier	Exclusive Supplier	Partner
Types of Contract	Purchase Orders	Contract	Contract	Agreements
Length of Contract of a model	Short of a model	Medium—Product life	Medium—Product life	Long
Product/Service Type	Standard	Specialized	Specialized	Leading Edge
Information Exchange	Sporadic	Frequent (supplier provides information regarding cost, process, quality to the buyer)	Frequent (buyer provides information regarding design, sales, cost, inventory to the supplier)	Continuous (both buyer and supplier exchange information)
Pricing Scheme	Unit Price	Unit price plus incentive for supplier to deliver better products/services	Unit price plus incentive for buyer to sell better final products/services	Risk and Profit Sharing
Delivery Schedule	Infrequent	Frequent	Frequent	Very Frequent
Senior Management Involvement	Not Necessary	Necessary	Necessary	Critical
Supplier Development Programs offered by the Buyer <sup>1</sup>	No	No	Yes	Yes
Number of suppliers	Many	Few	One or Very Few	One or Very Few

Figure 12 Operational characteristics of different types of supplier relationships (Tang, 1999, p. 46)

### 2.9.2 Supplier relationships according Monczka et al. (2011)

The basis for (supplier) relationship management according to Monczka et al. (2011) is a rationalized supply base; a supply base in which the suppliers have been ranked for:

- Capabilities
- Past performance
- Fit of core competencies
- Culture, communication and behavioural fit

Suppliers scoring highest are best suited try and build a relationship with.

Based on these criteria, the suppliers are selected to be included in the relationship management program. Relationship management is based on three fundamental elements.

- Information sharing and transparency between buyer and supplier, regarding future business and technology plans, investments, costs, schedules etc.
- Trust building, based on making realistic commitments, honesty and executive engagement and support in response to unforeseen events.
- Joint efforts with equitable input of resources and equitable sharing of resulting rewards.

### 2.9.3 Techniques to become more interesting as buyer

Johnson et al. (2011) offer techniques that can help a contractor to become more interesting for suppliers, which could also help in building supplier relationships. The techniques are called 'stroking'.

- Granting of substantial volumes of business, long run commitments or 100% requirements contracts
- Sharing of internal information of forecasts, problems and opportunities to invite a mutual search for alternatives

- Evidence of willingness and ability to work toward changed behaviour in the purchasing organization to improve the seller's position.
- Rapid positive response to requests from suppliers for discussions and adjustment in price, quality, delivery, and service.

### 2.9.4 Partner success factors

Chan et al. (2004) conducted a fairly extensive analysis on the underlying factors for successful project partnerships in the Hong Kong construction sector. Their research is aimed at client-contractor instead of buyer-supplier relationships. It is however assumed that these principles are easily transplantable.

Five success factors were identified:

- Establishment and communication of conflict resolution strategy
- Willingness to share resources among project participants
- Clear definition of responsibilities
- Commitment to win-win attitude
- Regular monitoring of partnering process

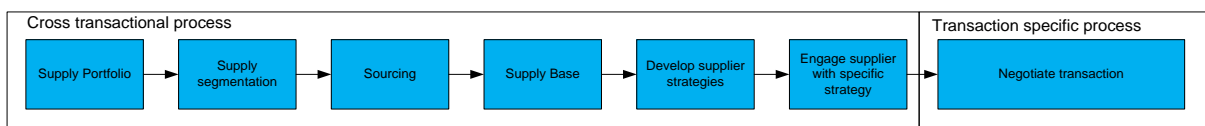
## 2.10 Conclusion

Based on the preceding literature, a project supply process is drawn up to answer the third research question.

### 2.10.1 Structure

The main structural feature of the project supply process is the split between the cross transactional and transaction specific processes. Kaufmann (2002) argues that a supplier should be fully managed with cross transactional processes. Transaction specific processes just consist of negotiations. See also Appendix C and Figure 13)

### 2.10.2 Functions



**Figure 13 literature based project supply process**

The first step is building a supply portfolio for the new activities offered when entering a new market. An inventory of all third party items is made for each new activity. Next, the portfolios on product level are bundled into supply categories. The categories should be chosen in a way that is recognized by their respective branches.

In supply segmentation, the industry recognized supply categories are segmented according to the Kraljic criteria. The choice for supply risk and project profit impact thresholds is to be well documented. The geographical location, project scope & size and client could be factors influencing the choice of threshold. Main goal of the supply segmentation process is to serve as a starting point for individual supplier strategies.

With sourcing, a set of suppliers is sought for each of the supply categories. The supply segment of a category can dictate the amount of market research required to effectively select suppliers.

The selection of suppliers for each category forms the supply base. A supply base is to be maintained constantly. Non performing suppliers are to be removed and new suppliers are entered. For the suppliers in the supply base, strategies are developed.

A supplier strategy dictates how to approach and manage a supplier in a way that suits the company's objective. The company objective often, but not necessarily, aligns with the supply segment the category is in. A supply strategy for a supplier of non-critical items is for instance aimed at price reduction. For a supplier of bottleneck items, the strategic objective could be assurance of supply.

### 3 Case study

#### 3.1 Interview Questions

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##### 3.1.1 Topics

To come to research questions for the case study, four topics were lifted from literature, the current situation at the Company and the research questions. For each of the topics a guiding question is formulated. The guiding questions are expanded into interview questions in the next paragraph.

The first topic is the background of O&G contracting. Both in paragraph **Error! Reference source not found.** as in the literature study in paragraph 2.2, characteristics of contracting in the O&G industry were discussed. The case study is a good opportunity to verify these literature-based characteristics with practice.

The second topic is the place of project supply in the organization. The preliminary research within the Company showed that its central procurement department is part of fleet management. Furthermore, no specific project supply department currently exists. Literature provided little insight in this matter but there were some indication that this does not suit the Company's O&G contracting activities. This topic aims to give insight in this matter.

The third topic involves actual supply management methods and techniques used by O&G contractors. Literature showed that supply segmentation, sourcing and supplier strategies are returning functions in supply management frameworks. In this topic, it is verified whether, and how these techniques are used in practice.

The final topic is the tender process itself. In this topic, operational aspects of project supply in tendering are investigated with two questions. A third question aims to verify how cross transactional processes to engage suppliers are used in practice. This concept stems from literature (see Appendix C) and was found very interesting because most supply management activities can be executed in the relative quiet when not in a large O&G tender.

For each topic a guiding question is formulated. The interviewer asks this question to himself, not to the respondent. It guides the interviewer to formulate actual interview questions and helps to keep more informal interactions during the interview on track.

Topic	Guiding question
<b>Background of O&amp;G contracting</b>	What is company's view on O&G contracting?
<b>Organization</b>	How is project supply integrated in the company?
<b>Methods &amp; Techniques</b>	What supply management methods and techniques do they use?
<b>Tender process</b>	How does the process of securing supply in the tender phase look?

