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MASTER'S THESIS

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SUMMARY

This Master's Thesis describes the financial awareness amongst the onshore project teams in Pipeline & Process Services (PPS) Scandinavia, a Sub-Product Service Line (PSL) of Halliburton. *Financial awareness* is in this Thesis defined as knowledge of project revenue, cost and profit and the aspects that can affect these. This includes project management, contract formats, cost estimation, cost control, change management and cost drivers.

The ongoing cost savings in the Norwegian petroleum industry have led to an increased focus and awareness of costs amongst the majority of the suppliers and subcontractors in the market. To be able to keep the position in the market and to have a profitable business Halliburton PPS Scandinavia is required to reduce project costs. To accomplish this it is important that all employees are aware of how they can contribute to increase revenue and reduce costs.

The main goal of the Thesis is to identify suggestions for improvement and recommendations to increase the financial awareness amongst the project teams to reduce project costs in Halliburton PPS Scandinavia.

To describe the financial awareness a survey has been distributed to the team members of four project teams inclusive of support personnel. Follow-up interviews have been performed with personnel assumed to be in key roles to obtain more information related to the topics of the survey as well as identifying suggestions for improvement to increase financial awareness and reduce project costs.

In addition to this a Case Study of a project has been described to identify cost drivers and cost overrun by performing a financial analysis. From this, suggestions for improvement to reduce costs have been identified.

The theory of the Thesis describes project management and financial aspects of a project based on existing literature and how this is applied in Halliburton PPS Scandinavia. This includes contract formats, estimating and budgeting, cost control, change management and project cost drivers. The literature has been used for analysis of the results from the survey and the interviews and will support the recommendations to Halliburton PPS Scandinavia.

The Thesis concludes that the financial awareness amongst certain project team members should be increased to be able to reduce project costs, with knowledge, training and visibility being important factors to accomplish this. The Thesis Problem Statement has been answered by the

recommendation of 37 suggestions for improvement based on the information about Halliburton PPS, the theory, the Case Study, the results from the survey and the interviews, as well as the analysis. They have been critically evaluated based on the knowledge obtained through this study and are considered to be important to increase the financial awareness amongst the project teams to be able to reduce project costs in Halliburton Pipeline & Process Services Scandinavia. However, they should be verified by the PSL management prior to an implementation. Some of the recommendations will be easy to implement, while others may require more planning.

One of the most important suggestions for improvement is to provide PSL specific financial training to technical personnel for them to understand how they can contribute to increase revenue and reduce costs. In addition to this a work method or a guideline for financial awareness should be created and made available to all employees through the Halliburton Management System. This document should present methods to increase revenue and reduce cost in all phases of a project, including what the different roles of a project team should be aware of, how they can contribute to reducing costs, as well as the typical cost drivers of a project.

All of these suggestions for improvement will be important to increase the financial awareness amongst the project teams to be able to reduce project costs in Halliburton Pipeline & Process Services Scandinavia.

PREFACE

This Master's Thesis in Industrial Economics marks the end of our Master's studies at the University of Stavanger.

The Thesis is a result of close co-operation between Silje Aase and Sigrid Vårdal-Fiskaaen throughout the entire semester. Together we have defined the purpose, objectives and constraints of the Thesis. Although some of the chapters have been individual work, all of the chapters have been checked and supplemented by the other part. Working together has given us the benefit of expanding our research and going into details of the thesis problem. We have been able to use both quantitative and qualitative methodology to obtain valid and reliable results.

We are grateful to have been trusted by Halliburton to write this Thesis and would like to thank our supervisor and manager in Halliburton, Oddvar Aamodt, for his involvement and support during our work. Furthermore we would like to thank our colleagues in Halliburton for their support and understanding, as well as for taking part in the survey and interviews.

We would like to thank our supervisor at the University of Stavanger, Frank Asche, for constructive feed-back and guidance during our work with the Thesis.

We would also like to thank our husbands, children and the remainder of our families for their encouragement and massive support and for keeping up with us during our studies, particularly this semester.

Lastly, we would like to tank each other for the great support throughout the studies. Neither of us could have done it without the other one.

Stavanger, 15.06.2014

Silje Aase

Sigrid Vårdal-Fiskaaen

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ABBREVIATIONS AND DEFINITIONS

Abbreviation	Definition
ACWP	Actual Cost of Work Performed
B&C	Boots & Coots
BCWS	Budgeted Cost of Work Scheduled
BD	Business Development
BLD	Business Leadership Development
BV	Budget Variance
CBS	Cost Breakdown Structure
CO/COR	Change Order/Change Order Request
COGS	Cost of Goods Sold
COPQ	Cost of Poor Quality
Cost Driver	Any factor that causes a change in the cost of an activity.
Cost Plus	The actual invoice incurred by the supplier from a Third Party increased by the percentage amount applicable to the said cost plus item or service.
Direct costs	Costs that are related to the production of revenue.
EVA	Earned Value Analysis
FBOI	*Fully Burdened Operating Income*. Means revenue less direct and indirect costs. Indirect costs include those at the field (Region/Country/District) and global levels.
Financial Awareness	The knowledge of project revenue, cost and profit.
Fixed costs	Costs which remain constant despite changes in activity.
HMS	Halliburton Management System
Indirect costs	Costs that are not directly connected to generating revenue.
KPI	Key Performance Index
LTF	Latest Thinking Forecast
Lump-sum Projects	A project with a contract involving a mix of cost-reimbursable and lump-sum work. Most of the work performed for management & services and engineering is fixed price or lump-sum.
MOC	Management of Change
Net Revenue	Total revenue less any discount.
NPT	Non-Productive Time

Abbreviation	Definition
P&L Analysis	*Profit & Loss Analysis.*Measures the result of the operation, i.e. how much revenue the project earned over a specific period of time and the related costs and expenses associated with earning that revenue.
PE	Project Engineer
PEP	Project Equipment Personnel
PM	Project Manager
PMI	Project Management Institute
PMP	Project Management Plan
PO	Purchase Order
PPS	Pipeline & Process Services
Profit	The residual profit after selling a product or service and deduction the cost associated with its production and sale. Calculated as net revenue less cost of goods sold less total direct expenses.
PTL	Project Technical Lead
Quality creep	A subtle change that occurs when individuals deviate from the quality standard developed for the project.
Reimbursable Projects	A project with a contract involving a mix of cost-reimbursable and lump-sum work. Most of the work performed for management & services and engineering is reimbursable and includes compensation through predefined hourly unit rates.
Revenue	Money brought in from sales of products or services.
Scope creep	Scope elements of a project increase in small increments until a significant change occurs. Could be initiated by project team or customer.
Scope leap	A major change in scope normally requested by the Customer.
SP	Service Planner
Sub-PSL	Sub-Product Service Line
Variable costs	Costs that are changed in relation to activity level.
VOR/VO	Variation Order/Variation Order Request
WBS	Work Breakdown Structure

1 INTRODUCTION

1.1 Background

Recently some of the oil companies in Norway have announced major cost cuts. Investments, field developments and planned projects have been cancelled or delayed, leading to reduced work for the service industry. In addition the suppliers are also expected to reduce their costs towards their customers.

Halliburton is a Service Company in the petroleum industry. A further introduction of the company is given in Chapter 2 *The Company*. In 2013 Pipeline & Process Services Scandinavia (PPS), which is a Sub-Product Service Line (PSL) of Halliburton, experienced a reduction in the planned workload due to projects being cancelled or delayed. This started the process of cost reductions in the department.

Cost control processes have documented that several PPS projects have generated low profit over the past year. Labour hours for engineering are assumed to be a large cost driver and have a tendency to exceed the forecast in the cost estimates, which could result in higher costs and lower profit for the project. This effect is especially seen with lump-sum projects where engineering is provided on a lump-sum basis. Other cost drivers that are assumed to increase project costs are related to changes to the original scope of work, extra mobilisations and transportation of equipment to site, use of rental equipment and non-productive time.

The goal of PPS Scandinavia is to reduce these costs to a minimum by increasing the general financial awareness amongst all employees and making revenue, costs and profit of a project more visible to the project teams. As a project team consists of many roles with different length of experience, tasks and responsibilities it can be assumed that the financial awareness varies amongst the project team members. The roles, tasks and responsibilities within a project team are further described in Chapter 2 *The Company*.

Financial awareness is in this Thesis defined as knowledge of project revenue, cost and profit and the aspects that can affect these. This includes project management, contract formats, cost estimation, cost control, change management and cost drivers.

This Master's Thesis addresses the current cost challenges in PPS Scandinavia and will provide recommendations for how to increase the financial awareness amongst the project team members

inclusive of support personnel, as well as how to reduce project costs. This will involve increasing knowledge and making project revenue, cost and profit more visible to the employees.

To get an overall understanding of the challenges related to project costs the start phase of the research was spent acquiring information through meetings with our supervisor in Halliburton and the PSL accountant. Time was spent on studying the PSL accounts including cost and revenue groups, as well as project accounts. Thereafter the existing processes and systems in Halliburton PPS for project management, cost estimation, forecasting, change management and cost control were studied. This information was obtained from the Halliburton intranet and the systems used for financial reporting.

In parallel existing literature on the theory of project management and financial aspects of a project was collected. This information was obtained from the curriculum for subjects in Industrial Economics, literature search in BIBSYS and local libraries.

In addition to this literature a Case Study of a PPS project was used to perform financial analysis including EVA and Profit & Loss Analysis to identify cost drivers, variance from cost estimates and other factors which affected the profit of the project. This was done to identify cost drivers and cost overruns in the project to be able to evaluate how project cost could be reduced and the aspects that should be communicated to the project team members to increase the financial awareness.

The research design was established and literature on methodology was studied. Both quantitative and qualitative research methods have been used to be able to analyse the Thesis problem. The methods are further described in Chapter 6 *Methodology*. A survey, which is a quantitative research method, was generated to identify awareness and knowledge related project revenue, cost and profit among all the project team members and support personnel. Interviews, which are part of the qualitative research methods, were planned and conducted with key personnel in the PPS department to obtain more information related to the topics of the survey as well as identifying suggestions for improvement to increase financial awareness and reduce project costs.

All of the information collected throughout the study will be used to analyse the problem statement of the Thesis.

1.2 Thesis Problem Statement

The ongoing cost reductions in the Norwegian petroleum industry have led to an increased focus and awareness of costs amongst the majority of the suppliers and subcontractors in the market. To be able to keep the position in the market and to have a profitable business Halliburton PPS Scandinavia is required to reduce project costs. To be able to accomplish this it is important that all employees are aware of how they can contribute to increase revenue and reduce costs.

Halliburton PPS has allowed a thorough analysis of the financial part of their business to take place in order to get a holistic view of the overall financial awareness and knowledge amongst the onshore employees. Based on this the following Thesis Problem Statement has been composed:

How can the financial awareness amongst project teams be increased to reduce the project costs in Halliburton Pipeline & Process Services Scandinavia?

1.2.1 Purpose

The purpose of the Thesis is to analyse the current financial awareness of the members within four project teams including support personnel, in order to identify where more knowledge, training and visibility is necessary to improve their understanding of project revenue, cost and profit.

To be able to answer the Thesis Problem, the following main goal was established:

Identify suggestions for improvement to increase the financial awareness amongst the project teams to reduce project costs in Halliburton Pipeline & Process Services Scandinavia.

To reach the main goal, three sub-goals are defined as follows:

1. Describe project management and financial aspects of a project based on existing literature and how this is applied in Halliburton PPS Scandinavia. This includes contract formats, estimating and budgeting, cost control, change management and project cost drivers.
2. Describe the financial awareness amongst the project teams through a survey and interviews. From this, suggestions for improvement to increase the financial awareness to reduce project costs should be identified.

3. Describe a Case Study of a project to identify cost drivers and cost overrun by performing a financial analysis. From this, suggestions for improvement to reduce project costs and increase the financial awareness should be identified.

1.2.2 Constraints

The Thesis problem statement can be approached in different ways and since the time frame is limited it has been necessary to set some constraints. This could imply that there will be other issues that may have potential for improvement which are not discussed in this Thesis.

The basis for the Thesis is the Sub-PSL Pipeline & Process Services of Halliburton Scandinavia, hence the results cannot be assumed to be valid for other PPS locations, other PSLs in Halliburton or companies within the same business.

The analysis is based on existing literature as well as processes and systems in Halliburton PPS. The survey has been distributed to all PPS project teams and the relevant personnel from support the functions. The interviews have been performed with some of the survey respondents which are assumed to be in key roles to share their knowledge and experience. Since the survey questionnaire has a limited range of response alternatives, the respondents cannot express their opinions freely. Personal input and comments could not be added and essential information may have been missed from the personnel that were not interviewed.

The PPS department consists of an onshore and an offshore organisation. Due to the time frame the Thesis is focused around the financial awareness amongst the onshore personnel, thus the results, analysis and recommendations are applicable for this group only. Although the recommendations are focused on the onshore personnel, the entire department will be able to benefit from the suggestions on how to increase the financial awareness and reduce project cost.

The financial analysis for the Case Study has only been prepared for one project with very low or negative profit, which means that the possibilities for comparison is the Thesis is limited.

Rather than focusing only on how to increase revenue, the focus in the Thesis is reduction of project costs. Direct and indirect department costs are allocated to the project, however the Thesis will mainly focus on direct project costs and the reduction of these.

1.3 Thesis Structure

This Thesis is divided into 9 sections. After the introductory chapter a description of Halliburton and the Sub-PSL PPS including organisation, roles and responsibilities is given in Chapter 2. Chapter 3 describes relevant existing literature related to project management, contract formats, estimating and budgeting of project costs, cost reporting, change management and cost drivers. This chapter is followed by the description of how these processes and systems are applied in Halliburton PPS. A Case Study of a project presents cost drivers and cost overrun by performing a financial analysis in Chapter 5. Chapter 6 presents different the methodology of the Thesis and is the foundation for the questions in the survey and interviews. The results from the survey and the interviews are presented in Chapter 7 and analysed in Chapter 8. The analysis will try to connect the results for the survey and interviews and will try to interpret the meaning of the outcome in the light of the purpose of the Thesis. Chapter 9 presents the conclusions of what was discovered in the Thesis.

2 THE COMPANY

2.1 Halliburton

Halliburton is an American service company in the upstream oil and gas industry founded by Earl P. Halliburton in Duncan, Oklahoma in 1919. After borrowing a wagon, a team of mules and a pump, he built a mixing box out of wood and started an oil well cementing business. Today Halliburton is one of the world's largest providers of products and services to the energy industry. The company has more than 75 000 employees representing 140 nationalities in approximately 80 countries (Halliburton Homepage, 2014a).

Halliburton's vision is to be the preferred upstream service company for the development of global oil and gas assets (Halliburton Homepage, 2014b). The total revenue in 2013 was $29.4 billion, an increase of $899 million, or 3 percent, from 2012 (Halliburton Homepage, 2014c).

The services provided by the company ranges from location of hydrocarbons and managing geological data, to drilling and formation evaluation, well construction and completion, and optimization of production throughout the life of the field (Halliburton Homepage, 2014d).

The company is divided into 13 Product Service Lines (PSLs). The PSLs operate in two divisions: *Drilling and Evaluation* and *Completion and Production*. Drilling and Evaluation provides services such as field and reservoir modelling, drilling, evaluation, and precise well-bore placement solutions that enable customers to model, measure, and optimize their well construction activities (Halliburton Homepage, 2014e). Completion and Production delivers services such as cementing, stimulation, well intervention, pressure control, pipeline & process services and completion services (Halliburton Homepage, 2014f). Each PSL is responsible and accountable for strategy, technology development, process development, people development and capital allocation. The different PSLs are shown in Table 2-1.

Table 2-1 Product Service Lines (PSLs) in Halliburton.

Drilling and Evaluation Division	Completion and Production Division	Supporting both Divisions
Baroid	Artificial Lift	Consulting and Project Management
Drill Bits and Services	Boots & Coots	
Landmark Software and Services	Cementing	
Sperry Drilling	Completion Tools	
Testing and Subsea	Multi-Chem	
Wireline and Perforating	Production Enhancement	

2.2 Pipeline & Process Services

Halliburton Pipeline & Process Services (PPS) is a sub-PSL of Boots & Coots (B&C) in the Completion and Production division. The sub-PSL provides services such as pre-commissioning, commissioning, maintenance and decommissioning to pipeline and process plant construction, commissioning and maintenance industries. The services enable the operators to initiate, sustain and increase production. Halliburton PPS operates globally both onshore and offshore. PPS has been a sub-PSL of Halliburton for over 40 years (Halliburton homepage, 2014g).

2.3 PPS Scandinavia Organisation

PPS Scandinavia has approximately 120 employees belonging to the same cost centre and is split into onshore and offshore organisations with approximately half of the people in each organisation. The employees that have their primary workplace onshore perform the planning of the projects while the employees that have their primary workplace offshore execute the projects. Most of the personnel working in the offshore organisation have rotations and travel to different locations depending on the project. This Thesis will focus mainly on the onshore organisation.

The organisational chart of PPS Scandinavia can be seen in Figure 2-1. Most of the operational personnel can be directly charged to projects, while most of the support personnel are charged as a calculated support cost and divided on all ongoing projects.

As Halliburton is an international company with many levels of management the administrational costs for regional managers and other local administration functions are distributed to the respective PSLs and deducted from the accounts. These costs are then distributed on the ongoing projects. This is further described in Chaper 4.6.1 *PPS Department Costs*.

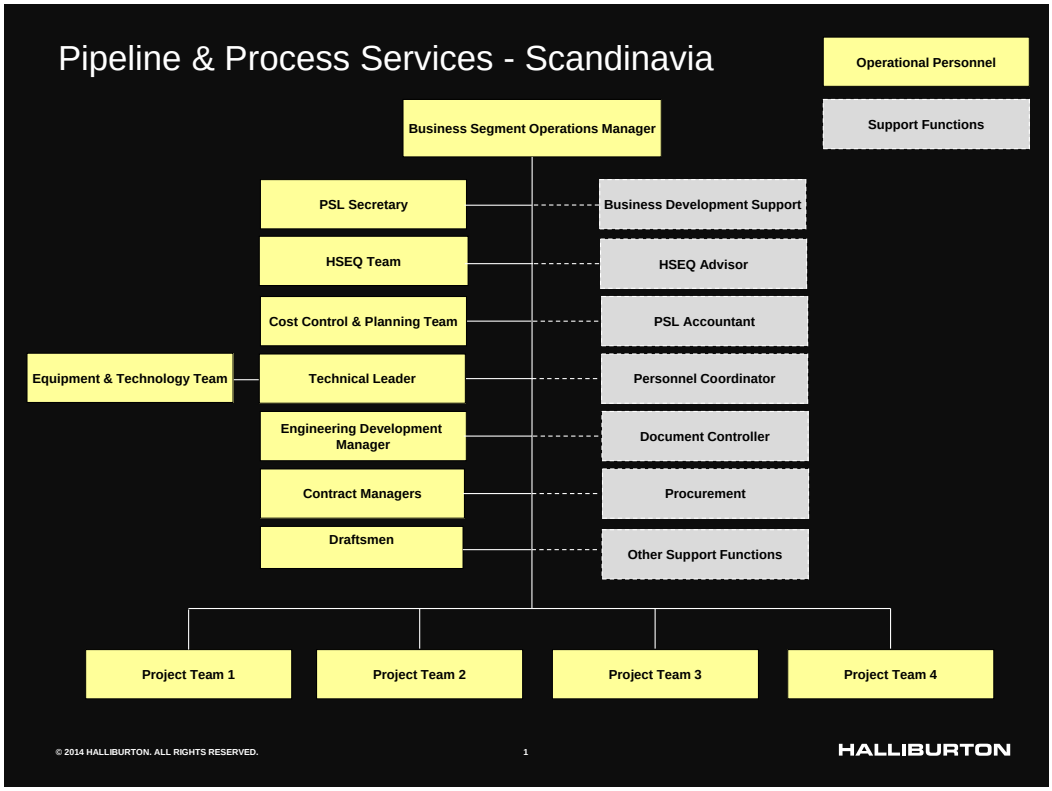

Figure 2-1 Organisational Chart Pipeline & Process Services Scandinavia

PPS Scandinavia consists of four project teams with different roles to manage different parts of the project. The team structure can be seen in Figure 2-2. A project team consists of a Project Manager, Technical Leaders, Project Engineers, a Project Equipment Coordinator and a Service Coordinator. The number of personnel with the same roles in a team depends on the workload and the number of projects that the project team have. The project teams are assisted by shared support functions such as a HSEQ representative from the HSEQ team, a draughtsman, a Service Planner from the Cost Control & Planning Team and a Business Development representative.

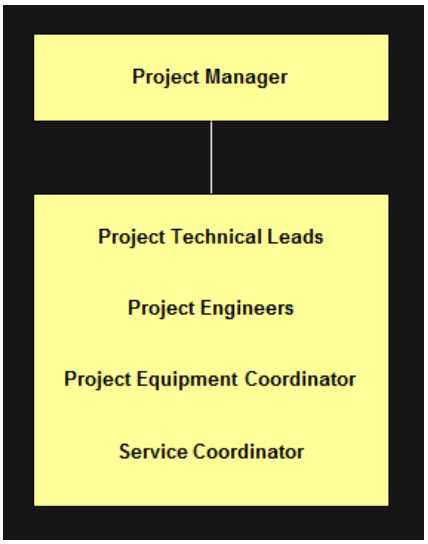

Figure 2-2 Project Team Structure

2.4 Tasks and Responsibilities

All roles in the project team have different tasks and responsibilities. These are described in the Project Responsibility Matrix, which is an internal Halliburton work method (Halworld Home, 2014a). This work method is a supplement to other documents that describe certain processes more detailed. More information about these documents can be found in Chapter 4.1.2 *The Halliburton Management System and the 7 HMS Mainstays*.

The *Project Manager* is the team leader and is responsible for all phases of a project, including:

- Planning, organisation, coordination and control in accordance with the established policies, procedures, systems and requirements found in the Halliburton Management System (HMS).
- Communication with customer on commercial issues
- Checking and approval of invoices, approval of procurement, updating of monthly reports to customers, checking and approval of cost reports, creating and approval of cost estimates and VORs and forecasting of project revenue.
- Understanding the project contract and familiarise the project team with its content, as well as complying with contract milestones.
- Evaluation of need for more personnel resources
- Creation and update of project schedules and comparison of actual progress according to planned progress.

The *Project Technical Lead* is responsible for the technical aspects of a project including:

- Planning, organisation, coordination and control of technical aspect of the project in accordance with the established policies, procedures, systems and requirements found in the Halliburton Management System (HMS).
- Communication with customer on technical issues
- Responsible for the quality of all project documents and procedures

The Project Engineer group is divided into Principal Project Engineer, Senior Project Engineer and Project Engineer. The Project Engineer could also be a Trainee Engineer. All roles might not be represented in a project team, and a team which has a Senior Project Engineer might not have a Principal Engineer.

The *Principal* or *Senior Project Engineer* has tasks and responsibilities such as:

- Quality control of the work that is produced in the planning phase of a project
- Provide job design and post job analysis to the customer
- Assist in writing and checking of project documents and procedures
- Assist in equipment spread engineering
- Utilise the PPS HMS system to ensure that correct procedures, reports, field paperwork and other documents are used for the projects

The *Project Engineer* or *Trainee Engineer* has tasks and responsibilities such as:

- Perform assignments requiring knowledge and application of basic engineering principles
- Write project documents and procedures
- Provide job design and post job analysis to the customer
- Utilise the PPS HMS system to ensure that correct procedures, reports, field paperwork and other documents are used for the projects

The *Project Equipment Coordinator* has tasks and responsibilities such as:

- Coordination of equipment and materials within a project team and communication with internal vendors and other PSLs
- Prepare required technical information for procurement of equipment and communication with procurement representative
- Design and technical evaluations of new or upgraded project specific equipment
- Equipment planning in Mobile Equipment Planning and MODEM (see Chapter 4.3.1.2 *Equipment Planning*)
- Quality check of all procured and rented equipment
- Mobilisation and demobilisation of equipment

The *Service Coordinator* has tasks and responsibilities such as:

- Communication with suppliers and coordination of third party services and equipment within assigned project team, including updates of schedule or scope changes
- Communication with procurement representative regarding procurement and rental of equipment
- Creation of Purchase Requests for procurement or rental of equipment
- Ensure that procured or rental equipment is delivered in time and with correct specifications
- Ensure all rental equipment is off hire as soon as possible after demobilisation and return to Halliburton

The *HSEQ Representative* has tasks and responsibilities such as:

- Maintenance and communication of relevant documents and processes in the HMS towards the projects teams
- Planning of regular meetings for project risk assessment and ensure required actions are followed up
- Communicate experience transfer including issues and incidents from other projects
- Coordinate risk assessment facilitation and follow up reports

The *Service Planner or Cost Controller* has tasks and responsibilities such as:

- Create Sales Orders and Work Breakdown Structures for new projects
- Perform invoicing and prepare cost reports
- Perform internal audits of closed projects

The *Business Development Group* has task such as:

- Market assessment and forecasting
- Generate new and manage existing customer relations
- Development of strategic plans and business plans
- Tendering process including pricing, bidding, clarifications and establishment of new contracts
- Creation of preliminary cost estimate for a project
- Handover of project to Operations
- Support Operations with contractual and commercial issues

As the Project Managers, the Service Planners and the Business Development group have mainly tasks and responsibilities related to financial aspects of a project included in their daily work, these groups are referred to as *the commercial groups.* As the Project Technical Leads, the Project Engineers, the Project Equipment Coordinators and the Service Coordinators have mainly tasks and responsibilities related to technical aspects of the project included in their daily work, these groups are referred to as *the technical groups*.

3 PROJECT MANAGEMENT AND FINANCIAL ASPECTS OF A PROJECT

This chapter gives an introduction to project management and financial aspects of a project to be able to compare existing literature to how project management is performed in Halliburton PPS as described in Chapter 4 *Project Management and Financial Aspects of a Halliburton PPS Project.*

3.1 Project Management

The project is a commonly used work method within the oil and gas industry. A project can be characterised by being temporary and unique, as well as requiring progressive elaboration. The Project Management Institute (PMI) defines a project as follows:

A project is temporary endeavour undertaken to create a unique product or service (Gardiner, 2005).

The British Standards Institution gives another definition:

A project is a unique set of coordinated activities, with a definite starting and finishing point, undertaken by an individual or organisation to meet specific objectives within defined schedule, cost and performance parameters (Gardiner, 2005).

Project management is the management of all activities associated with a project. There are many definitions of project management. The British Standards Institution has provided a definition for project management as follows:

Project Management is the planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to the specified cost, quality and performance (Gardiner, 2005).

In addition project management is about managing a process and the people who are part of this. The responsibility of the project manager includes control of people, resources and delivery of products. Activities such planning, organising, controlling as well as leading and motivating constitute the main tasks of a project manager (Gardiner, 2005).

3.1.1 Project Lifecycle

The lifecycle of a project can be divided into different phases each leading to a deliverable. Gardiner (2005) has defined four phases as follows:

1. Initiation and Definition
2. Planning and Development
3. Execution and Control
4. Project Closure

Phase 1, *Initiation and Definition*, represents the start of the project and often includes a feasibility study to decide whether to initiate the project or not based on investigation of costs and benefits. This phase also includes definition of the scope of work and the deliverables. Resources are limited for this phase and decisions are often made with limited information. At the end of the phase it is determined either to start planning of the project or to reject it.

During phase 2, *Planning and Development*, more detailed planning as well as management and organisation of the project is performed. This involves creation of required plans such as scope management plans, work plans and schedules, resource and budgetary plans, procurement plans and contract strategy, risk management plans, quality management plans, document management plans, project control plans and human resource management plans. In addition to this mobilisation and organisation of resources such as people, equipment, materials, knowledge and power is performed, as well as establishment of an infrastructure to support these resources.

In phase 3, *Execution and Control*, the rate of the expenditure is at its greatest and the sponsor expects to see deliverables. In this phase more resources are spent, changes are likely to occur and control is critical. It is important to maintain control of the changes and minimise them to those that are required to achieve the critical success factors of the project.

Phase 4, *Closure*, represents the end of the project and includes closure of the project budget, settlement of outstanding issues such as payments to contractors and suppliers, completion of documentation and preparation for release of resources.

3.1.2 Work Breakdown Structure

To be able to plan the project work and effectively follow up the project execution it is necessary to break the project into detailed defined elements which are easier to handle than a whole project as one task. Such a project breakdown is called a Work Breakdown Structure (WBS). By

defining and describing the execution of activities, tasks and jobs it is easier to get an overview of the type, amount and quality of the resources required (Karlsen, 2013).

The smallest units of the WBS are called work packages which define the work in sufficient detail to make it possible to be measured, budgeted, scheduled and controlled. Information from the WBS can be related and linked to other project control systems. One method is Organisational Breakdown Structure where the manageable activities can be assigned to members of the project team to encourage personal accountability for delivery of each activity. Another method is the Critical Path Method which can be prepared to show the sequencing and independences of activities in the WBS. A third method is the Cost Breakdown Structure (CBS) which is further described in Chapter 3.3.3 *Cost Budgeting* (Oberlender, 2000).

3.2 Contract Formats

A contract is required to regulate the exchange of products and services between two or more parties and is a critical element which can make the difference between success and failure for a project. The contract theory is characterised by different terms used to describe identical or very similar situations which can generate misunderstandings and confusion. There are many terminologies used for the different parties involved in a contract. The most commonly used are Customer or customer and supplier. Other terms for Customer are principal, procurer, owner and buyer whereas agent, contractor and bidder are used for supplier.

When there is a need of a service or a product in a project a contract has to be established between the customer and one or more suppliers. The supplier is to deliver the defined services, products and scope of work and the customer has to pay according to agreed contract prices. The principle seem simple, but in fact it is complex to choose the most suitable contract strategy and several conditions such as when the supplier should be involved, criteria for supplier selection, the best way to negotiate, risk distribution, incentive mechanisms and selection of the most suitable contract and compensation format should be evaluated and clarified during the contract strategy process (Karlsen, 2013).

Several contract formats exist and it is essential to choose the most suitable format for each situation and type of work. The type of contract determines the cost and performance risk which are placed on the supplier. Due to the current increasing trend towards outsourcing of non-core business activities procurement represents a large part of total economic activities and influences

the choice of contract formats. An important strategy for the customer when designing a competitive procurement mechanism is the choice of winning suppliers. It can be either a single award to one supplier or multiple awards with a number of competitively selected suppliers in a framework agreement.

3.2.1 Framework Agreements and Frame Contracts

A framework agreement is an agreement between one or more contracting authorities and one or more economic operators. The purpose is to establish the terms governing contracts to be awarded during a given period, in particularly with regard to price and the quantity envisaged. Such an agreement is in general more flexible than a frame contract where economic variables tend to be fully pre-determined. The framework agreement normally allows more flexibility around volume and the details of the relevant goods and services under the framework. To ensure each purchase represents the best value a multi-supplier framework allows the contracting authority to select from a number of suppliers for its requirements (Dimitri, Piga and Spagnolo, 2009).

Procurement contracts commonly distinguish between three main categories:

1. Lump-sum contracts
2. Cost-reimbursement contracts
3. Incentive contracts

The first two contract formats are commonly used and include two fundamental different strategies. The properties of the lump-sum and cost-reimbursable contracts are basically opposite to each other and are used for different purposes. The incentive format is rarely used in the petroleum industry since it involves agreements of cost targets before the design process is complete, hence this contract format is not further discussed in the Thesis.

A combination of the three categories is often used in a way that adapts to the current situation while others are very similar to one of the three with only minor adjustments.

3.2.2 Lump-sum Contracts

Dimitri, Piga and Spagnolo (2009) define a lump-sum contract as a contractual agreement where the supplier is paid a fixed price for realising a project that satisfies a predetermined quality standard. Another commonly used terminology for this type of contract is lump-sum. In this type of contract the supplier does not receive any additional payment for achieving a higher quality

standard, but penalties are commonly used to avoid poor quality of work that is not according to the agreed standard. The size of the penalties must be large enough to avoid opportunism.

The supplier bears the highest risk in a lump-sum contract and may end up using more resources than planned to complete the project in time. Other risks such as extended schedule due to lack of personnel or equipment and higher procurement costs than estimated could put extra expenses and increased cost to the supplier. On the positive side the supplier has the full responsibility of procurement and execution and can enjoy the benefits of possible cost savings in terms of profit (Dimitri, Piga, and Spagnolo, 2009).

Fixed price contracts are most suitable for projects involving little uncertainty and complexity. There should not be many uncertain factors which may occur with high probability and can result in large consequences unless these factors can be managed and controlled. It is necessary to ensure that the complete design is as error free as possible to keep any changes to a minimum. There should also be an adequate review of the contract documents prior to bidding to detect any discrepancies that may exist. The customer may find it profitable to letting the supplier bear the burden for cost savings for example in situations where the actual production cost depends on the actions of the supplier to reduce costs and little on events out of the control of the customer. The customer may then provide an incentive program taking care of the interest of both parties, however lump-sum contracts may be unsuitable if incentives are used in situations where quality is unverifiable. Due to cost-reduction incentives there is a risk that the supplier saves on non-verifiable activities at the cost of the customer related to degradation of quality (Dimitri, Piga, and Spagnolo, 2009).

3.2.3 Cost-reimbursement Contracts

A cost-reimbursable contract means that the supplier is paid for all expenses including an agreed profit margin. The profit margin is normally a percentage of the cost or a fixed amount. This type of contract is often used in situations where it is hard to define the entire scope of work or if many changes are likely to occur to complete the project. The contract will normally contain a cost estimate based on assumed man-hours and material costs. To cover the expenses of the supplier regularly documentation and reporting of actual hours and other costs to the customer is required. In this type of contract the supplier is not provided with any incentives to undertake cost-reducing activities, hence the supplier will not gain any extra profit if the actual costs for the customer are below the estimated costs. However, the supplier is fully insured against any cost

overruns and will be paid if the costs turn out to be higher than forecasted. The highest risk in this type of contract is taken by the customer (Karlsen, 2013).

A drawbacks with the cost-reimbursable contract is that it may be difficult to select the most efficient supplier since all costs are reimbursed and the lack of incentives can easily result in cost escalation during the project realisation. However, when contract flexibility is important and design changes are likely to occur after the contract is signed, this type of contract can be suitable because it reduces the costs of renegotiating the contract. It can also be a favourable choice in situations where quality is non-verifiable and it plays an important role in the procurement market, because the contract format has the advantage of not giving the supplier incentives to cut quality in order to save cost of quality provision (Dimitri, Piga and Spagnolo, 2009).

3.3 Estimating and Budgeting Project Costs

Money, resources and time are three factors required to carry out a project. The amount of each factor is never precisely known until the closure of the project, however several estimating techniques to predict projects costs, resources and durations exists with varying degree of certainty. The estimates mainly act as documents needed for strategy planning, capital and project budgeting, project scheduling and project control (Gardiner, 2005).

Although there is a strong interdependence between project budgeting and scheduling, this section will mainly deal with cost estimating and budgeting. The time required to complete a task is an important factor when predicting the project costs thus schedule will be part of the theory which is further described. However detailed scheduling techniques will not be covered in this Thesis.

Project costs are generated by using resources which includes, but are not limited to, labour, equipment and facilities, materials and capital (Karlsen, 2013). A project budget is prepared to fix in advance the resources needed and represents the planned costs of a project at its start. The building blocks are expenditures in terms of used resources, revenue, cash flow which are the incoming and outgoing money and a time-phased plan. It is essential that the cash flow is maintained by the project manager to make sure the project expenditures do not exceed the project finance plus the project revenues. A well designed budget is a key document that makes the tasks of project control much easier as it enables the managers to make rapid decisions about

how to steer a project that is overspending back into line with baseline budgets (Gardiner, 2005). The early estimates are often called baseline budgets or estimates because they serve as a baseline for identifying changes as the project progresses. The overall project success is often measured by how well the final cost compares to the baseline estimate or budget (Oberlender, 2000).

A continuous follow-up through all project phases is required to control the resources. Four important processes are used for project budgeting and to control the project costs (Karlsen, 2013):

1. Resource planning
2. Cost estimating
3. Cost budgeting
4. Cost control

These processes are further described in the subsequent sub-sections.

3.3.1 Resource Planning

Resource planning involves estimation of physical resources related to personnel, equipment and materials and quantities of each resource required to perform the project activities. Personnel resources may be provided internally or by one or several external organisations, e.g. consultants, contractors, subcontractors or suppliers (Gardiner, 2005).

3.3.2 Cost Estimating

Cost estimating includes developing an approximation of the costs of the project resources required to perform the project activities (Gardiner, 2005). The purpose of a cost estimate is to function as a reference for follow-up and control through the project life (Karlsen, 2013).

A cost estimate is encumbered with uncertainty and the level of accuracy is dependent of project type and size. There are four main variants of cost estimates where the first often is a proposal based on a business case or a feasibility study. In the early project phases the access to information is limited and the accuracy of the project costs is a rough estimate which may have a variance up to 50 percent.

The next variant is normally a concept estimate which is prepared in the project initiation phase when more information is available. The level of uncertainty in this phase is still fairly high and the variance may be up to 20 percent on the estimate.

A detailed estimate has to be established to obtain more of the objective of the cost estimate. Such an estimate is prepared during the design phase when detailed project information is available and gives a result with higher certainty. In this case the accepted variance is reduced to ± 5 percent.

In some cases where a company is to deliver a custom-made tender there may be a need of even more accurate and detailed estimates which are labour-intensive and time-consuming. A doubling of the accuracy requires quadrupling the use of resources is a known and useful rule of thumb which gives an indicator of how important a thorough evaluation is of whether it is necessary and profitable to increase the level of accuracy of the estimate.

To be able to evaluate and get an indication of the project work and the cost of it through the project lifecycle, well prepared cost estimates are essential since they are used as a basis to compare the actual costs against the forecasted costs (Karlsen, 2013).

There are several different approaches to prepare useful and realistic project cost estimates and two of the most common are described below:

1. Analogous estimating (top-down)
2. Definitive estimating (bottom-up)

The first approach uses the actual costs of a previous, similar project as the basis for estimating the costs of the current project. The approach is most reliable when the previous projects are similar, but few projects have exactly the same size or complexity and upward or downward adjustments are normally used to account for such differences between the estimates. Top-down estimating is a form of expert judgment and is often used to estimate total project costs in the early project phases when there is limited amount of detailed information. The approach is generally less costly than other techniques, but also generally less accurate (Gardiner, 2005).

The latter approach involves estimating the cost of each individual item in each activity based on either the WBS or the project schedule. All costs are then summarised to give the total cost for the entire project. The estimating method is the most time-consuming but is also the most accurate one amongst the techniques (Gardiner, 2005).

A cost estimate is normally composed of several components grouped in either direct or indirect cost categories. Direct costs are costs which can be directly related to project activities and include labour, materials, equipment and travel. Indirect costs cannot be directly related to

project activities and can include management, premises, current, insurance and cleaning. These can be characterised as accrued costs and are necessary to keep the business going. The sum of the direct and indirect costs gives the total costs (Karlsen, 2013).

Compensation for escalated prices should be included in the estimates if the project is expected to have a long lifetime. If the customer and supplier are located in two different countries, the exchange rate fluctuation may lead to increase or decrease of costs, especially in the terms of a fixed price contract. To avoid this a calculated exchange rate should be used. When some of the work is to be completed by an external supplier, a percentage between 7-10 percent of the earning is normally added (Karlsen, 2013).

Taking the estimates uncertainty into account, financial reserves may be used to account for extra costs. Such reserves can be a percentage mark-up to the basis estimate (Karlsen, 2013).

3.3.3 Cost Budgeting

Cost budgeting relates cost estimates to individual activities in the project schedule to produce projections of expenditure against time. Cash flow projections can also be produced by payment milestones (Gardiner, 2005).

A Cost Breakdown Structure (CBS) is a tool which can be created to help communicate, manage and control cost and budget aspects of a project. The basis of a CBS is a combination of a WBS and an OBS and the appropriate level of breakdown includes details needed to monitor and control cost as shown in Figure 3-2. Each separate building block in the structure is called control accounts and their purpose is to provide an objective, reliable and systematic method to monitor and control the progress of all the work packages in a project.

Earned Value Analysis (EVA) includes methods to help project managers in this area. EVA is further described in Chapter 3.4.2 *Earned Value Analysis*. Each control account in the CBS represents a unit of work for which a particular resource unit has responsibility to deliver on time, in accordance with the scope of work and quality described in the project plan and to budget. A large project can have a large amount of control accounts which are then collected and entered into a cost and schedule control system on a computer which can perform various calculations and comparisons to determine how the project is progressing with respect to the plan (Gardiner, 2005).

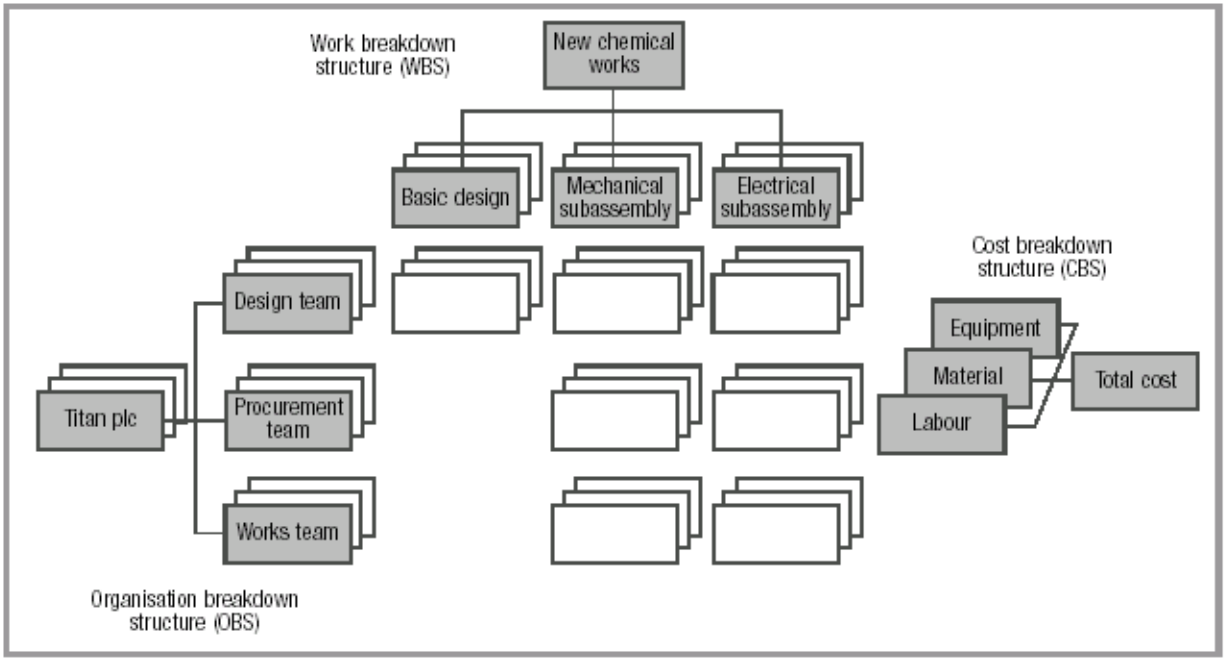

Figure 3-1 Cost Breakdown Structure (CBS)

Cost projections created during the budgeting process form the baseline for control and performance measurement of the project. The baseline costs projections can be used to generate S-curves for visual representation in the project plan and progress reports. An S-curve is shown in Figure 3-3 with cumulative project costs along the y-axis and time along the x-axis (Gardiner, 2005).

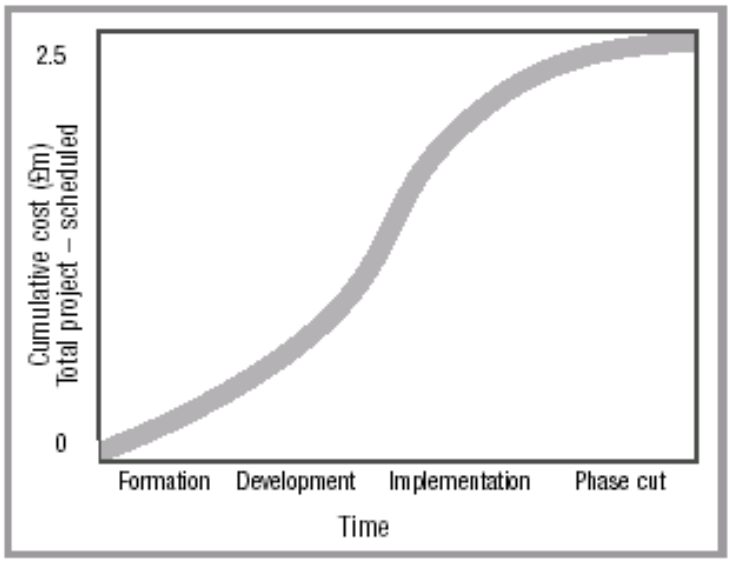

Figure 3-2 Example of an S-curve of a Project

The shape is related to the project lifecycle where the consumption of resources is relatively low, hence the expenditures are low, during the project initiation and definition stage when plans are

discussed and sketched out. Once solutions are settled, development takes place and the rate of expenditures steadily rises until implementation phase when the rate is at its highest. When the project nears completion, activity subsides and the S-curve slope decreases and reaching zero at project closure (Gardiner, 2005).

A poorly structured budget may obstruct effective control and the budgeting decisions that are made during the early project phases typically have their highest impact during the implementation phase (Gardiner, 2005).

3.3.4 Cost Control

Cost control includes registering cost variance such as costs in relations to schedule and changes to the project budget. The result of this process is updated and revised cost estimates and budgets and creation of variation orders. Section 3.4 *Cost Control Systems and Follow-up* describes this in more detail.

3.4 Cost Control Systems and Follow-up

An important part of management and follow-up of a project is to have control of the costs to prevent budget overruns. Karlsen (2013) defines the term control as *actions which reduce the difference between plan and actuals*.

Control and follow-up of costs is challenging and several factors such as poor estimation and project breakdown techniques, unrealistic expectations to internal organisation, increased workload due to poor planning, poor communication with the customer, increased material costs and alteration of personnel in the organisation can cause budget overruns (Karlsen, 2013).

Advanced methods and techniques such as S-curve (described in Chapter 3.3.4 *Cost Control*), Percent Complete Matrix and Earned Value Analysis (EVA) can be used for follow-up of cost and progress.

3.4.1 Percent Complete Matrix

Another simple technique for determining the overall status of a project is the percent complete matrix method which can be used for any size of project and only requires a minimal amount of information that is available from the work packages. The budget can be measured as any one of three variables; cost, physical quantity of work or work-hours. The matrix requires only two input variables for each work package which can be estimated cost and percent complete. By entering these data into a matrix in a spreadsheet, the spreadsheet can calculate *percent unit* and *percent project* based on the estimated cost, and *cost to date* and *percent complete project* based on the variable *percent complete* as shown in the Figure 3-5 (Oberlender, 2000).

Work Package	
Estimated Cost*	Percent Unit
Percent Complete*	Percent Project
Cost to Date	% - Complete Project
Spreadsheet Formulas	
Input from Estimate*	Estimated Cost/Total Unit Cost
Variable Input by User*	Estimated Cost/Total Project Cost
Percent Complete × Estimated Cost'	Cost to Date/Total Project Cost

*Required Input Data by User

Figure 3-3 Work Package Information and Spreadsheet Formulas for %-complete Matrix

3.4.2 Earned Value Analysis

EVA is a widely used cost and schedule control system and is known as either *cost/schedule control system* or *baseline performance measurement*. The basic principle is to compare the value of actual work completed, known as the earned value, against actual expenditure and planned progress. Gardiner (2005) has defined three main variables used in EVA to determine project performance in terms of cost and schedule as follows:

1. Earned value or budgeted cost of work performed (BCWP) which is the value of actual work performed
2. Budgeted cost of work scheduled (BCWS) which is the value of planned work
3. Actual cost of work performed (ACWP) which is the actual expenditure

BCWP, BCWS and ACWP are used by the project manager to calculate variances and performance indices useful for project control. Cost variance (CV) is one of these variances and shows the difference between actual expenditures and earned value. The calculation is found in Equation 3-1.

Equation 3-1 Cost Variance

$$CV=BCWP-ACWP$$

A positive CV indicates a lower actual cost than budgeted for the control period which means the project execution is better than anticipated, while a negative CV indicates cost overruns.

Schedule variance (SV) is another useful variance and is found by calculating the difference between the value of planned work and the value of actual work done. The calculation is found in Equation 3-2.

Equation 3-2 Schedule Variance

$$SV=BCWP-BCWS$$

The SV indicates the variance between the work content performed and the work content scheduled for the control period. A positive difference indicates that the project is ahead of schedule and a negative difference implies that the project is late. Schedule delays detected by EVA should be monitored closely and when the delay extends beyond the control level, analysis of resource requirements should be initiated to test whether the entire project may be delayed.

A budget variation (BV) shows the difference between the values of planned work minus the actual expenditure. The calculation is found in Equation 3-3.

Equation 3-3 Budget Variance

$$BV=BCWS-ACWP$$

A positive number indicates that the project has used less money than budgeted while a negative number means more money has been spent than budgeted (Karlsen, 2013).

The correct development of a project is when there are no variances between actuals and budgets, however negative or positive variances are usually the case in a real project life. Another way of obtaining information about the project control is to calculate performance indices such as schedule performance index (SPI) or cost performance index (CPI). The SPI of a project or a work package is defined as the ratio of BCWP to BCWS and the CPI is defined as the ratio of BCWP to ACWP as found in Equations 3-4 and 3-5, respectively (Gardiner, 2005).

Equation 3-4 Schedule Performance Index

$$SPI = \frac{BCWP}{BCWS}$$

Equation 3-5 Cost Performance Index

$$CPI=\frac{BCWP}{ACWP}$$

An SPI equal to 1 indicates the associated activity is on schedule and CPI equals to 1 that the work package is on budget. Values larger than one indicates the activity is ahead of schedule for SPI or better than planned cost performance for CPI, while values smaller than 1 indicates schedule or cost overruns.

Using SPI or CPI as a basis schedule at completion and estimate at completion (EAC) can be calculated. The schedule at completion is an estimate of total duration of the project based on the current schedule performance. The calculation is found in Equation 3-6.

Equation 3-6 Schedule at Completion

$$Schedule\ at\ completion=\frac{Original\ estimated\ durations}{SPI}$$

An EAC is a forecast of the total project costs based on the current project performance. There are three methods which can be used to find the EAC. The first method uses an equation where BAC is budget at completion. This is the most commonly used method and is often used when current variances are seen as typical of future variances. Equation 3-7 is used for the first method.

Equation 3-7 Estimate at Completion for Typical Variances

$$EAC = \frac{BAC}{CPI}$$

The second method is often used when current variances are seen as atypical and will most likely not occur in the future. Equation 3-8 is used for the second method.

Equation 3-8 Estimate at Completion for Atypical Variances

$$EAC = ACWP + (BAC - BCWP)$$

In the third method EAC is equal the actual plus a new estimate for all remaining work. This is an approach which is often used when past performance shows that the original estimating assumptions are fundamentally wrong or when they are no longer relevant due to change in conditions (Gardiner, 2005).

3.5 Change Management and Control

A certain amount of change is expected for most projects. However, change should be carefully controlled. Planning, discipline and communication amongst team members and the customer representatives is important when managing changes. Lack of clear and consistent leadership when confronted with the challenges of change could cause failure of a project. PMI includes the following activities in the change control process, as described in Gardiner (2005):

- Influence the factors which create changes to ensure that changes are beneficial
- Determine that a change has occurred
- Manage the actual changes when and as they occur

Project changes can either be initiated by the project team, the customer or external sources. Changes initiated by the project team may be related to scope or quality creep, increased level of effort leading to unintended additions to the amount of work performed, new technologies and tools, personnel changes or schedule improvements. Changes initiated by the customer may be related to personnel changes, scope creep or scope leap. Changes initiated by external sources may be mandated changes, availability changes or implementation cost changes (Gardiner, 2005). The cost of the change is likely to increase with time and as the degree of uncertainty is reduced. This can be seen in Figure 3-3.

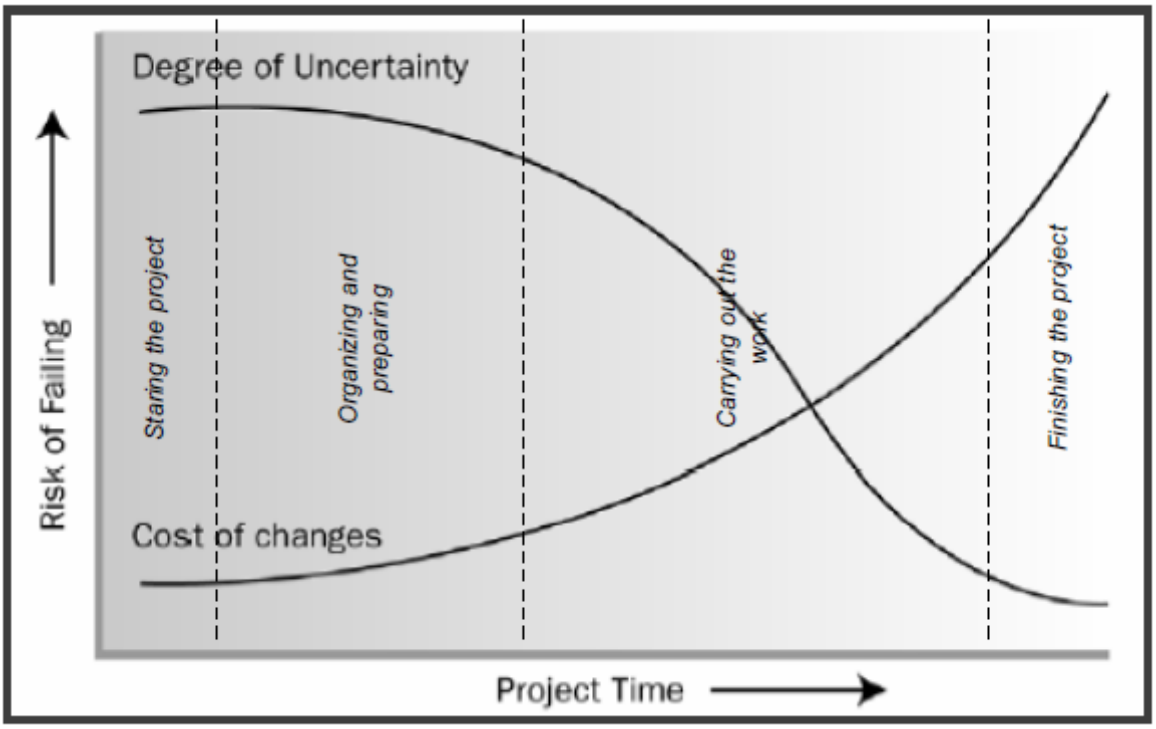

Figure 3-4 Impact of Change during the Project Lifecycle

To minimise risk and maximise value from any proposed changes to the project plan, a change management plan should be developed during the planning phase of a project. Important elements of a change management plan would be identification of change, analysis of the effects of a change, development of a response strategy, communication of the strategy, gaining acceptance for the change, revision of the project plan and monitoring of the effects of the change.

3.6 Cost Drivers

Management of key cost drivers is essential for a company that competes on the basis of cost leadership and they contribute directly to success of a company. When developing cost estimates the most important step is to identify the cost drivers. A number of relevant cost drivers exists and some might not be immediately obvious. The most practical way to identify the cost drivers is to rely on the judgement of product designers, engineers and manufacturing personnel which normally have the most useful information on cost drivers (Blocher et al., 2008). Different cost drivers in a PPS project is further described in *Chapter 4.6 Project Cost Drivers in Halliburton PPS.*

4 PROJECT MANAGEMENT AND FINANCIAL ASPECTS OF A HALLIBURTON PPS PROJECT

4.1 PPS Project Management

Due to the unique and temporary nature of PPS work each job that is carried out can be classified as a project. Projects are about more than just performing well operationally. They include delivering contractually what the customers expect as well as ensuring that desired outcomes are met both from a financial and a reputational point of view. Halliburton PPS has therefore implemented the principles of project management through every aspect of the business and the system is designed to be compliant with standards set by the Project Management Institute (PMI) (Halworld Home, 2014b).

The *Halliburton Boots & Coots Project Management Handbook*, called the PM Handbook, is a tool for all project members to use during all phases of a project. The purpose of the handbook is as follows:

- Apply project management to the management of (PPS) business activity
- Establish an application of PMI standards in a practical manner
- Provide guidelines and templates to assist projects from initiation of a project to its close-out
- Link into the relevant training course for Project Management
- Provide an easy-to-understand guide to running a well-controlled project

The PM Handbook defines a project as follows:

The successful delivery of a contracted scope of work for a Customer, with defined requirements in terms of scope, cost, time and quality.

The following goal for project management in PPS has been defined as follows:

Enable the department to conduct its projects in a disciplined, well managed, and consistent manner so that projects are completed on time, within budget, to the required quality standards, and overall, to increase the probability of achieving, or exceeding, the expected margins from PPS global business activity (Halliburton Management System, 2014a).

This can be achieved by:

- Developing an infrastructure to provide the knowledge, skills, tools and techniques necessary to support projects, project managers and project teams.
- Incorporating best practice procedures, lessons learned and providing a consistent, re-usable set of guidelines for the employees involved in project work.
- Developing standard templates and guidelines to assist projects.

Standard templates have been made for documents such as Business Case, Project Management Plan (PMP), Work Breakdown Structure (WBS), Issues Log, Minutes of Meeting, Management of Change (MOC) and Change Control Log. The templates are incorporated into the Halliburton Management System, which is further described in sub-section 4.1.2 *The Halliburton Management System and the 7 HMS Mainstays*.

4.1.1 Project Lifecycle in Halliburton

Halliburton PPS has broken the project lifecycle into five project management process groups, each of which have set activities that must be performed. The following process groups can be found in the PM Handbook:

1. Initiation
2. Planning
3. Executing
4. Monitoring & Controlling
5. Closing

Process 1, *Initiation,* includes the processes performed to define a new project or a phase of an existing project by obtaining authority to start the project or the phase. Examples of activities performed are:

- Clarification of the Scope of work in a tender from a technical perspective and understanding of the commercial terms and conditions.
- Performance of a Business Case to decide whether the project is feasible or not and to obtain sufficient evidence to show that the project is worthwhile, as well as that the risks are understood.
- Generation of the draft Project Management Plan (PMP).

Process 2, *Planning*, includes the processes required for establishment of the scope of project, refinement of objectives, identification of risk and definition of the course of the action required to attain the project objectives. Examples of activities performed are:

- Development of the PMP and applicable engineering solutions as more information is received.
- Formulation of timeframes, requirements and associated costs.
- Mitigation of risks.

In process 3, *Executing*, the plans are put into action. This includes processes to complete the work defined in the PMP to satisfy the project specification. This process should be integrated with the monitoring and controlling processes. An example of activities performed is mobilisation of resources and execution of the planned field operations.

Process 4, *Monitoring & Controlling*, includes the activities required for tracking, review and regulation of the progress and performance of the project. This involves identification of areas where changes to the plan are required and initiation of these changes. Examples of activities performed are:

- Review and control of the work performed.
- Measurement of progress and re-forecast as required e.g. daily reports and operations logs issued to the customer.

Process 5, *Closing*, includes the processes performed to finalise activities and formally close the project or phase. Examples of activities performed are:

- Conclusion and formal close-out of the project with a review of deliverables to determine completeness and acceptance. This includes customer satisfaction survey, Key Performance Index (KPI) and review of performance with the operational management team.
- Identification and documentation of lessons learned in order to continuously improve processes and standards.
- Create best practices or case studies where successful lessons learned are identified.

4.1.2 The Halliburton Management System and the 7 HMS Mainstays

Halliburton has a management system, the *Halliburton Management System* (HMS), which is applicable to the entire organisation. It is established, implemented and maintained in accordance with applicable International Standards. The system includes a *Quality Management Sub-System* which is based on standards such as ISO 9001, ISO/TS 29001, API Q1 and API Q2, a *Health and Safety Sub-System* based on standards such as OHSAS 18001 and API RP 75, as well as an *Environment Management Sub-System* based on standards such as ISO 14001 and API RP 75. These sub-systems have separate standards and guidelines and are defined in Company policies (Halliburton Management System, 2014b).

The *7 HMS Mainstays* are part of the management system and gather process maps, guidelines, checklists and work methods for seven different phases of a job. There are both global and local mainstays which are specified on PSL or Sub-PSL level. The mainstays can be seen in Figure 4-1 and are divided in the following categories:

- Mainstay 100: Develop Solutions
- Mainstay 200: Prepare Resources
- Mainstay 300: Mobilise Resources
- Mainstay 400: Perform Services
- Mainstay 500: Demobilise Resources
- Mainstay 600: Complete Reports and Field Tickets
- Mainstay 700: Review Performance

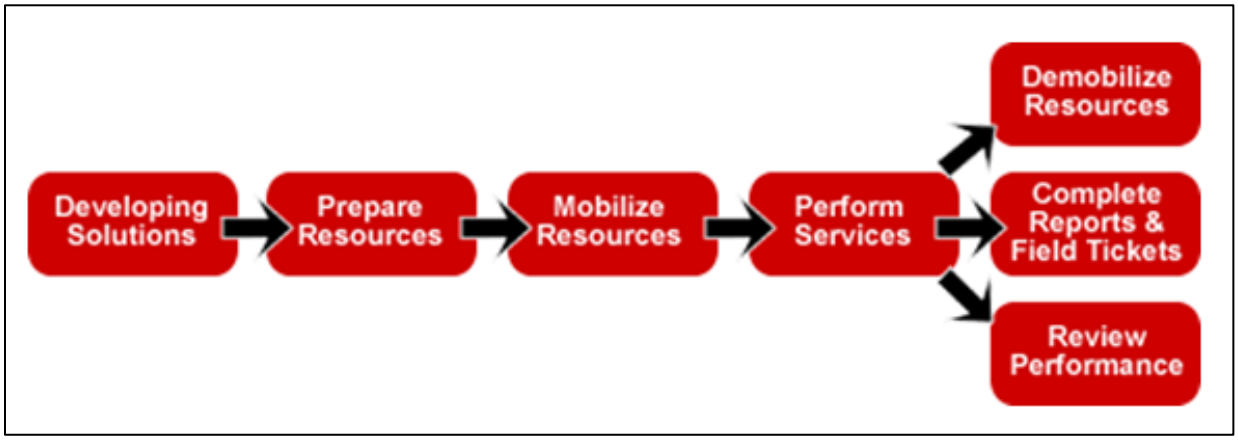

Figure 4-1 The 7 HMS Mainstays

There are specific mainstays for PPS Scandinavia. Mainstay 100, *Develop Solutions*, involves activities related to tendering, project initiation and engineering. This mainstay applies to project management process 1, Initiation.

Mainstay 200, *Prepare Resources*, involves activities related to preparation of equipment, materials and personnel, while Mainstay 300, *Mobilise Resources*, involves activities related to mobilisation of these resources. These mainstays applies to project management process 2, Planning.

Mainstay 400, *Perform Services*, involves activities related to site operations including preparatory tasks, inspection of equipment and materials, rig-up of equipment, performance of the planned operations and post operational tasks. This mainstay applies to project management process 3, Executing.

After completion of this mainstay the last three mainstays are initiated simultaneously. All of these mainstays applies to project management process 5, Closing. Mainstay 500, *Demobilise Resources*, involves activities related to confirmation of job completion and equipment status, rig-down and backload of equipment, personnel demobilisation and receipt of equipment at the Halliburton yard. Mainstay 600, *Complete Reports & Field Tickets*, involves activities related to completion of field paperwork and job documentation, as well as commercial activities such as update of VOs and cost estimates, invoicing and performance of internal audits. Mainstay 700, *Review Performance*, involves activities related to project review, lessons learned for experience transfer and feed-back to management on critical deviations between tender and the job performed. All seven mainstays apply to project management process 4, Monitoring & Controlling (Halliburton Management System, 2014b).

4.1.3 Work Breakdown Structure in PPS

All PPS projects have a specific WBS. The WBS represents the work that needs to be done to complete the project and is grouped into work packages (Halliburton Management System, 2014a). A diagram for a WBS can be seen in Figure 4-2.

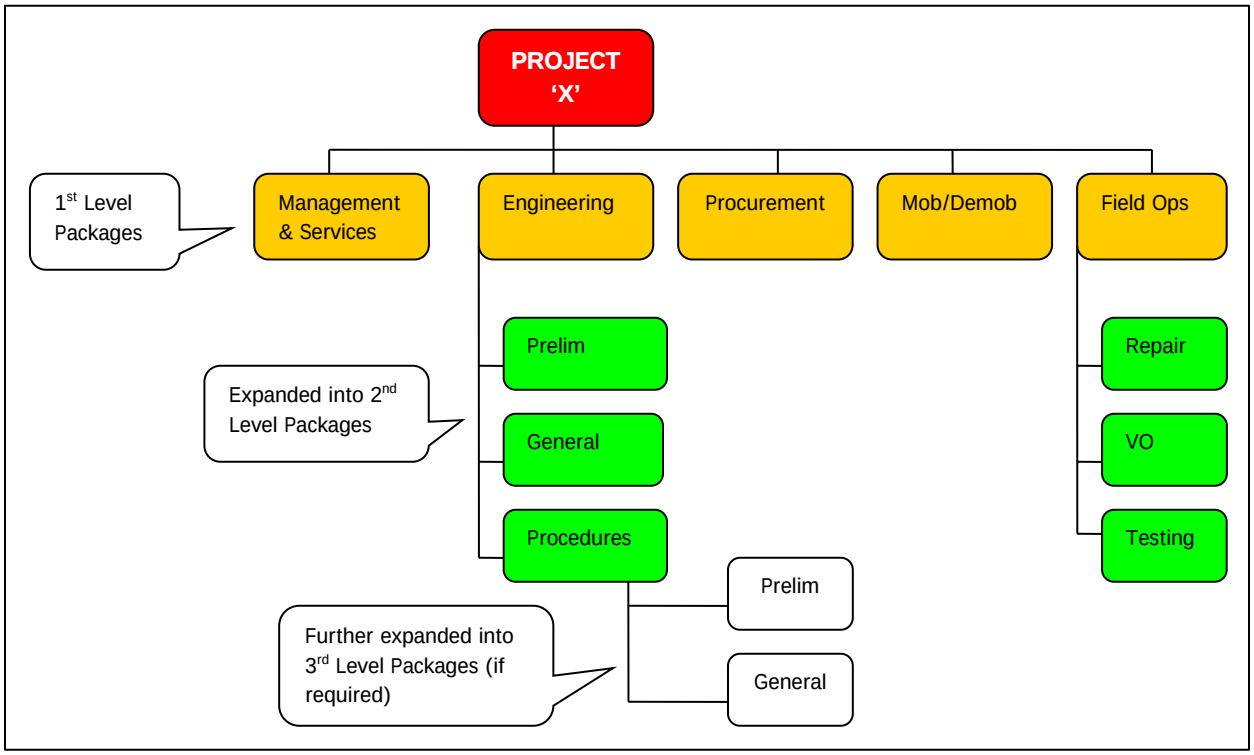

Figure 4-2 Example of a Work Breakdown Structure

The project activities are normally divided into the categories Management & Services, Engineering, Procurement, Mobilisation/Demobilisation and Field Operations, which are 1st level work packages. The most commonly used 2nd level work packages can be seen in Table 4-1. All work packages have specific codes to make it possible to register personnel hours spent for the activities in the work packages. Equipment is also scheduled against a specific WBS code. Some of these activities may be cost-reimbursable to the customer depending on the type of contract. This is further described in Chapter 4.2 *Contract Formats in Halliburton PPS*.

Table 4-1 Example of WBS Categories for a PPS Project

1st Level Work Packages	2nd Level Work Packages
Management & Services	PM/Planner/CC/DCC Documentation Travel HSE
Engineering	General Engineering Procedures Equipment and Mobilisation Close out
Procurement	Cost Plus items Non Reimbursable
Mobilisation/Demobilisation	Labour Equipment
Field Operations	Labour Equipment VO

4.1.4 Financial Training in Halliburton

All practical and theoretical training courses, whether they are related to technology, safety, business development or leadership, are available to the Halliburton employees through an interactive learning portal called Halliburton University. This system also includes role-based competency training and assessments for career development.

There are several levels of financial training that is offered to the Halliburton employees. Some of the basic courses are called *Basic Costs for Non-Finance Personnel*, *Basic Contract Price Database* and Basic *Contract Management for Operations and BD*. These courses are web-based and are available to all employees through Halliburton University.

Delivering Financial Performance is an instructor led course which offers hands-on financial training targeting the role-based competency requirements for PSL Country Managers and Operations Managers. The course focuses on the application of financial concepts to enable the delivery of strong financial performance specific to Halliburton operations. Topics such as

revenue, cost, profit, accounts receivable, inventory, fixed assets and building & managing financial plans are covered in the course (Halliburton University, 2014).

Financial training is also offered in a series of courses called Business Leadership Development (BLD). This series constitutes three courses, BLD I, BLD II and BLD III. Participation in these programmes is by senior management nomination only.

BLD I takes place over four days and is split into 2 sections: Financial Acumen and Managerial Leadership. Topics covered include Environment and Culture, Managing Employees Motivation and Performance, Managing Leadership and Influence Processes, Accounting for Non-Financial Managers, Financial Statements and Time Value of Money.

BLD II is made up of two separate one week courses and covers topics such as International Business, Supply Chain Management, International Finance, Cognitive Psychology and Decision Making, Corporate Governance, Profitability Management, Strategic Leadership, Marketing Management, Marketing Strategy, Enhancing Leadership Skills, Intellectual Property Rights, Leading with Emotional Intelligence, Customer Relations, Organisational Culture & Change and Organisational Communication.

BLD III is made up of three separate one week courses and covers topics such as Leadership competencies, Leadership and Organisational Change, Negotiating Integrative Agreements in Competitive Environments, Strategic Staffing for a Global Workforce, Long Term Investment Decisions and Value Creation, Managing the Future for Market Innovation and Growth, Foreign Exchange Rates and Risk Management, Leading with your Strengths, Leading Project Groups and Teams, Branding, Business Writing, Professional Presents, Employee Retention Strategies, Financial Evaluation of Business Opportunities, Managing through Motivation, Crisis Management, Presenting with Integrity, International Business Strategy and Managing Uncertainty – Analytical Tools.

4.2 Contract Formats in Halliburton PPS

Halliburton PPS have framework agreements and single project contracts for the different customers. The contracts are a mix of cost-reimbursable and lump-sum depending on the customer and are compensated through lump-sum work, unit rate work and cost plus work. When a contract is signed a Purchase Order (PO) is raised and the invoicing can start. Some of

the projects may have a PO or a Call-off Order instead of a contract depending on the size of the project or if it is covered by a framework agreement. All contracts covered by a framework agreement, including POs and Call-off Orders, should be read in conjunction with the framework agreement

Even though all contracts are a mix of the two contract types, they are often referred to as *reimbursable projects* and *lump-sum projects* amongst the employees. Most of the work performed for a reimbursable project is reimbursable and includes compensation through predefined hourly unit rates for personnel for management & services and engineering, fixed rates for mobilisation and demobilisation of personnel and equipment based on location, as well as day rates for personnel and equipment for field operations.

Most of the work performed for a lump-sum project is lump-sum and includes compensation through a fixed price for management & services and engineering, fixed rates for mobilisation and demobilisation of personnel and equipment based on location, as well as day rates for personnel and equipment for field operations. The unit rate work can be defined as reimbursable work.

Both contract types can include compensation through cost plus, meaning that the actual invoice from a Third Party is increased by a percentage of typically 5%, 10% or 15%.

For projects with long durations the unit rates for personnel and equipment can be escalated in accordance with the agreed specifications in the contract. Normally the percentage mark-up for all Cost Plus items and services remains fixed for the contract period.

The contracts could include sections such as terms & conditions, scope of work definition, compensation format, the schedule including milestones and penalties, administrative requirements, project specifications and standards, system drawings and sketches, the company provided items and information about subcontractors that are accepted by the customer.

The day rates for personnel and equipment are detailed in the cost estimate for each project. Some contracts have equipment spread package prices while other contracts have single item prices only. It is important to be aware of these differences in the contract during equipment spread designed, equipment scheduling and mobilisation of equipment.

There may be penalties in the contract which is important to be aware of. If Halliburton fails to perform and complete any part of the agreed work within the agreed time, there may be a

requirement to pay for each day of the delay. These penalties can typical involve engineering penalties if documents are not issued according to agreed schedule or spread performance penalties in the event that the spread does not perform according to the agreed requirements.

Change management is especially important for the reimbursable/lump-sum contracts and is further discussed in Chapter 4.5 *Change Management and Control in Halliburton PPS*.

4.3 Estimating and Budgeting Project Costs in Halliburton PPS

4.3.1 Resource Planning

4.3.1.1 Personnel Planning

The resources estimated for management, engineering and field operations are dependent on the estimated unit rate for each role and the duration of the schedule. In some of the contracts the management and engineering resources are estimated by the number of each project document multiplied with the total activity period of the project and then multiplied with a general factor adjustment. The general factor adjustment varies and depends on the type of project contract. The number of field personnel is dependent on the scope of work and requirements for operation of the equipment spread.

4.3.1.2 Equipment Planning

The equipment required to perform a job is included in the cost estimates for the tender. If additional equipment is required, this should be discussed with the customer and a VOR should be raised to ensure that the equipment can be invoiced. Equipment planning and mobilisation of equipment and materials is a complex process which involves personnel from various parts of the organisation. Equipment planning and mobilisation is conducted in adherence with relevant process maps in HMS.

Halliburton PPS uses two systems for equipment planning, the *Mobile Equipment Planning* and *MODEM*. The first system is a scheduling system on the Halliburton intranet shared with several PSLs which use the same equipment, e.g. pumps. All major items are registered with their equipment ID making it possible to book a particular item for a planned period of time.

The latter system is an application that aids the communication between Operations, Workshop and Warehouse. Detailed electronic equipment lists are prepared for separate jobs and are related to a specific Sales Order number and a WBS code. It provides a status overview on mobilisations as well as a common repository for logistics documentation such as freight documents, delivery

notes, item overviews and return manifests. When a MODEM is created for a job it gives a detailed overview of the items that are packed and how they are packed, including measurements and weights. When equipment has been mobilised delivery notes are distributed by e-mail to the customer and the relevant project team members. The delivery notes are also sent to the Service Planners and are the basis for invoicing for reimbursable projects (Halworld Home, 2014a).

4.3.2 Cost Estimating in Halliburton PPS

For new customers or projects that are not assigned within an existing frame agreement PPS cost estimates are prepared during the tendering process and submitted with the bid to the customer. The accuracy of these initial estimates reflects the maturity of the described scope of work as presented by the prospective customer. For an established project with a well-defined scope of work the estimates are normally clearly laid out and detailed to mirror the customers WBS. The extent of resources and deliverables are then assessed to meet the scope of work and can be detailed enough to give a reasonably accurate evaluation of overall profitability. However, estimates are often based on poorly defined scope of work. This can be due to the project being awarded under an existing frame agreement at a very early stage or because the customer themselves is tendering, i.e. a bid-for-bid tender. Such estimates can be relatively rough and are mainly based on experience from previous, fairly similar projects. The estimating approach for this phase can be compared with the analogous (top-down) approach described in sub-section 3.3.2 *Cost Estimating*.

After a contract has been signed and awarded there the cost estimate used during the tendering process forms the baseline estimate for the project, however it is updated to include more details as more information is now available. It continuously updated as the project progresses, particularly with regard to the operational schedule. The costs for all resources and individual items for each activity together with the project schedule sums up to give the total cost for the entire project for the customer. The estimating approach for this phase can therefore be compared with the definitive estimating (bottom-up) approach described in sub-chapter 3.3.2 *Cost Estimating*.

4.3.3 Cost Budgeting

The PPS department is currently not performing any cost budgeting on project level, however budgets are created on department level on annual and monthly basis. The annual department budget is called 'Plan-Target' and is created by the PSL Accountant together with the PSL

Management with information from the Business Development group and operations. It is then evaluated by the local management, thereafter by the region and then by the global management prior to being accepted as the plan for the year. The department is measured against the 'Plan-Target' throughout the year. In addition to showing the budgeted plan for the year it can be divided further into quarterly and monthly budgets.