**Table 6 Interview topics with their guiding questions**

The next step is to formulate interview questions based on the topics and guiding questions. The main tactic for the interview is engaging the respondent to tell an interesting story on the subject chosen by the researcher. To that effect, questions on a certain level of specificity need to be formulated. Too specific and the questions might cause the respondent to disclose company secrets; too general



questions might the respondent doubt the expertise of the interviewer. The interview questions and their rationale are presented below. The questionnaire itself is available in Appendix I.

### 3.1.2 Questions

#### *Background*

- What does your function encompass?

This question is mainly to express interest in the respondent and partly to let him tell about the structure of the procurement department.

- How would you describe the general O&G contracting industry?

This question serves to verify the trends in O&G contracting described in the problem statement as well as the beginning of the literature study. Even more, the researcher has its own preconceptions based on non academic written sources and word of mouth which also need to be verified.

- How do you see the role of project supply (chain) management in O&G contracting?

This question is important in assessing the impact of trends in O&G contracting on the project supply process.

#### *Organization*

- What is the role and scope of your department?

This question finds out how the company deals with direct, indirect and project procurement. It is driven by the split in direct and project supply as found within the Company. This question aims to investigate whether this is normal practice.

- How is your department integrated in the company?

Where the procurement department is incorporated in the company hierarchy is good indication on how important it is deemed for the company (Strategic Forum for Construction, 2003).

#### *Methods & Techniques*

- What criteria do you use to segment supply?

Supply segmentation is an important aspect of building relationships with suppliers. The Kraljic criteria are often used in production environments. It is very interesting to see what criteria are used by O&G contractors. It also tests if a company indeed uses segmentation techniques.

- How do you source your suppliers?

This question first establishes if the company uses sourcing and second gives insight in how sourcing is used within the company. Sub questions include the use of relationships, preferred suppliers and supplier selection criteria.

- How do you engage each class of suppliers?

This question aims to investigate the practical methods used to engage suppliers. It is also a follow up on the segmentation question. Literature showed that different supply segments require different levels and methods of engagement of the suppliers.

#### *Tender process*

- How do you use supply management in the project management cycle?

With this question, the respondent is seduced to tell a general story on the operational aspects of supply management in the project cycle. Aspects like scoping the supply part of the ITT, transgressing from tender to execution are questioned.

- How is supply management involved in tendering?

With this question the supply approach in the tender phase is researched. Inspiration for the supply process for the Company is sought.

- What supply management activities are run cross tender?

This question verifies the division between cross tender activities and in tender supply management activities. Running project unspecific supply management activities like sourcing cross-tender (not in function of a certain tender) is thought to be an effective way to make securing supply for a tender much easier. This idea is tested against practice with this question.

### 3.1.3 Data Collection

Data collection for the external cases was done in two face to face interviews at the offices of both respondents. The interviewer took notes on paper. These notes were processed into proceedings immediately after the interviews took place (see Appendix J and Appendix K). All written sources issued by the respondents were scanned and included in the interview proceedings.

The case within the Company is synthesized based on many interviews with employees in the course of the research. It serves only to indicate the gap between current the Company project supply process and EPC O&G contractors.

## 3.2 Case study results

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The case study results are presented as follows: first, three case reports are presented. The reports follow the same setup as the interviews: background on oil and gas contracting, organization, methods & techniques and processes. Second, a cross case comparison is made (Eisenhardt, 1989, p. 540). The cross case comparison takes the shape of matrix with the slightly adapted interview questions on the vertical axis and the cases on the horizontal axis. Per interview question, the results per company are presented and compared in the supporting text.

### 3.2.1 Company A

#### 3.2.1.1 Introduction

Company A is a large, mature contractor in the design, fabrication, installation and commissioning of seabed-to-surface projects (including the full SURF scope) worldwide. It owns and operates an extensive fleet of state-of-art vessels.

#### 3.2.1.2 Background

The respondent from Company A is a supplier relations manager of the supply chain management department, the name they chose for the supply function. As supplier relations management he runs the relationship management program for key suppliers, negotiate frame agreements with all segments of suppliers and leads local commodity experts.

Company A sees ever larger structures and projects to be the continuing trend in the next years. This draws a huge strain on their key suppliers. Lack of supplier capacity is becoming a problem. Engineering has been designated as core business for Company A, it aspires to do all engineering for their project supply in house.

In the SURF business, third party spend is between 50-60% of project cost. Company A transfers no risks surpassing the supply scope to suppliers.

#### 3.2.1.3 Organization

Company A has offices on main O&G hubs worldwide. The supply chain management department centrally procures all engineered products for global operations. Procurement of commodities is delegated to these local branches. Company A sees their supply network as a core competence. Developing the project supply function is actively being stimulated by the board of directors.

The chief procurement reports to the Commercial VP of the Board. The department is setup in categories with dedicated employees per category.

#### **3.2.1.4 *Methods & techniques***

Supply is segmented using the percentage of project cost and criticality as criteria. Critical, high cost suppliers are called key suppliers. The third segmentation criterion is the engineering content of an item. This criterion is used to make the distinction between subcontracting and purchasing. The process of acquiring items that need no engineering is called "purchasing". Acquiring items that do need engineering is called "subcontracting". The same goes for both goods and services.

Company A has an extensive and powerful database containing almost all suppliers for their supply categories worldwide. This database is used to select suppliers to be contacted for a tender. All suppliers with which they do business are prequalified according to their own criteria supplier performance and all interactions are stored in the database.

Company A actively engages key suppliers with their relationship management program. These suppliers are engaged by: not transferring risk beyond their own scope, actively building relationships, provide post project feedback, specific technical and relationship managers, monitoring of product and relationship. Company A very limitedly interacts with suppliers when not in a tender, except for post project feedback. Company A uses the tender process and subsequent contract with a supplier to steer their relationship. Company A contacts their suppliers only to actually secure a production slot or capacity, not to get quotes for prices. Cost calculating and quality -assurance and -control capabilities are all available in house. Company A aims to be preferred client for its key suppliers.

#### **3.2.1.5 *Tender process***

Company A uses a bid-to-win approach. Because of the engineering and cost calculating capabilities, Company A is able to do only one round of (key) subcontractor bids. It approaches its key suppliers only to secure capacity. The final design is agreed upon after overall contract award. The exact tender procedure is available in Appendix J.

In a tender, a SCM liaison has a seat in the tender team. With the ITT in hand, the liaison scopes the supply packages with his own SCM team. The SCM team prepares the RFQ's for the packages and interacts with the suppliers. The SCM team checks the proposals and selects the best supplier for all packages. The SCM liaison recommends a supplier for each scope and the tender is sent out to the client (See also Appendix J)

Prequalification and supplier feedback/improvement tracks are run cross tender. Because Company A is project based, its supply management activities are also designed to run in tenders or execution stages.

### **3.2.2 Company B**

#### **3.2.2.1 *Introduction***

Company B used to be an O&G transport and installation contractor and actively grew a SURF EPIC contracting department. Company B has been awarded only one large (around 1 billion\$) EPIC project, despite actively tendering for these contracts since around five years.