An unofficial Latest Thinking Forecast (LTF) is prepared by the Project Managers for each project and is summarised by the PSL Accountant to get the total LTF for each month. The PSL Accountant and PSL Management decide the monthly budgeted revenue based on the unofficial LTF which then gives the basis for the cost budget. These numbers are entered into the official Halliburton LTF system. The LTF numbers are compared with the 'Plan-Target' which gives an indication of whether the target in the 'Plan-Target' is being achieved or not. The numbers are also compared on a quarterly basis.

4.4 Cost Control in Halliburton PPS

Cost control is performed at some level for all projects in Halliburton PPS to prevent estimate overruns and ensure that the projects receive the forecasted revenue. There are several documents on the HMS related to cost control and the main document is a process map showing how cost control should be performed. The process map shows the role accountable for each task and includes links to all relevant cost control guidelines and work methods such as the invoicing process, check lists for cost reports, internal audit and project completion, forecast files and monthly cost reports. The process map also defines the roles that should be consulted and informed in the different processes (Halworld Home, 2014a).

These control methods are used to control and follow up the estimated project costs for the customers. The revenue of a project includes labour and equipment costs for management, engineering and field operations, mobilisation and demobilisation costs for equipment and personnel, as well as costs for materials and supplies. The control methods for these costs are based on two different documents used for the invoicing process where the first is a cost report for reimbursable projects and the latter is for lump-sum projects.

The cost report for the reimbursable projects shows the total estimated costs from the baseline estimate, Variation Orders (VOs), options and adjustments, the actual costs for the current month, as well as the accumulated actual costs including current month based on the resources

used. From the accumulated costs including the current month and the total estimated costs, the estimated remaining costs and the percentage of actual costs invoiced are calculated. This is calculated for the entire project, however it is also calculated and shown for each cost groups, i.e. management and services, and engineering, procurement, mobilisation and demobilisation, as well as field operations. The method corresponds to some of the calculations described in Chapter 3.4.1 *Percent Complete Matrix* and gives an overview of the project costs which are invoiced to the customer on a monthly basis and helps the project members to keep control of the project revenue.

The report includes the contract price list which is used as a basis to calculate the total cost for hours spent on management and services, engineering and for field personnel and includes the day rate prices for each single equipment item. The price list contains the accepted contract prices for all resources except project specific procurement items. These items can either be added to the price list with an agreed day rate or be invoiced to the customer as a cost plus item with a mark-up of 5-15%. The revenue gained for the latter alternative does normally not cover all administrational costs and is therefore not profitable for the project. It is important to be aware of the escalation intervals for these contracts and update the price list accordingly post escalation in order to obtain the increased rates.

Due to the large amount of resources used for many of these projects the monthly check in conjunction with the invoicing process requires much attention. Two monthly check list, Monthly check of Statoil Cost Reports for Cost Controller and Monthly check of Statoil Cost Reports for Project Manager, are established to help the personnel involved in this process to quality check the invoice in order to capture all costs for the current month to be in line with the monthly forecast. These checklists can be found on the HMS.

These cost reports are the main control method used for reimbursable projects and is updated as required to be able to capture all costs and to better control the project costs for both Halliburton and the customer.

The cost report template used for lump-sum projects includes a monthly overview of the current actual project costs based on the resources used. Compared to the cost report used for the reimbursable projects there is no status of the total amount invoiced or estimated remaining costs which decreases the internal cost control for these projects. The cost categories 'Management & Services and Engineering' and 'Equipment' is fixed to product deliverables, e.g. work package

for engineering or spread packages for equipment, and is not based on labour hours or payment for each single equipment item as for the reimbursable projects.

There is a risk that the work packages do not contain all the necessary equipment for the operation and extras need to be mobilised without getting paid, or that more labour hours are spent to complete project documents within the timeframe given than the estimated hours. If these overruns are caused by scope creep or scope leap variation orders should to be created to ensure revenue for the extra work performed.

There is not established a common template for control of the variation orders, however most of the projects have prepared an Excel sheet which is updated regularly as the VOs are created and accepted.

The internal costs including direct and indirect costs are used to calculate the profit of some of the projects in the tendering phase, however they are only visible to the Business Development group and the PSL Accountant and are therefore not properly estimated or controlled by the project teams.

4.5 Change Management and Control in Halliburton PPS

Changes are frequently seen in most of the PPS projects. The changes can occur in all phases of the project and are most often related to scope creep or scope leap. This may include amendments to the scope of work, the delivery schedule or the estimate and are often related to e.g. additional equipment required due to extra work, a delay in operation due to weather conditions and personnel and document charges.

According to the PM Handbook all changes should be documented and reported whether they are approved or rejected by the customer. Once a change is approved it is essential to implement and manage it during the project execution. To ensure that a change is manageable, contains all required information and increases the likelihood of project success, it is crucial to establish communication with the customer at an early stage of the project lifecycle and to keep an effective communication process throughout the project between the customer and the PPS project team.

To be able to track and have control of the changes the PM Handbook recommends the use of two documents. The first, *Management of Change*, is to document that includes all proposed changes, their impact and priority. The second, *Change Control Log*, is to record all change

orders and ensure that they are captured during invoicing if there is a cost impact (Halliburton Management System, 2014b).

4.5.1 Variation Orders in Halliburton PPS

A change order is a written document that describes the modification of the work normally by adding costs to the project and impact the schedule. Halliburton PPS uses the terms Variation Order Request (VOR) and Variation Order (VO) when a change is required to a reimbursable project. A change can be submitted by either PPS as a VOR or by the customer as a VO. The VOR is a document submitted to the customer including the description of the variation work together with an estimate of all effects on the contract price and the contract schedule. The estimate is based on the same template as used for cost estimates for reimbursable projects. If the VOR is accepted by the customer a signed and valid VO will be returned which is used in the invoicing process and has impact on the original cost estimate, schedule or both. This is normally how a change is handled, however the customer may inform about a change through a VO without requiring a VOR. In this case both parties still have to sign the VO.

For lump-sum projects the terms Change Order Request (COR) and Change Order (CO) are used for the same purpose as described above. Normally the estimate is added to the cost estimate document in a separate sheet.

4.6 Project Cost Drivers in Halliburton PPS

To understand the project costs it is important to identify the cost drivers of the project as they will affect both the profit and the Fully Burdened Operating Income (FBOI) of the project. FBOI means revenue less direct and indirect costs. Indirect costs include those at the field (Region/Country/District) and global levels.

The cost drivers can be either direct costs associated with the project which affects the profit, or allocated indirect costs which are overhead spending such as regional costs, local county costs and support costs on department level that affect the FBOI of the project. As the Thesis is mainly concentrated around the direct costs that can be influenced by the project team members these cost drivers will be further described in this section.

The direct costs related to PPS projects are divided into the cost categories Costs of Goods Sold, Labour, Travel & Entertainment, Equipment, Materials & Supplies and Other Expenses. The typical cost drivers in each of these categories can be seen in Table 4-2.

Table 4-2 Typical Cost Drivers for a PPS Project

Project Direct Costs	Cost Drivers
Costs of Goods Sold	Nitrogen in stock Gel chemicals in stock
Labour	Onshore personnel Offshore personnel Contractors Overtime
Travel & Entertainment	Travel for meetings Travel for offshore
Equipment	Equipment Scheduling(1) Rental Equipment Repair & Maintenance
Materials & Supplies	Freight Express cost Pig trap and service Pigs Radioactive Isotopes X-overs Flanges Valves Filters Flowmeters Bolts and Gaskets Seals Chemicals Destruction of chemicals Analysis(2) Inspection and testing HAZOP and HAZID(3) Lodging Rental car
Other Expenses	Halliburton Iron Intercompany(4)

(1) Cost for Halliburton equipment based on utilisation hours on project.

(2) E.g. water content in MEG.

(3) Risk Assessments.

(4) Cost split between different countries, e.g. Halliburton PPS personnel from Norway mobilised on a UK job.

The typical cost drivers for *Cost of Goods Sold* (COGS) are nitrogen and chemicals for gel in stock. These costs appear in the project account when these products have been removed from stock and transferred to a project in SAP, which is the program used for inventory and logistics planning.

The *labour costs* of the project depend on hours registered against the project WBS code in SAP. Hours are booked against a WBS code both for onshore engineering and field operations. In periods with high operational activity the use of contractors is normally increased due to shortage of staff personnel.

Another cost driver related to labour costs is overtime. For some projects the use of overtime is necessary especially in periods with high activity or on vessel jobs where the weather has impact on schedule and crew changes.

The cost driver in the *Equipment* category is related to the use of rental of equipment and cost for Halliburton equipment based on the utilisation hours on the project. It is also possible to rent equipment from other Halliburton departments which has a lower cost than rental equipment from external companies. However, if there are several projects with field activities in the same period of time it may be necessary to rent from external suppliers to be able to perform the operations. The project that mobilises first normally mobilise the Halliburton equipment and the project that has to use rental equipment will see an effect on the profit of the project. One of the largest cost drivers for rental equipment is hose deployment equipment.

The cost drivers for *Travel & Entertainment* are related to travel for meetings and field operations.

The *Material & Supplies* category includes mostly freight costs and procurement items for a project. These items are typically invoiced as cost plus items, i.e. with a mark-up of normally 5%, 10% or 15%. The revenue gained on these items does rarely cover all the costs as e.g. administration costs and labour costs.

Freight and express costs could be invoiced as cost plus, as a fixed price agreed in the contract or handled by the customer. However, such costs are not covered if the mobilisation is an extra mobilisation caused by lack of equipment or damaged equipment and not requested by the customer. Such extra mobilisations are costly for the projects as they normally involve express cost and many people working to get the equipment mobilised.

Non-productive time (NPT) is related to occurrences that lead to downtime or delay of an operation on site which Halliburton is responsible for and may have potential to increase costs. This is most often related to failure of equipment.

Another cost driver which may have a potential for generating costs is *Cost of Poor Quality* (COPQ). COPQ is the cost Halliburton has to pay the customer for poor service performance and/or product quality such as poor performance of the equipment spreads. Money returned to a customer, called negative revenue, represents lost revenue and income for Halliburton. COPQ can also increase the internal costs e.g when equipment repair is required as a result of misuse or damage on the location or in transit or when additional or replacement materials are necessary to complete a job due to inadequate quantities or wrong materials mobilised.

4.6.1 PPS Department Costs

Cost classifications include primary and secondary cost elements, direct and indirect costs, as well as fixed and variable costs. Reviewing cost using different classifications could help to understand the source and drivers behind each cost element. This enables managers to acquire an overall understanding of the PSL cost structure by knowing what costs can be controlled, how costs are impacted by changes in activity level and what costs are directly related to generating revenue compared against cost related to support functions. This will also help managers to forecast cost based on a given revenue base or to know when costs are out of line with current revenue stream (Halliburton, 2012).

To better understand how the PPS fixed, support and indirect costs affects the FBOI for a project the structure of the PPS department account is described in this sub-section. The department revenue represents the money brought in from the project through the invoicing process, while the direct costs includes COGS and costs of Labour, Travel & Entertainment, Equipment & Facilities, Materials & Supplies, IT Expense and Others.

Subtracting the direct costs from the total revenue gives the gross profit. The indirect costs consist of country and global expenses which include support costs such as Business Development, Legal, Accounting, Human Resources, also known as overhead costs. The FBOI is calculated by subtracting the indirect costs from the gross profit.

To make it easier to calculate the FBOI for the projects a general factor for allocation of department cost can be used. An example of allocation factors can be found in Table 4-3. The factor is adjusted annually and is based on numbers from the previous year and estimated figures for the current year.

Table 4-3 Example of General Factor for Allocation of Department Cost for PPS Projects

PPS Fixed Costs	BD/Support Costs	Indirect Costs	Sum Allocation Cost
0.26	0.07	0.07	0.37

The COGS represents the product cost and volume and is the price of producing or purchasing goods that are sold to the customer (Halliburton, 2012).

The Labour costs in the department are broken down into the following sub-groups:

- Salaries and wages including actual base pay, sick and Holiday pay.
- Benefits and Burden including state and local taxes, group insurances, retirement, profit sharing and social security.
- Bonus and Incentive Compensations like performance awards, bonuses for offshore and radioactive isotope handling.
- Salaries and compensation for contractors.
- Overtime and Time off in Lieu.
- Other including several items such as personnel expenses from global pool, relocation, training, housing costs etc.

The Travel & Entertainment costs appear after the employees have submitted their expense claims and can include customer entertainment, employee business meals, lodging, per diems, rental car, airlines, parking and use of personnel vehicle.

The Equipment & Facilities costs are the costs to own, maintain and operate the equipment and facilities of the department. It includes e.g. depreciations, internal and external rental, maintenance and repair, fuel and facility lease.

The Materials & Supplies costs may include freight, materials, modification and rework charges, inspection and testing, pass through expenses, safety and office supplies and inventory adjustments.

The IT expenses are the costs for communication through telephone and cell phone, PC device service charge, IT service charge, computer, software licenses, printers, faxes and copiers.

The Other expenses category includes e.g. BD support, subcontract, cost center for chiksan (iron), costs from the region and global pool, insurance liability, consultants as auditors and lawyers and toll for new equipment.

Figure 4-3 shows the allocation of PPS direct costs on department level to the different sub-groups from 2010 to 2014. It shows that Labour cost is the largest cost driver for the PPS department, followed by Equipment & Facilities and then Materials & Supplies. The representation is based on actual costs except for 2014 which are taken from the February LTF.

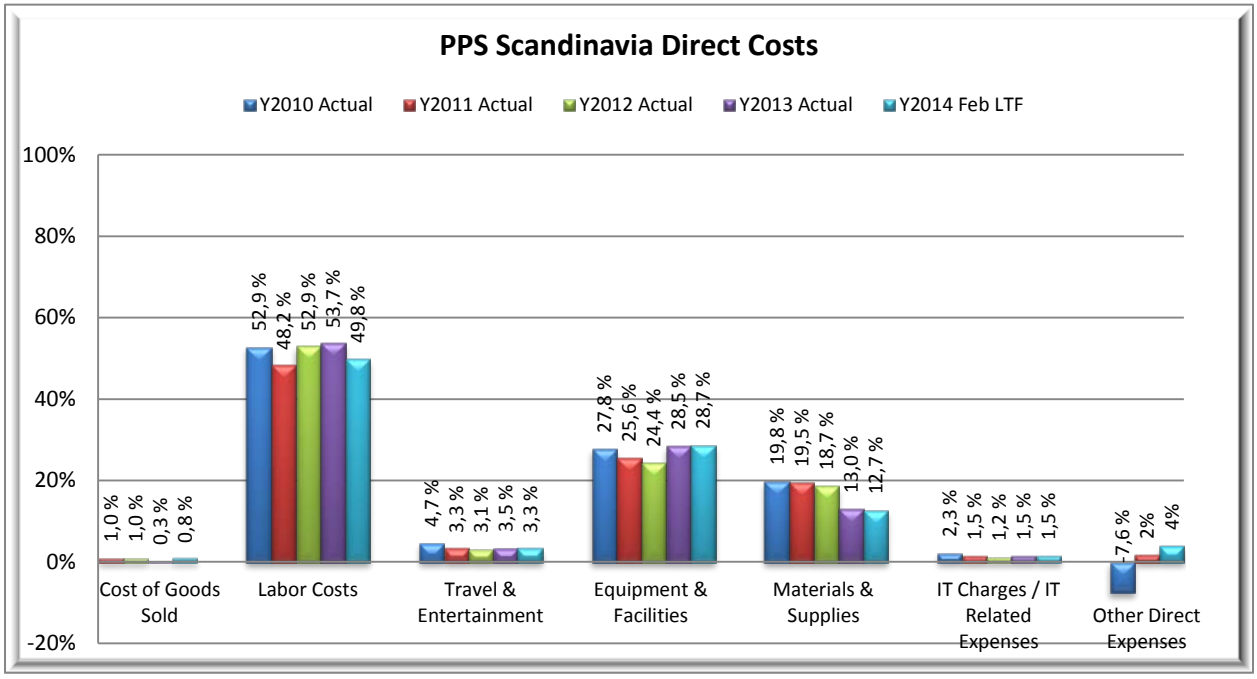

Figure 4-3 PPS Scandinavia Direct Costs

4.6.2 Project Accounts in Halliburton PPS

Projects ending with a low or negative profit give the basis for creating a project account, also referred to as a Profit & Loss (P&L) Analysis. This analysis is prepared post project closure after the final invoicing to ensure that all revenue and cost are included in the analysis. Preparation of a P&L Analysis could be valuable to make the impact of costs on department level visible to the project team members, as well as showing that a positive profit does not necessarily give a positive FBOI for the project.

After a project account has been created it should be compared to the original cost estimate that was prepared in the initiation process of the project to ensure experience transfer to the tendering process and the BD personnel who are bidding on new jobs.

An example of a Profit & Loss Analysis for a project is shown in Table 4-4. All numbers are fictive and cannot be related to an actual project.

To create a P&L Analysis for a project the sum of all direct project costs are subtracted from the total revenue to give the profit. Thereafter the allocated fixed, support and indirect costs represented by the factors shown in Table 4-3 are subtracted to give the FBOI for the project. The FBOI % is calculated by dividing the FBOI by the revenue of the project.

Table 4-4 Example of a Profit & Loss Analysis

P&L Analysis	**NOK**
Revenue	10 000 000
SUM Direct Job Cost	8 500 000
Profit w/o Fixed & Support Cost	1 500 000
Profit %	**15 %**
PPS Fixed, Support and Indirect Cost	3 700 000
FBOI	-2 200 000
FBOI %	**-22 %**

A more detailed P&L Analysis can be seen in the Case Study in Chapter 5.

5 CASE STUDY

5.1 Case Introduction

This chapter describes a case study of a project completed in recent years to identify cost drivers and causes of cost overrun by performing a financial analysis using information from cost estimates, cost reports, equipment planning and P&L Analysis.

The scope of work for the project included pre-commissioning operations of new pipeline systems in the North Sea. The operations included services and testing required prior to introducing hydrocarbons in a pipeline such as flooding, cleaning, gauging, hydrostatic testing and dewatering. A field layout can be seen in Figure 5-1, showing a production pipeline, a gas lift pipeline and a service umbilical extending from a subsea template to a fixed platform.

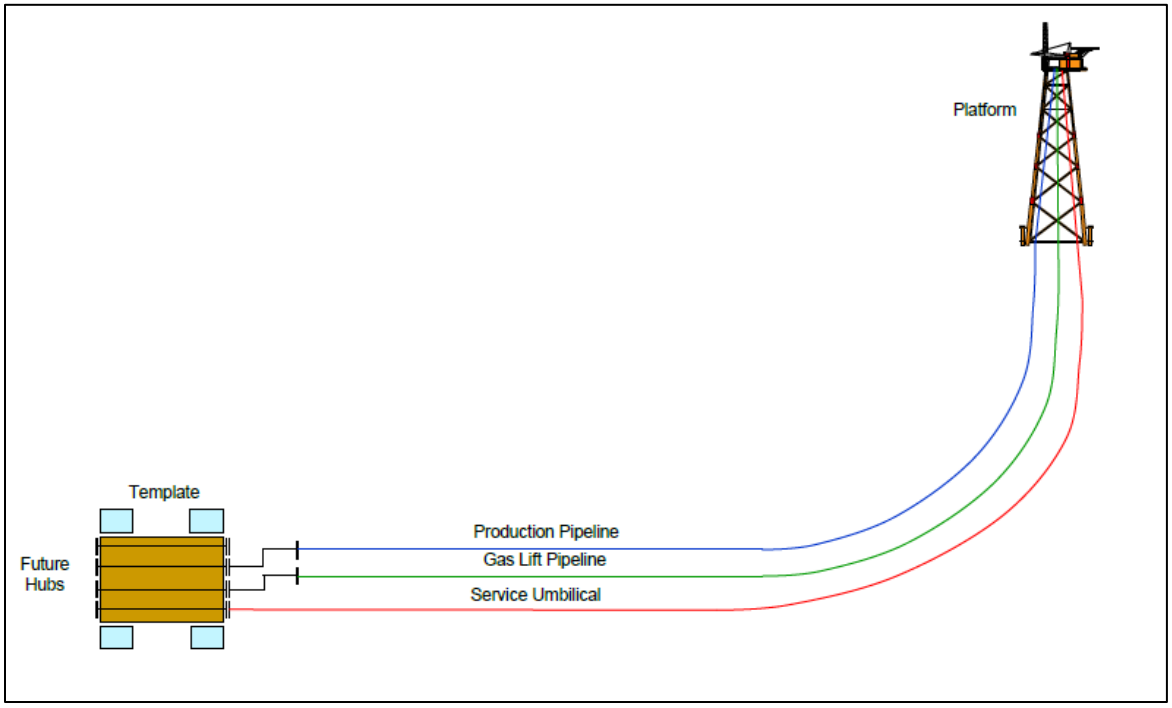

Figure 5-1 Field Layout for Case Study

The project had a cost-reimbursable/lump-sum contract with most of the work being lump-sum. The contract included compensation through a fixed price for management & services and engineering, fixed rates for mobilisation and demobilisation of personnel and equipment based on location, as well as day rates for personnel and equipment for field operations. The unit rate work was defined as reimbursable work.

The project had three main mobilisation locations, one platform and two vessels, with 16 planned mobilisations for the operations. A total of 17 MODEMs were created and equipment was

mobilised to the different locations within a three month period of time. In addition 4 extra mobilisations were generated due to the need of more equipment.

5.2 Financial Analysis Based on EVA

All numbers used in this Case Study are amended and cannot be directly traced to the actual project. However, the values in percentage reflect the actual outcome of the analysis.

The calculations in the Tables 5-1 to 5-3 are based on EVA, however some terminologies are not used as this case study is related to an already completed project. If this was an ongoing project the calculations for BCWP, CV, SV, CPI, SPI and EAC described in Chapter 3.4.2 *Earned Value Analysis* could have been used.

A summary of the baseline estimate for the project, the actual value of the invoices related to the baseline and the variance between the forecasted values and the actuals can be seen in Table 5-1. % of outstanding or overspent estimate and % money used of estimate can also be seen in Table 5-1. The baseline estimate reflects the agreed costs between the customer and Halliburton PPS for the services and operations to be performed for the scope of work within the timeframe defined in the contract. These costs serves as Halliburton revenue for the project, hence the different categories in the table are called Cost/Revenue Categories. One more category, *Contingency*, is normally presented in such an overview, however since there was no need for contingency for this project this category has been omitted. Reference to *Chapter 3.4.2 Earned Value Analysis*, the terms BCWS, ACWP and BV have been used for the estimates, the actuals and the variance in Table 5-1 to 5-3, respectively. It would have been more suitable to use Estimated Variance as Halliburton PPS does not prepare budgets, but the abbreviation could then be mixed with Earned Value, hence Budget Value (BV) is used in this Case Study.

Table 5-1 Variance between Forecasted Values and Actuals for the Baseline Cost Estimate(1)

Cost/Revenue Categories	Estimated Baseline (BCWP)	Invoiced Baseline (ACWP)	Budget Variance (BV)	% Outstanding/ Overspent Estimate	% Used of Estimate
Preliminaries, Management & Engineering	1 660 000	1 160 000	500 000	30.1 %	69.9 %
Mob/Demob Personnel	157 000	118 000	39 000	24.8 %	75.2 %
Mob/Demob Equipment	517 000	447 000	70 000	13.5 %	86.5 %
Equipment	4 710 000	5 540 000	-830 000	-17.6 %	117.6 %
Field Personnel	4 190 000	4 110 000	80 000	1.9 %	98.1 %
Consumables	1 700 000	1 330 000	370 000	21.8 %	78.2 %
Total project	**12 934 000**	**12 705 000**	**229 000**	**1.8 %**	**98.2 %**

(1) All numbers in NOK

The total sum and most of the values in the categories are positive which means that the actuals are not exceeding the estimate, i.e. Halliburton has not invoiced as much as planned. However, the *Equipment* category shows a negative value of -830 000 NOK which means there is an overrun of 17.6% for this category in the estimate. As the total sum has not exceeded the estimate, this means that some of the other categories are not invoiced as forecasted in the estimate, e.g. 30% more could have been invoiced for the category '*Preliminaries, Management & Engineering*'. The variance of the total project related to the baseline estimate is very close. 98% of the total baseline estimate has been invoiced.

During the project lifecycle several changes from the contract occurred which resulted in 15 VOs being accepted. The VOs included mainly additional equipment, site visits and overtime which all created more value to the project in terms of higher revenue for Halliburton. One of the VOs which concerned removal of equipment generated a negative value of approximately 200 000 NOK to that specific VO. However the summary of all the 15 VOs shown in Table 5-2 shows a positive total estimate. Table 5-2 also shows the actual numbers invoiced against the VOs and the variance between the total estimate for all VOs and the actuals.

Table 5-2 Variance between Forecasted Values and Actuals for the Total Estimate for all the 15 VOs[(1)]

Cost/Revenue Categories	Estimated VO (BCWS)	Invoiced VO (ACWP)	Budget Variance (BV)	% Outstanding/ Overspent Estimate	% Used of Estimate
Preliminaries, Management & Engineering	-	-	-	-	-
Mob/Demob Personnel	61 000	52 000	9 000	14.8 %	85.2 %
Mob/Demob Equipment	551 000	543 000	8 000	1.5 %	98.5 %
Equipment	620 000	604 000	16 000	2.6 %	97.4 %
Field Personnel	406 000	370 000	36 000	8.9 %	91.1 %
Consumables	81 000	116 000	-35 000	-43.2 %	143.2 %
Total project	**1 719 000**	**1 685 000**	**34 000**	**2.0 %**	**98.0 %**

(1) All numbers in NOK

The total sum and most of the values in the categories are positive as for Table 5-1, which indicates that Halliburton has not invoiced as much as planned for the VOs. However, the variance of the total project related to the total estimate for all VOs is very close. Almost 99% of the total estimate for all VOs has been invoiced.

Table 5-3 shows the total estimate, actual invoiced and the variance for both the Baseline and all of the VOs.

Table 5-3 Variance between Forecasted Values and Actuals for the Total Estimate for Baseline and all VOs[1]

Cost/Revenue Categories	Total Estimated Baseline +VO (BCWS)	Total Invoiced Baseline + VO (ACWP)	Budget Variance (BV)	% Outstanding/ Overspent Estimate	% Used of Estimate
Preliminaries, Management & Engineering	1 660 000	1 160 000	500 000	30.1 %	69.9 %
Mob/Demob Personnel	218 000	170 000	48 000	22.0 %	78.0 %
Mob/Demob Equipment	1 068 000	990 000	78 000	7.3 %	92.7 %
Equipment	5 330 000	6 144 000	-814 000	-15.3 %	115.3 %
Field Personnel	4 596 000	4 480 000	116 000	2.5 %	97.5 %
Consumables	1 781 000	1 446 000	335 000	18.8 %	81.2 %
Total project	**14 653 000**	**14 390 000**	**263 000**	**1.8 %**	**98.2 %**
% Baseline of Total project	**88.3 %**	**88.3 %**	**87.1 %**	-	-
% VOs of Total project	**11.7 %**	**11.7 %**	**12.9 %**	-	-

(1) All numbers in NOK

The total estimates, actuals and variance of the project also show positive results since the estimates in total are not exceeded. 88.3% of the total estimate and actuals for the project are numbers from the baseline and 11.7% consist of all the VOs, hence the numbers are quite similar as in Table 5-1 for the baseline. Although the numbers are slightly changed when adding the VOs to the baseline, the same comments as for Table 4-5 are applicable.

The reason for the negative number in the *Equipment* category may be due to extended schedule during field operations, additional equipment being mobilised without any VO being submitted and accepted. This might be because of less use of money than estimated in the other categories and the total sums up not to overrun the estimate.

5.3 Profit & Loss Analysis

The total revenue gained from both baseline and VOs, *14 390 000 NOK*, is visible in the top line in the P&L analysis for the project shown in Table 5-4. Below the revenue the direct job costs

for the project are displayed. Some of the main elements, such as purchase of ball valves, could have been a part of the 'Equipment Scheduling' but are shown in the analysis due to the relatively high cost. As the costs of these valves are high an accepted day rate price is used instead of invoicing these as cost plus items, which would give less revenue and hence influence the FBOI in a negative manner.

The personnel cost for onshore and field personnel was collected in one group in the original P&L Analysis, however they were split to be able to compare the numbers with the estimated values. The hours booked for each group are based on hours entered in SAP booked against the project WBS code. To calculate the direct costs for the field personnel the total number of hours for this group was multiplied with an average labour cost for direct costs of field personnel then subtracted from the total sum to find the direct costs for onshore personnel. This is a simplified method compared to the use of separate hourly rates for each job role, however it may vary slightly form the actual. Any hours booked against a Sales Order has not been registered for this project, hence some hours may have been missed and not invoiced. Yard personnel involved in equipment preparation and maintenance sometimes register their hours used on a project against the SO for the project instead of using WBS.

Based on the actual numbers invoiced for the project personnel the direct costs are taken out from SAP and calculated by the PSL Accountant. These costs include some of the factors described for labour costs in *Chapter 4.6.1 PPS Department Costs*.

The freight costs are normally covered in the mob/demob rates for this type of contract, however the project will get an internal direct costs in the P&L analysis. Due to the 3 extra mobilisations to site, this cost can be expected to be higher than if there were no extra mobilisations for the project. These mobilisations have an approximate cost of 11 000 NOK, based on numbers taken form MODEM.

Table 5-4 P&L Analysis of the Project[1]

P&L Analysis	NOK
Revenue	**14 390 000**
Direct Job Costs:	**-**
Onshore personnel	4 100 000
Offshore personnel	4 600 000
Travel Expenses	200 000
Equipment Scheduling	1 000 000
Ball Valves Purchase	250 000
Rental Equipment[2]	3 450 000
Cost Plus	170 000
Inspection & Testing[3]	550 000
Freight	220 000
Inventory sale cost	10 000
Waste Management	10 000
SUM Direct job cost	**14 560 000**
Profit w/o fixed & support cost	**-170 000**
Profit %	**-1.2 %**
PPS fixed, Support and Indirect cost	5 324 300
FBOI	**-5 494 300**
FBOI %	**-38 %**

(1) All numbers in NOK

(2) Includes Iron rental cost, Swire rental cost and Misc. Rental Cost

(3) Includes Misc. Supplies, Repair and Maintenance Costs

All the direct job costs sums up to be 14 560 000 NOK which is 170 000 more than the revenue gained on the project. This results in a negative Job Profit of 1.2%. The factor used to calculate the PPS fixed, support and indirect cost, which is found in Table 4-3 to be 0.37, is multiplied with the revenue. Subtracting these costs from the Job Profit gives a negative FBOI of 38% of the project which is far below the 11% FBOI target in Halliburton. The low FBOI results in the project not gaining any revenue for the department and rather increases the cost.

Figure 5-2 indicates that 59.8% of the project direct costs are related to the Onshore & Field Personnel group. The second largest group represents 23.7% of the total project costs and is Rental Equipment. This might vary from project to project however compared to Figure 4-4 PPS Scandinavia Direct Costs the same groups stand out to be the highest costs. The rental equipment group includes iron, Swire and miscellaneous rental cost and can be assumed to be high due to the project being executed during in a high activity season for field operations. High activity means high utilisation of own equipment, hence some projects may have to rent from external

suppliers. This also applies to personnel utilisation and it is expected that some of the personnel costs are related to use of contractors.

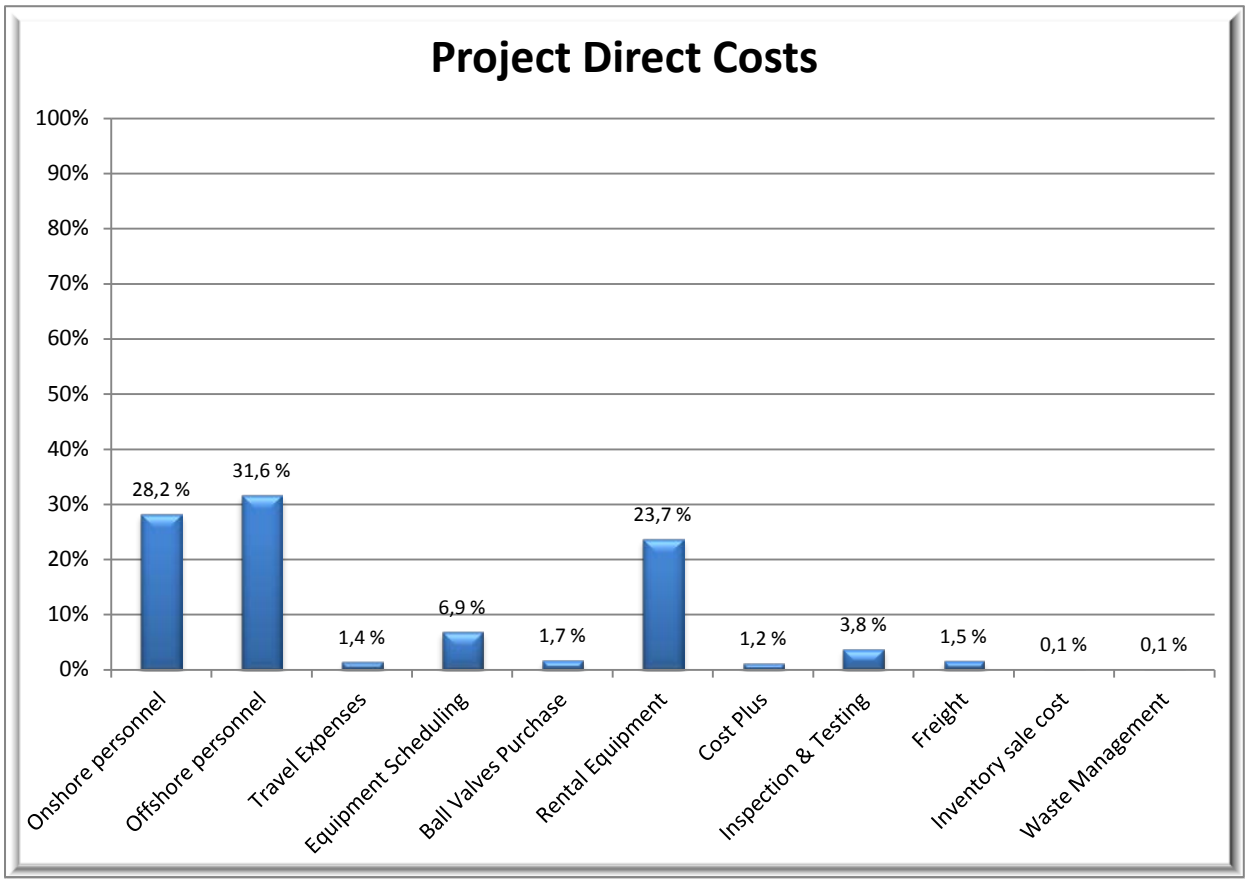

Figure 5-2 Project Direct Costs

Table 5-9 show the revenue, direct costs, profit without fixed and support cost and the Profit % related to the cost/revenue categories used in the estimates. The profit of the Preliminaries, Management & Engineering group is -20.4% which indicate that either the revenue should be increased or the direct cost reduced. Since approximately 30% more could have been invoiced against Management and Engineering this should have been evaluated prior to project closure. As a result, the estimate would have been overrun. However, this could have been prevented by raising more VORs for additional equipment to prevent costs related to equipment from exceeding the estimate.

Table 5-5 Project Profit related to the Cost/Revenue Categories from the Estimates(1)

Cost/Revenue Categories	Revenue	Project Direct Cost	Profit w/o fixed & support cost	Profit %
Preliminaries, Management & Engineering	1 160 000	4 100 000	-2 940 000	-20.4 %
Mob/Demob Personnel	170 000	200 000	-30 000	-0.2 %
Mob/Demob Equipment	990 000	220 000	770 000	5.4 %
Equipment	6 144 000	5 430 000	714 000	5.0 %
Field Personnel	4 480 000	4 600 000	-120 000	-0.8 %
Consumables	1 446 000	10 000	1 436 000	10.0 %
Total	**14 390 000**	**14 560 000**	**-170 000**	**-1.2 %**

(1) All numbers in NOK

Figure 5-3 presents the revenue, projects direct costs and the profit without fixed and support costs from the Table 5-9. All numbers are presented in NOK.

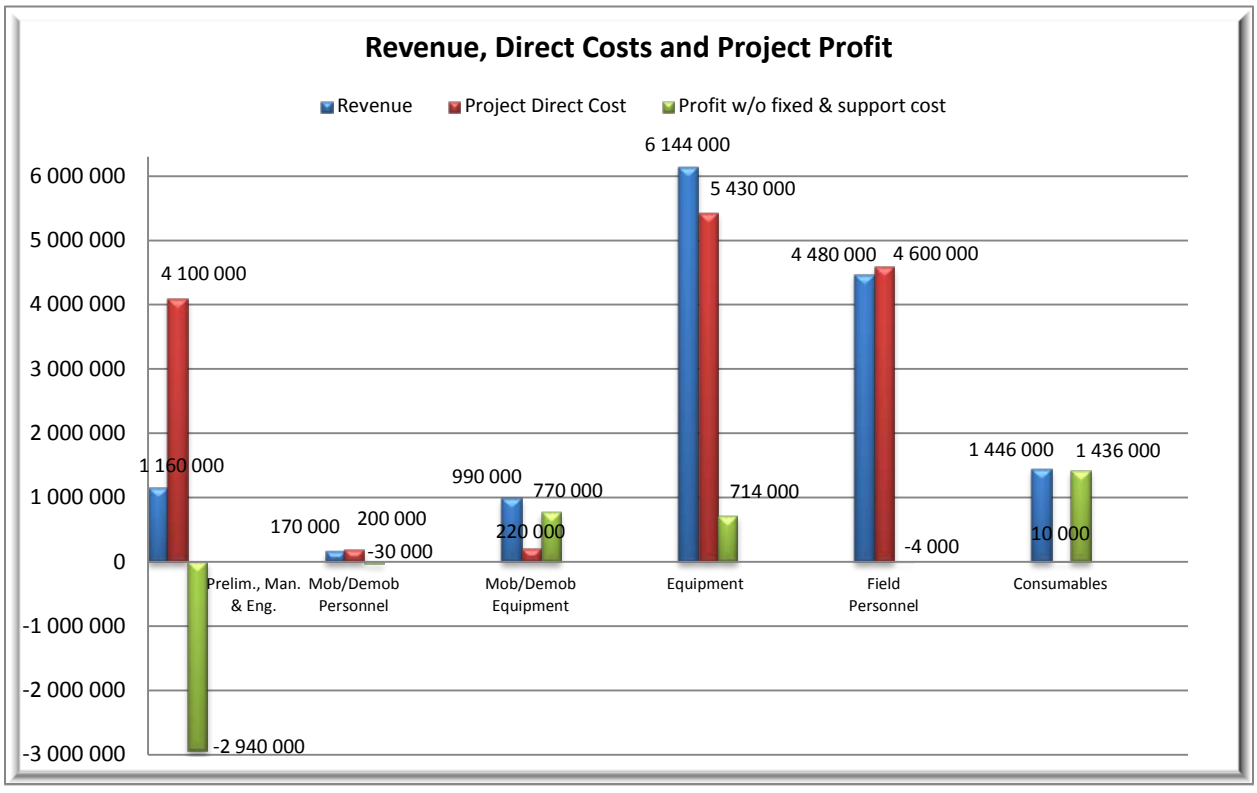

Figure 5-3 Revenue, Direct Costs and Project Profit of the Case Study

5.4 Cost Breakdown Structure

A CBS has been prepared for this Case Study to show an overview of the direct cost related to the project. This can be seen in Figure 5-4. For this Case Study the numbers are taken from the P&L Analysis of the project which was prepared post project closure. By using this structure the direct costs are more visible and presentable as they are related to the different main cost categories.

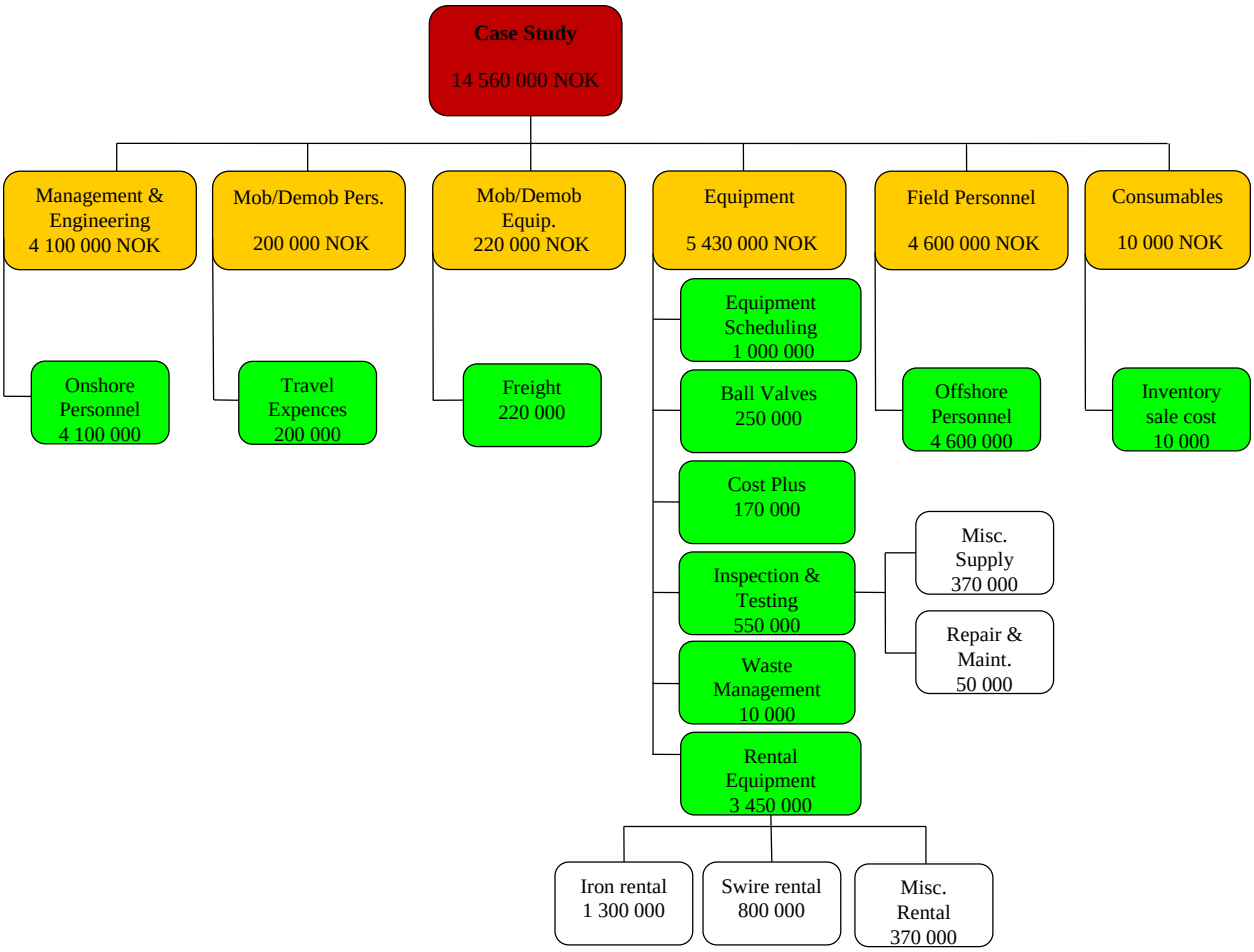

Figure 5-4 Cost Breakdown Structure for the Case Study

6 METHODOLOGY

This chapter presents the choice of methodology for the Thesis. It also gives a description of qualitative and quantitative methods and the requirements for the usage, data and procedure for the analysis.

6.1 Choice of Method

For this Master's Thesis the following methods have been used in addition to literature studies:

- Quantitative methods – Survey
- Qualitative method – Interview

Primary data was collected through a survey amongst the employees using quantitative methods. The survey gave a foundation for follow-up interviews and qualitative methods were used to perform interviews with key personnel assumed to be in roles to give information related to the topics of the survey, as well as identifying suggestions for improvement to increase financial awareness and reduce project costs.

6.2 Quantitative and Qualitative Methods

A method is defined as a technique to solve problems and to raise new knowledge. Any technique which serves this objective belongs to the collection of methods. A method will give guidelines on how new knowledge can be obtained and how existing knowledge can be verified. The method will be a tool to collect data and information that is required for the research (Dalland, 2012).

A method can be classified as quantitative or qualitative. Both methods are important to get a better understanding of society, as well as how individuals, groups and institutions act and interact.

Quantitative methods present data in the form of measurable units and give basis for different kinds of statistical analysis. These methods are focused on obtaining the most exact representation of the quantitative variation by collecting limited information from many individuals to reflect the range of the population, as well as to present common features which are representative for the group. The methods are systematic and could be either a questionnaire with prescribed response options, or systematic and structured observations. The researcher observes the phenomenon from outside from a neutral position and does not have to be directly

involved in the field of study to collect data. When presenting the results the researcher attempts to explain coherence in the findings (Dalland, 2012).

Qualitative methods aim to capture opinions and experience that could not be quantified or measured. These methods are focused on obtaining the most correct representation of the qualitative variation, whilst reflecting sensitivity, and collecting much information from few individuals to reflect the depth of the selection, as well as presenting specific or different opinions within a small group. The methods are flexible and could be either an interview without any prescribed response options, or unstructured observations. The researcher observes the phenomenon from the inside and participates with the possibility to influence the research, as well as being directly involved in the field of study to collect data. When presenting the results the researcher attempts to explain understanding and interpretation of the findings. Both quantitative and qualitative methods can include elements from the other group of methods. Many quantitative researchers interpret their findings, and many qualitative researchers include elements of quantification (Dalland, 2012).

Qualitative methods are also referred to as intensive and open, due to the limited number of research units and restricted control for the researcher in advance of the data collection. Quantitative methods are also referred to as extensive and closed, due to the characteristics of a large amount of research units and that most of the data collection is pre-defined by the researcher in advance (Jacobsen, 2005).

When asking questions to reflect reality empirical questions are used. Empiricism is knowledge based experience. There are different norms that give directions to how a method should be used to get answers to empirical questions. These norms are based on experience from quantitative methods, but are also valid for qualitative methods. The results should be in accordance with reality and accurate data should be systematically selected for use. The presumptions of the researcher should be accounted for, the results should be controllable and the research should be cumulative, i.e. should be based on existing recognised research (Dalland, 2012).

Two fundamental requirements for collection of data are that the data should be relevant for the research topic and be collected in a reliable manner to reduce inaccuracy. Both data from existing literature and human informants should be relevant (Dalland, 2012). In the following two sub-sections the methods Survey and Interview are further described.

6.2.1 Quantitative Method – Survey

Questionnaires or surveys with closed response alternatives are the most frequently used methods for collection of primary data amongst the quantitative methods. The frames for the survey are given, and the respondents have to choose between set response categories such as 'yes', 'no', 'completely agree' etc. (Jacobsen, 2005). The method involves research of an entire population or a selection of a population to describe attitude, behaviour and other characteristics.

Design of the survey requires thorough planning. Jacobsen (2005) identifies the following three elements as particularly important in the planning phase:

1. Concretise the phenomenon or concepts to be quantified. These are often vague and inaccurate.
2. Formulate the questions as correctly as possible to avoid undesirable results.
3. Decide how the survey should be distributed and performed. This could be through personal interviews, phone interviews, distribution via mail or electronic distribution.

There are different categories of response alternatives which reflect the level of information included, also referred to as level of measurement. The higher the level of measurement the greater the amount of information obtainable by the response alternatives. Jacobsen (2005) describes the following three categories:

1. Categorical or nominal. Responses can be used to group units or respondents into different categories. The researcher will be able to see if the respondents belong to the same or different categories, i.e. that they have chosen the same response alternatives. This category of response alternatives has the lowest level of measurement. The most common questions in this category give the respondents precise response alternatives, such as 'Yes', 'No' and 'I don't know'.
2. Hierarchy or ordinal. In addition to using the responses to group respondents into categories the researcher will be able to use the response categories to range the respondent groups. The questions in this category are formed with response alternatives to measure intensity to see the degree of difference between the respondents. Questions about frequency, intensity, evaluation, comparison and intensity measured through attitude to statements are typical questions in this category. Response alternatives such as

a range from 'Never' to 'Several times', 'Very good' to 'Very poor' and 'Completely agree' to 'Completely disagree' are widely used.

3. Metric or ratio. In addition to using the responses to group and range the respondents a more accurate ranging is possible. This category of response alternatives has the highest level of measurement.

6.2.2 Qualitative Method – Interview

The purpose of a qualitative research interview is to collect the experience and understanding of individuals through a professional conversation. Knowledge is created through interaction between the interviewer and the interviewee and opinions are captured within a subject that is of common interest. The research interview is not a conversation between equal participants as the researcher is in the position to define and control the conversation. The topic of the interview is given by the interviewer whose task is to follow up the responses to the questions asked in a critical manner (Kvale and Brinkmann, 2009).

According to Kvale and Brinkmann (2009) there are seven characteristics related to interview based knowledge. The knowledge is produced, relational, conversation based, contextual, linguistic, narrative and pragmatic. The knowledge is actively produced through questions and answers and the product is jointly created by the interviewer and the interviewee. The production process continues throughout transcription, analysis and reporting of the original interview and is influenced by the procedures and techniques which are utilised.

There are four main ethical guidelines for researchers related to interviews:

- Informed consent
- Confidentiality
- Consequences
- The role of the researcher

Informed consent means that the research participants are informed of the purpose of the research as well as the possible risks and benefits of their involvement. The participants should be informed that their participation is voluntary and that they have the right to withdraw from the research at any time. The participants should be informed about the persons who will have access to the information obtained from the interview, the right of the researcher to publish parts of or

the interview in its entirety, and the chance of the participant to access transcriptions and analysis of the qualitative data.

Confidentiality related to research means that private data which can reveal the identity of the participants should not be published. If this is required due to the research design the participants should agree to publication of detectable information. It is the responsibility of the researcher to reflect on consequences related to the participants in the research and the group that they might represent. With the participant in mind the sum of the potential advantages and the value of the achieved knowledge should exceed the potential risk to harm the participant.

The integrity of the researcher is important to the quality of the scientific knowledge and the ethical decisions related to qualitative research. This is especially important for interviews as the interviewer is the key tool for collection of knowledge. All research material that is published should be of high scientific quality, accurate and representative to the area of research and fulfil ethical requirements to reliability and validity (Kvale and Brinkmann, 2009).

An interview can be structured, semi-structured or unstructured. The degree of structure depends on the subject and the target group. The structured interview involves given categories for questions and answers while the unstructured interview collects the information in an informal way. For the semi-structured interview form many of the methodological decisions have to be determined during the interview due to the lack of pre-structured or standardised procedures for how to perform an interview. The interviewer requires a high level of knowledge about the subject and has to be prepared to be able to analyse and interpret the findings from the interview (Kvale and Brinkmann, 2009).

6.3 Financial Awareness Survey

A survey with the title *Financial Awareness Survey* was created to get an overview of the financial awareness and knowledge in the department. The population of the survey was the Sub-PSL Pipeline & Process Services, with the selection being all onshore employees who are members of or support a project team or have any financial responsibility related to projects. The selection included 60 people with different roles within Operations and Business Development. Participation was voluntary and there were 48 respondents, out of which 43 completed the full survey making the participation rate 71.6%. The 5 incomplete responses will be disregarded in the survey results. The full overview of survey questions can be seen in Appendix A – Questions: Financial Awareness Survey.

The survey had a total of 43 questions of which 5 questions were demographic questions to give background data for the respondent group. The questions were a mix of specific questions and statements. Table 6-1 shows some of the response alternatives that were used for most of the questions in the survey.

Table 6-1 Survey Response Alternatives

Evaluation	**Intensity of Attitude measured through Statements**	**Frequency or ratio**
Very poor	Completely agree	Little/nothing
Quite poor	Quite agree	Some
Neither good nor poor	Quite disagree	Quite much
Quite good	Completely disagree	Very Much
Very good	I do not know	
I do not know		

In addition to these response alternatives some categorical 'Yes' or 'No' questions were used. The response alternative '*I do not know*' was included to be able to reveal poor financial awareness and knowledge.

The survey was divided into seven sections with the following topics:

- Section 1: General
- Section 2: General Financial Understanding
- Section 3: Tendering Process and Forecasting
- Section 4: Cost Estimates, Cost Reports and Variation Orders
- Section 5: Equipment, Mobilisations and Resource Efficiency
- Section 6: Non-productive Time and Cost of Poor Quality
- Section 7: Business Case and Project Final Account/Job Profitability

6.4 Interviews in Halliburton

Since the Financial Awareness Survey had its limitations for qualitative information it was necessary to perform follow-up interviews with some of the survey participants. For this Thesis the semi-structured interview form has been utilised. No categories for answers were made and the interviewees were able to answer all questions freely. If the questions were unclear more information was given, and if the answers were unclear follow-up questions were asked to confirm the answer.

The personnel selected for the interviews are in three different key roles within the management or project teams and they all belong to the same cost centre. The role, interview guide no. and number of questions can be seen in Table 6-2. The full interview guides are presented in Appendix C – Interview Guides.

Table 6-2 Key Personnel for Interviews

Role	No. of Personnel	Interview Guide	No. of Questions
Project Manager	2	#1	43
Project Team Member	2	#2	38
PSL Manager	1	#3	32

To be able to capture improvement suggestions to increase the financial awareness and reduce project costs, it was necessary to investigate the experience of the existing systems established for cost estimation, forecasting, handling of variation orders and purchasing, as well as how they are used. By interviewing key personnel who are involved with and have authority to make

decisions related to cost control one may acquire personal experiences and knowledge of the challenges within the current systems and how they can be improved.

The interviews were divided into similar sections as for the survey:

- Section 1: General
- Section 2: General Financial Understanding
- Section 3: Tendering Process and Forecasting
- Section 4: Cost Estimates, Cost Reports and Variation Orders
- Section 5: Equipment, Mobilisations and Resource Efficiency
- Section 6: Non-productive Time and Cost of Poor Quality
- Section 7: Lease vs. Buy, Business Case and Project Final Account/Job Profitability

6.5 Reliability and Validity

Quantitative and qualitative research attempts to give credibility and it is therefore important to consider how reliable and valid the research is. The highest possible reliability and validity is always desired by the researches.

Reliability is related to the accuracy of the various parts of data collection and measures how stable the results are. This is often treated in the context so that the result can be replicated with the same results by other researchers in the future. The reliability also measures if the results are consistent which means that a respondent should be able to answer relatively similarly to questions related to the same type of problem. In order to ensure reliable research, the number of random errors should be reduced to a minimum. It can be difficult to achieve high reliability in qualitative research because the dynamic relationship between the researcher and the respondent can change and the interpretation of the research may be different from person to person.

Validity means whether a method actually examines what it is supposed to investigate. The validity indicates how much the research findings correspond with the truth. The validity depends on what is measured and if this represents the characteristic of the problem.

By using a combination of quantitative and qualitative methods the weaknesses related to quantitative data can be compensated for by the strengths of the qualitative data and vice versa. One advantage of using a questionnaire as a research method is the ability to treat a large amount of information and participants at the same time.

The research in this Master's Thesis involves analysis of the financial awareness amongst the project teams and how this can be increased to reduce project costs. During the research process several measures were taken into consideration to improve the reliability and validity of both the questionnaire and the interviews.

The survey was distributed to all project team members inclusive of support functions and personnel with any financial responsibility related to projects in the department. This was done by using the program SurveyMonkey where the responses were saved directly in the program, thus making it quite easy for the respondents to answer the questions with minimal effort. To ensure a high response rate in a hectic workday, the simplicity and speed of completion was prioritised. In order to receive as many answers as possible the questions were carefully formulated and both the questions and the multiple choice questions were composed in a general manner to eliminate any uncertainties and make the questions as valid as possible. Prior to the survey being distributed the validity was accomplished by having the Thesis supervisor in Halliburton and the PSL Manager reviewing and commenting on the questions and check the formulation and spelling in order to correct any ambiguous implications that could cause confusion.

Since the respondents are the colleagues of the writes there is a relatively good knowledge of the respondents. This could be an element of risk if the questions are formulated based on personal knowledge and experience influencing the results. As the element of danger is known it has been avoided by excluding leading questions. Another hazard of conducting a survey and interviews in a familiar environment is the chance that the respondents are not willing to share the truth about their experiences. The respondents were informed about the purpose of the survey in advanced in an operational meeting for the department as well as being informed by e-mail, and they were aware that their contribution could lead to a better understanding of the financial part of the projects.

The interviews were conducted in a professional and confidential and the interviewees could freely express their opinions. The information given by the interviewees is rich and the data is very reliable being of first-hand information. Any ambiguous or unclear information about an issue could be resolved and discussed promptly and follow-up questions could be asked by the interviewer to catch essential information. Each question was of relevance for the Thesis Problem and the responses were therefore valid. The leading questions in the semi-structured

interview helped steering the communication in the best possible direction, however this could prevent other opinions which could have been useful for further analysis from being illuminated. This was accounted for in the last questions where the interviewees had the ability to add any improvement suggestions they could think of regarding the topic. No signs of information being withheld were observed through the interviews although this can never be guaranteed by the researches.

One issue that can weaken the reliability of the information gathered from the interview is if the response from the interviewee is hard to analyse and is misunderstood. As both the writers attended all five interviews and discussed the answers after conducting the interviews and during the analysing process, the chance of misinterpretation is decreased. The interviews were also audiotaped on iPhone and notes were taken throughout the interviews.

The interviews were conducted in the Halliburton office in Tananger in order to relax the interviewees. This gave the opportunity for the interviewers to be able to match body language with their verbal message. With only five respondents the ability to verify the results as generalizable can be a challenge. Two of the participants belong in the group of project team members, two in the group of Project Managers and one from the PSL management. If both of the respondents in the same group had the same response to a question, it can be concluded that it was generalizable, because of the independent answers. However if one had a specific opinion, where the other had no comment, the result cannot be concluded to be reliable.

The limited range of response alternatives in the questionnaire could prevent the respondents from expressing their opinions freely and could possibly result in essential information being missed. Also the wide range of knowledge and experience amongst the respondents can lead to different interpretations and misunderstandings of the questions. Also respondents with little experience or no knowledge about the questions asked had the ability to choose "I do not know".

Due to the limited timeframe it was not possible to repeat the survey or to make a new survey with relatively similar questions which could potentially have strengthened the results. It is therefore hard to conclude on how stable the results from the questionnaire are. However the questions used in the questionnaire and the three interview guides are attached in Appendix A and Appendix C, respectively, and also saved internally in the Halliburton system which gives the possibility of repeating the survey and the interviews, as well as making it easier to follow the research process. A broader perspective and more opinions could have been received by

executing interviews with all project team members, but it would be hard to find voluntary participants in a hectic work day and it would take too much time to both carry out all the interviews and transform and analyse the results afterwards within the given time frame. Instead the survey extracted the most essential and valid responses.

Summarising and considering all these measures the reliability and validity of the Master's Thesis is safeguarded as far as possible.

7 RESULTS

In this chapter the results from the Financial Awareness Survey and follow-up interviews are presented. The chapter is divided into one sub-section for each section of the survey, in total 7 sub-sections.

7.1 Financial Awareness Survey

This section will summarise the results from the survey. The focus is to describe the overall financial awareness amongst the project teams and how the financial awareness varies for the different respondent groups sorted by job roles.

The survey questions can be seen below each question header and in the chart titles. A complete overview of all questions can be found in Appendix A – Questions: Financial Awareness Survey.

The result for each question is presented in the figures through column charts. The column charts show the results sorted by respondent group as a percentage for each response alternative, see details in sub-section 7.1.1. The total unsorted response distribution for all respondents is shown with the label 'Total' in the column chart figures. The number of respondents is shown in brackets behind the percentage in the text, and can be found in the tables of Appendix B – Survey Data.

Some of the response alternatives have not been chosen by the respondents, hence these response alternatives are not shown in the figures.

7.1.1 Section 1: General

Section 1, *General*, included 6 questions with the purpose to be able to:

a) collect general information about the respondents.
b) compare the survey responses for the different respondent groups.

Question 1, *What is your job role in Halliburton?*, is the basis for how the results for most of the questions are presented. Since some of these job roles had few respondents it was decided to join some of the groups with similar work tasks together to form larger groups. Project Equipment Coordinators and Service Coordinators work closely together and could act as a substitute for the other role. These roles were therefore joined to form a group of 6 respondents called 'Project Equipment Personnel.' The role 'Trainee Engineer' was joined with the role 'Project Engineer' to form a larger group of 7 respondents with the name 'Project Engineer'. These roles have the

same work tasks and responsibilities except that the Project Engineer might have more technical knowledge than the Trainee Engineer. The role 'Other – HSEQ' had 2 respondents and it was therefore decided to join this group with 'Other' to form a large group of 9 respondents.

Question 1

What is your job role in Halliburton?

Figure 7-1 shows the grouping of roles for the new respondent groups. 14.0% (6) of the 43 respondents are Project Managers (PMs), 14.0% (6) are Project Technical Leads (PTLs), 16.3% (7) are Project Engineers (PEs), 14.0% (6) are Project Equipment Personnel (PEP), 7.0% (3) are Service Planners (SPs), 14.0% (6) belongs to Business Development (BD) and 21.0% (9) belongs to the group 'Other'. This shows a similar distribution amongst most of the respondent groups. The SPs have fewer respondents and the 'Other' group have more respondents than the average group size.

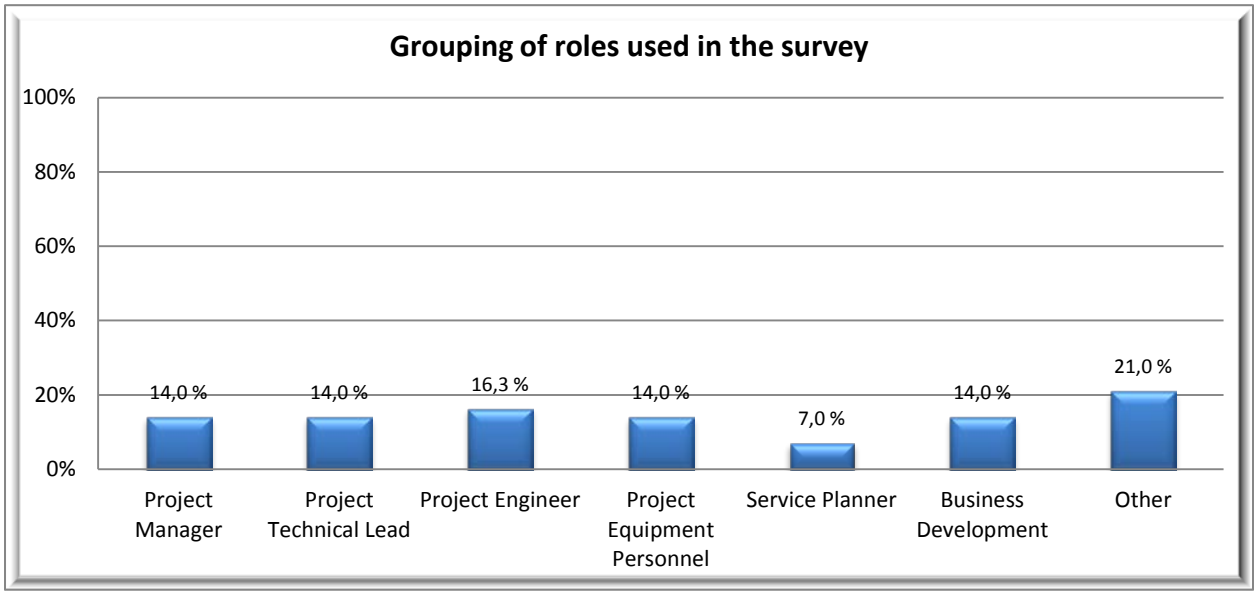

Figure 7-1 New Grouping of Roles in Survey

Questions 2 to 6 in this section gave general information about the respondents. The full questions, figures and results can be found in Appendix B.

74.4% (32) of the respondents belong to a project team and are directly involved in daily project tasks, while 25.6% (11) of the respondents are currently not project team members but have project support roles.

The majority of the respondents, 76.8% (33), have completed higher education (Bachelor's or Master's degree). Their length of work experience varies from 0-2 years up to 30 or more years, with 0-2 years being the largest group. Their length of service in Halliburton is equally distributed from 0-2 years to 10-19 years, with fewer respondents with 20-29 years of service. All of the PMs and most of the PTLs have 3 or more years of experience. The PEs are the largest group with the shortest length of experience in Halliburton. The PEP and the 'Other' group have the largest groups of personnel with long length of service.

65.1% (28) of the respondents state that they do not have any financial responsibility related to project costs or that they do not know.

7.1.2 Section 2: General Financial Understanding

Section 2, *General Financial Understanding*, included 7 questions for the purpose of collecting information and opinions about the:

a) general understanding of project costs.
b) financial training offered to the respondents.
c) tendency of systematic cost deviations.
d) responsibility of the team members related to reduction of project costs.
e) activities that have the highest potential to reduce costs.

Question 7

How do you find the general understanding of project costs in your team?

Figure 7-2 for Question 7 shows that 16.3% of all respondents find the general understanding of project costs *quite poor*, and 44.2% find it either *quite good* or *very good*. 27.9% find it *neither good nor poor*, while 11.6% *do not know*. On respondent group level 50.0% (3) of the PMs find the general understanding *quite poor*, while 50.0% (3) of the PMs find the general understanding *quite good* or *very good*. Since the PMs are the team leaders, their opinions could indicate that the general understanding of project costs varies for the different project teams. However, 28.6% of the PEs find the general understanding *quite poor*, while 100% (6) of the PTLs find it *neither good nor poor*. Since these groups are highly involved with engineering and daily project planning their responses could indicate that the general understanding of project costs could be increased.

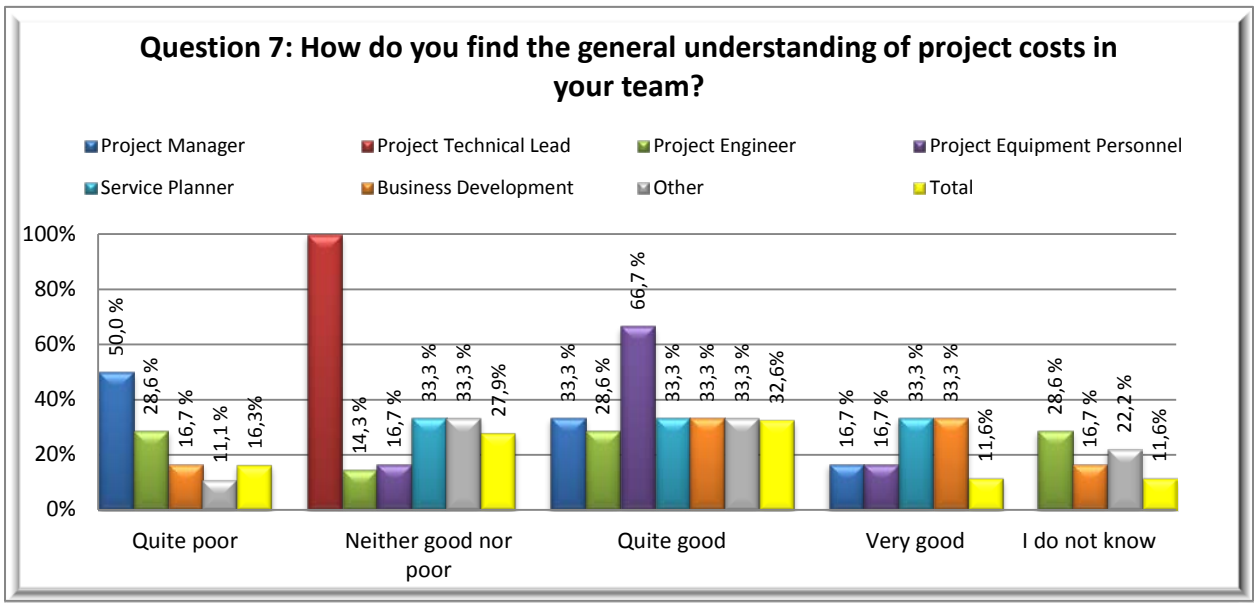

Figure 7-2 Question 7 Section 2: General Financial Understanding

Question 8

It is difficult to identify all costs in a project.

Figure 7-3 for Question 8 shows that 76.8% of the respondents *agree* or *completely agree*. On respondent group level 33.3% (2) of the PMs, 28.6% (2) of the PEs, 33.3% (1) of the SPs, 11.1% (1) of the 'Other' group *completely agree*.

On respondent group level 50.0% (3) of the PMs, 100% (6) of the PTLs, 42.9% (3) of the PEs, 83.3% (5) of the Project Equipment Planners, 33.3% (1) of the SPs, 66.7% (4) of the BD Group 55.6% (5) of the 'Other' group *quite agree*. This indicates that the respondents find it difficult to identify all project costs.

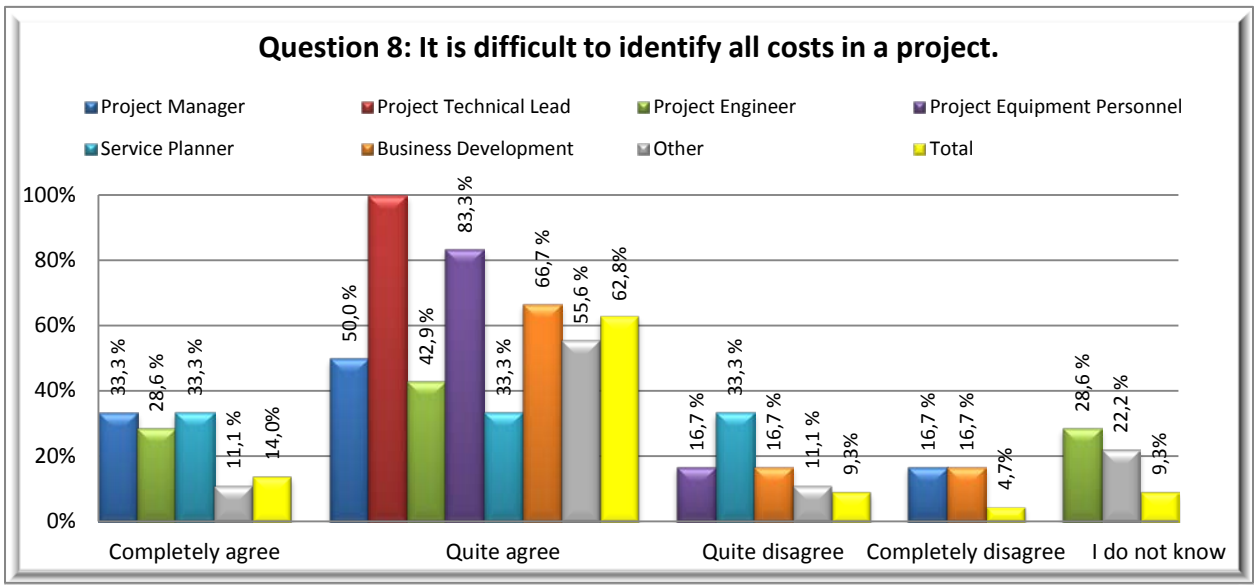

Figure 7-3 Question 8 Section 2: General Financial Understanding

Question 9

Have you received necessary training in Halliburton to be able to see the relationship between revenue, cost and profit?

Figure 7-4 for Question 9 shows that 67.4% (29) *have not received any training*, while 32.6% (14) *have received the necessary training*. The responses on respondent group level indicate that 66.7% (2) of the SPs and 50.0% (3) of the BD group *have received necessary training*. 83.3% (5) of the PMs, 66.7% (4) of the PTLs, 100.0% of the PEs and PEP *have not received any training*. This could indicate that the financial competency of these respondents is poor.

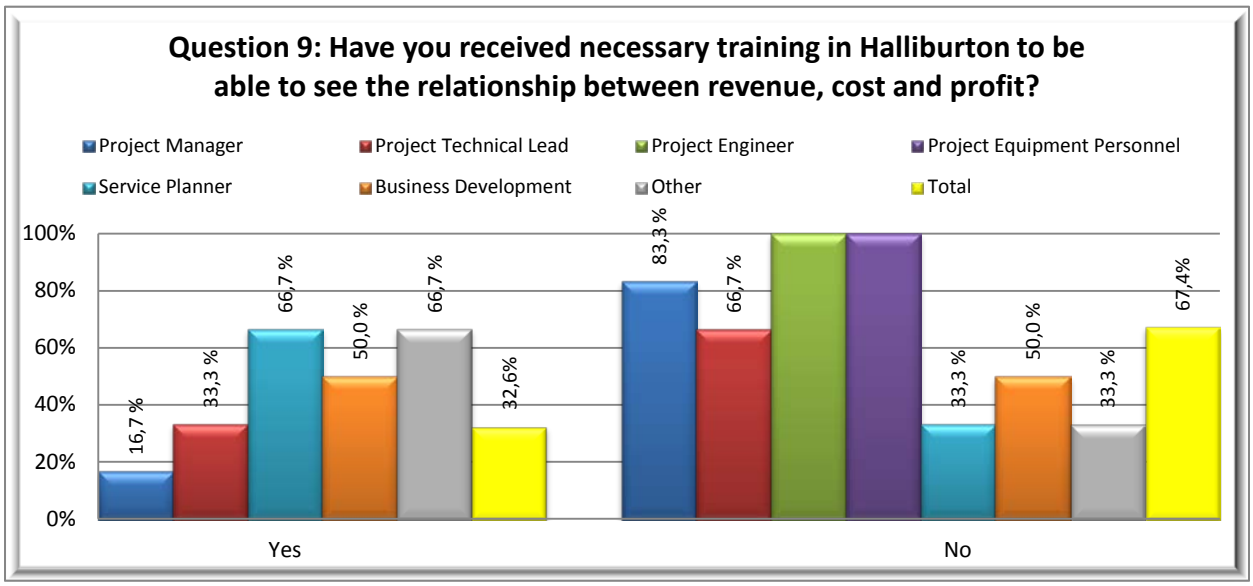

Figure 7-4 Question 9 Section 2: General Financial Understanding

Question 10

If 'Yes' to the previous question, how did you find the training?

Figure 7-5 for Question 10 shows how the respondents who have received necessary training found the training, in total 14 respondents. 57.1% (8) fount it *neither good nor poor*, while 42.9% found it *quite good* or *very good*. This implies that the financial training offered may have potential for improvement.

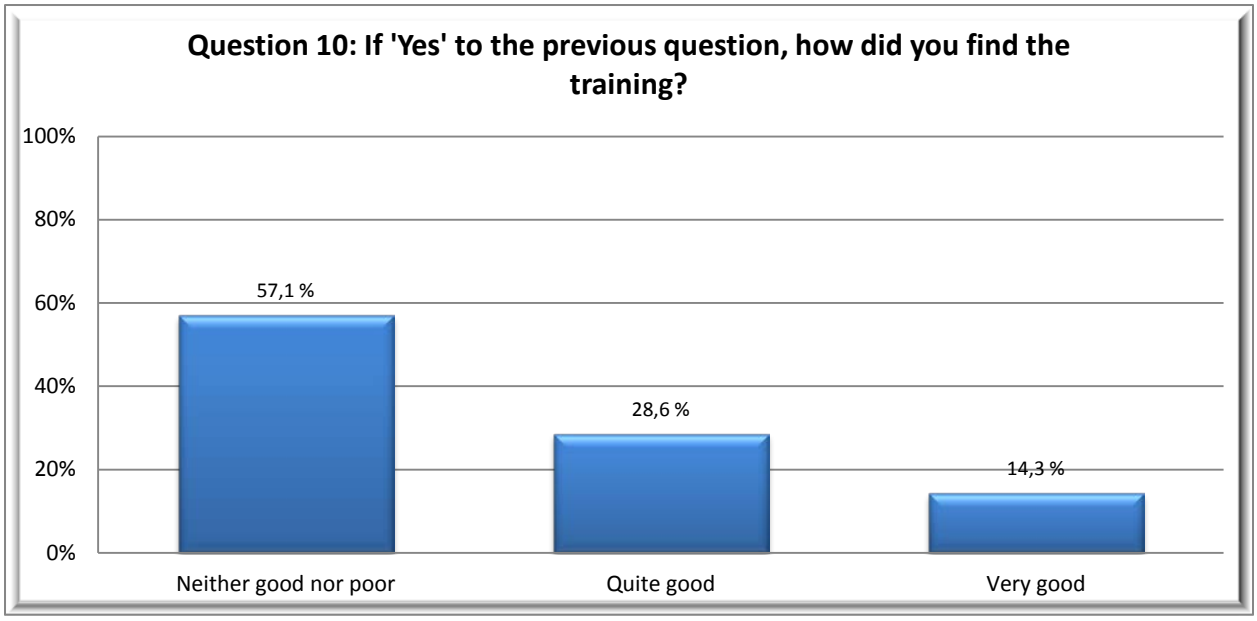

Figure 7-5 Question 10 Section 2: General Financial Understanding

Question 11

Have you seen a tendency of systematic cost deviations in the projects you have been a part of?