### 3.2.2.2 *Background*

The respondent from Company B is a Supply chain manager. Company B employs a couple of supply chain managers to oversee the third party scopes of EPIC SURF tenders and the actual projects when awarded.

Company B sees the scale of offshore installation increase ever more. Deep water developments put more emphasis on seabed processing, thus leading to bigger, heavier and more complex templates. Full lumpsum (turnkey) contracting of large integrated offshore scopes is becoming ever more popular among the large IOC's and NOC's. However, they are tightly managing and intervening in these contracts, leading to tensions between client and contractor. The contractor needs some room to manoeuvre to actually be able to make money with smart solutions. Client interventions are also experienced in project supply.

Company B sees that procuring Long Lead Items (LLIs), usually done by the client and his FEED partner and then made available to the contractor, is delegated more and more to the contractors. This is done in a push from clients to minimize interfaces even more. In Company B's SURF project, around 30-40% of project price (or cost, unknown) is third party spend. From when Company B started its EPIC department, the SCM department grew from 25-55 fte. Third party spend for classic Company B activities was around 10%.

### 3.2.2.3 *Organization*

Company B's procurement department has two subsections: procurement with 20 fte for their T&I activities and supply chain management with 35 fte for their EPIC activities. Category managers are used for important supply categories.

Company B's chief of procurement reports to the commercial vice president of the board. The EPIC activities are centrally managed, so is their EPIC SCM department.

### 3.2.2.4 *Methods and techniques*

Company B uses the Kraljic criteria to segment their supply. Strategic items include: rock installation, line pipe, solid ballasting, ROVs. For these strategic items, framework agreements are ideally used. For strategic items, often only 3 or 4 suppliers are available.

Company B does its own prequalification and auditing of key suppliers. They see their supply base and supply relations as strategic assets.

Company B sees engaging and building relationships with key suppliers important and a big issue. Strategic items are almost always supplied by very few suitable suppliers. This leads to interdependency between supplier and contractor. Getting a supplier to work hard for you in tenders, despite the significant chance of missing the contract, is extremely difficult. Trust, active in-tender relation management and grant-factor are critical to secure supply of these items. Tailoring the requests for proposal or quotation to the capabilities of the supplier is way of saving them time and showing you are serious. Furthermore, the supply chain manager protects the suppliers from too much pressure from management to submit their bids.

### 3.2.2.5 *Tender process*

A SCM team is assembled as soon as an ITT for a large EPIC tender comes in. The team is lead by a supply chain manager. The team stays on when a project is awarded. This safeguards continuity and increases quality of the general project supply process.

[Overlap with previous question]

Company B currently does not do cross tender relationship management. The added value is however recognized.

### 3.2.3 the Company

The Company's case report is partly made on the supply process as used in the *[classified]* tender. This process included employees from the central procurement department, cost estimating department and the Company's tender department. The questions in the "organization" and methods & techniques paragraphs are answered for the central procurement department. The questions in the "process" paragraph are answered for the tender supply process. The "background" paragraph is left unanswered because the Company's opinion is not relevant for answering the research question.

#### 3.2.3.1 Background

Not applicable.

#### 3.2.3.2 Organization (central procurement department)

Eighty five percent of procurement volume of the central procurement department is for the fleet.

The head of procurement reports to the head of fleet management who reports to the board.

#### 3.2.3.3 Methods & techniques

The Company currently does not actively segment supply

The Company sourced the suppliers in the *[classified]* bid mainly from personal contacts from prior tenders and internet searches.

The RFQ's in the *[classified]* tender were thought to put emphasis on legal and contract management issues while sometimes neglecting the technical aspects.

#### 3.2.3.4 Tender process

For traditional Company projects, the procurement part of a tender is done by the tender engineers assisted by the cost estimators. When a project is awarded, a new operational team lead by a Project Manager is assembled and takes over the project. This team often redoes the whole procurement scope and goes on to purchase the goods and services on the project account.

The *[classified]* supply management team was thought to be need driven. No clear structure existed at the start of the project. When the true complexity of the scope became apparent, gradually more people were added to the project supply team.

The Company maintains the relationship with their current strategic suppliers on an informal and personal basis.

## 3.3 Cross case comparison

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### *Dimensions of the analysis*

The results matrix provides a concise overview of the main interview outcomes per topic. The columns closely follow the interview questions, but are presented on a single level of aggregation.

## Comparison table

Case	Company Characteristics	Supply in company hierarchy	Scope of procurement department	Supply segmentation criteria	Third party spend	Sourcing approach	Supplier strategies	Techniques used to engage suppliers	Tender process
Company A	A large, mature contractor in the design, fabrication, installation and commissioning of seabed-to-surface projects (including the full SURF scope) worldwide.	Chief supply reports to commercial VP. Supply is taken very serious and has the full attention of the board.	Central procurement handles all key suppliers. Regions feature capable procurement centres that acquire commodities not needing engineering.	Uses the Kraljic criteria in their supplier relationship management approach and engineered vs. non engineered products for their in-tender procedural approach	50-60% (of project cost)	Own global sourcing and prequalification network. Fully integrated supplier management database. Running the global network of suppliers is regarded as a core competence.	Fully collaborative partnership approach towards key suppliers. Active development of relationships with strategic suppliers.	Post project feedback for key suppliers. Aim to be preferred client Tailored RFQ's Spirit of contract subcontracting	RFQ only for securing the supply, not for prices Contracts used to manage relationship
Company B	Used to be an O&G transport and installation contractor and actively grew a SURF EPIC contracting department over the last five years.	Chief supply reports to commercial VP. Company B embraced supply in their aim to become an EPIC contractor.	Central procurement handles all EPIC suppliers. Only central epic capabilities. SCM for epic contracts. Purchasing for T&I contracts.	The Kraljic criteria are used to segment supply. the consequences of the segmentation were not discussed into detail.	30-40% (unknown whether project cost or value is meant)	Own sourcing and prequalification initiative. The supply base is seen as a strategic asset	Relationship approach necessary because of interdependence with strategic suppliers Very few suppliers capable of supplying certain items	Communication Tailored RFQ's Convey commitment to win tender	Cross cycle supply teams. Tender supply team also becomes project supply team
the Company (project supply)	<i>[classified]</i>								

Table 7 Cross case comparison (original research)

## 4 Discussion

This chapter discusses the conceptual, non Company specific supply process based on theory and practice.

### 4.1 Trends in O&G contracting

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The paragraph compares the O&G contracting specifics found in the preliminary investigation at the Company and the literature study with the results from the 'background' topic of the cases study.

#### 4.1.1 General

Paragraph 1.1.2 shortly discussed the increasing scale of O&G installation and the large investment programs being effectuated in the near future. In the case study, the respondents were asked for their take on the international O&G contracting market. Both companies notice the ongoing trend for larger installations to profit from economies of scale. The increasing size is made possible by advancing technology. Furthermore, Company B sees clients becoming more risk averse. As a result, clients accept fewer interfaces, meaning more responsibilities being delegated to the contractor. According to Company B, another consequence of the risk adversity of the client is close scrutiny of all aspects of the project by client representatives. Company B, compared to company A, is still a novice O&G contractor, which might reduce the value of these remarks.