Figure 7-6 for Question 11 shows that the distribution between '*Yes*' and '*No*' is equal with 34.9% (15) for each response alternative, while 30.2% (13) *do not know*. On respondent group level 66.7% (4) of the PMs *have seen* systematic cost deviations, but 66.7% (3) of the SPs *have not seen* systematic cost deviations. This indicates that there could be systematic cost deviations for some projects, as well as showing that approximately a third of the respondents are not familiar with cost deviations.

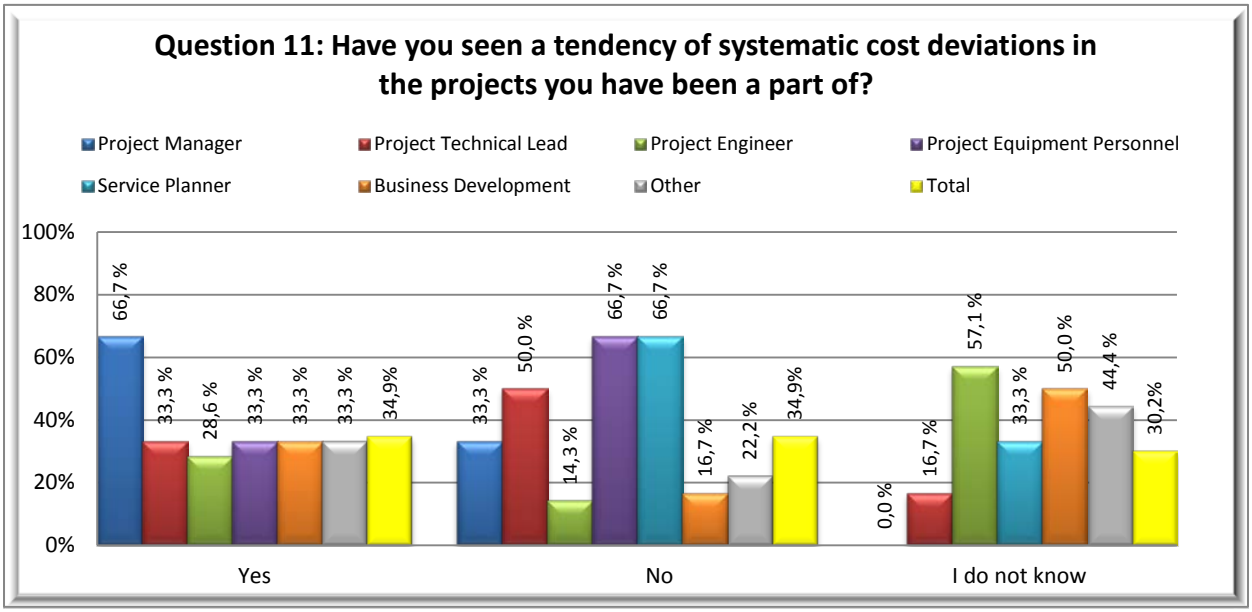

Figure 7-6 Question 11 Section 2: General Financial Understanding

Question 12

All team members take responsibility to reduce project costs.

Figure 7-7 for Question 12 shows that 30.3% (13) of the respondents *completely disagree* or *quite disagree*, while 58.1% (25) *completely agree* or *quite agree*. 11.6% (5) *do not know*. On respondent group level 50.0% (3) of the PMs, 100.0% (6) of the PTLs, 83.3% (5) of the PEP and 66.6% (2) of the SPs quite agree. This could indicate that many team members take responsibility to reduce project costs.

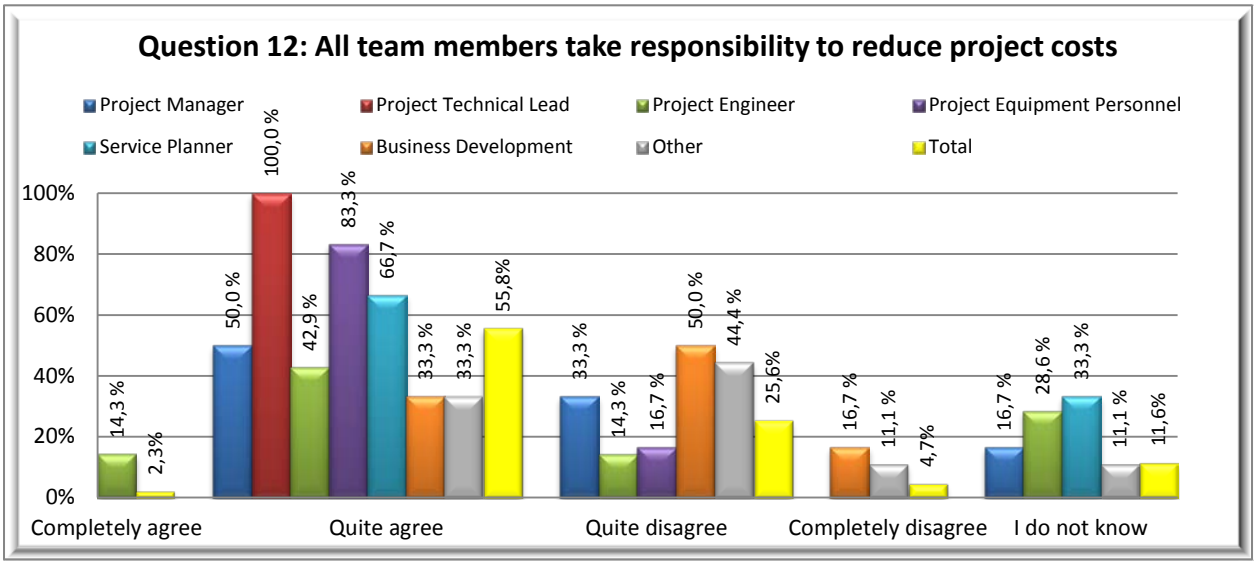

Figure 7-7 Question 12 Section 2: General Financial Understanding

Question 13

What activity do you think would have the highest potential to reduce costs?

The response alternatives included an alternative where the respondents could express other opinions. Figure 7-8 for Question 13 shows that the alternatives *be more efficient in engineering*, *improve quality of MODEM lists to avoid extra mobilisations* and *improve project management* could be considered to have the highest potential to reduce costs with 20.9% (9), 27.9% (12) and 27.9% (12) of the total responses, respectively. Fewer respondents have identified *more technical training*, *more financial training* and *improve tendering process* to have the highest potential to reduce costs, with 9.3% (4), 7.0% (3) and 7.0% (3) of the total responses, respectively.

The following comments were submitted:

- Increase the responsibility of the vendor to avoid express mobilisations and extra mobilisations. Purchase of equipment should be planned long time ahead of mobilisation to avoid high prices for short notice purchasing.
- Better cooperation between the projects, avoid last minute firefighting.
- The quality of MODEM list varies a lot and depends on the equipment coordinator. More efficient engineering is a general improvement point for the whole department.
- The department has to rent 50-60% of the equipment for each mobilisation. In addition there is no focus on development of new technology.
- A mix of all suggestions would have high potential to reduce costs. Some people are inefficient.

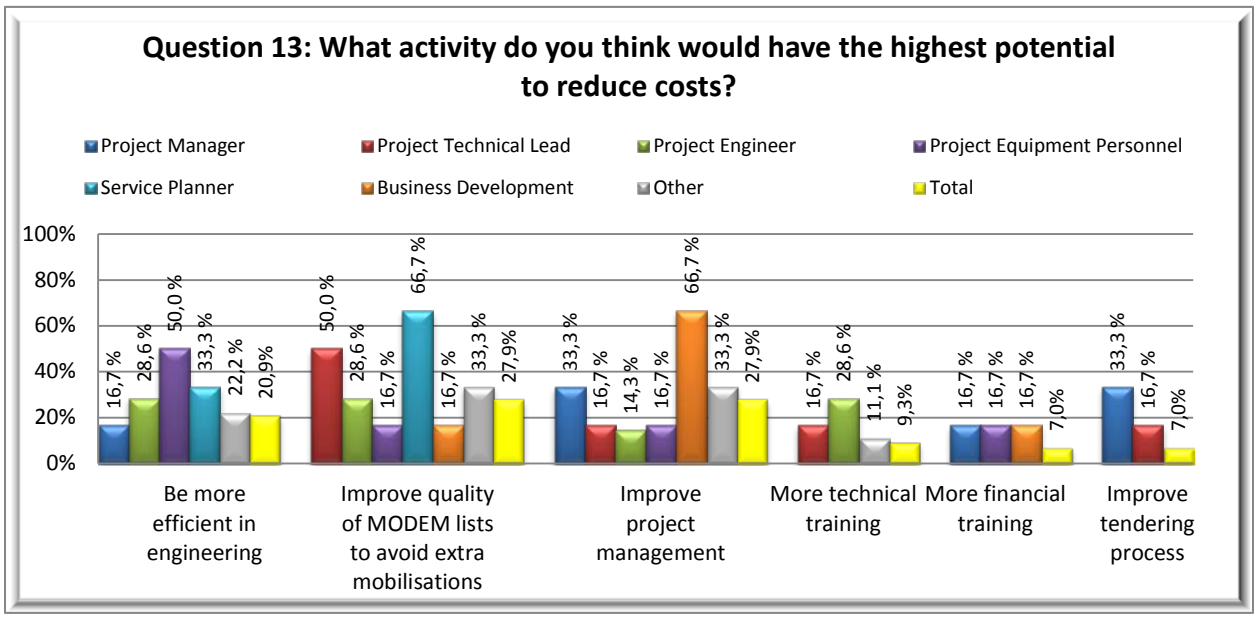

Figure 7-8 Question 13 Section 2: General Financial Understanding

7.1.3 Section 3: Tendering Process and Forecasting

Section 3, *Tendering Process and Forecasting*, included 6 questions with the purpose to collect information about the:

a) knowledge of the tendering process, involvement in this process and the opinions of the process.
b) opinion of the communication between BD and operations.
c) knowledge of forecasting and opinion of the forecasting system format.

Question 14

How much knowledge do you have about the tendering process?

Figure 7-9 for Question 14 shows that 27.9% (12) of the respondents have *little or no* knowledge, 48.8% (21) have *some* knowledge, 14.0% (6) have *quite much* knowledge and 9.3% (4) have *very much* knowledge of the tendering process.

The only respondent group with *very much* knowledge is the BD group, with 66.7% (4). 83.3% (5) of the PMs have *some* knowledge, while 16.7% (1) have *quite much* knowledge. The largest respondent groups with *little or no* knowledge are the PEs and the SPs with 57.1% (4) and 66.7% (2), respectively. This could indicate that the knowledge of the tendering process is poor for certain groups.

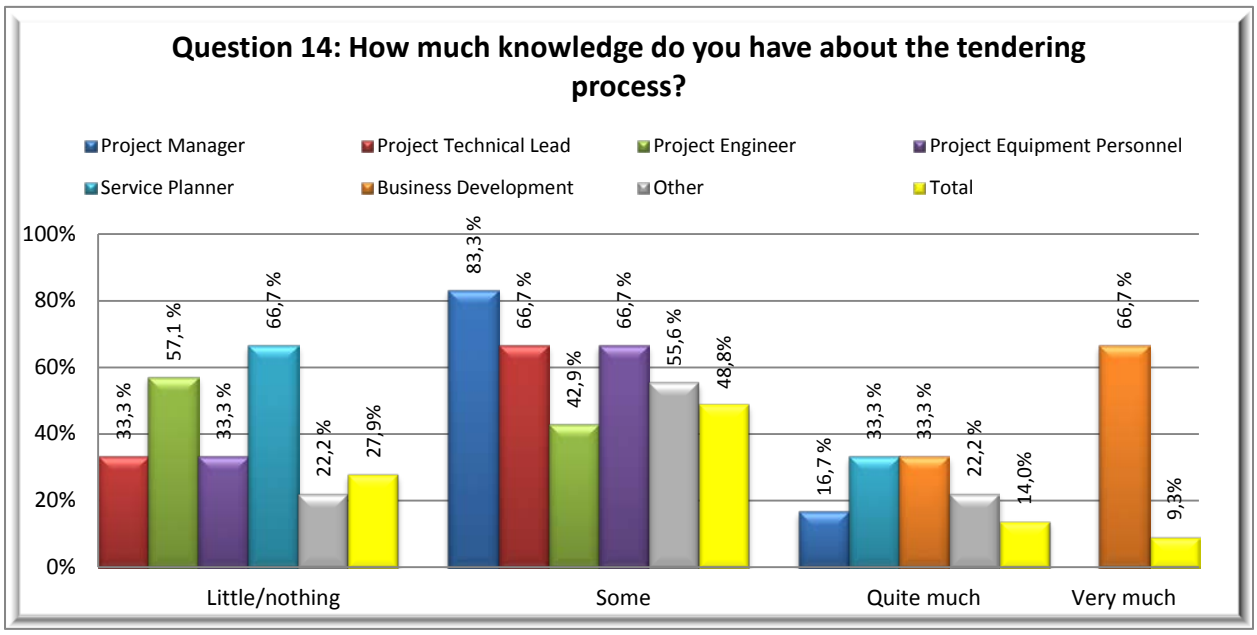

Figure 7-9 Question 14 Section 3: Tendering Process and Forecasting

Question 15

Have you ever been involved in the tendering process?

Question 15 is related to the involvement in the tendering process. The results are presented in Figure B-7 in Appendix B.

Question 16

How do you find the tendering process?

Figure 7-10 for Question 16 shows that 11.6% (5) of the respondents find the tendering process *quite poor*, 25.6% (11) find it *neither good nor poor*, 30.2% (13) find it *quite good* while 32.6% *do not know* the process. On respondent group level 83.3% (5) of the BD group and 33.3% (2) of the PMs find it *quite good*, while 16.7% (1) of the BD group and 50.0% of the PMs find it *neither good nor poor*. The PEs, PEP and the SPs are highest represented in the group that *do not know* the process, with 71.4% (5), 50.0% (3) and 66.7% (2), respectively. This could indicate that the tendering process could be improved.

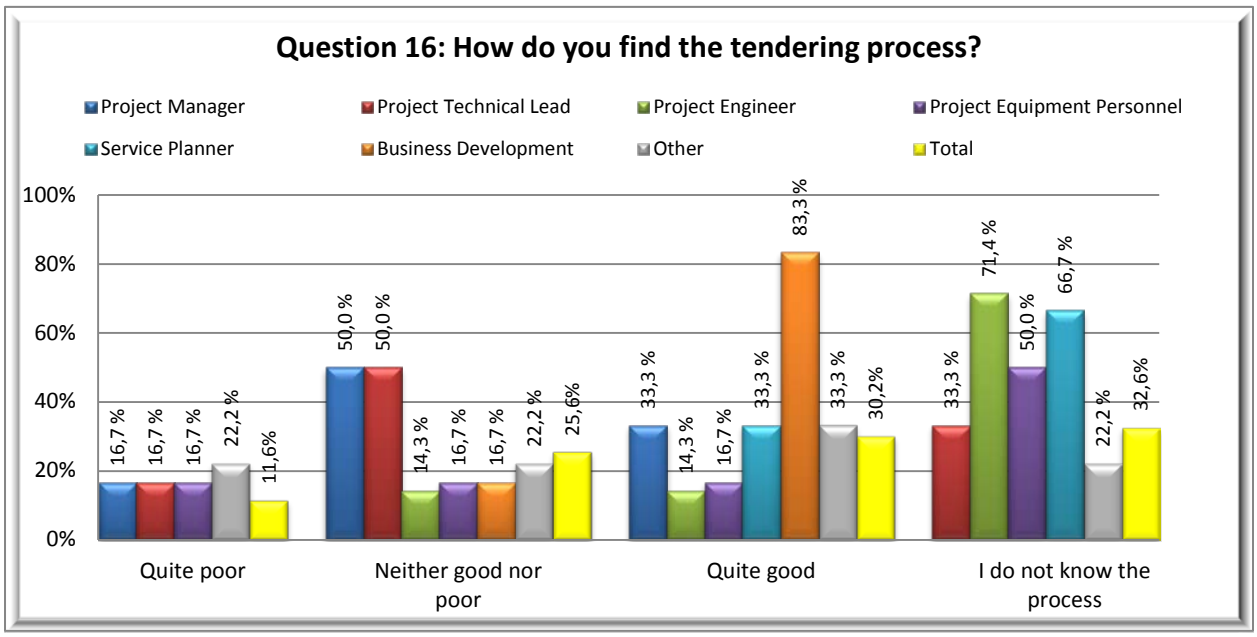

Figure 7-10 Question 16 Section 3: Tendering Process and Forecasting

Question 17

How do you find the communication between Business Development (BD) and operations in the department?

Figure 7-11 for Question 17 shows that 21.0% (9) of the respondents find the communication *very poor* or *quite poor*, while 32.6% (14) find it *neither good nor poor*. 28.0% (12) find it *quite good* or *very good*, while 18.6% (8) *do not know*.

Of the respondents in the BD group 33.3% (2) find the communication *quite* poor, 16.7% (1) *neither good nor poor*, 33.3% (2) *quite good* and 16.7% (1) *very good*. Of the PMs 33.3% (2) find it *quite poor*, 33.3% (2) *quite good* and 33.3% *do not know*. This could indicate that the communication between BD and Operations could be improved.

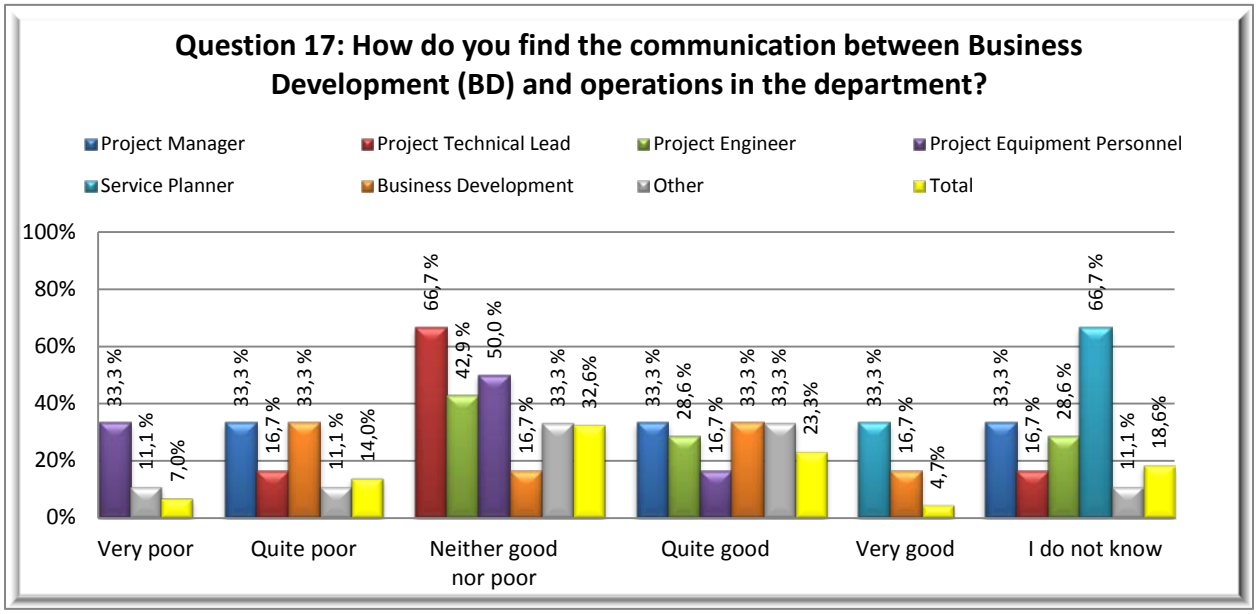

Figure 7-11 Question 17 Section 3: Tendering Process and Forecasting

Question 18

How much knowledge do you have about forecasting?

Figure 7-12 for Question 18 shows that 41.9% (18) of the respondents have *little or no* knowledge, 25.6% (11) have *some* knowledge, 27.9% (12) have *quite much* knowledge and 4.7% (2) have *very much* knowledge about forecasting.

On respondent group level 50.0% (3) of the PTLs, 85.7% (6) of the PEs, 50.0% (3) of the PEP, 33.3% of the BD group and 44.4% (4) of the 'Other' group have *little or no* knowledge. This could indicate that these groups could increase their knowledge about forecasting.

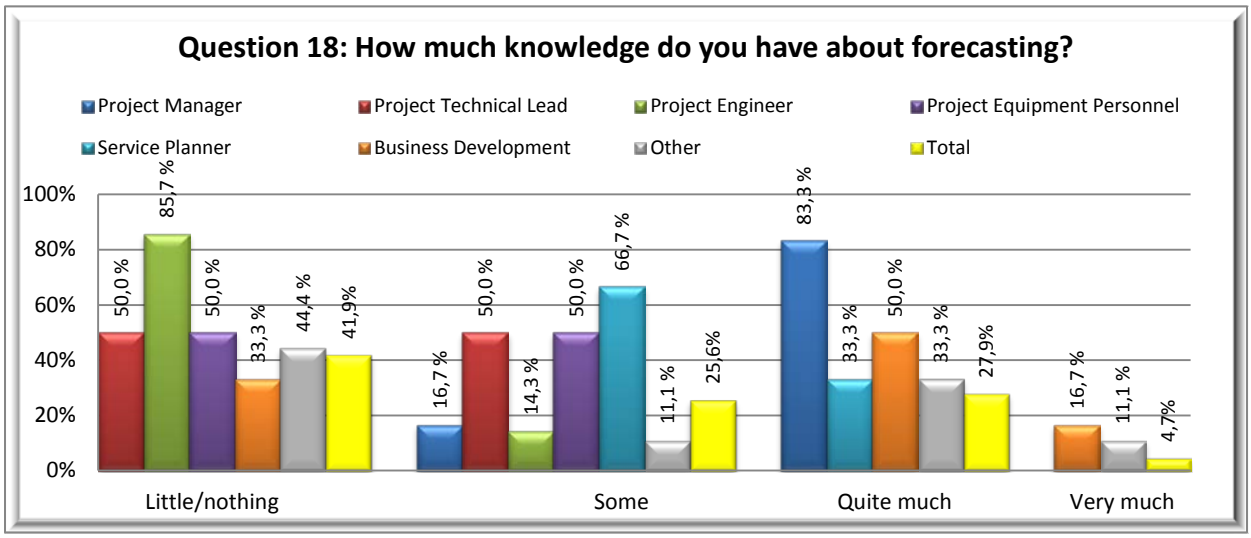

Figure 7-12 Question 18 Section 3: Tendering Process and Forecasting

Question 19

How do you find the forecasting system format?

Question 19 is related to how the respondents find the forecasting system format. The results can be found in Appendix B in Figure B-8.

7.1.4 Section 4: Cost Estimates, Cost Reports and Variation Orders

Section 4, *Cost Estimates, Cost Reports and Variation Orders,* consisted of 13 questions with the purpose of collecting information about the:

a) knowledge of cost estimates, cost reports and variation orders.
b) opinions of the different formats for cost estimates, cost reports and variation orders.
c) experience with cost estimate updates and generation of VORs.
d) experience with project costs that could have been covered by the customer and the type of VOR that should have been generated.

Question 20

How much knowledge do you have about cost estimates?

Figure 7-13 for Question 20 shows that 37.2% (16) of the respondents have *quite much* or *very much* knowledge about cost estimates and that the PMs, SPs and BD group tend to have the most knowledge.

62.8% (27) of the respondents have *some* or *little/no* knowledge about cost estimates and the PTLs, PEs, PEP and the 'Other' group tend to have the least knowledge. This could indicate that these groups could have more knowledge about cost estimates.

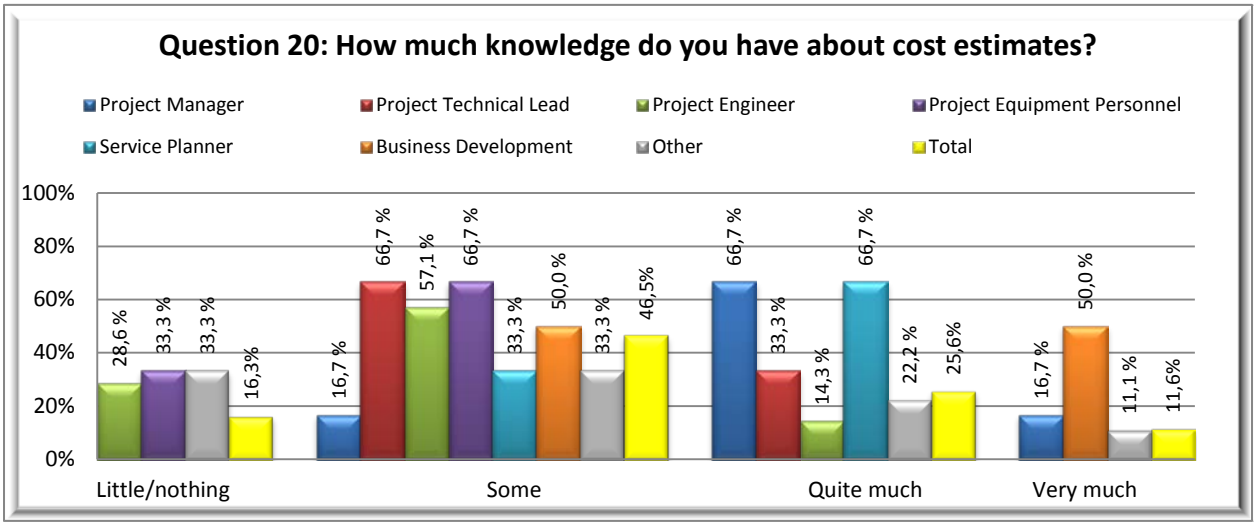

Figure 7-13 Question 20 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 21

How do you find the cost estimate format for Statoil projects?

Question 21 is related to how the respondents find the cost estimate format for Statoil projects. The results can be found in Appendix B in Figure B-9.

Question 22

How do you find the cost estimate format for other customers?

Question 22 is related to how the respondents find the cost estimate format for other customers. The results can be found in Appendix B in Figure B-10.

Question 23

How much knowledge do you have about cost reports?

Figure 7-14 for Question 23 shows that 25.6% (11) of the respondents have *quite much* or *very much* knowledge about cost reports and that the PMs and SPs tend to have the most knowledge.

74.5% (32) of the respondents have *some* or *little/no* knowledge about cost reports and the PTLs, PEs, PEP, BD group and the 'Other' group tend to have least knowledge. This could indicate that the knowledge about cost reports could be increased.

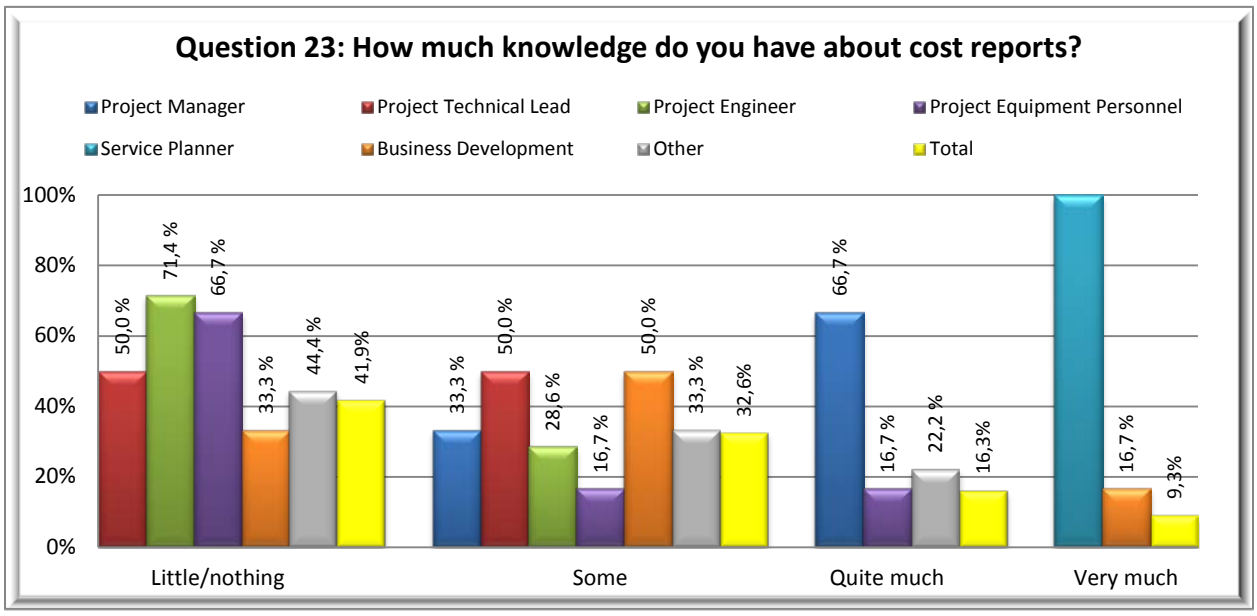

Figure 7-14 Question 23 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 24

How do you find the cost report format for Statoil projects?

Question 24 is related to how the respondents find the cost report format for Statoil. The results can be found in Appendix B in Figure B-11.

Question 25

How do you find the cost report format for other customers?

Question 25 is related to how the respondents find the cost report format for other customers. The results can be found in Appendix B in Figure B-12.

Question 26

How much knowledge do you have about Variation Order Request and Variation Order (VOR and VO)?

Figure 7-15 for Question 26 shows that 37.2% (16) of the respondents have *quite much* or *very much* knowledge about VOR and VO and that the PMs, PTLs, SPs and the BD group tend to have the most knowledge.

62.8% (27) of the respondents have *some* or *little/no* knowledge about VOR and VO and the PEs, PEP and the 'Other' group tend to have least knowledge.

This could indicate that the knowledge of VOR and VO could be increased.

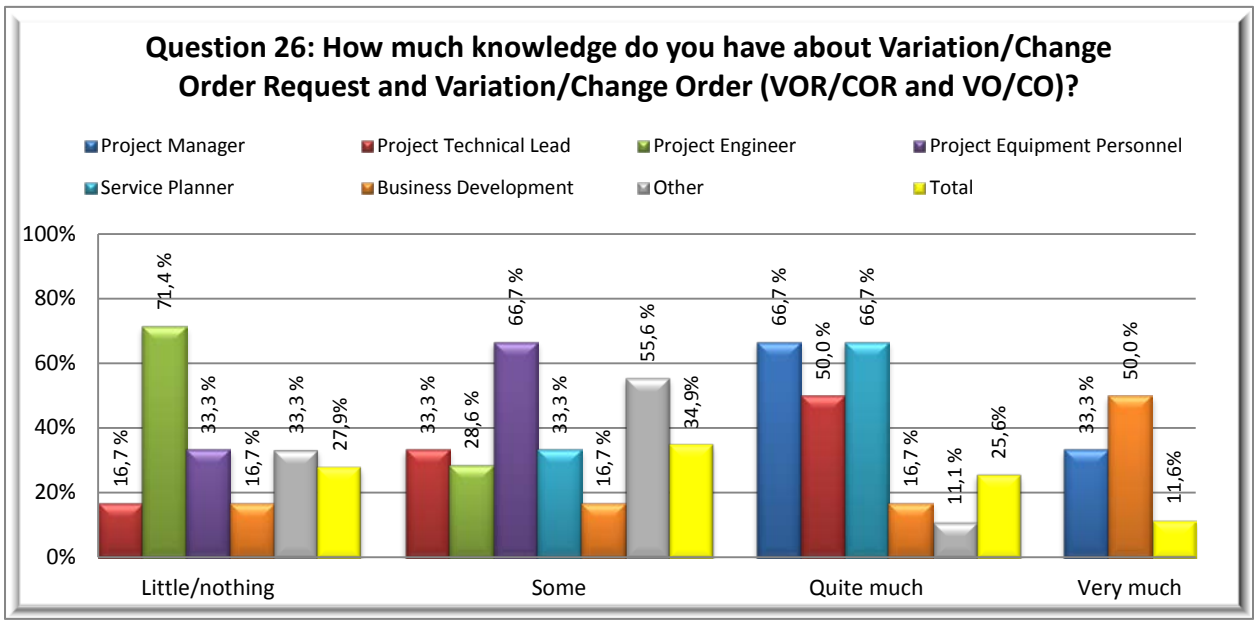

Figure 7-15 Question 26 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 27

How do you find the VOR and VO formats for Statoil projects?

Question 27 is related to how the respondents find the VOR and VO formats for Statoil projects. The results can be found in Appendix B in Figure B-13.

Question 28

How do you find the VOR and VO formats for other customers?

Question 28 is related to how the respondents find the VOR and VO formats for other customers. The results can be found in Appendix B in Figure B-14.

Question 29

Do you often find that the original cost estimates have to be updated with a VO?

Figure 7-16 for Question 29 shows that 51.2% (22) of the respondents find that updates are often necessary while 7.0% (3) *do not find it necessary*. 41.9% (18) *do not know.*

On respondent group level the PMs, PTLs and SPs are the respondents who find that *updates are necessary* the most. However, 33.3% (2) of the PMs *do not* find that the original cost estimates have to be updated with a VO. This could indicate that cost estimates often have to be updated with a VO.

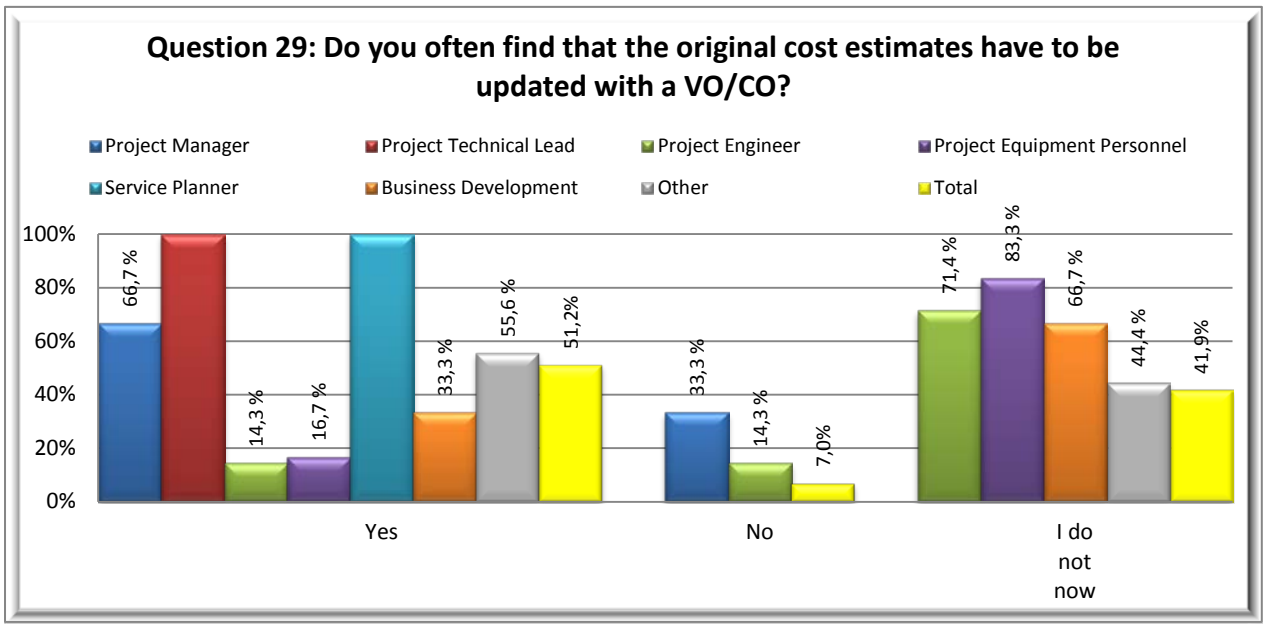

Figure 7-16 Question 29 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 30

If 'Yes' to the previous question, who is normally requesting the change?

Question 30 was asked to 22 respondents who answered that the original cost estimates often have to be updated with a VO. Figure 7-17 for Question 30 shows that 54.5% of the respondents mean that the customer is normally requesting the change, and 45.5% mean that Halliburton is normally requesting the change. This could indicate that Halliburton could be more active to request variation orders if a change is discovered.

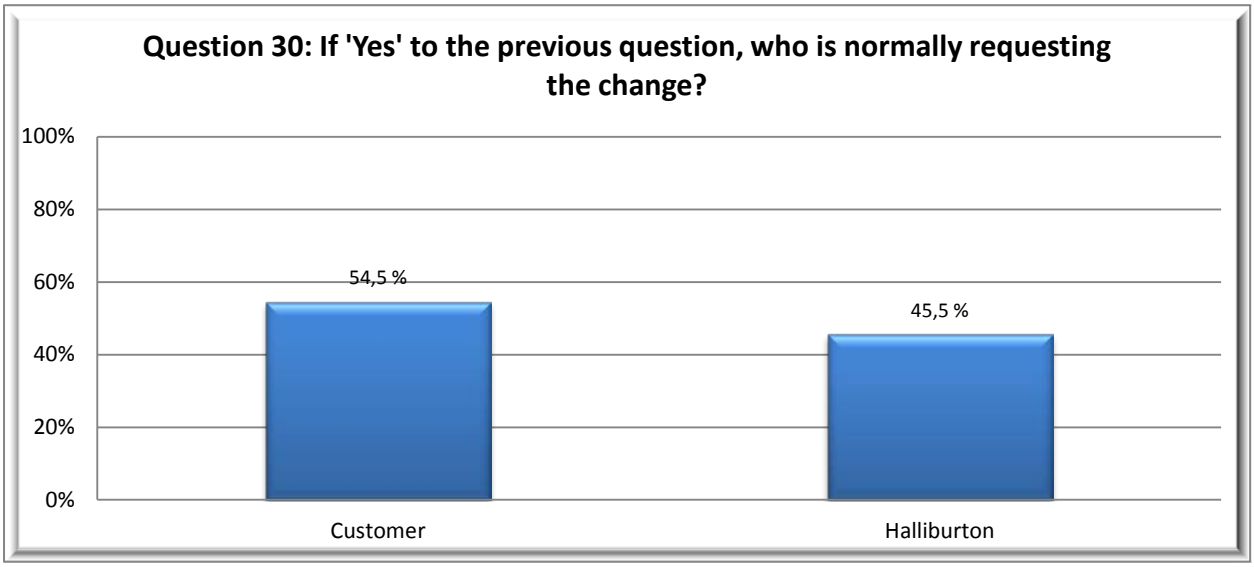

Figure 7-17 Question 30 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 31

Have you ever noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time?

Figure 7-18 for Question 31 shows that 41.9% (18) of the respondents *have* noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time, while 27.9% (12) *have not* noticed this. 30.2% (13) *do not know.*

On respondent group level 83.3% (5) of the BD group *have* noticed such project costs. Also half of the PMs, PEP and the 'Other' group have noticed this. This could indicate that Halliburton could be more active to request VOs if a change is discovered in due time.

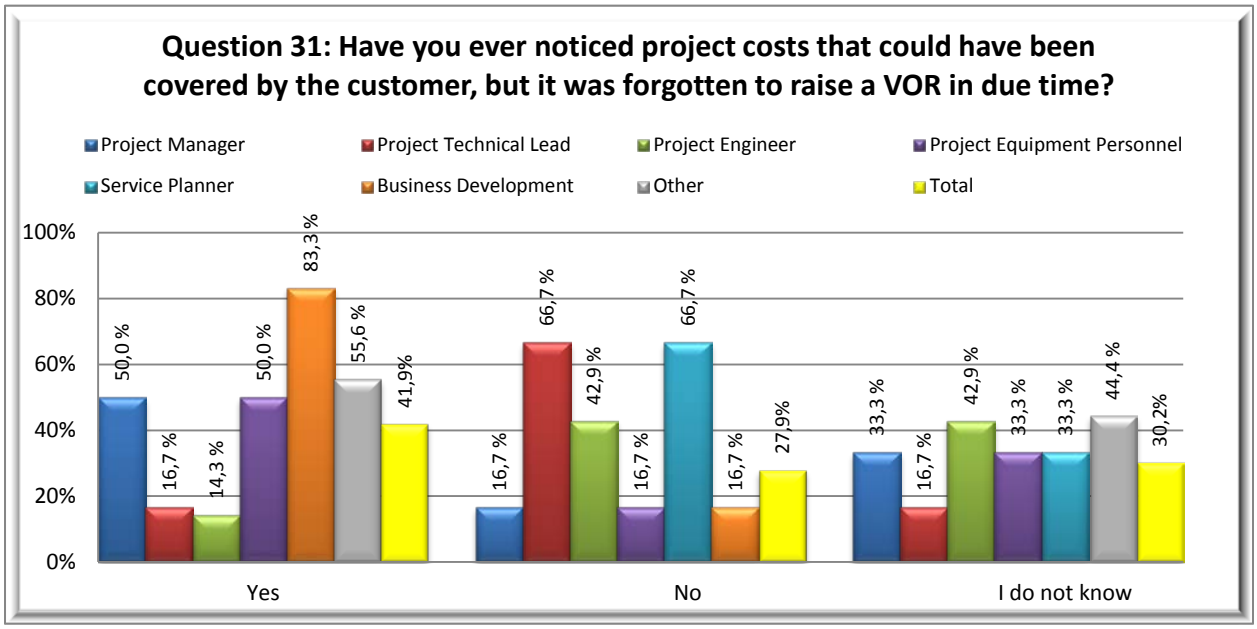

Figure 7-18 Question 31 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 32

If 'Yes' to the previous question, for what category should a VOR have been made? Multiple answers are allowed.

Question 32 was asked to the respondents who answered that they have noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time. Figure 7-19 for Question 32 shows that 33.3% of these respondents have experienced that VORs should have been made for *Management & Services*, 61.1% for *Engineering*, 33.3% for *Procurement*, 66.7% for *Mobilisation & Demobilisation* and 38.9% for *Field Operations*. This could indicate that VORs are likely to be prepared for all these categories.

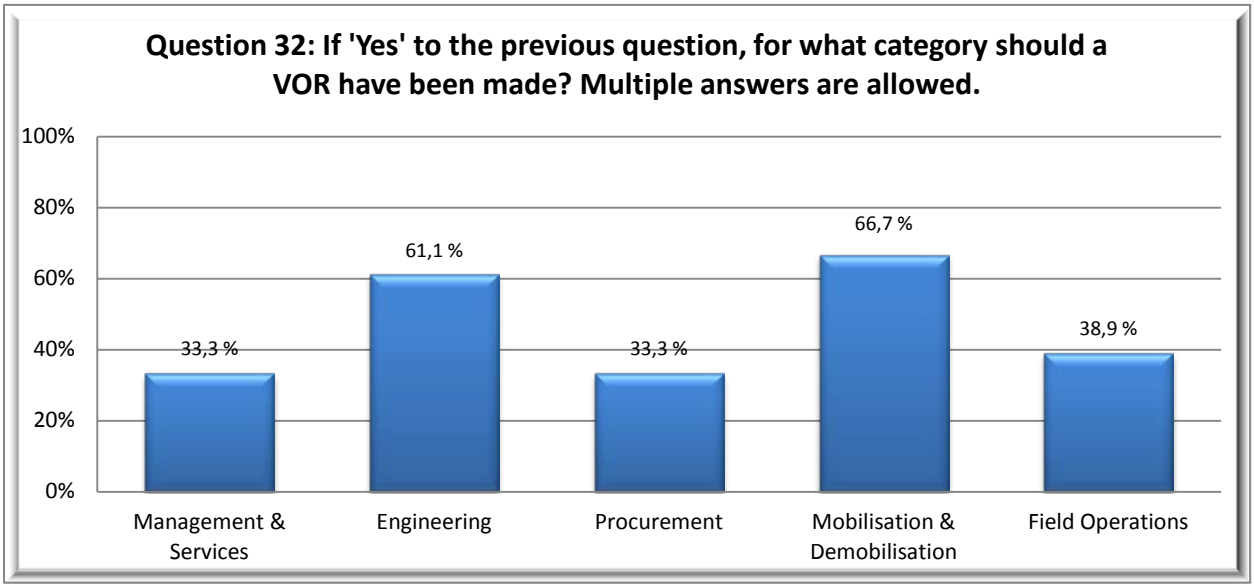

Figure 7-19 Question 32 Section 4: Cost Estimates, Cost Reports and Variation Orders

7.1.5 Section 5: Equipment, Mobilisations and Resource Efficiency

Section 5, *Equipment, Mobilisations and Resource Efficiency*, included 5 questions with the purpose to collect information about the:

a) visibility of the extra work and cost related to an extra (not planned) mobilisation.
b) visibility of the consequences of not returning rental equipment in time, or as soon as possible after demobilisation.
c) efficiency of personnel resources onshore, offshore and contractors.

Question 33

Is the extra work and cost related to an extra (not planned) mobilisation visible to you and the rest of your project team?

Figure 7-20 for Question 33 shows that 44.2% (19) of the respondents find these costs *visible* while 30.2% (13) find them *not visible*. 25.6% (11) *do not know.*

On respondent group level 100.0% (6) of the PEP find these costs visible. 55.8% (24) of all respondents find these costs either *not visible* or *do not know*, hence this could indicate that costs related to extra mobilisations could be more visible to some of the respondents.

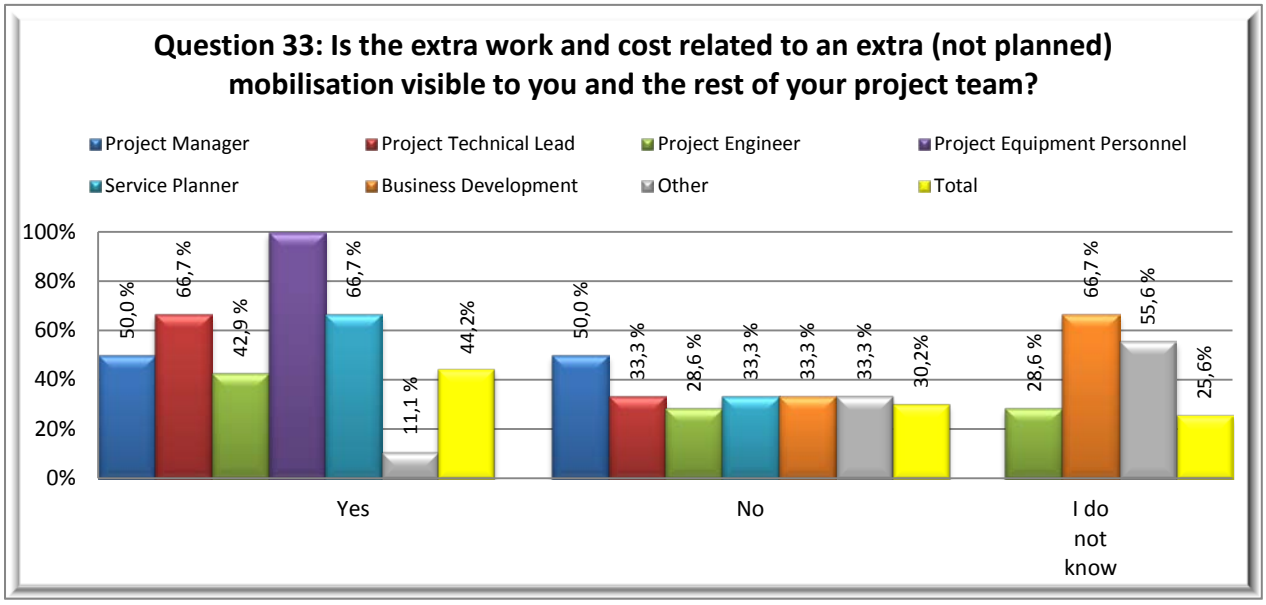

Figure 7-20 Question 33 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 34

Are the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, visible to you and your project team?

Figure 7-21 for Question 34 shows that 41.9% (18) of the respondents find these consequences visible while 32.6% (14) find them not visible. 25.6% (11) *do not know.*

On respondent group level 100.0% (6) of the PEP and 66.4% (2) of the PTLs find the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, *visible* to them and the rest of their project team. More than half of the other respondent groups find the consequences either *not visible* or they *do not know*. This could indicate that the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, could be more visible to these respondents.

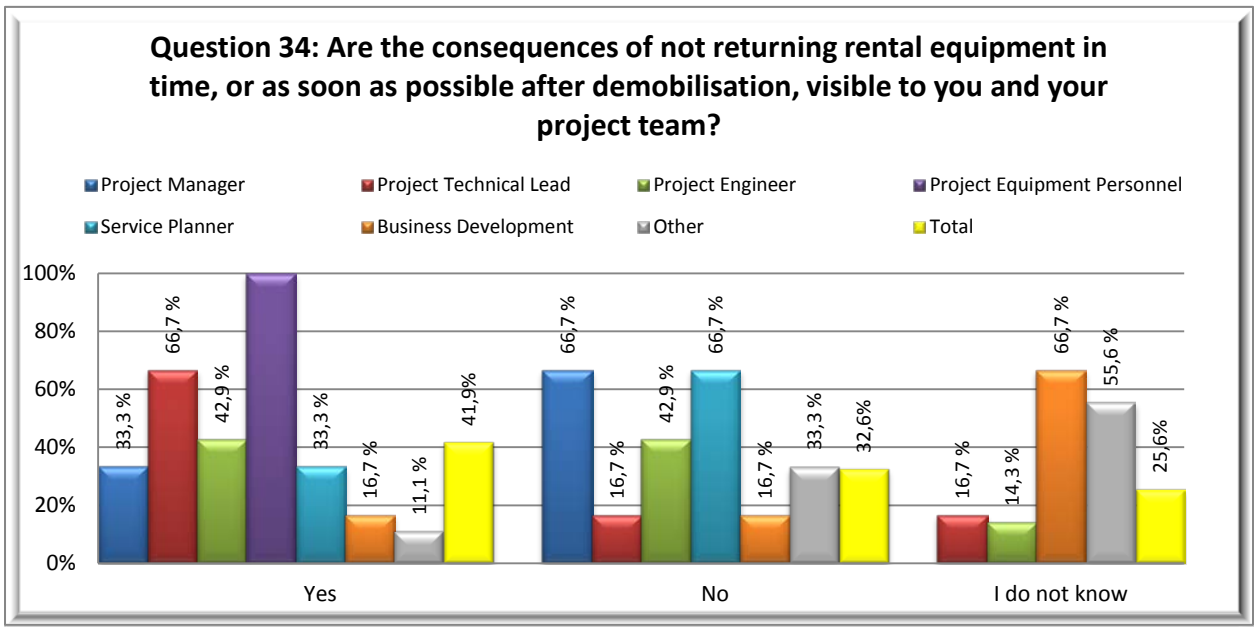

Figure 7-21 Question 34 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 35

How do you find the efficiency of onshore resources?

Figure 7-22 for Question 35 shows that 14.0% (6) of the respondents *do not know* the efficiency of onshore resources, 30.2% (13) find it *quite poor* or *very poor* and 23.3% (10) find it *neither good nor poor*. This could indicate that the efficiency of the onshore resources could be increased. This is supported by only 32.6% (14) who find the efficiency *quite good* and none find it *very good* and also that 50.0% (3) of the PMs, who are responsible for onshore resources working in their project teams, find the efficiency *quite poor*.

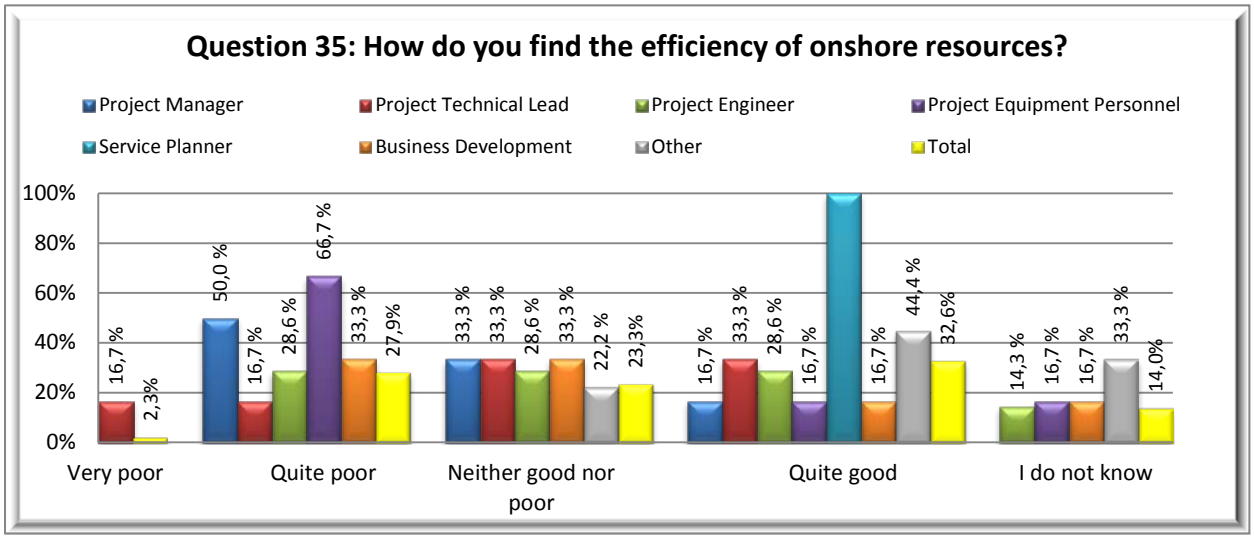

Figure 7-22 Question 35 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 36

How do you find the efficiency of offshore resources?

Figure 7-23 for Question 36 shows that 30.2% (6) of the respondents *do not know* the efficiency of offshore resources, 2.3% (1) find it *quite poor* and 18.6% (8) find it *neither good nor poor*, while 48.9% (21) find the efficiency *quite good* or *very good*. This could indicate that there is no immediate need to increase the efficiency amongst the offshore resources.

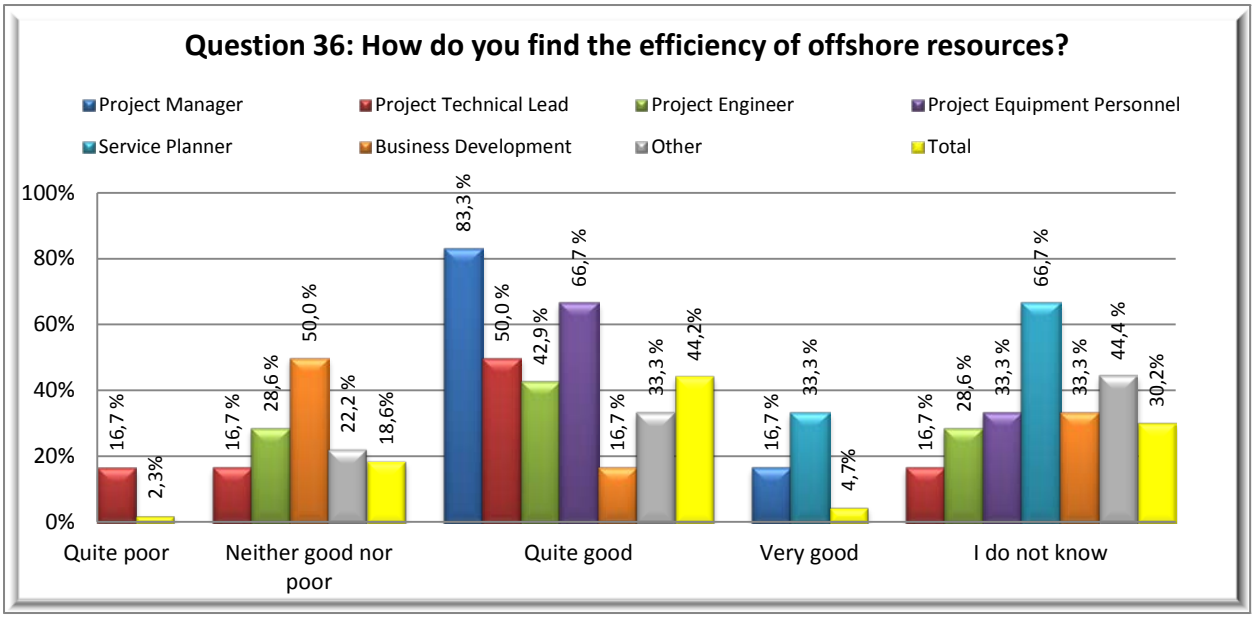

Figure 7-23 Question 36 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 37

How do you find the efficiency of contractors?

Figure 7-24 for Question 37 shows that 23.3% (10) of the respondents *do not know* the efficiency of contractors, 7.3% (18) find it *quite poor* and 34.9% (15) find it *neither good nor poor*. 34.9% (15) find the efficiency *quite good* or *very good*. This could indicate that the efficiency of the contractors is good, however there may be room for improvements.

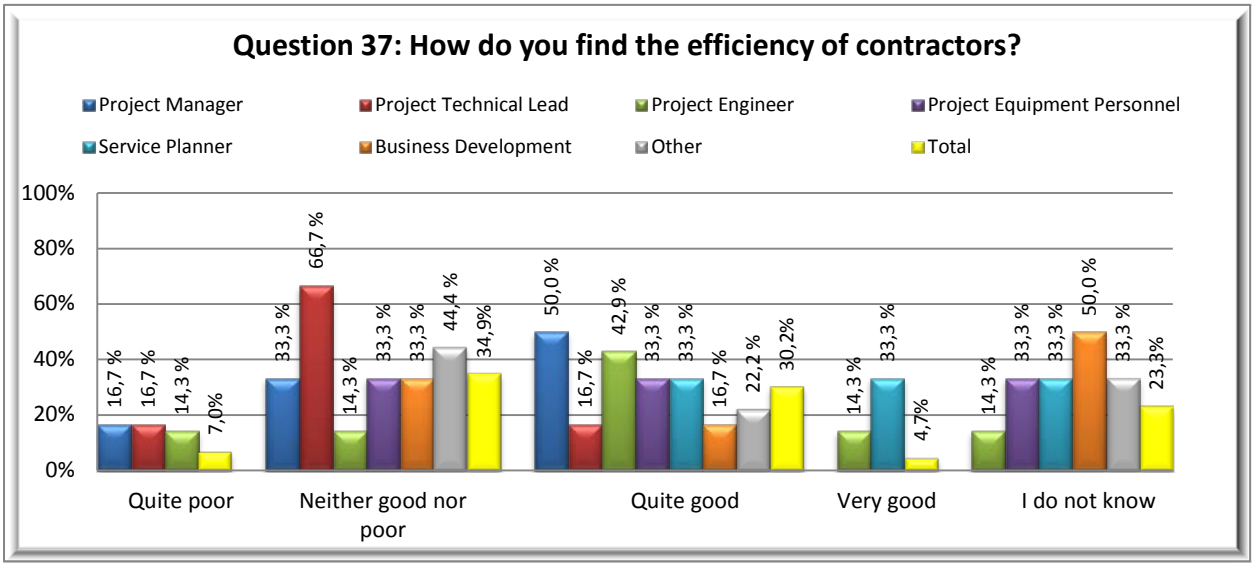

Figure 7-24 Question 37 Section 5: Equipment, Mobilisations and Resource Efficiency

7.1.6 Section 6: Non-productive Time and Cost of Poor Quality

Section 6, *Non-productive Time (NPT) and Cost of Poor Quality (COPQ)*, included 4 questions with the purpose to collect information about:

a) experiences with NPT.
b) knowledge of and experience with COPQ.

Question 38

Have you ever experienced Non-Productive Time (NPT) for field operations that Halliburton had to pay for?

Figure 7-25 for Question 38 shows that 53.5% (23) of the respondents have experienced NPT while 27.9% (12) have not. 18.6% (8) *do not know*.

On respondent group level 83.3% (5) of the PMs, which have the overall responsibility for the projects, have experienced NPT. This could indicate that there should be more focus on reducing the amount of NPT for field operations that Halliburton has to pay for.

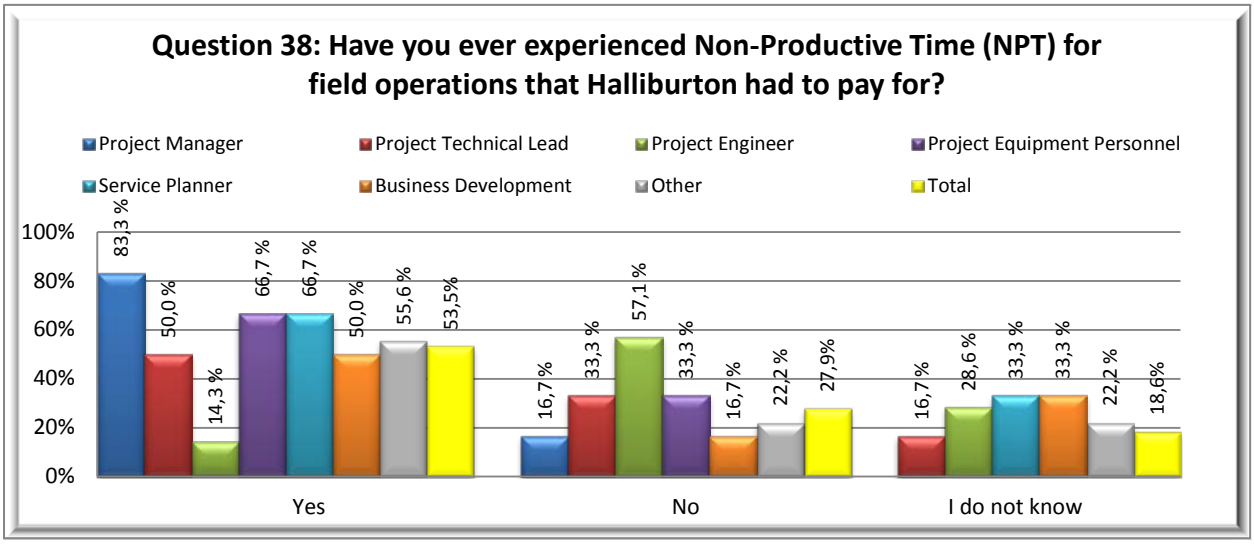

Figure 7-25 Question 38 Section 6: Non-productive Time and Cost of Poor Quality

Question 39

How much knowledge do you have about Cost of Poor Quality (COPQ)?

Figure 7-26 for Question 39 shows that 25.6% (11) of the respondents have *quite much* or *very much* knowledge about COPQ and the PMs, the BD group and the 'Other' group tend to have the most knowledge.

74.4% (27) of the respondents have *some or little/no* knowledge about COPQ. This could indicate that the knowledge about COPQ amongst the respondents could be increased.

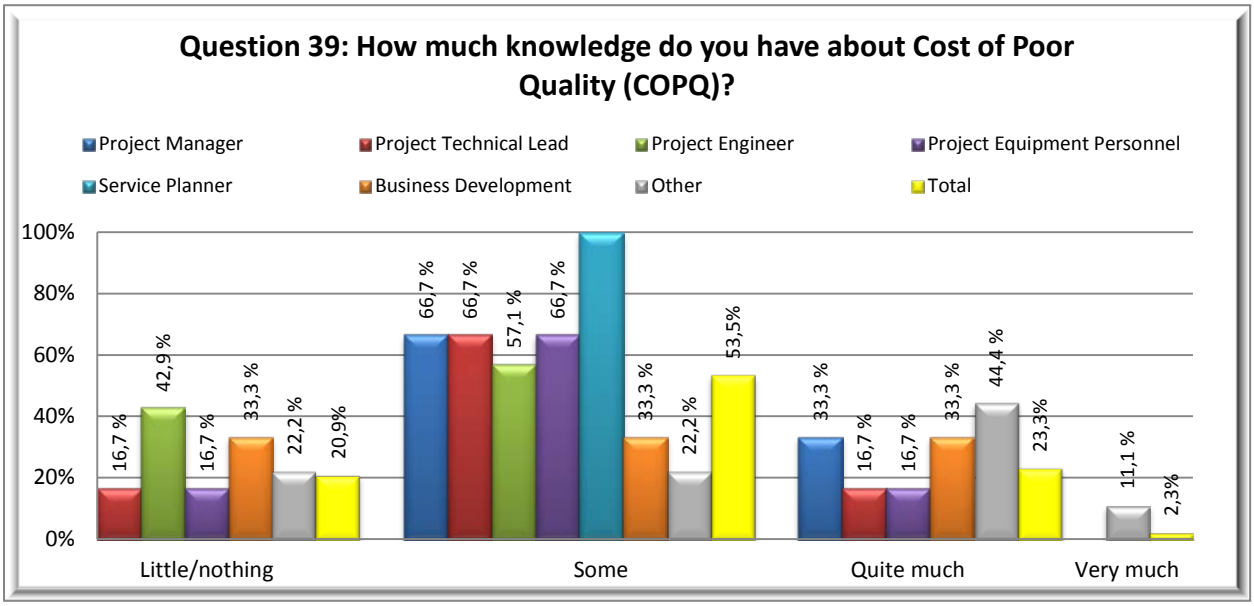

Figure 7-26 Question 39 Section 6: Non-productive Time and Cost of Poor Quality

Question 40

Have you ever experienced COPQ in any of your current or earlier projects?

Question 40 is related to the respondent's experiences with COPQ. The results are presented in Figure B-15 in Appendix B.

Question 41

If you have experienced COPQ in any of your current or earlier projects, in what range was the sum of the COPQ?

Question 41 is a follow-up question to Question 40 and is related to in what range the sum of the COPQ was. The results are presented in Figure B-16 in Appendix B.

7.1.7 Section 7: Business Case and Project Final Account/Job Profitability

Section 7, *Business Case and Project Final Account/Job Profitability*, included 2 questions with the purpose to collect information about the:

a) involvement in performing a Business Case.
b) knowledge about final account/job profitability for a project.

Question 42

Have you ever been involved in performing a Business Case?

Figure 7-27 for Question 42 shows that 11.7% (5) of the respondents have been involved in performing a Business Case *more than 6 times*. The BD group, which are responsible for the tendering processes, tend to have been involved in performing Business Cases the most. 67.4% (29) of the respondents have *never* been involved in performing a Business Case and 21.0% (9) have performed it *1-5 times.* This could indicate that the focus on performing Business Cases could be increased.

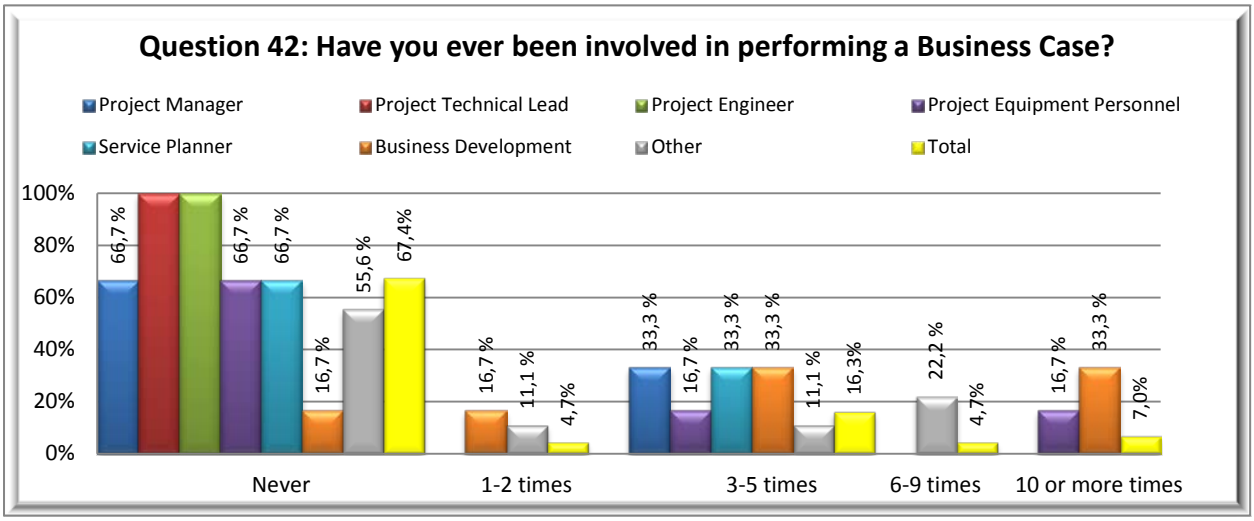

Figure 7-27 Question 42 Section 7: Business Case and Project Final Account/Job Profitability

Question 43

How much knowledge do you have about the final account/job profitability for a project?

Figure 7-28 for Question 43 shows that 16.3% (7) of the respondents have *quite much* knowledge about the final account/job profitability and that the BD group tend to have the most knowledge.

83.8% (36) of the respondents have *some or little/no* knowledge about the final account/job profitability. This could indicate that the knowledge about the final account/job profitability amongst the respondents could be increased.

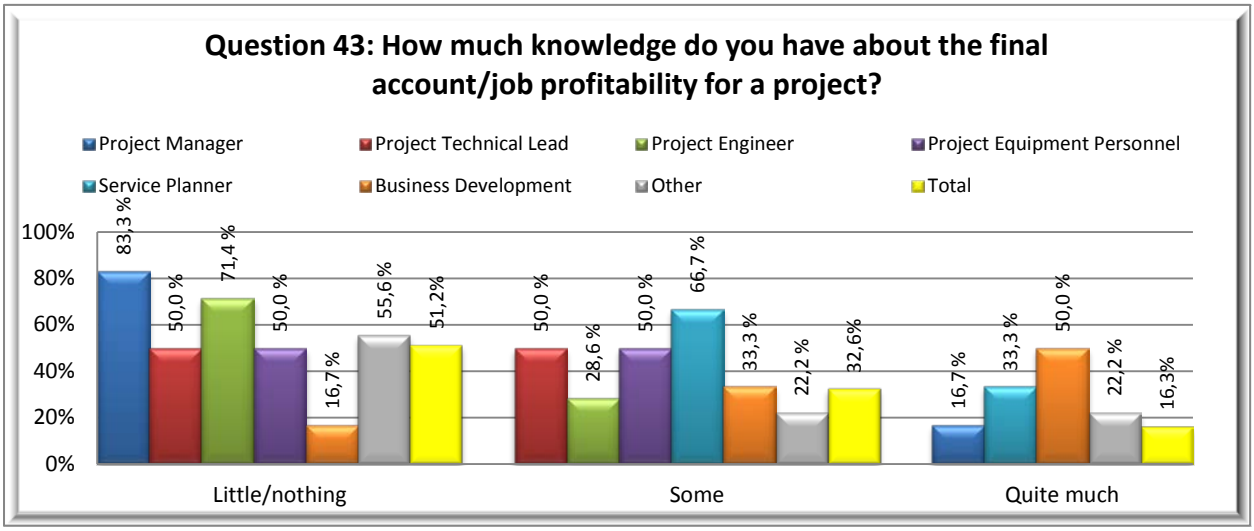

Figure 7-28 Question 43 Section 7: Business Case and Project Final Account/Job Profitability

7.2 Interview

In this section the findings from the interviews will be presented. The full interview guides can be found in Appendix C – *Interview Guides*. The questions were adjusted to fit the tasks and responsibilities of the different groups.

The findings are divided into the same sections as for the survey. The results for each section are presented for the different functions, i.e. Project Managers, Project Team Members and PSL Management. The responses from the interviewees within the same function are commented collectively if the opinions are similar and there are no contradicting comments. When using the function title to express common opinions, e.g. 'the Project Managers state' this indicates that both interviewees within the same function have the same opinion to a specific question. When the answer indicates that only one of the interviewees has an opinion, e.g. 'one respondent states' it does not mean that the other interviewee within the same function disagreed, but there is simply no comment to this question. The interviewees are referred to as respondents.

7.2.1 Section 1: General

In this section the respondents were asked questions about their role, highest level of education, length of experience in Halliburton and duration in current position. One respondent is in a PSL Management role, two of the respondents are Project Managers, and two of the Project Team Members are Project Equipment Coordinators. All of the respondents have a length of service in Halliburton of five or more years. To preserve the anonymity of the respondents the rest of the results are omitted in the Thesis.

7.2.2 Section 2: General Financial Understanding

In this section questions about financial responsibilities, greatest financial challenges related to job role, general understanding and identification of costs, visibility of cost, use of existing financial systems and improvement suggestions were asked.

7.2.2.1 Project Managers

The Project Managers are financially responsible for the projects. Their responsibility is to ensure that the project is controlled according to the contract and that revenue and costs are accounted for. It is their responsibility to identify changes in scope and to ensure that a VOR is raised to acquire as much revenue as possible.

One respondent thinks that the greatest financial challenge related to the job role is to interpret the project contract correctly especially with regard to changes in scope. Much information is not included in the contracts but there is a common idea of how the processes should be understood which is based on experience. The other respondent thinks that financial challenges are contract dependent. Lump-sum projects are challenging since the revenue opportunities are limited with fixed equipment spread prices and not item for item, which is common practice with reimbursable projects. Getting the extras can be difficult.

The Project Managers find the general understanding of project costs within their project team quite poor. There is a good overview of the revenue but no proper overview of costs on lump-sum projects as long as the project is ongoing. Many project members think that cost plus items increase the revenue but the fee is actually only covering the internal administration costs.

To improve the general understanding of cost in the department one respondent suggests that all engineers should review the contract and the scope included in the pricing before starting any detailed engineering. Sometimes the equipment spreads have to be slightly adjusted but generally all engineers should be more aware of the pricing and try to stick to these solutions. Prior to mobilisation rental equipment at high rates are often put on hire up to one week before the customer can be charged for the rental. This is costly especially if the mobilisation dates are postponed and there should be a higher focus to minimise the period of rental prior to mobilisation. The other respondent suggests that an overview of actual costs should be made for all projects. This would make it easier to control the revenue and to determine if the customers can get any discounts.

One respondent does not think that all team members should take ownership of project costs because it could conflict with the task to ensure that the job is engineered properly. The Project Equipment Coordinators focus on reducing project costs by moving delivery dates for rental equipment and following up return of rental equipment after demobilisation of the equipment from site. This focus has been necessary but is time consuming and takes up their time when they could be focusing on the next job. The other respondent thinks that the team members are focusing on spending most of their working hours on reimbursable projects to get as much revenue as possible. Ownership to tasks and project costs is a general problem for engineering. The expectations should be better communicated and all team members should be more accountable for their performance to ensure ownership.

HMS documents for financial project tasks are only used by one respondent. The documents used are the forecasting file and Project Management Plan.

One respondent finds freight costs related to mobilisations and costs related to destruction of waste and chemicals difficult to identify. These costs occur late in a project after the field operations have been completed and it could then be difficult to have them reimbursed. Personnel costs are difficult to identify since different personnel rates, overtime or use of contractors in field operations is difficult to predict. The other respondent finds internal equipment cost difficult to identify. The rental cost towards the customer is easy to identify but the internal cost is not visible.

To reduce costs the Project Managers suggest that the first step would be to identify all costs and break them down into smaller cost elements. Furthermore the department should focus on the following activities:

- Offer financial training to all personnel with focus on cost.
- Focus on technical training of engineers to improve the efficiency.
- Establish a new commercial support function for each project team to handle financial project tasks such as forecasting, invoicing, variation orders, procurement etc. This role could replace other support functions.
- Identify the cost related to rental equipment and what type of equipment this is. Evaluate if the equipment could be purchased instead of rented.

To better capture all project costs one respondent suggests that there should be a better overview of personnel and equipment costs. The other respondent thinks that the current system which involves using a project module in SAP is a good system. Purchase orders are tracked to the project, equipment is booked against sales orders and personnel hours are booked against WBS. However, it is difficult to use the system for day-to-day or weekly monitoring and control activities and the final results will not be available until the project is completed. A project specific procurement plan makes it possible to capture costs related to purchase of equipment and materials or rental of equipment.

The Project Managers have not spent much time to make the project cost picture visible to the team members in project team meetings. One respondent thinks that it is most important to keep the revenue flowing and to make sure that income from equipment is equal to or greater to half of the total revenue to ensure a high profit. A P&L Analysis for all projects would make it easier to show actual costs and how they affect profit or loss. It would be of great value to see the costs and not only invoicing against the customers.