#### 4.1.2 Project supply

Literature (see paragraph 2.3) showed that procurement in O&G contracting is evolving into a highly strategic discipline driven by scarcity of materials and far reaching financial implications. This view is corroborated by the case study. Both companies regard their supply network as a strategic asset and procurement as a core competence. Company A remarked that the ever larger and more complex installations and projects draw a huge strain on their suppliers. Supplier capacity is getting problematic; they indicated that acquiring enough high quality goods and services takes increasingly more effort. Company A sees the ability to secure supply a major strategic asset in the future of O&G contracting. Company B perceives that a contractor more often also has to procure the long lead items. The LLIs are normally procured by the client or its engineering partner in an early stage of the project.

With capacity of a limited number of strategic suppliers strained (as indicated by company A), contractors become more dependent on their suppliers in serving their clients. The strategic items are often technologically advanced and for specific niches in the O&G industry. The market for these goods is made up of a limited number of contractors. In effect, the suppliers depend on a limited number of clients to sell their items to. This results in increasing interdependencies between contractor and supplier with increasing supply specificity. With the market condition being a key source of supply risk, this explains why many O&G specific goods and services are segmented as strategic or bottleneck items.

### 4.2 Organizational set-up of a project supply department

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The comparisons in this paragraph are mostly made between the current situation at the Company and the findings from the case studies. It explores the role and place of a project supply department in an O&G contracting environment.

### 4.2.1 Scope of a supply department

The Company' procurement department is currently primarily aimed at supplying the fleet. Project procurement is done by either the various tender departments or by the project organizations themselves in case of project award. Both companies from the case study run central procurement departments responsible for operational and project procurement. Both companies run an extensive fleet of specialized vessels, making for a comparable situation.

Three important reasons to centralize all types of procurement in one capable department were formulated based on research in this thesis. First, there are economies of scale: the higher purchasing volumes of the central procurement department versus the volumes generated by the project organizations generally results in lower prices. Second, specialization; a procurement department has trained purchasing professionals while procurement in project organizations is often done by general staff; resulting in for instance higher prices, non uniform conditions and inconsistent reporting. Indications for the latter were found in the preliminary interviews at the procurement department. Thirdly, managing relationships with strategic and bottleneck suppliers is challenging, as shown by the case studies and literature. Company specific strategies need to be developed and executed. This requires, long term views, specialist knowledge and manpower and should thus be kept outside a time pressured and finite project cycle.

The strategic role of project supply in EPC O&G contracting could results in the need for more specialized procurement personnel. Company B revealed that its procurement department expanded from 25 to 55 FTEs when it entered EPC O&G contracting a few years ago. No hard numbers are available from Company A, but the refinement of its project supply processes is an indication of the large size of its project supply department.

### 4.2.2 Place of a supply management department in the organization

Within the Company, the central procurement department is part of the fleet management department. This could be a logical structure for a dredging company, as procurement makes up only a small percentage of the costs in a dredging project (see **Error! Reference source not found.**). Also, spare parts and supplies for the fleet need to be procured regularly.

This set up does not hold for an O&G contractor. Project supply theory and the case studies show the strategic role of supply management in modern business. A central procurement department responsible for securing project supply should have a place in the organization that fits its strategic role in O&G contracting.

## 4.3 Review of the structure

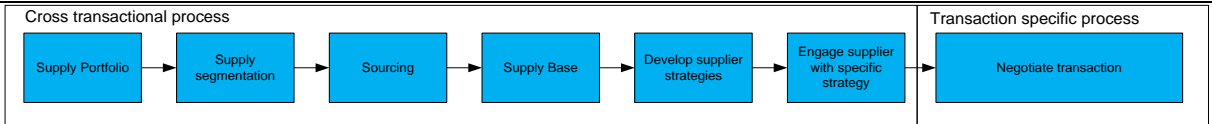


Figure 14 Project supply process from literature

### 4.3.1 Split between cross transactional and transactions specific processes

The split between cross transactional and transaction specific processes in Figure 14 resulted from the supply management framework by Kaufmann (2002) (see also Appendix C). This framework prescribes that the supplier should be fully managed in the cross transactional phase. The transactional phase is only used to negotiate specific transactions. Company A had an interesting view on this matter:



because the company is fully project based, suppliers are also only engaged on a project basis (be it tenders or execution). Company A perceives interacting with suppliers in the cross transactional phase as unwanted. This however does not mean that the contractor cannot develop specific supplier strategies for future tenders. Implementation of such strategies is however reserved for the tender and execution phases. The only exception mentioned by Company A is post-project feedback on supplier performance.

Company B on the other hand, indicated that they did too little cross transactional supplier engagement, showing that they do not regard it as unwanted.

### 4.3.2 Choice of functions

The case study showed that most of the functions of the supply process from literature have counterparts in practice. The supply portfolio is the only exception. No specific interview questions were asked regarding this subject and it was not mentioned by any of the respondents.

## 4.4 Comparing supply functions

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This paragraph discusses the different functions of the supply process in relation to the results of the case study.

### 4.4.1 Supply portfolio

A supply portfolio is a detailed inventory of goods and services required for each activity offered by a contractor. The supply portfolio is thought to be the project equivalent of need recognition.

The main task is to bundle the required goods and services in categories that match the standard activity bases of the suppliers. The function was specifically selected for the context of project supply for a market entrant. When entering a market, new activities are offered for which little tacit knowledge exists in the organization. Tendering for a project in a new market is a very intense process as shown in the [classified] analysis. Pre built supply portfolios for the different activities help to understand the extents of the supply scope and could thus guide the supply effort in such a project. Building a supply portfolio is thought to coincide with the "need recognition" step in a classical procurement model (see Table 2).

The supply portfolio function is the result of problem encountered in the [classified] case study solved by an element from supply management literature.

### 4.4.2 Supply segmentation

Analysis of the way Company A segments its supply together with the literature lead to the following line of thought: Company A both segments along the Kraljic criteria but also along the engineering content of a certain item. The hypothesis stands that the Kraljic criteria dictate what kind of strategy one should employ towards a certain supplier. The engineering content establishes whether (engineering) effort is needed from the project organization to acquire the item.

On a more general note, both companies use segmentation to make a selection of the most important suppliers. Company B uses the Kraljic (1983) term 'strategic suppliers', Company A calls them 'key suppliers'.

### 4.4.3 Sourcing & Supply base

Sourcing has previously been called the process of populating the supply base, both functions are closely related. Therefore, these functions are discussed in one paragraph. Both Company A and B take their sourcing very seriously and consequently refrain from using prequalification/sourcing bureaus.

Company A developed a powerful supply base in which all supplier information and past performances are stored. Both companies seldom source something outside their own tightly managed supply base. This seems good practice for project based companies, as it means that even for suppliers that were contacted only once, a history and starting point for a relationship is laid. A flexible, centrally managed and hosted database that can store anything from documents to pictures and notes per email is preferable. Lock in for a certain technology should be avoided because it will be the core of the project supply process, a long operating horizon is critical.

The prequalification phase is part of the sourcing process. In prequalification, the client audits the prospective supplier on certain indicators like liquidity, solvability, prior performance, quality control, safety, health and environment. A few external sourcing/prequalification parties exist; Shell for instance uses FPAL (Achilles, 2012). The Company itself was requested to prequalify for the FPAL database as seabed intervention subcontractor. The two companies from the case study both decided to not use these services. They developed their own prequalification process and maintain their supply base in house. Company A argued that FPAL services are limited to Europe, thus of no use for a large percentage of their projects. Company B sees sourcing and supply base management as core business and therefore weary to outsource it.

#### 4.4.4 Operational aspects

Literature provided little information on operational aspects of project supply. The 'process' topic was included in the case study interviews to provide recommendations to improve the the Company project supply process. (See chapter 6).

### 4.5 Supplier strategies

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Because of its importance in O&G project supply, the supplier strategies are discussed in a separate paragraph.

#### 4.5.1 Introduction

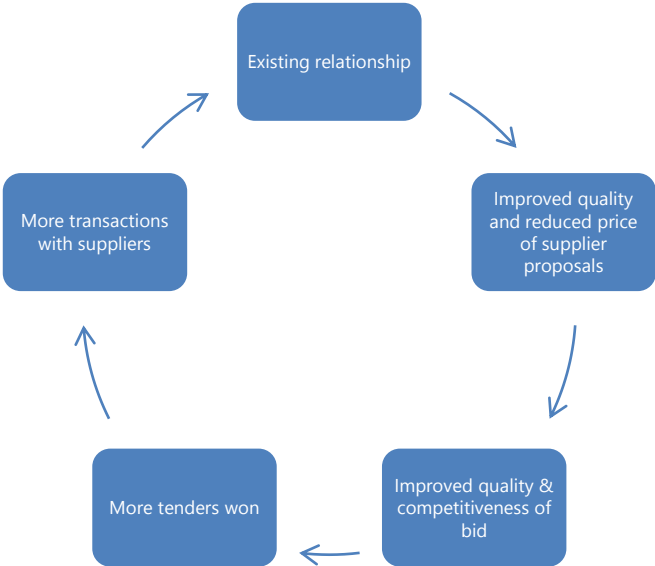
Literature on supplier relationships is presented in paragraph 2.7. Kraljic (1983) uses supplier relationships as one of many tasks in the supplier strategy for 'strategic' items (see 2.7.1). Wagner (2000) describes supplier relationships as a one of two supplier strategies, opposing a supply base design (see 2.7.2). This thesis agrees with Kraljic (1983) in classifying supplier relationships as a component of a supplier strategy. Kraljic (1983) limits the use of relationships to strategic items. This thesis argues that supplier relationships should be a part of supplier strategies for all four supply segments. In the table of Tang (1999) (see Figure 12), four types of supplier relationships are presented, showing that a supplier relationship is not limited to the strategic supply segment.

#### 4.5.2 Supplier relationships for a market entrant

Competitive tendering makes sound relationships with suppliers very important: To win a tender, one has to offer a plausible solution for a sharp price. The supply part of the tender should show the right products at the right price while keeping supply risks at bay. This implies that the suppliers included in the bid needed to have done a proper job in preparing their scope. The *[classified]* analysis showed that suppliers have limited capacity to prepare bids and often receive RFQs from multiple contractors bidding for the same tender. The Company is thought to use this mechanism themselves when working as subcontractor. The resources allocated to each of the bids have to be prioritized. Proposals for contractors with whom the supplier has a relationship or that are ascribed a very high chance of

winning the main contract, are expected to receive more attention and a better price. This effort is more likely to translate into business than working for a novice party.

For a newcomer without an existing working relationship with strategic suppliers, a negative loop occurs. No relationship means less attention for the proposal being prepared and probably a higher price and lower quality, making the main tender less competitive. This decreases the chance a contract is awarded and yields no transactions for your strategic suppliers. Transactions however are a powerful mechanism to build a supplier relationship. Figure 15 shows the problem.



**Figure 15 Relationship feedback loop for a market entrant**

Two general approaches can be discerned to turn this effect around. Firstly, one could low-bid for a project. The possible gaps in the supplier bids are negated by offering a project for cost price, thus building relationships by forcing transactions.

The second approach depends on building supplier relationships before even being in a tender process. Paragraph 2.8.1 showed many potential benefits of supplier relationships in tendering.

[Table Classified]

**Table 8 Cross referencing project supply symptoms with benefits of relationship**

The choice between buying a project and using the relationship approach to improve tender competitiveness is clearly in favour of the latter. Even more because Beach et al. (2005) in paragraph 2.8 showed that supplier relationships originally were used to greatly improved project performance in the UK construction industry. The advantages of supplier relationships in tendering were basically a side effect. So developing supplier relationships not only helps to improve tender competitiveness, it also helps to improve the performance of the project execution.

### 4.5.3 Objectives of supplier relationships

The case study showed that the main goal in building supplier relationships with strategic suppliers is assurance of supply. Both company A and B acknowledge their dependence on strategic and bottleneck suppliers. Company A aims to become preferred client for their strategic suppliers.

For a market entrant in O&G contracting, supplier relationships help in the tender phase to increase the effort a supplier puts in his proposal, improving competitiveness of the main bid for the client.

### 4.5.4 Building supplier relationships

Literature in 2.9 shows three fundamental elements for building supplier relationships: (Monczka et al., 2011) trust building, information sharing & transparency and equitable joint efforts. The techniques found in the case study are classified according to those three elements in Table 9. For the the Company case, some behaviour encountered in the preliminary research is presented as comparison.

	Trust building	Information sharing & transparency	Equitable joint efforts
<b>Company A</b>			
Spirit of contract' subcontracting. Company A does not force suppliers into back to back liabilities. It takes all contracting responsibility. Suppliers are only responsible for the performance of their own items.	+		
Provide post project feedback on supplier performance. Company A provides feedback to all its strategic and bottleneck suppliers.	+	+	+
Active supplier relationship management program. Both a specific technical and relationship specialist is assigned to each bottleneck and strategic supplier.		+	+
Supply packages are tailored to the core competences of the suppliers. Preparing a proposal is made much easier.			+
Strategy to become preferred client. This strategy is communicated publically by the board members. This acknowledges the importance of the supplier.	+	+	
<b>Company B</b>			
Strive for highest possible quality in RFQs and tailor these towards supplier core competences.			+
Protect suppliers against management pressing for quicker turnaround time on RFQs. Preparing a bid takes time.	+		
Communicate commitment to win tender and update suppliers regularly on the tender progress. Show suppliers the investment made by the contractor to win the project. This could stimulate the supplier to prioritize your bid.	+	+	
<b>the Company</b>			
[classified]	-		

**Table 9 Relationship building techniques from the case study**

Both Company A and B employ techniques aimed at the three main elements of relationship building. Interestingly, some of the explicit behaviour of the Company is clearly contra productive in building

relationships. For instance trying to force back to back liabilities in the first interaction with a supplier is not a good start for a productive relationship.