7.2.2.2 Project Team Members

The Project Team Members summarised their financial responsibilities to focus on minimisation of expenses and finding the best technical and efficient solutions to the best price offered by the suppliers.

One respondent stated that the greatest financial challenges related to the job role are to find suitable equipment at a decent price and to re-use equipment in stock. The other respondent stated that the greatest financial challenge is to obtain capital for purchasing of new equipment for the department (capitalisation). The process of getting investments approved is complicated and takes long time.

One respondent thinks that the general understanding of project costs within the project team is good and that all team members are focused on cost saving. The other respondent thinks that the general understanding of project costs is quite poor. Much time is spent to perform engineering when the scope is not completely clarified hence much work has to be done over again. There is not much focus to re-use existing equipment hence new equipment is procured for the project.

To improve the general understanding of costs in the department the Project Team Members suggest that the Project Managers should give a monthly presentation of project costs to make

the accumulated costs for the project visible. This way unnecessary cost can be identified at an early stage. It is also suggested to emphasise the importance of correct processes for handling of equipment backload from site. The Project Managers should present unnecessary costs and use simple examples for illustration.

One respondent thinks that the project team is currently focusing on reducing project costs and that all team members take ownership of project costs. The other respondent states that there is room for improvement but there is an ongoing focus to re-use existing equipment for current projects. If all personnel with leading roles in a project team have a continuous focus to reduce project cost this could have effect on all team members to take ownership of project costs.

One respondent finds costs related to engineering hours difficult to identify. Costs related to unexperienced personnel on site during execution of the jobs are also difficult to identify. The other respondent finds unforeseen costs such extra or unplanned mobilisations difficult to identify. These costs could typically arise if the personnel responsible for the mobilisation (internal vendors) forget to mobilise an item hence express freight will be charged to the project.

To reduce costs the Project Team Members suggest that the department should focus on the following activities:

- Reduce frequency of meetings and evaluate if all personnel invited are required to attend. This is important if a meeting requires travelling. Facilities and equipment for video conference meetings should be improved.
- Evaluate efficiency of personnel. There should be more focus on training of offshore personnel and the quality of the training courses should be improved.

To better capture all project costs one Project Team Member suggests that all project members should go through financial training to be able to report cost variances and see opportunities to save money. The other Project Team Member suggests that a fixed percentage for unforeseen costs should be budgeted for all projects, e.g. 10%.

None of the Project Team members have experienced any actions to make the project cost picture visible to their team. One Project Team Member has previously experienced a monthly presentation of project costs in a former project. This was useful to make the costs visible and should be done for all projects. The other Project Team Member suggests that there should be more focus on checking cost estimates prior to procurement or rental of equipment.

7.2.2.3 PSL Manager

The PSL Manager is responsible for all financial activities in the PSL including revenue and cost.

The PSL Manager finds the general understanding of project costs in the department poor. The reason for this could be that the former management did not have a high financial focus. If the management has a poor understanding of costs the result would be poor understanding amongst the employees.

To improve the general understanding of costs in the department the PSL Manager suggests that the main sources to revenue and the cost drivers should be identified. All personnel should understand how revenue is generated and what activities that decrease the profit. An example is purchase of cost plus items, which is a procurement method which generates minimal profit due to the administration cost. It seems to be a common understanding that this is easy money but in most cases this is not correct.

For the management to ensure continuous improvement and follow-up of the financial knowledge amongst all employees it is important to raise the financial awareness and offer training adapted to the different roles in the organisation and the degree of financial responsibility. The training should be PSL specific and be focused on daily tasks to make it easy to understand. The financial knowledge should be improved as the individual gets more responsibility and is promoted to other positions.

To reduce costs and increase profit the PSL Management plans to utilise current resources more efficiently. Salary payment is the greatest cost driver on department level and more efficient utilisation of personnel could increase revenue. A periodic use of contractors could also contribute to reduction of costs. Lump-sum projects are a great challenge due to the fact that the planned engineering hours are normally always exceeded. This could be reduced by standardisation of different documents to the customers. It is also planned to focus on technical training of the engineers the next couple of years.

The PSL Manager does not see any great focus on reduction of project costs in the project teams. When the team members do not understand the cost drivers they will not know what could be done to reduce costs. To ensure that all team members take ownership of project costs the general financial understanding should be raised through training. Generally much time that could be used on engineering is spent on internal courses which also involve a cost. Each

engineer should evaluate if the course is necessary at that time or if it could be cancelled or postponed in busy periods. This should be controlled by the Project Managers. There should also be a focus to prevent late cancellation of courses since the course fee will then be charged to the department.

The PSL Manager thinks that the employees find most of the costs difficult to understand since there has been low focus on finding cost drivers. This focus needs to be turned around and all employees should be aware of the requirements to cover the costs.

To reduce costs the PSL Manager suggests that training should receive higher focus. The training should be adapted to the different roles but everyone should be aware of the financial tasks that are performed by the other roles. All project team members should be familiar with the minimum FBOI requirement for a project. Another activity to reduce costs is to evaluate whether to lease or buy equipment.

To better capture all project costs the PSL Manager suggests that the management should challenge the project managers to improve their financial awareness and to ensure that they are aware of all cost drivers and potential cost savings. The project managers should be able to explain monthly variations of cost.

The PSL Management has not spent much time to make the cost picture visible to the employees but the plan is to focus on raising the financial awareness in the next few months.

7.2.3 Section 3: Tendering Process and Forecasting

The respondents were asked one question about what they would suggest could be done to improve the tendering process, especially related to pricing. No follow-up questions about forecasting were asked.

7.2.3.1 Project Managers

None of the respondents have any input to improvements of the tendering process, but have some suggestions to how co-operation between Business Development and Operations could be improved. One respondent suggests there should be more focus on handover of contracts to Operations. The Business Development (tendering) group will have to communicate precisely what has been included in the pricing of the contract and highlight weak spots.

The other respondent does not know the process well but suggests that more focus on technology development and increase of equipment inventory can give lower prices towards the customers and lead to more contract wins.

7.2.3.2 Project Team Member

The Project Team Members were not asked questions in this category since they are normally not involved in these processes.

7.2.3.3 PSL Manager

The PSL Manager suggests that in order to improve the tendering process the Business Development group will have to increase their technical knowledge. Today the group is dependent on technical support from Operations to submit all tenders. When the technical part of the tender is prepared the pricing can be completed. This process is often time limited hence too little time is left for pricing.

7.2.4 Section 4: Cost Estimates, Cost Reports and Variation Orders

The respondents were asked one question about improvement suggestions for cost estimate formats, cost report formats, VOR/VO formats and processes, and invoicing processes. They were also asked several questions about the following VOR/VO scenarios:

- Cases where they find it difficult to create a VOR/COR
- Project costs that could have been covered by the customer but it was forgotten to raise a VOR/COR in due time
- Examples of costs that have been captured in last minute, but should have been captured and invoiced at an earlier stage
- Examples of costs that have not been captured for a project, but have appeared after final cut-off

The last question in this section was about internal audits.

7.2.4.1 Project Managers

The Project Managers think that the cost estimate format for Statoil is easy to use and to understand and have no improvement suggestions. Cost estimates for other customers are prepared by Business Development and are not very intuitive, easy to use or presentable. There

are some issues related to the use of the document which have the potential to lead to wrong invoicing.

The cost report for Statoil is a detailed report which makes it easy to capture project costs and not much is missed. However, the disadvantage is that many single items are included and it takes much time to review and check it if the project is large. Cost reports for other customers are easy to use, but less detailed and it is easier to miss costs. One respondent suggests that the report could include all equipment items that are mobilised for a job and not only equipment spreads. Personnel costs should be included in an internal cost report.

The VOR format for Statoil is easy to use. The format for other customers often varies for each project. The Project Managers think that all of these formats should be more similar independent of customer.

One respondent thinks that the invoice process against Statoil is uncomplicated with few issues. Invoices are not returned, and if there should be any mistakes these are corrected on the next invoice. The other respondent suggests that the invoicing process could be improved if there is a dedicated person responsible for commercial issues to perform a proper check of the invoice. Today all invoices are prepared by a cost controller who has little knowledge about scope of the project. In project teams with a large number of projects ongoing at the same time the project manager does not have enough time to quality check all the invoices, hence a commercial person would be of great value.

To improve the invoicing process against other customers the Project Managers suggest that there should be higher focus to make sure all invoices are correct especially related to equipment spread pricing to prevent that the customer returns the invoices after review. This could potentially delay the income with days or weeks.

None of the respondents has any improvement suggestions to the VOR/VO process against Statoil. The process is easy to follow and is the same for all Statoil projects. For other customers the process could be improved by standardising the formats.

The Project Managers find it most difficult to create a VOR for lump-sum projects where the items of equipment spreads or package prices are poorly defined in the contract. It is then often hard to get a VOR approved by the customer. In addition to this it is often difficult to have a VOR approved for overtime for personnel.

Both respondents have experienced project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time. This has happened for lump-sum projects when mobilisation locations have been moved and for equipment that have been mobilised but the customer has not been charged. There have also been cases where project costs that could have been invoiced at an earlier stage of the project have been captured in the last minute. Some customers are also slow in the approval process. In some instances there have been project costs that have appeared after final cut-off for a project. This can happen if the supplier has a slow invoicing process, and has happened several times with disposal and transportation costs for equipment. Other examples are rental equipment that has not been returned to customer after demobilisation of equipment and engineering documents such as close out documentation that are issued late.

The Project Managers find the monthly close-out or invoicing process hectic. They do not have enough time to quality check everything and very often documentation such as personnel time sheets are missing, which could delay revenue for one month.

One respondent have been through internal audits for previous projects and finds this activity useful to identify project costs that have not been captured. The other respondent has not been though any financial audits.

7.2.4.2 Project Team Member

The Project Team Members were not asked any questions about formats for cost estimates, cost reports and VOR since they are not handling these documents in their daily tasks.

To improve the invoicing process against all customers one respondent suggests that all team members should focus more on ensuring that all costs are reported correctly. Cost Controllers should be aware of the equipment that is mobilised for a job and should always be copied on delivery notes issued from the MODEM system. The other respondent is not familiar with the invoicing process, but suggests that the Project Manager and the Project Technical Lead in a project should have detailed knowledge of the invoicing process.

None of the respondents have any improvement suggestions to the VO process against the customers, but highlight the importance of knowledge about contracts to identify potential VOs.

The Project Team Members have experienced project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time. An example is scope creep on site

which could involve additional engineering. There have also been cases where project costs that could have been invoiced at an earlier stage of the project have been captured in the last minute. This has typically been equipment on site for field operations. In some instances there have been project costs that have appeared after final cut-off for a project. This has typically been personnel costs due to late delivery of time sheets.

One respondent finds the monthly close-out or invoicing process difficult due to short deadlines and lack of training. The other respondent is not familiar with this process but comments generally based on experience from project closure. More time should be spent to evaluate each project both technically and financially.

7.2.4.3 PSL Manager

The PSL Manager is not deeply involved in the all the financial processes on project level, and only gave a general comment to the questions of this section.

All Project Managers should communicate closely with contract managers and Business Development prior to issue of a VOR. The Project Managers should improve their knowledge about contracts and how to price a VOR. There should be more focus on internal audits.

7.2.5 Section 5: Equipment, Mobilisations and Resource Efficiency

The respondents were asked questions about equipment, equipment mobilisations and resource efficiency. This included questions about how extra mobilisations could be reduced, how costs related to extra mobilisations could be made more visible to the team members, use of cost plus vs. day rate items, costs related to rental equipment and the use of this equipment, as well as resource utilisation.

7.2.5.1 Project Managers

The Project Managers have the following suggestions to reduce extra mobilisations for a project:

- Identify the reason to all extra mobilisations and find recurring issues to be able to avoid the same problem in the future. If the problem is shortage of equipment more items should be included in the main mobilisation.
- Training of engineers who write operational procedures. The engineers should always check a MODEM before it is submitted to internal vendors.
- Create detailed rig-up drawings to show equipment required for the spread.

To make costs related to extra mobilisations more visible to the team members one respondent suggests that they first need to know how costly the main mobilisation is. For the customers that do not pay the freight cost Halliburton is paid a lump-sum price, which might not be large enough to cover the costs. This is also applicable to extra mobilisations, except that Halliburton might not get paid at all if an extra mobilisation is caused by reasons controlled by Halliburton such as shortages or failure of equipment. The other respondent states that the cost is currently not visible to any team members but it should be made visible.

Both respondents have cost plus items for their projects since this is often requested by the customer. One respondent focuses on minimising the use of cost plus items to risky items only, i.e. equipment where the rental period is short, if the equipment is project specific and cannot be re-used for future projects, or if it assumed that the equipment would generate less revenue on day rate. The other respondent have had cost plus items due to short delivery deadlines. The normal fee is cost plus 10%, but when possible engineering costs are added to the price.

To reduce the use of cost plus items in the department the Project Managers suggest that the amount of cost plus purchases should be quantified to be able to evaluate if it would be more profitable to invest in new equipment based on estimated days of operation and if the equipment can be re-used for future projects. Sometimes it cannot be avoided if the customer wants to have equipment on cost plus.

The Project Managers mention manifolds, valves and other temporary items as cost plus items that could have been day rate items instead.

Both respondents have experienced that rental equipment often generates unnecessary costs due to the practice of receiving the equipment from the suppliers many days ahead of the mobilisation date. Internal checking and packing of equipment is required, but these days are not paid by the customer and can generate high costs. There is also a high focus to return rental equipment to the supplier as soon as it is received at the base.

The Project Managers have often experienced that equipment is damaged during operations. This is typically hose deployment equipment, fittings or pump units. Suggestions on how to reduce the damage are to make standard procedures for handling of major equipment and focus on proper maintenance programs and check of the equipment prior to mobilisation for a job.

To reduce the use of rental equipment the respondents suggest that there should be more focus on lease vs. buy evaluations. Some equipment would require maintenance personnel which would make it more expensive to buy. There should also be more focus to optimise an inventory list to be able to see equipment in stock. Sometimes equipment is rented even though this is items that already are in the inventory. There is currently a high focus to return rental equipment to the suppliers as soon as it returns from field operations and a new person has recently been hired to handle return of rental equipment. To be able to handle the return faster it is important that field personnel prepare correct back-load documentation and that the equipment planners send a proper overview of rental equipment so that this can be backloaded in the same container.

To communicate and make the importance of fast return of rental equipment visible to all project team members and field personnel one respondent thinks that the rental costs should be communicated. The project lead onshore has daily contact with field personnel during operations and could communicate this. The other respondent does not think that field personnel should focus much on cost rather than operational tasks, but proper inventory lists would improve the return process.

To utilise contractor resources more efficiently one respondent suggests that the contractors should be available the entire work week and not work weekends. Generally the contractors are experienced and should have more time for quality check of the engineering performed and training of inexperienced personnel. The other respondent suggests that to use resources more efficiently the project managers need to make sure that the right contractor is used for the right task and that the contractors own their tasks. This is general for all resources and not only contractors.

7.2.5.2 Project Team Member

The Project Team Members have the following suggestions to reduce the amount of extra mobilisations for a project:

- Proper equipment planning and review of MODEM lists prior to mobilisation of equipment. MODEM should have the same requirements for review as engineering documents. The person who is checking the MODEM should also review the operational procedures to ensure that the equipment is fit for purpose. The project lead should ensure that this is done.

- When additional equipment is requested from offshore this should be evaluated prior to performing an extra mobilisation. The field personnel might not be aware of the extra cost related to the extra mobilisation and might not be able to see alternatives for rig-up of equipment.
- Improve communication with internal vendors and perform an annual meeting every spring to prepare for upcoming jobs and mobilisations.
- Train internal vendors to give them an understanding of the consequences of poor mobilisations such as missing items, late mobilisations, poor maintenance and equipment preparation.

To make costs related to extra mobilisations more visible to the team members both respondents think that the cost should be communicated in project meetings. One way to make the costs more visible to the team members is to show the expected profit for the project and then show how much the extra mobilisation will or already have already affected the profit.

Both respondents have cost plus items for their project but there is a focus to minimise this and mobilise existing equipment on day rate instead. Equipment that is project specific and cannot be used for future projects is usually cost plus items. Sometimes cost plus items can be profitable since some of the customers do not have any storage after the project is completed, hence Halliburton can take over the equipment and use if for other projects on day rate.

To reduce the use of cost plus items in the department the respondents suggest that Halliburton should invest in more equipment.

The Project Team Members mention pig traps, manifolds, x-overs and spools as cost plus items that could have been day rate items instead.

Both respondents have experienced that rental equipment has high day rates and gives low profit. Some equipment that previously has been rental items has now been purchased to be day rate items instead. Some equipment still has to be rental equipment due to maintenance requirements.

The Project Team members have often experienced that equipment such as fittings and hose couplings is damaged. One respondent suggests that field personnel should have more training in financial consequences of improper handling of equipment. Both respondents suggest that the type of fittings used should be re-evaluated, and that permanent manifolds should be used to minimise the use of fittings.

To reduce the use of rental equipment the Project Team Members suggest investing in more equipment. Field personnel have to feel ownership and handle the equipment in a better way, as well as being aware of financial consequences of damaging equipment and not doing a proper backload. Inventory control should start the day that equipment arrives at site. When equipment is mobilised it is important that it is packed in suitable containers or pallets that can be used for demobilisation at the end of the field operations. When equipment is demobilised and arrives at the Halliburton yard there is no system for handling of containers, which means that containers with rental equipment can be blocked and rental equipment cannot be handled immediately. If the yard personnel are busy they will always prioritise mobilisation of equipment and not backload, hence rental equipment could remain in the yard and give extra cost for several days until it is returned. There should be a proper system for handling of containers at the yard and dedicated personnel to handle the backload. A scanning system to ease the process is currently evaluated.

To communicate and make the importance of fast return of rental equipment more visible to all project team members and field personnel it is important to highlight the costs and reduction in profit by using specific examples. This should be communicated by financial personnel in annual service quality meetings for all personnel but could also be a part of the monthly HSEQ presentation for field personnel which is distributed to the leader on site.

To utilise contractor resources more efficiently one respondent suggests that the competence should be spread in the different project teams. The contractors should have more responsibility and the schedule should be optimised. The other respondent does not have any suggestions and thinks that most of the current onshore contractors are more efficient than other staff personnel.

7.2.5.3 PSL Manager

The PSL Manager has the following suggestions to reduce the amount of extra mobilisations for a project:

- Identify the cause of all extra mobilisations to be able to prevent recurrence.
- Develop the current equipment planning system (MODEM) to communicate with CAD system to generate automatic rig-up drawings and P&IDs with inventory list included.
- Start to use 3D drawings to better visualise equipment required for the rig-up.

To make costs related to extra mobilisations more visible to the team members the PSL Manager suggests that performance reports could be distributed to all project managers each month after cut-off. This would give each team a monthly target to work for.

To reduce the use of cost plus items in the department the PSL Manager suggests that Halliburton should invest in more equipment and focus on having equipment on day rate.

The PSL Manager has often experienced that equipment such as fittings, valves and hose deployment equipment is frequently damaged. There should be more focus on correct handling of these items.

To reduce the use of rental equipment the PSL Manager suggests that there should be more focus on lease vs. buy evaluation. The equipment planner or the PSL accountant should identify rental equipment and do an evaluation if it would be more profitable to buy these items. One person is already hired to handle rental equipment and to ensure faster return, this has already given improvements after one month. To better handle equipment there has to be good systems to make this possible. Containers for storage of iron have been made to ease the handling and to make it easier to keep a good inventory. This will also help the backload process and ensure faster return to the suppliers.

There should be focus on communicating the importance of fast return of rental equipment more often to the field personnel. During backload the following things should be in focus: proper backload documentation, correct packing and marking of containers with iron and other rental equipment, and ensure that all containers that were mobilised are demobilised.

To utilise contractor resources more efficiently the PSL Manager suggests that the use of contractors should be based on periods of high activity in engineering. These periods should be predictable to get the same competence each year.

7.2.6 Section 6: Non-Productive Time and Cost of Poor Quality

The respondents were asked questions about Non-Productive Time (NPT) and Cost of Poor Quality (COPQ). This included questions about NPT for field operations that Halliburton had to pay for, suggestions to avoid NPT, experience with COPQ in current or earlier projects and how COPQ could be reduced.

7.2.6.1 Project Managers

One respondent has experienced NPT for field operations that Halliburton had to pay for. This was related to rental equipment that failed and had to be changed out. Halliburton did not get paid for equipment or personnel during this period of NPT, hence this affected the revenue of the project. The other respondent has experienced downtime but this was not classified as NPT and Halliburton did not have to pay for the downtime.

The use of NPT amongst the customers has increased and to avoid NPT in the future the Project Managers suggest that there should always be 100% back-up and spare parts for all critical items. It is important with a proper maintenance and check of equipment prior to mobilisation to ensure that the equipment is reliable.

Only one respondent has experienced COPQ for current or earlier projects, and this was related to internal cost.

To reduce COPQ one respondent emphasise the importance of reliable equipment. The other respondent states that COPQ is most often caused by poorly engineered jobs, poor mobilisations or equipment that is inadequate to perform the job in a good manner. To reduce COPQ there should be focus on proper planning and engineering and not to waist necessary resources.

7.2.6.2 Project Team Member

The Project Team Members have experienced downtime for field operations, but this was not classified as NPT and Halliburton did not have to pay for the downtime.

To avoid NPT in the future the Project Team Members suggest that there should be focus on training of personnel to ensure correct competence for all jobs, training of leading personnel in customer in dealing with customers and development of new equipment that is fit for purpose. One respondent also suggests that field personnel should be more involved in pre-mobilisation activities onshore.

Only one respondent has experienced COPQ for current or earlier projects. This was related to conditions uncontrollable by Halliburton affected the operational performance and caused the pumping flowrate to fall below the planned rate.

To reduce COPQ the Project Team Members emphasise the importance of proper planning, training of personnel and equipment fit for purpose. All personnel should feel ownership to the operations and contribute to a team. Costs should be communicated as soon as they appear, and

incidents should be documented for experience transfer. There should be a greater focus on communicating examples of good quality performance, then both NPT and COPQ could be reduced.

7.2.6.3 PSL Manager

To avoid future NPT the PSL Manager suggests that there should be focus on documentation of all field activities in daily reports. Generally there is not much downtime caused by Halliburton, and the documentation will make it easy to see the causes of downtime and that Halliburton could not be held responsible for NPT.

To reduce COPQ the PSL Manager emphasise the importance of following procedures during field operations. COPQ is currently only reported if it is external and affects the customer. Internal COPQ is not reported, but this could be done to avoid similar situations in the future.

7.2.7 Section 7: Lease vs. Buy, Business Case and Project Final Account/Job Profitability

The respondents were asked questions about lease vs. buy evaluations, business case and project final account/job profitability. This included questions about methods used for evaluation to decide whether to lease or buy equipment, when a business case is performed, weaknesses and improvement suggestions for the lease vs. buy evaluation, how final accounts for a project could be beneficial, suggestions for how to increase job profitability and other improvement suggestions on how to reduce costs and increase profit.

7.2.7.1 Project Managers

The Project Managers use the same method to decide whether to lease or buy equipment. This involves looking at the duration that the equipment will stay on a job and what it would cost to rent the equipment. Most of the projects have too short duration to justify new investments. If it is equipment that could be re-used for future projects it should be evaluated how much it will be used. Items that would generate low profit will often be cost plus items.

Only one respondent has performed a Business Case and this was related to new investments or tenders.

The Project Managers think that the lease vs. buy process is slow, and often when a decision is taken to buy the immediate need for equipment is gone and the equipment has been rented instead.

Both respondents think that final project accounts and P&L Analysis would be beneficial for all team members to see if the project generates profit or loss, and what could be done to increase profit and prevent loss. It would also be useful to see the direct and indirect costs that are allocated to the projects. Currently these costs are allocated based on the revenue of the project and do not take the resources spent for each project into consideration. The final project accounts should be detailed to be able to track all costs.

To increase job profitability and reduce overall costs the Project Managers have the following suggestions:

- Invest in more equipment to reduce the use of expensive rental equipment.
- Avoid using rental equipment if the equipment is already available in the inventory. This should always be checked.
- Focus on technology development to get equipment that is purpose build for the jobs.
- Focus on training of personnel to increase efficiency and ensure high quality engineering.
- Increase utilisation of equipment since equipment is the revenue driver.
- Always focus on possibilities for extra revenue, charge for as much as possible and raise VOs for lump-sum projects.
- Ideally change out personnel for field operations every 14 days to avoid extra costs for overtime.
- Focus on personnel retention to avoid extra costs for training of new employees.

7.2.7.2 Project Team Member

To evaluate whether to lease or buy equipment the Project Team Members focus on utilisation of the equipment in the project and re-use for future projects. The prices of new equipment investments are then compared with rental prices.

One respondent performs business cases for new investments above 50 000 NOK. The other respondent has not performed any business cases, but evaluates and compares offers from suppliers. The project manager usually decides whether to lease or buy.

The Project Managers think that the lease vs. buy process is complicated. One respondent suggests that it should be possible to take over equipment from the supplier after long period rental agreements to make rental more beneficial.

Both respondents think that final project accounts and P&L analysis would be beneficial for all team members to provide learning and to avoid similar mistakes for future projects. The accounts should be presented after cut-off for a project when all costs are captured. Every team member would then be able to get an impression of their own performance.

To increase job profitability and reduce overall costs the Project Managers have the following suggestions:

- Standardise project support documents and put create more standard equipment spreads to make the engineering more efficient.
- Improve training of onshore and offshore personnel.
- Invest in equipment to reduce use of rental equipment.
- Dedicate personnel to projects to increase ownership.

7.2.7.3 PSL Manager

The PSL Manager thinks that the PSL Accountant should handle all lease vs. buy evaluations together with the equipment coordinators. All employees should be aware of the reason to rent equipment. There are costs related to new investments, the equipment might require support and maintenance hence it may not be profitable to buy vs. lease.

The PSL Manager thinks that a Business Case should be performed every time someone has an idea to new investments.

One weakness with the lease vs. buy process is that personnel find it more profitable to own equipment rather than to lease, and do not consider evaluation criteria required to decide whether it is profitable to buy or not. Full cost method including the real cost, opportunity cost and the external synergy effects should be evaluated to make a proper decision in the lease vs. buy process. The external synergy effects may include evaluation of the reactions from competitors if Halliburton buys lots of new equipment, especially related to pricing of tenders. It is also important to evaluate if it is possible to rent the equipment out to other departments or companies.

The PSL Manager thinks that final project accounts, P&L Analysis and financial reporting on project level would be beneficial for all team members. It would also be beneficial for the Business Development group to evaluate if the pricing of jobs is correct.

To increase job profitability and decrease overall costs the PSL Manager summarises the following suggestions:

- Offer financial training to all employees relevant for their role.
- Focus on utilisation of current resources.
- Reduce costs related to extra mobilisations by mapping the causes to avoid future events.
- Distribute monthly performance reports to the project teams to give the team members goals to work for.
- Improve equipment planning processes by developing design solutions (integration of MODEM in rig-up drawings and P&IDs.
- Maintain high focus on correct backload routines to avoid unnecessary costs related to rental equipment.

8 ANALYSIS

This chapter includes the analysis of the literature and the results presented in the Thesis and how this information can be used to answer the Thesis problem statement, as well as accomplishing the main goal and the sub-goals of the Thesis. The following Thesis Problem Statement was presented in the introduction:

How can the financial awareness amongst project teams be increased to reduce the project costs in Halliburton Pipeline & Process Services Scandinavia?

To be able to answer the Thesis Problem, the following main goal was established:

Identify suggestions for improvement to increase the financial awareness amongst the project teams to reduce project costs in Halliburton Pipeline & Process Services Scandinavia.

To reach the main goal, three sub-goals were defined as follows:

1. Describe project management and financial aspects of a project based on existing literature and how this is applied in Halliburton PPS Scandinavia. This includes contract formats, estimating and budgeting, cost control, change management and project cost drivers.
2. Describe the financial awareness amongst the project teams through a survey and interviews. From this, suggestions for improvement to increase the financial awareness to reduce project costs should be identified.
3. Describe a Case Study of a project to identify cost drivers and cost overrun by performing a financial analysis. From this, suggestions for improvement to reduce project costs and to increase the financial awareness should be identified.

The chapter is divided into three parts, each representing a sub-goal of the Thesis. All of the sub-goals have contributed to identifying suggestions for improvement to increase the financial awareness to reduce the project costs in Halliburton PPS. These suggestions are the basis for the recommendations presented in the conclusion in Chapter 9.

8.1 Project Management and Financial Aspects of a Project

The study of the literature made it possible to analyse how project management is performed in Halliburton PPS and how financial aspects of a project including contract formats, estimating and budgeting, cost control, change management and cost drivers are applied.

Halliburton PPS Scandinavia has several tools for successful project management. The BC Project Management Handbook, described in Chapter 4.1 *PPS Project Management and Financial Aspects of a Halliburton PPS Project*, uses several concepts from the project management theory presented by Gardiner (2005) and Karlsen (2013) in Chapter 3 *Project Management and Financial Aspects of a Project*. This should be used as a guide for all project team members, especially the Project Manager. However, the Pipeline & Process Services Scandinavia HMS homepage which is described in Chapter 4.1.2, *The Halliburton Management System and the 7 HMS Mainstays*, could be assumed to be the most valuable tool for successful management.

Since most of the customers of Halliburton PPS have project specific contract formats with a varying cost-reimbursable/lump-sum ratio it can be difficult for the project team members to be aware of the variations in compensation format and the basis for the pricing in the cost estimates. The compensation format and the extent of the work packages should be clearly defined in order to avoid exceeding the cost estimates and generating additional costs that could not be reimbursed to the customer. The most favourable contract format to reduce costs and increase profit of a project is assumed to be the format used for reimbursable projects. As described by Dimitri, Piga, and Spagnolo (2009) the supplier bears the highest risk in a lump-sum contract and may end up using more resources than planned to complete the project in time. This is assumed to be the greatest challenge with the lump-sum contracts in PPS.

As described by Karlsen (2013) thorough cost estimates should be established in order to be able to evaluate and get an indication of the project work. Some of the cost estimates in Halliburton PPS are complex documents and the results from the survey and the interviews have indicated that these estimates are challenging for the employees to understand. When such an estimate which is not very intuitive is used as the baseline estimate throughout the project, there is a potential for wrong invoicing which can lead to revenue being lost. Specific training in cost estimation using these estimating documents in conjunction with the project contract may increase the understanding amongst the employees and the likelihood of correct invoicing will

increase. A more user-friendly and simplified workbook which is easier to understand for the majority of the users could have the potential to increase knowledge and awareness of project costs, as well as ensuring that all costs that could be invoiced to the customer are captured. If the project costs are not invoiced the result will be less revenue and increased projects cost, leading to lower profit and FBOI of the project.

The theory states that a well-designed cost estimate can function as a reference for follow-up and control throughout the project life as they can be used as a basis to compare actual costs against the forecasted costs (Karlsen, 2013). Some of the cost reports in Halliburton PPS include actual costs to the customer, as well as project baseline estimate and all current VOs. These cost reports, which are using EVA, are found to be useful for cost control as they show the accumulated invoiced costs, % invoiced and estimated remaining costs. This may also help the project to raise VORs prior to overrunning the baseline estimate.

For lump-sum projects this type of invoicing and cost overview is not shown. These projects use a simplified invoicing worksheet which only contains the current costs of the month and the accumulated costs, but is not related to the estimates. The results from the survey and the interviews have indicated that this makes it harder for the project to keep track of the remaining estimated costs and the agreed costs for the project, which may have a negative effect of the control and follow-up of these projects. An upgraded version of this workbook with an additional sheet that include all estimated values split between baseline and VOs, as well as actual numbers compared with the estimate, will most likely enhance the cost control of these projects and may increase the project revenue.

The projects using this workbook are normally associated with equipment spread package prices and management and engineering work package prices. The low complexity of this document, compared to the corresponding worksheet including prices for all resources, makes it easier to check and missed costs might be spotted more easily. Any costs which are not invoiced will cause less revenue and increased costs for the project. It is therefore important that the estimation formats and the cost report formats are fully understood by the personnel responsible for the cost control.

The theory also recommends the use of budgets for enhanced cost control and Gardiner (2005) describes that a cost and schedule control system can perform various calculations and comparisons to determine how a project is progressing with respect to the plan. Halliburton PPS

does not prepare budgets on project level as they are time-consuming and considered difficult to control due to the frequently changing factors of equipment and personnel available.

As described by Gardiner (2005) a Cost Breakdown Structure (CBS) can be created to help communicate, manage and control cost and budget aspects of a project. Halliburton does not use CBSs for the projects, however this should be considered to be used in order to increase the visibility, knowledge and awareness of the project costs amongst the project team members and support personnel as it could contribute to reducing the project costs.

Blocher et al. (2008) state that cost drivers are critical elements which are important to identify for a project. The internal cost drivers for the PPS projects are not estimated and are not shown in any reports before the P&L analysis is established for some projects post closure. The results from the survey and the interviews have indicated that the visibility and awareness of the cost drivers are low and that communication of theses to the project teams from the initiation phase of the project could potentially increase the awareness and contribute to the reduction of costs. This could increase the profit and the FBOI of the project.

Since labour costs often are a large part of the project costs it is important to evaluate the personnel efficiency and productivity. The results from the survey have indicated that resource efficiency could be improved. However, as identified form the survey results most of the technical groups have a short length of service in Halliburton. The efficiency and productivity of unexperienced personnel can be expected to be low. Overtime and labour cost related to use of contractors is expensive and will most likely have a negative impact on the profit and FBOI of a project, hence the utilisation of staff personnel should be optimised to reduce project costs. The r

The results from the interviews and the Case Study have shown that equipment cost related to rental equipment is a large cost driver. Halliburton equipment should always be the first choice if available before rental from other departments or external suppliers. There should also be a focus to reduce the use of cost plus items since most of these are not gaining any profit for the project. To increase the revenue of such items it should be evaluated if there is Halliburton equipment in stock that could be used or if a day rate price could be agreed with the customer instead of cost plus. Day rate is only preferred if the duration of the field operations is long enough to cover the procurement cost of the item.

For lump-sum projects including equipment spread packages there is a risk that the packages do not contain all the necessary equipment for the operation and extras need to be mobilised without

getting paid. There is also a risk that work packages for engineering do not include enough estimated engineering hours to complete project documents within the time frame given. In such cases VORs are to be created to increase the project revenue to cover these extra costs. However, sometimes this is found to be difficult for such projects, e.g. if the items of the equipment spread package are poorly defined in the contract and the customer will not approve the VOR. It is also often difficult to have a VOR approved for overtime for personnel and in these cases it is important to ensure experience transfer to BD to help improving the tendering process.

The time required to complete a task is an important factor when predicting the project costs and it is therefore important to understand the cost-time relationship. Shortening the project may cut the indirect costs but it may also increase the direct costs if it means that more resources are needed.

The project management process including the HMS with all relevant process maps, work methods, guidelines and checklist related to financial tasks should be known by the project team members to increase the financial awareness amongst the project teams and to reduce the project costs in Halliburton PPS Scandinavia.

8.2 Current Financial Awareness amongst the Project Teams

The results from the survey and the interviews made it possible to analyse the financial awareness amongst the project teams and to identify suggestions for improvement that could be used as recommendations to Halliburton PPS.

It has been evaluated if some of the questions in the survey could have been formulated differently or omitted, and if other questions could have been added. Since some of the questions were related to the overall knowledge of the project team this could cause variation in the results since there are four project teams. To increase the precision another level of accuracy could have be introduced by sorting the respondent in project teams to get a better overview of the financial awareness within each team. However, the survey gave information about the current financial awareness and all roles of a project including support personnel were represented amongst the respondents.

In addition to the results from the survey the interviews provided comprehensive information about the topics covered in the survey. Even though a large amount of opinions and improvement suggestions have been presented in the results, it is important to emphasise that these are

personal opinions and might not be relevant or feasible to implement and should be validated by the PSL management.

The results from the survey indicate that many of the respondents find the understanding of project costs in their team either quite poor or neither good nor poor. This could make it difficult for the Project Manager to have commitment from the project team member as well as leading the group. However, more than half of the respondents quite agree that all team members take responsibility to reduce project costs. This could indicate that there is a large focus on reduction of project costs, but it could be assumed that the poor knowledge and understanding amongst certain roles could limit or prevent the identification of costs and the potential to reduce these.

To ensure that all project members take responsibility to reducing project cost it is important that they have knowledge of the cost drivers and attend appropriate training courses adjusted to their tasks and responsibilities. This could then have the potential to reduce the project costs further.

The structure of the organisation with four project teams and support functions with different roles as presented in Chapter 2.4 *Tasks and Responsibilities* is assumed to have an impact on the financial awareness. An assumption when stating the work with the Thesis was that the financial awareness varies amongst the project team members due to the different tasks and responsibilities related to the roles, as well as their length of experience.

Amongst the commercial groups the Service Planners could be assumed to have more knowledge of invoicing and cost control than the other groups. The members of the BD group could be assumed to have knowledge of the tendering process, contract formats, cost estimation and the cost drivers of a project. The Project Managers could be assumed to have good knowledge of the project management processes, contract formats, forecasting, cost estimating, cost control, change management and the cost drives of a project. These assumptions have been confirmed by the results of the survey and the interviews, although there are some variations within the groups that can be assumed to be caused by variation in length of experience for the individuals.

The results from the survey indicate that the technical groups tend to have the least knowledge of the tendering process, forecasting, cost estimates, cost reports, variation orders, COPQ and project accounts. To be able to reduce project costs it is important that all employees are aware of the factors that affect revenue, cost and profit of a project, as well as how they can contribute to reducing costs. However, the extent of the financial knowledge required for the different groups should be evaluated, as it should not be necessary for all the personnel that do not

perform financial tasks regularly to have the same knowledge as the Project Managers or the Service Planners.

To be able to increase the financial awareness to reduce project costs, the technical groups should increase their knowledge of the project management processes, the tendering process, cost estimating and contract formats, cost control, change management and cost drivers.

Knowledge of the project management process should include basic knowledge of the activities performed for each phase of the project and use of the HMS.