<b>Literature (Johnson et al., 2011)</b>			
Grant substantial volumes of business, long run commitments or 100% requirements contracts.			
Share internal information of forecasts, problems and opportunities to invite a mutual search for alternatives.		+	
Evidence of willingness and ability to work toward changed behaviour in the purchasing organization to improve the seller's position.			+
Rapid positive response to requests from suppliers for discussions and adjustment in price, quality, delivery, and service.	+		+
Involve senior management in interactions with suppliers	+		

**Table 10 Relationship building techniques from literature (Johnson et al., 2011)**

Cross referencing the stroking techniques of Johnson et al. (2011) (see paragraph 2.9.3) in Table 10 shows that most of them also connect to the three main elements of relationship building. Techniques aimed at information sharing and transparency are mentioned by literature and both Company A and B. Therefore, this would be the single most important guideline in building supplier relationships.

## 5 Conclusions and recommendations

### 5.1 Conclusions

The conclusions are presented by answering the research questions of this thesis. The two questions concerning the project supply processes based respectively on literature and on practice are answered by presenting a consolidated supply process to not repeat the discussion chapter.

#### 5.1.1 What are the specifics of contracting in the oil and gas industry?

When making step from subcontractor to main contractor, one has to deal with different parties and project dynamics. A concise overview of relevant literature is given in paragraph 2.2 It shows that clients are mostly powerful E&P branches of the big IOCs, however NOCs are slowly taking a more prominent role. A handful large and powerful Engineering Contractors assist these clients in translating an investment decision into a concrete project. This so called front end engineering and design or FEED stage is an important aspect of project cycle. Technical solution directions are engineered and explored into great detail after which large contractors are invited to tender for the construction. Often this FEED partner takes on the role of client representative.

The elaborate project preparation is function of the huge investments and risk adversity of the oil companies as client. No surprises, not even positive, are acceptable and keeping promises critical for the life cycle profitability of the project. Construction risks are minimized by engineering every aspect in detail.

So called easy oil has been depleted in the last decades. This shifts exploration project to remote locations and extremely deep water. Economies of scale assisted by technological progress dictate size and complexity of O&G projects is increasing. The limited capacity and long lead times of highly specific items results in scarcity. Being able to secure these items is a strategic asset for O&G contractors.

#### 5.1.2 What is project supply?

Based on literature, Figure 16 was drawn up. It shows where project supply stands in the general supply portfolio of a project based company. Project supply is a type of direct supply; it consists of all goods and services procured for a project. Investments depreciated over more than one project are excluded. Operational supply is used to keep the means of production operational and is continuously performed, crossing project delineations and budgets.

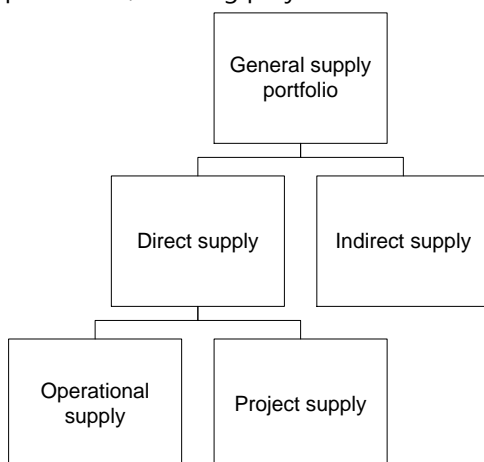
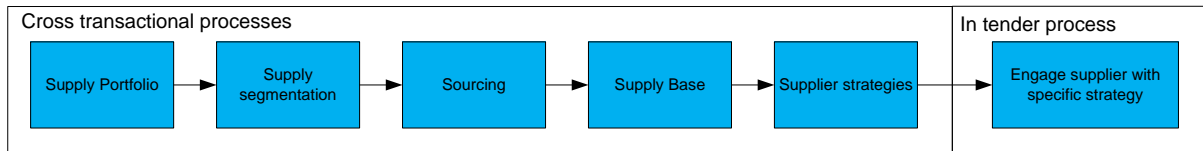


Figure 16 Different supply types

### 5.1.3 A project supply process for a market entrant in O&G contracting

One of the challenges a market entrant faces, is the difficulty to secure supply of strategic and bottleneck items. This is demonstrated by the case of the Company (see paragraph 1.2.4). If a contractor is not able to effectively secure bottleneck and strategic items, tender competitiveness is greatly impaired. Paragraph 4.5.2 shows that good supplier relationships effectively mitigate almost all symptoms encountered when procuring strategic and bottleneck items as a market entrant. A project supply process for a market entrant in O&G contracting should consequently be aimed at building relationships with suppliers.



**Figure 17 Basic project supply process**

The initial aim of the process is to develop a ‘preferred supplier’ type relationship, as shown in paragraph 2.9.1. Based on two supply management frameworks from literature and the insights from the case study, the process in Figure 17 was developed. The main concept is to fully prepare the organization to build supplier relationships in the cross transactional phase. All interactions with suppliers in the tender phase are then driven by a carefully prepared supplier strategy. In the supply portfolio, an overview is made of items required for the market to be entered. Supply segmentation serves to classify the importance of each supply category and decide on a procurement approach. Sourcing is roughly the process of selecting suitable suppliers for each supply category. All this information together makes up the supply base. For each bottleneck and strategic supply category, a strategy is devised. Relationship building is the most important aspect of the strategy.

This strategy is finally put to work in a tender. Transparent communication by the contractor on its intentions, project information, commitment to win the tender and the tender progress is recognized by both literature and practice to be an important method to build supplier relationships. Finally, the process should be run by a capable and empowered central procurement department.

## 5.2 Recommendations

### 5.2.1 Limitations

*Single case interview might not be a representative sample for the entire company.*

For both external cases, only one respondent was interviewed. These results were then generalized for the entire company. The views of the respondent might not be representative for the entire company.

*Limited data points for triangulation towards reality*

Due to constraints in time and resources, relevant literature might have escaped the attention of the researcher and no more than two case study interviews were performed. This yields only a limited number of data points to triangulate towards reality on the subject of this thesis. As a result, general validity is limited.

*Bias towards commissioning company*

The researcher worked at the commissioning company for 9 months. Bias, in the form of representing the state of affairs in a too negative or positive light, can be expected.

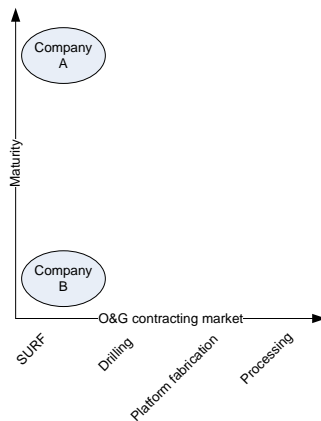
### *Unstructured interviews were used in the problem definition*

Some information on the current situation in the Company stems from unstructured interviews and casual conversations, leaving room for arguments on some aspects.

## 5.2.2 Recommendations for further research

### *Study more cases*

Only two case study interviews were performed. Time constraint was the most important limiting factor. The two case study interviews do not span the whole of O&G contracting markets. The reality of what works in the O&G project supply is nowhere near to be discovered (see also Figure 18). More replications of the slightly adapted case study could lead to interesting generalizations and an as such a clear addition to the project supply literature.



**Figure 18 Span of the O&G contracting market (indicative)**

### *Collect more data for each case*

Each case study consisted only of one interview and some desk research to the background and structure of the company. Collecting more data could lead to a more precise representation of the real workings of the company.

### *Do more research on the applicability of production based procurement/supply models and frameworks on project based organizations*

During the research, it became clear that supply management for project based organizations has very different characteristics than production based organizations. This makes it difficult to apply generally accepted production procurement frameworks to project based context.



## 6 Recommendations towards improving the project supply process of the Company

*[Classified]*

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## Appendix A: the Company's activities

*[Classified]*

## Appendix B: the Company's clients

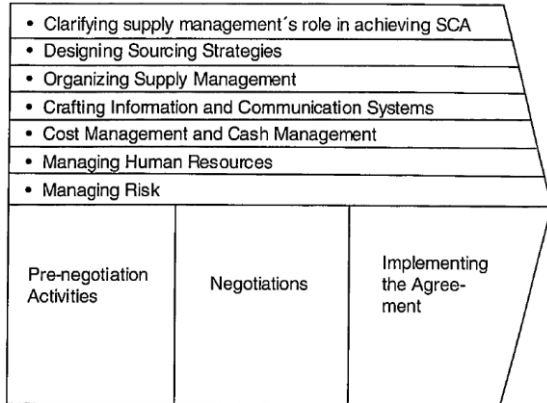
*[Classified]*

## Appendix C: Supply framework background information

Kaufmann (2002) provides an interesting view on a supply management process. The most important aspect of his framework for this thesis is the notion to separate project supply in a cross-transactional part a transaction specific part. He sees the actual contact with the supplier, summarized in his framework by pre-negotiation, negotiation and agreement implementation processes, only as a manifestation of the process running across all transactions.

### *Cross-transactional Processes*

*„Creating the Supply Management System“*



### *Transaction-specific Processes*

*„Using the Supply Management System“*

**Appendix figure 1 Supply management framework (Kaufmann, 2002, p. 13)**

## Appendix D: Case description

*[Classified]*



## Appendix E: Desk research

*[classified]*

## Appendix F: Workshop

*[classified]*

## Appendix G: Supply segmentation

*[classified]*

## Appendix H: Exploratory interview matrix

*[classified]*

## Appendix I: Case study interview questions

### *Introduction*

- Background of the interviewer
- Description of the thesis
- Informed consent
  - No names or direct references in the thesis or case study report (Company X)

### *Background*

1. What does your function encompass?
  - a. What terminology do you use to describe project supply?
2. How would you describe the general oil and gas contracting industry?
  - a. Role of engineering?
3. How do you see the role of project supply (chain) management in O&G contracting?
  - a. Added value?

### *Organization*

4. What is the role and scope of your department?
5. How is your department integrated in the company?
  - a. Part of project procurement?
  - b. Matrix organization/pool?

### *Methods and techniques*

6. What criteria do you use to segment supply?
  - a. Difference between supply and supplier segmentation
7. How do you source your suppliers?
  - a. Selection criteria?
  - b. Preferred suppliers?
  - c. Relationships?
8. How do you engage each class of suppliers?
  - a. Hindered by intermittent transaction etc.?
  - b. How do you build supply relationships?
  - c. How do you engage suppliers to work hard for you?

### *Process*

9. How do you use supply management in the project management cycle?
10. How is supply management involved in tendering?
11. What supply management activities are run cross tender?

## Appendix J: Interview proceedings Company A

### Background

- terminology:
  - Non standard products -> engineering required -> subcontracting
  - Standard products -> no engineering required -> purchasing
- Spoolbase in Africa due to local content requirements
- Engineering regarded as a core competence
  - All detailed engineering done in house

#### *What does the function "manager of supplier relations" encompass?*

- Supplier relationship management program for key suppliers
- Negotiate frame agreements with all supplier classes
- Lead geographical commodity experts

#### *How would you describe the general oil and gas contracting industry?*

- Ever larger structures and projects
- Huge strain on suppliers
- Capacity of suppliers getting problematic

#### *How do you see the role of project supply (chain) management in O&G contracting?*

- Supply chain seen as core competence
- In SIRF business, 50-60% of project cost is third party spend
- Being able to secure supply major strategic asset in the future
- Strategic choice to do all in house engineering
  - Result of a make-or-buy decision to 'make' the engineering part of contracting
- no risk transfer to subcontractors
  - company A takes full design responsibility
- non adversarial relationship approach
- value your suppliers
- keep them honest by knowing exactly what you're asking
- Company A only goes to the market to secure the goods and services or commodities like a production slot
  - Costs of all third party goods and services are first calculated in medium detail internally.
- aim to become a preferred customer for your key suppliers
- Not strictly driven on price
- Open

### Organization

#### *What is the role and scope of your department?*

- Department name: Supply chain management.
- Values of the department: (board of directors strategic emphasis)
  - We develop a collaborative culture with our suppliers in order to maximize their expertise and resources
  - We gain efficiency, improve communications and reduce operating cost by developing global supply chain networks
  - We provide performance feedback to our key suppliers to ensure that the best service provided to Company A and its client
  - We support and develop local content through our global supply chain networks

### *How is your department integrated in the company?*

- Primarily geographically oriented
  - Split between commodities and engineered products
  - Commodities mostly locally sourced
  - Engineered products through central supply management
  - Capable local supply management organizations
- VP of supply chain in group management team
  - Under Chief commercial officer

## Methods and techniques

### *What criteria do you use to segment supply?*

- Percentage spend vs. Criticality
- High percentage spend and high criticality -> key suppliers
- Clear tabs on how dependent a supplier is on Company A's business.
  - Ideally no more than 50% of total revenue of supplier may be from Company A's
  - If spend reaches 50% of revenue, position is diversified

### *How do you source your suppliers?*

- Prequalification
- Very little sourcing due to very powerful supply base management software
- Company A developed own prequalification and sourcing processes because Achilles/fpal is focussed on Europe. So of no use across the world
- Company A developed very powerful and integrated supply base management process. Prior projects, performance etc. is all easily accessible.

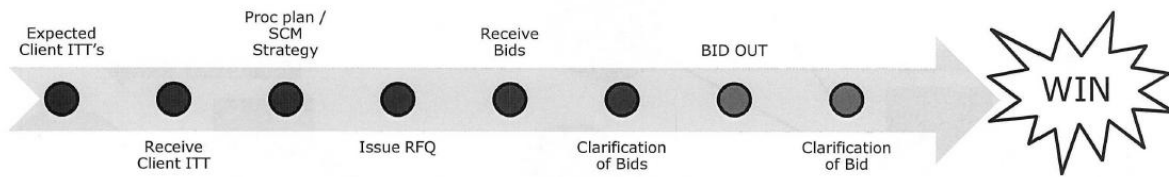
### *How do you engage each class of suppliers?*

- Company A is fully project based. Supplier engagement and relationship management of key suppliers is carried by the project based interactions. Some cross tender interactions exists; mainly feedback on prior performance and preparations for new projects
- Make sure your packages are tailored to the core capabilities of your subcontractors
- Company strategy to be preferred client
- Full relationship approach
- Spirit of contract subcontracting
- Provide post project feedback to all suppliers
- Every key supplier has a specific:
  - relation manager
  - Technical expert
- Contracts used to steer supplier relationships
- No back-to-back contracts. Company A takes all design responsibility
  - Has the capabilities to do so
  - QA, engineering, fabrication drawings etc.
- All key/critical suppliers are closely followed in the supplier relationship program

## Tender process

### *How do you use supply management in the project management cycle?*

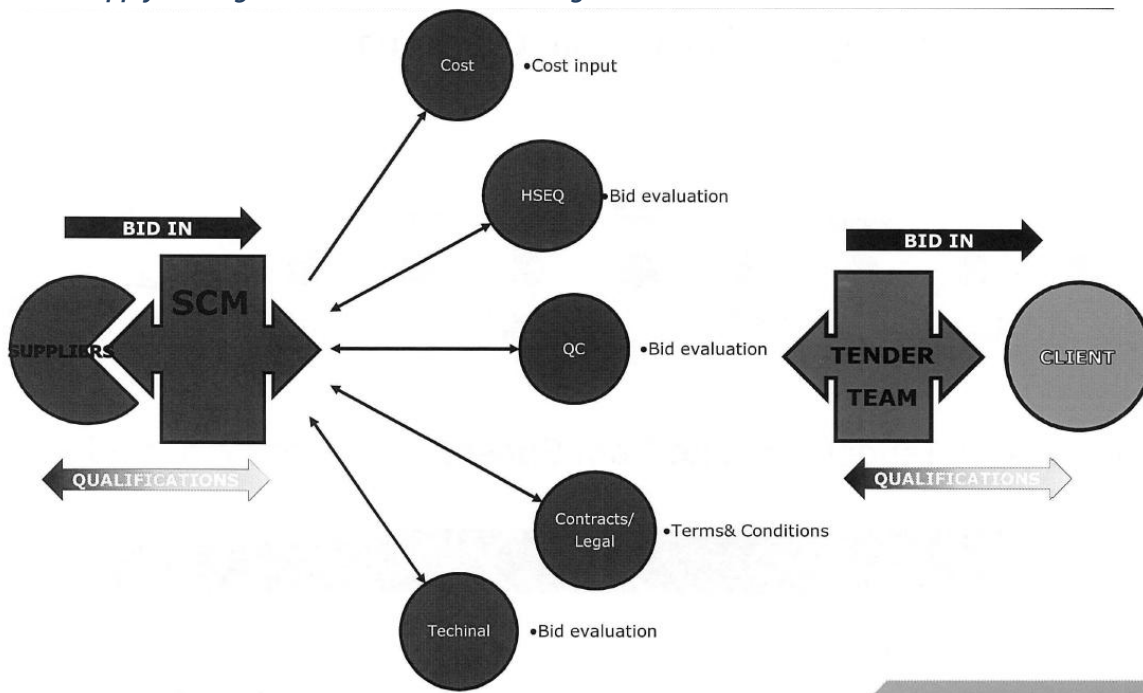
- Tender timeline



- Bid to win
- Supplier time line:



**How is supply management involved in tendering?**



- SCM liaison in tender team. -> scoping supply packages.
- SCM department interacts with suppliers
- SCM checks proposals
- SCM department recommends specific supplier to tender team

**What supply management activities are run cross tender?**

Pre qualification and feedback/improvement programs are run cross tender. Because it is a project based company, supply management activities are designed to be project based.



## Appendix K: Interview proceedings Company B

### Background

#### *What does your function encompass?*

- Function name: Supply chain manager.
- Handful of supply chain managers: project supply leaders.
  - Responsible for all third party involvement in a project
  - Calling it supply chain manager is a bid of trend

#### *How would you describe the general oil and gas contracting industry?*

- EPIC becoming ever popular
- Projects themselves also keep getting bigger & more complex
  - Larger installations due to economies of scale
  - Client wants no risk -> lumpsum tenders
    - However, client intervenes on many aspects
    - Makes running a contracting business challenging.

#### *How do you see the role of project supply (chain) management in O&G contracting?*

- Ever more procurement of Long lead items delegated to EPIC contractor
- Clients wish to minimize interfaces
- Around 30-40% of SIRF projects is third party spend
  - Unknown whether it is a percentage of cost of price
- Procurement department grew from 25 -> 55 fte.

### Organization

#### *What is the role and scope of your department?*

- The department has no real sub sections.
  - 20something purchasers for low supply risk items.
- Two main pillars:
  - Supply chain management for EPIC SURF contracting
  - purchasing for Transport & installation and operational items
- category managers for each

#### *How is your department integrated in the company?*

- Chief procurement reports to commercial Vice President
  - Supports three branches of Company B
    - EPIC
    - T&I
    - Decommissioning
  - All with different procurement demands

### Methods and techniques

#### *What criteria do you use to segment supply?*

- Company B segments supply along the Kraljic criteria
- Use of product categories
- Use of frame agreements with suppliers of strategic items:

- ROV's
- Line pipe
- Shallow water pipe lay
- Solid ballasting
- Rock dump

***How do you source your suppliers?***

- Own prequalification and auditing system
- Because project supply is core business, weary to outsource it.

***How do you engage each class of suppliers?***

- Engaging suppliers very difficult
- Strategic items -> mostly few party's who have the capabilities
- Mutual interdependence
- Managing relations is key
  - Building relations with intermittent transactions is difficult
- RFQ's need to be tailored and as high quality as possible
  - Demands a lot of expertise from supply professionals
- Protect subcontractors against management pressing for quicker response on RFQ's
- For Kraljic strategic items: very few high quality suppliers -> around 3 or 4
  - Line pipe, ROV's
  - Company B won 1 major EPIC Surf Project
  - Keeping strategic suppliers interested for your tender is very challenging
  - Try to convey commitment to win tender to your suppliers

**Tender process**

***How do you use supply management in the project management cycle?***

- A team of supply managers is formed when a tender comes in.
  - The team is lead by a supply chain manager.
  - The team also does the acquisition and execution when a project is awarded.
- This safeguards continuity and increase quality of third party aspects.

***How is supply management involved in tendering?***

- Project dedicated team of supply professionals assigned to surf tender

***What supply management activities are run cross tender?***

- Currently very little supply management/ relations run cross tender