Knowledge of the tendering process, cost estimates and contract formats should include basic knowledge of how bidding is performed, the basics of the different contract formats and how they vary with the customer. The cost estimates should be understood and the team members should be aware of the services and equipment that are included in the prices. The necessary information in the contract of the projects they are a part of should also be known, such as scope of work, deliverables, milestones, penalties and compensation format. Some of the project teams might have several projects for different customers ongoing at the same time. It would then be of great value to be aware of the differences in the contracts to be able to prioritise planning and utilisation of resources.

Since many of the contracts involve lump-sum for engineering and day rates for equipment spread packages instead of single items pricing, it is critical to be aware of the services or items which are included in these prices. This has been highlighted in the interviews by the Project Managers as one of the greatest challenges related to project management. To reduce costs the technical personnel should be aware of the consequences of using more engineering hours than what is included in the estimates, as overrun of these estimates will increase the labour cost which will affect the profit of the project if a VOR is not crated. If more equipment is mobilised for a job than the equipment that is included in the day rate for the package, this will increase the equipment cost and have a negative effect on the profit of the project.

Cost control is an important and critical part of each project which can prevent estimate overruns and should therefore be visible to all employees. Knowledge of cost control and change management should include basic knowledge of the information required for correct invoicing, the causes of changes, how a change should be handled and when a VOR should be made. The results from the survey indicate that changes can occur for all phases of a project, hence there should be a continuous focus on raising VORs.

Knowledge of cost drivers should be related to identification of cost drivers for the specific projects in the project team, as well as how they can be controlled and reduced.

The results from the survey show that technical the groups have not received any training to see the relationship between revenue, cost and profit. Halliburton offers a lot of financial training courses as described in Chapter 4.1.4 *Financial Training in Halliburton* and this should be offered to the employees who are assumed to benefit from this.

To be able to raise the financial awareness the results from the survey and the interviews have indicated that the main sources to revenue and typical cost drivers should be made more visible to the project team members. This includes costs related to extra mobilisation, personnel costs related to engineering and field activities, as well as equipment costs.

The results show that the Project Managers should make the cost picture more visible to the team members since this is something that is requested by the project team members. This would first require the Project Manager to have this knowledge. A P&L Analysis would make it easier to show actual costs and how they affect profit or loss.

The results from the survey and the interviews have made it possible to analyse the financial awareness amongst the project teams and have generated a large amount of improvement suggestions to increase the financial awareness to reduce project costs in Halliburton PPS Scandinavia. These are presented as recommendations for improvement Chapter 9.2 *Recommendations to increase the Financial Awareness amongst the Project Teams in Halliburton PPS Scandinavia*.

8.3 Financial Analysis of Case Study

The Case Study made it possible to identify cost drivers and causes of cost overrun for a project by performing a financial analysis using information from cost estimates, forecasts, cost reports and Profit & Loss Analysis. This Case Study could be assumed to be a valuable tool to increase the understanding of project cost drivers, cost control and change management.

The results from the survey indicated that most of the project team members find it difficult to identify project costs. To be able to increase the financial awareness it is important to be aware of the cost drivers of a project. Management of key cost drivers is essential for the success of the project. The financial analysis in the case study identified personnel cost as the largest cost driver. Halliburton PPS are aware of the low profit for personnel when creating the cost

estimates and this is expected according to the description of labour costs in Chapter 4.6 *Project Cost Drivers in Halliburton PPS*. However, it is expected that equipment revenue will increase the profit of a project. When the cost of equipment rental is high the profit for equipment will be reduced. This has been the situation for this project, since rental equipment cost was identified as the second largest cost driver. The high costs in these cost groups resulted in a very low profit for the project as well as a negative FBOI after allocation of department costs.

There could be many reasons to high labour costs, such as overtime, use of contractors, unexperienced or inefficient personnel, as well as wrong priority and utilisation of resources. To increase the efficiency of the personnel there should be focus on financial and technical training, standardisation of similar documents that are frequently used and ownership of tasks.

There was a high number of planned mobilisations and extra mobilisations for the project in the case study. To increase the financial awareness and to reduce project costs it is important that all project team members are aware of the high costs related to a mobilisation, especially an extra mobilisation. As the extra mobilisation will induce both labour cost and probably express cost for freight, this will reduce the profit of a project. To avoid these costs it is important to identify the cause of each extra mobilisation for the purpose of experience transfer and avoiding recurrence. Spread design is important and there should be a higher focus on proper equipment planning. It should always be evaluated if an extra mobilisation is required or if the issue could be solved on site by small adjustments to the spread.

Some of the equations from the EVA presented in Chapter 3.4.2 *Earned Value Analysis* were used for the financial analysis to show the variance between forecasted values and actuals, as well as % Outstanding estimate and % used of estimate for the baseline estimate, the total sum of VOs and the total of baseline + VOs. This could be a valuable method for cost control throughout the lifecycle of the project.

The results from the P&L analysis showed a low job profit and a negative FBOI. This format could be expected to be of great value to make the project cost drivers visible to the project teams. A project ending up with a negative FBOI will generate cost to the department instead of revenue, leading to unprofitable business. To avoid this scenario and to increase job profitability there should be a continuous focus on possibilities for extra revenue and creation of VOs, as well as minimisation of all the known cost drivers. The P&L analysis should be performed shortly

after the closure of the project to ensure that the project team members still remember the recent issues related to the project.

The results from the Case Study is assumed to be valuable experience transfer as well as a useful example to present to the project team members to increase the financial awareness to reduce project costs in Halliburton PPS Scandinavia.

8.4 Further Research

Since the time frame for this study has been limited some constraints were defined in Chapter 1.2.2 *Constraints*. To improve the financial awareness and reduce project costs further research could involve obtaining more detailed information of the cost drivers related to the Case Study, as well as preparing P&L analysis for both closed and ongoing projects. A follow-up survey could be distributed to the project teams and support personnel after the recommendations for improvement have been implemented to document increased financial awareness.

9 CONCLUSION & RECCOMENDATIONS

9.1 Conclusion

This Master's Thesis has described the financial awareness amongst the onshore project teams in Pipeline & Process Services Scandinavia. Financial awareness has been defined as knowledge of project revenue, cost and profit and the aspects that can affect these. This includes project management, contract formats, cost estimation, cost control, change management and cost drivers.

The Thesis concludes that the financial awareness amongst certain project team members should be improved to be able to reduce project costs, with knowledge, training and visibility being important factors to accomplish this. The Thesis Problem Statement has been answered by achieving the main goal and the three sub-goals, resulting in the recommendations of 37 suggestions for improvement to increase the financial awareness and to reduce project costs for Halliburton PPS. In addition the recommendations could possibly contribute to a more efficient and productive working environment.

The recommendations for improvement have been identified based on the information about the Company, the theory, the Case Study, the results including suggestions for improvement collected from the interviews, as well as the analysis. They have been critically evaluated based on the knowledge obtained through this study and are considered to be important to increase the financial awareness amongst the project teams to be able to reduce project costs in Halliburton Pipeline & Process Services Scandinavia. However, they should be verified by the PSL management prior to an implementation. Some of the recommendations will be easy to implement, while others may require more planning.

The following two sections will present the recommendations to increase the financial awareness and to reduce project costs, respectively. Some suggestions might be relevant for both sections, but will only be mentioned once.

9.2 Recommendations to increase the Financial Awareness amongst the Project Teams in Halliburton PPS Scandinavia

The following recommendations are intended to help the department to increase the financial awareness amongst the employees and to make project revenue, costs and profit more visible.

1. Create an HMS document such as a work method, guideline or checklist for financial awareness that presents methods to increase revenue and reduce cost in all phases of a project, including responsibilities and what the different roles of a project team should be aware of.
2. Ensure that existing process maps, work methods, guidelines and checklists in HMS for commercial tasks are used by all roles that perform such tasks. This includes, but is not limited to, the process map *Cost Control - PM-SCA-HAL-PPS-101*, which links to all relevant work methods, guidelines and checklists for invoicing, cost control and forecasting.
3. Increase focus on proper handover of contracts from Business Development to Operations to ensure that all project team members are aware of the scope of work, compensation format and the degree of cost-reimbursable/lump-sum work packages, milestones and penalties. Ensure that the contract is reviewed and understood by the technical groups before starting any detailed engineering.
4. Define the level of financial knowledge required for each role in a project team to be able to create a training plan, course or workshop adjusted to the required level of knowledge.
5. Offer general financial training to all onshore personnel to increase the financial awareness. It should be recommended by management for all project team members to enrol minimum the following courses in Halliburton University:
    a. Basic Costs for Non-Finance Personnel
    b. Basic Contract Price Database
    c. Basic Contract Management for Operations and BD
6. Offer PSL specific financial training to all onshore personnel which should be focused on the daily tasks for the different roles and how they can contribute to increase revenue and reduce costs.

7. Offer as a minimum the courses *Delivering Financial Performance* and *BLD I* course to all PSL Managers and Project Managers.
8. Make project revenue, cost and profit and the factors that affect these more visible to all project team members. The understanding of direct and indirect cost drivers, as well as P&L analysis, profit and FBOI, should be increased in order to prevent cost overruns. This could involve presentations in:
    a. Weekly project meetings for all team members and support functions of a project.
    b. Monthly HSEQ presentation for field personnel.
9. Make PSL and Sub-PSL revenue, costs and profit and the factors that affect these more visible to all employees. This could involve presentations in:
    a. Bi-weekly operations meetings for all onshore personnel.
    b. Monthly newsletter distributed to all personnel.
    c. Annual service quality meetings for all personnel.
10. Establish a new commercial support function for each project team to handle commercial tasks such as forecasting, invoicing, variation orders, procurement etc. This function should be responsible for making project costs more visible to all employees.
11. Ensure that new trainee engineers receive both technical and financial training and are followed-up to give a faster progress to be more efficient and generate revenue as early as possible.
12. Create a Cost Breakdown Structure (CBS) for the internal costs for each project to structure the costs and make them more visible to the project team.
13. Focus on forwarding invoices to the Customer as soon as they have been received by Halliburton PPS, as well as chasing invoices which should have been received before project closure and final cut-off.

9.3 Recommendations to Reduce Project Costs in Halliburton PPS Scandinavia

The following suggestions have been identified to control and reduce project costs in Halliburton PPS Scandinavia:

1. Prepare Profit & Loss Analysis for all projects. A template should be created and made available on the HMS. A provisional P&L Analysis should be prepared in the initiation phase of the project and should be updated regularly throughout the project life to allow the project to compare revenue vs. direct costs to control the profit of the project. The

general factor for cost allocation for the current year should then be used to estimate the FBOI.

2. Create an additional sheet in the existing invoicing workbook for lump-sum projects to increase the internal control and follow-up of the invoicing process. The sheet should include columns for baseline estimate, VO estimates and estimated total cost and calculations of the estimated remaining costs, % invoiced and accumulated costs including current months by the use of Earned Value Analysis. This sheet should be created for internal use only.
3. Identify the cost related to rental of 3rd party equipment and what type of equipment this is. Evaluate if the equipment could be purchased (capitalised) instead of rented by preparing a Business Case.
4. Reduce use of rental equipment by optimising an inventory list to be able to see equipment in stock.
5. Standardise procedures for handling and operation of major equipment in field operations and focus on proper maintenance programs and check of the equipment prior to mobilisation on a job to avoid COPQ and NPT.
6. Focus on having procurement items as day rate items instead of cost plus items to generate more revenue.
7. Create an HMS document (work method, guideline or checklist) for equipment spread design to support planning of equipment to reduce the number of extra mobilisations.
8. Identify the causes of all extra mobilisations and find recurring issues to be able to avoid the same problem in the future. This could be captured in an experience transfer database for equipment, materials, mobilisation and demobilisation.
9. Ensure proper check of MODEM lists prior to mobilisation of equipment to ensure all required items including contingency to perform the operations are added to the list.
10. Ensure that VOs are created and accepted prior to the cost related to a change in scope of work has occurred.
11. Ensure that rental equipment is handled in accordance with Rental Equipment - PM-SCA-HAL-PPS-202 to reduce unnecessary costs related to this equipment.
12. Create a user-friendly and simplified workbook of the baseline estimates used for other customers which is easier to understand and can help the Service Planners and Project Managers to capture all costs in the invoicing process according to the contract.

13. Ensure that the Project Completion Checklist - FO-SCA-HAL-PPS-607 is used prior to closure and final cut-off for a project to ensure that all steps for equipment, engineering and commercial tasks are fulfilled.
14. Focus on technical training of Project Technical Leads and Project Engineers
15. Standardise operational procedures and support documents to save time in engineering, hence reducing labour costs.
16. Increase hours booked against project WBS and ensure that all hours are booked against the correct work package level in SAP. A minimum percentage, e.g. 80%, of all working hours for project team members should be booked against a project WBS. This should be communicated to all employees and regular monthly checks should be performed.
17. Ensure that hours booked against Sales Orders in SAP are registered and invoiced by Service Planner.
18. Initiate a cost saving campaign for a limited period of time where employees are encouraged to take action to reducing costs. This could be a competition where all participants have a chance to win a price.
19. Introduce a mid-month meeting to follow up the costs of the project with attendance from the Project Manager, a commercial support function, the Project Technical Lead, the Project Equipment Coordinator and a Service Planner, as a minimum. This could be a part of the agenda for the project team meeting once a month.
20. Evaluate to reduce frequency of meetings and if all personnel invited are required to attend, especially for meetings that involve travelling. Facilities and equipment for video conference meetings should be improved.
21. Establish a culture that encourages notification of free capacity to the Project Manager to be able to cross-utilise available resources.
22. Ensure correct utilisation of personnel, especially on lump-sum projects. This would involve using personnel that are qualified for a task, as well as ensuring that overqualified personnel are not used for simple tasks that could be performed by other personnel with less competence.
23. Identify the cost related to rental of 3rd party equipment and what type of equipment this is. Evaluate if the equipment could be purchased (capitalised) instead of rented.

24. Reduce use of rental equipment by optimise an inventory list to be able to see equipment in stock.

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APPENDIX A – QUESTIONS: FINANCIAL AWARENESS SURVEY

Financial Awareness Survey - April 2014

General

***1. What is your job role in Halliburton?**

- ◯ Project Manager
- ◯ Project Technical Lead
- ◯ Project Engineer
- ◯ Trainee Engineer
- ◯ Project Equipment Coordinator
- ◯ Service Coordinator
- ◯ Service Planner
- ◯ Other - Business Development
- ◯ Other - HSEQ
- ◯ Other

General

***2. Are you currently a member of a project team?**

- ◯ Yes
- ◯ No

General

***3. What is your highest completed level of education?**

- ◯ Masters or similar
- ◯ Bachelors or similar
- ◯ Upper Secondary School (videregående skole)
- ◯ Lower Secondary School (ungdomsskole)
- ◯ Certificate of Apprenticeship (fagbrev)
- ◯ Other

Financial Awareness Survey - April 2014

***4. How many years of work experience do you have after graduation?**

- ◯ 0-2 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 10-19 years
- ◯ 20-29 years
- ◯ 30 or more years

***5. What is your length of service in Halliburton?**

- ◯ 0-2 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 10-19 years
- ◯ 20-29 years
- ◯ 30 or more years

***6. What is your financial responsibility over a year related to project costs?**

- ◯ I do not have any responsibility related to project costs
- ◯ 0 -$25 000
- ◯ $25 000 - $100 000
- ◯ $100 000 - $250 000
- ◯ $250 000 or more
- ◯ I do not now

General Financial Understanding

***7. How do you find the general understanding of project costs in your team?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know

Financial Awareness Survey - April 2014

***8. It is difficult to identify all costs in a project.**

- ◯ Completely agree
- ◯ Quite agree
- ◯ Quite disagree
- ◯ Completely disagree
- ◯ I do not know

***9. Have you received necessary training in Halliburton to be able to see the relationship between revenue, cost and profit?**

- ◯ Yes
- ◯ No

General Financial Understanding

***10. If 'Yes' to the previous question, how did you find the training?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good

General Financial Understanding

***11. Have you seen a tendency of systematic cost deviations in the projects you have been a part of?**

- ◯ Yes
- ◯ No
- ◯ I do not know

***12. All team members take responsibility to reduce project costs**

- ◯ Completely agree
- ◯ Quite agree
- ◯ Quite disagree
- ◯ Completely disagree
- ◯ I do not know

Financial Awareness Survey - April 2014

***13. What activity do you think would have the highest potential to reduce costs?**

- ◯ Be more efficient in engineering
- ◯ Improve quality of MODEM lists to avoid extra mobilisations
- ◯ Improve project management
- ◯ More technical training
- ◯ More financial training
- ◯ Improve tendering process

Other (please specify)

Tendering Process and Forecasting

***14. How much knowledge do you have about the tendering process?**

- ◯ Little/nothing
- ◯ Some
- ◯ Quite much
- ◯ Very much

***15. Have you ever been involved in the tendering process?**

- ◯ Yes
- ◯ No

***16. How do you find the tendering process?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know the process

***17. How do you find the communication between Business Development (BD) and operations in the department?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know

***18. How much knowledge do you have about forecasting?**

- ◯ Little/nothing
- ◯ Some
- ◯ Quite much
- ◯ Very much

***19. How do you find the forecasting system format?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know the format

Cost Estimates, Cost Reports and Variation/Change Orders

***20. How much knowledge do you have about cost estimates?**

- ◯ Little/nothing
- ◯ Some
- ◯ Quite much
- ◯ Very much

***21. How do you find the cost estimate format for Statoil projects?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know the format

***22. How do you find the cost estimate format for other customers?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know the format

***23. How much knowledge do you have about cost reports?**

- ◯ Little/nothing
- ◯ Some
- ◯ Quite much
- ◯ Very much

***24. How do you find the cost report format for Statoil projects?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know the format

***25. How do you find the cost report format for other customers?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know the format

***26. How much knowledge do you have about Variation/Change Order Request and Variation/Change Order (VOR/COR and VO/CO)?**

- ◯ Little/nothing
- ◯ Some
- ◯ Quite much
- ◯ Very much

***27. How do you find the VOR and VO formats for Statoil projects?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know the format

***28. How do you find the VOR/COR and VO/CO formats for other customers?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know the format

***29. Do you often find that the original cost estimates have to be updated with a VO/CO?**

- ◯ Yes
- ◯ No
- ◯ I do not now

Financial Awareness Survey - April 2014

Cost Estimates, Cost Reports and Variation/Change Orders

***30. If 'Yes' to the previous question, who is normally requesting the change?**

- ◯ Customer
- ◯ Halliburton

Cost Estimates, Cost Reports and Variation/Change Orders

***31. Have you ever noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time?**

- ◯ Yes
- ◯ No
- ◯ I do not know

Cost Estimates, Cost Reports and Variation/Change Orders

***32. If 'Yes' to the previous question, for what category should a VOR have been made? Multiple answers are allowed.**

- ☐ Management & Services
- ☐ Engineering
- ☐ Procurement
- ☐ Mobilisation & Demobilisation
- ☐ Field Operations

Equipment, Mobilisations and Resource Efficiency

***33. Is the extra work and cost related to an extra (not planned) mobilisation visible to you and the rest of your project team?**

- ◯ Yes
- ◯ No
- ◯ I do not know

***34. Are the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, visible to you and your project team?**

- ◯ Yes
- ◯ No
- ◯ I do not know

***35. How do you find the efficiency of onshore resources?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know

***36. How do you find the efficiency of offshore resources?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know

***37. How do you find the efficiency of contractors?**

- ◯ Very poor
- ◯ Quite poor
- ◯ Neither good nor poor
- ◯ Quite good
- ◯ Very good
- ◯ I do not know

Non-Productive Time (NPT) and Cost of Poor Quality (COPQ)

***38. Have you ever experienced Non-Productive Time (NPT) for field operations that Halliburton had to pay for?**

- ◯ Yes
- ◯ No
- ◯ I do not know

***39. How much knowledge do you have about Cost of Poor Quality (COPQ)?**

- ◯ Little/nothing
- ◯ Some
- ◯ Quite much
- ◯ Very much

***40. Have you ever experienced COPQ in any of your current or earlier projects?**

- ◯ Never
- ◯ 1-2 times
- ◯ 3-5 times
- ◯ 5-10 times
- ◯ 10 or more times
- ◯ I do not know

Non-Productive Time (NPT) and Cost of Poor Quality (COPQ)

41. If you have experienced COPQ in any of your current or earlier projects, in what range was the sum of the COPQ?

- ◯ 0 -$25 000
- ◯ $25 000 - $100 000
- ◯ $100 000 - $250 000
- ◯ $250 000 or more
- ◯ I do not now

Business Case and Project Final Account/Job Profitability

***42. Have you ever been involved in performing a Business Case?**

- ◯ Never
- ◯ 1-2 times
- ◯ 3-5 times
- ◯ 5-10 times
- ◯ 10 or more times

***43. How much knowledge do you have about the final account/job profitability for a project?**

- ◯ Little/nothing
- ◯ Some
- ◯ Quite much
- ◯ Very much

APPENDIX B – SURVEY DATA

APPENDIX B – SURVEY DATA AND FIGURE DESCRIPTIONS

Appendix B includes figure descriptions and tables representing the full data for each survey question. The descriptions refer to the figures in Chapter 6.1. Due to the large amount of questions some of the figures and their description have been placed in this Appendix to make the presentation of the results in Chapter 6.1 more readable.

B.1 Section 1: General

Question 1

Figure B-1 for Question 1 shows that 14.0% (6) of the 43 respondents are *Project Managers*, 14.0% (6) are *Project Technical Leads*, 7.0% (3) are *Project Engineers*, 9.3% (4) are *Trainee Engineers*, 9.3% (4) are *Project Equipment Coordinators*, 4.7% (2) are *Service Coordinators*, 7.0% (3) are *Service Planners*, 14.0% (6) belong to *Other – Business Development*, 4.7% (2) belong to *Other – HSEQ* and 16.3% (7) belong to the group '*Other*'. Table B-1 shows the data for Question 1, while Table B-2 shows the data for the new role grouping of Question 1 used for the presentation of the survey results.

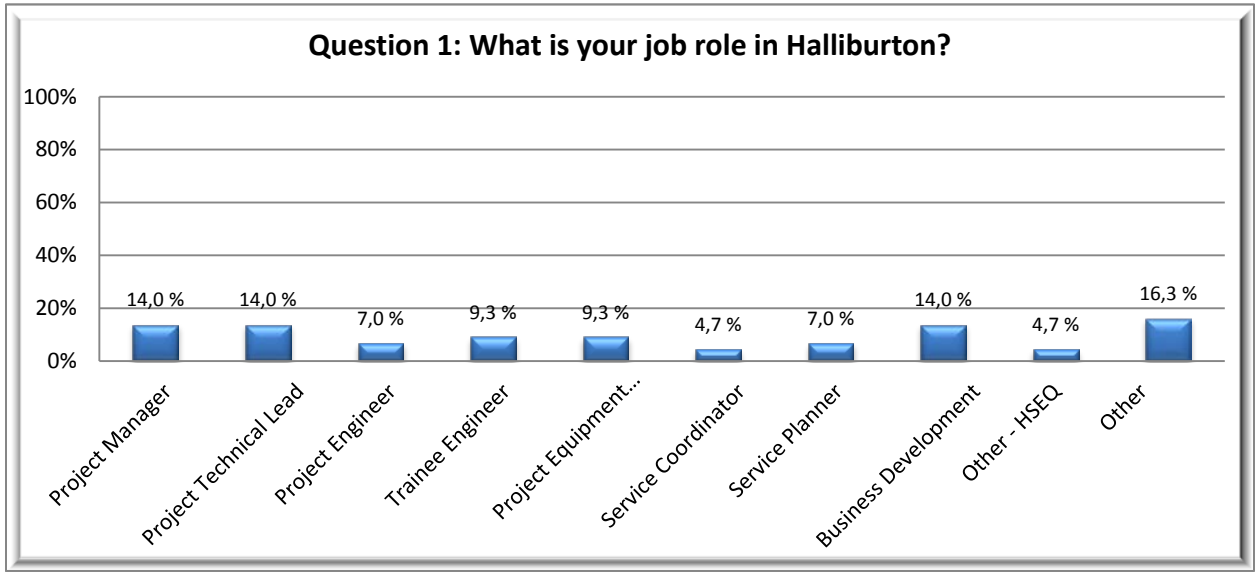

Figure B-1 Question 1 Section 1: General

Table B-1 Question 1 Section 1: General

Question 1: What is your job role in Halliburton?

Answer Options	Project Manager	Project Technical Lead	Project Engineer	Trainee Engineer	Project Equipment Coordinator	Service Coordinator	Service Planner	Business Development	Other - HSEQ	Other	Response Percent	Response Count
Project Manager	6	0	0	0	0	0	0	0	0	0	14,0%	6
Project Technical Lead	0	6	0	0	0	0	0	0	0	0	14,0%	6
Project Engineer	0	0	3	0	0	0	0	0	0	0	7,0%	3
Trainee Engineer	0	0	0	4	0	0	0	0	0	0	9,3%	4
Project Equipment Coordinator	0	0	0	0	4	0	0	0	0	0	9,3%	4
Service Coordinator	0	0	0	0	0	2	0	0	0	0	4,7%	2
Service Planner	0	0	0	0	0	0	3	0	0	0	7,0%	3
Business Development	0	0	0	0	0	0	0	6	0	0	14,0%	6
Other - HSEQ	0	0	0	0	0	0	0	0	2	0	4,7%	2
Other	0	0	0	0	0	0	0	0	0	7	16,3%	7
										answered question		**43**
										skipped question		**0**

Table B-2 New Grouping of Roles in Survey

Question 1: What is your job role in Halliburton?									
Answer Options	**Project Manager (PM)**	**Project Technical Lead (PTL)**	**Project Engineer (PE)**	**Project Equipment Personnel (PEP)**	**Service Planner (SP)**	**Business Development (BD)**	**Other**	**Response Percent**	**Response Count**
Project Manager	6	0	0	0	0	0	0	14,0%	6
Project Technical Lead	0	6	0	0	0	0	0	14,0%	6
Project Engineer	0	0	7	0	0	0	0	16,3%	7
Project Equipment Personnel	0	0	0	6	0	0	0	14,0%	6
Service Planner	0	0	0	0	3	0	0	7,0%	3
Business Development	0	0	0	0	0	6	0	14,0%	6
Other	0	0	0	0	0	0	9	20,9%	9
								answered question	**43**
								skipped question	**0**

Question 2

Question 2 was asked to respondents belonging to the Business Development (BD) and the 'Other' groups, in total 15 respondents. Figure B-2 for Question 2 shows that 27.7% (4) of the respondents within these roles are currently a member of a project team, while 73.3% (11) are currently not a member of a project team but have project support roles. This indicates that 74.4% (32) of the PPS employees are directly involved in daily project tasks. Table B-3 shows the data for Question 2.

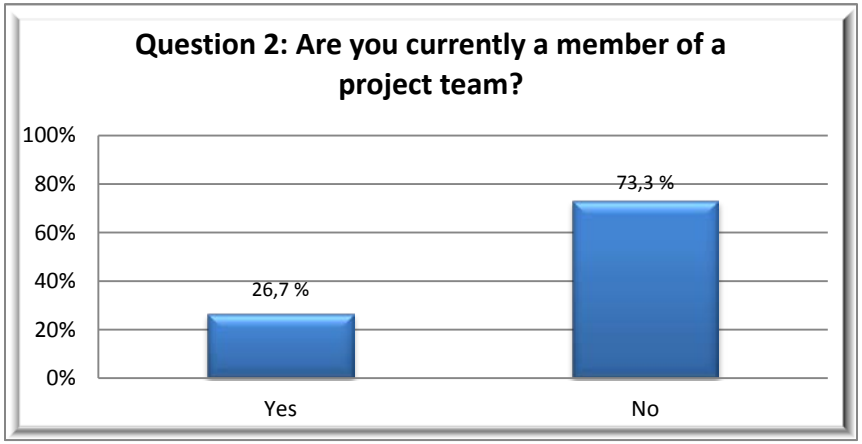

Figure B-2 Question 2 Section1: General

Table B-3 Question 1 Section 1: General

Question 2: Are you currently a member of a project team?									
Answer Options	**Project Manager (PM)**	**Project Technical Lead (PTL)**	**Project Engineer (PE)**	**Project Equipment Personnel (PEP)**	**Service Planner (SP)**	**Business Development (BD)**	**Other**	**Response Percent**	**Response Count**
Yes	0	0	0	0	0	1	3	26,7%	4
No	0	0	0	0	0	5	6	73,3%	11
								answered question	**15**
								skipped question	**28**

Question 3

Figure B-3 for Question 3 shows the distribution of highest completed level of education amongst all respondents. 25.6% (11) of the respondents have completed a Masters or similar, 51.2% (22) a Bachelors or similar, 11.6% (5) Upper Secondary School, 2.3% (1) Lower Secondary School, 4.7% (2) Certificate of Apprenticeship and 4.7% (2) Other. This reflects that the majority of the respondents, 76.8% (33) have competed higher education (Bachelor's or Master's). Table B-4 shows the data for Question 3.

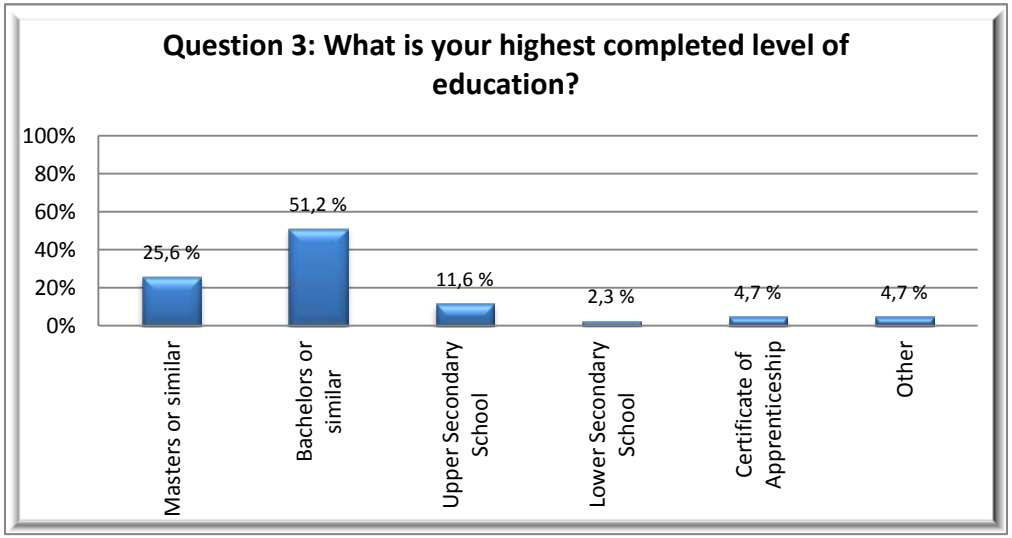

Figure B-3 Question 3 Section1: General

Table B-4 Question 3 Section1: General

Question 3: What is your highest completed level of education?									
Answer Options	**Project Manager (PM)**	**Project Technical Lead (PTL)**	**Project Engineer (PE)**	**Project Equipment Personnel (PEP)**	**Service Planner (SP)**	**Business Development (BD)**	**Other**	**Response Percent**	**Response Count**
Masters or similar	1	3	4	0	1	0	2	25,6%	11
Bachelors or similar	5	3	3	0	1	6	4	51,2%	22
Upper Secondary School	0	0	0	3	0	0	2	11,6%	5
Lower Secondary School	0	0	0	1	0	0	0	2,3%	1
Certificate of Apprenticeship	0	0	0	1	0	0	1	4,7%	2
Other	0	0	0	1	1	0	0	4,7%	2
answered question									**43**
skipped question									**0**

Question 4

Figure B-4 for Question 4 shows years of work experience after graduation amongst all respondents. 23.3% (10) of the respondents have 0-2 years of work experience, 11.6% (5) have 3-5 years, 18.6% (8) have 6-9 years, 16.3% (7) have 10-19 years, 18.6% (8) have 20-29 years and 11.6% (5) have 30 or more years of work experience after graduation. This indicates that the distribution is quite similar, but there are most respondents, 23.3% (10), with 0-2 years of work experience after graduation. Table B-5 shows the data for Question 4.

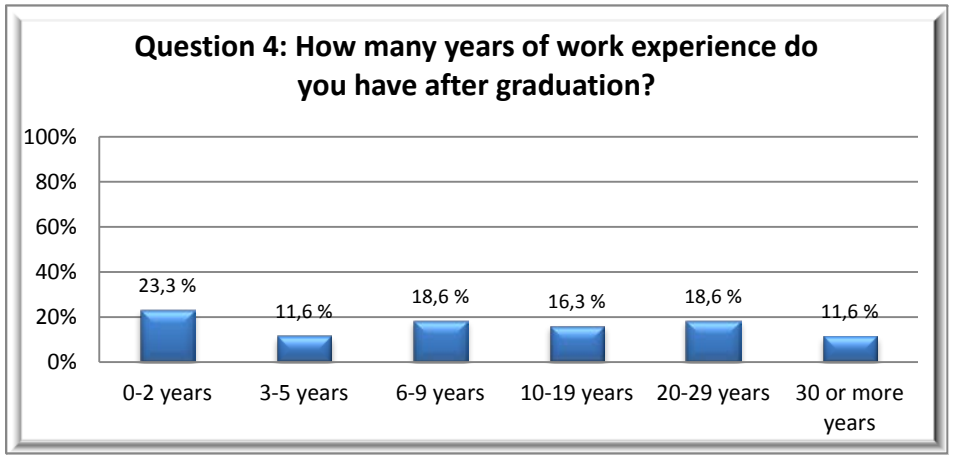

Figure B-4 Question 4 Section1: General

Table B-5 Question 4 Section1: General

Question 4: How many years of work experience do you have after graduation?									
Answer Options	**Project Manager (PM)**	**Project Technical Lead (PTL)**	**Project Engineer (PE)**	**Project Equipment Personnel (PEP)**	**Service Planner (SP)**	**Business Development (BD)**	**Other**	**Response Percent**	**Response Count**
0-2 years	0	3	6	0	1	0	0	23,3%	10
3-5 years	2	2	0	0	0	1	0	11,6%	5
6-9 years	3	0	0	1	0	1	3	18,6%	8
10-19 years	0	0	0	2	1	1	3	16,3%	7
20-29 years	1	1	1	0	1	3	1	18,6%	8
30 or more years	0	0	0	3	0	0	2	11,6%	5
answered question									**43**
skipped question									**0**

Question 5

Figure B-5 for Question 5 shows the length of experience in Halliburton amongst all respondents. Of all the respondents 25.6% (11) have 0-2 years of service. On respondent group level 16.7% (1) of the TLs, 85.7% (6) of the PEs, 66.7% (2) of the SPs, 33.3% (2) of the BD group have 0-2 years of experience.

Of all the respondents 23.3% (10) have 3-5 years of experience. On respondent group level 50.0% (3) of the PMs, 66.7% (4) of the TLs,16.7% (1) of the PEP, 33.3% (1) of the SPs and 11.1% (1) of the 'Other' group have 3-5 years of experience.

Of all the respondents 25.6% (11) have 6-9 years of experience. On respondent group level 33.3% (2) of the PMs, 14.3% (1) of the PEs, 33.3% (2) of the PEP, 50.0% (3) of the BD group and 33.3% (3) of the 'Other' group have 6-9 years of experience.

Of all the respondents 23.3% (10) have 10-19 years of experience. On respondent group level 16.7% (1) of the PMs, 16.7% (1) of the TLs, 50.0% (3) of the PEP, 16.7% (1) of the BD group and 44.4% (4) of the 'Other' group have 10-19 years of experience.

Of all the respondents 2.3% (1) have 20-29 years of service. On respondent group level 11.1% of the 'Other' group have 10-19 years of experience.

None of the respondents have 30 or more years of service in Halliburton, hence this response alternative is not shown in the figure.

For all the respondents the distribution is quite similar for all response alternatives, except for 20-29 years of work experience and 30 or more years. The majority of the PEs who are performing the engineering have the shortest length of service in Halliburton, which could indicate lack of experience within this group. 2/3 of the SPs who are responsible for cost control also have the shortest length of experience.

Table B-6 shows the data for Question 5.

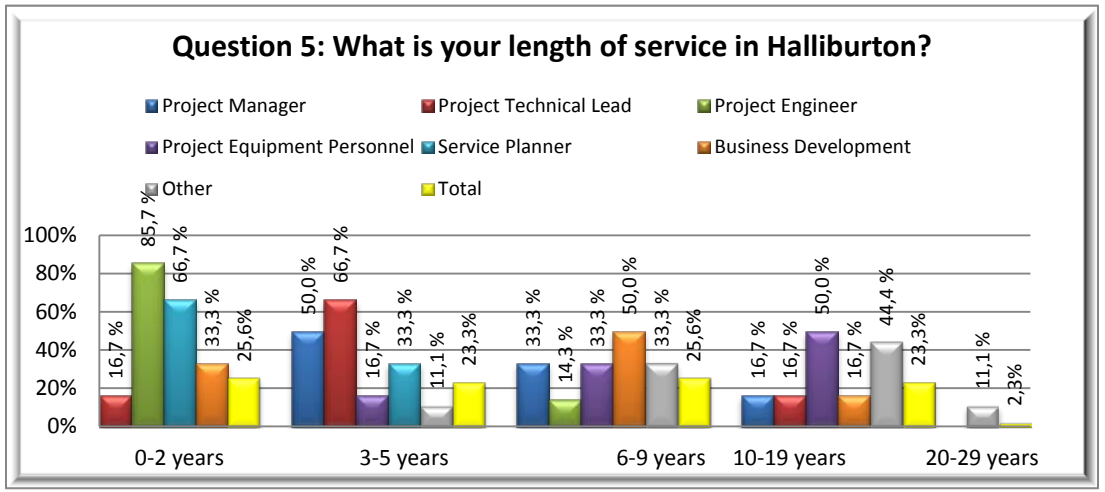

Figure B-5 Question 5 Section1: General

Table B-6 Question 5 Section1: General

Question 5: What is your length of service in Halliburton?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
0-2 years	0	0,0 %	1	16,7 %	6	85,7 %	0	0,0 %	2	66,7 %	2	33,3 %	0	0,0 %	25,6%	11
3-5 years	3	50,0 %	4	66,7 %	0	0,0 %	1	16,7 %	1	33,3 %	0	0,0 %	1	11,1 %	23,3%	10
6-9 years	2	33,3 %	0	0,0 %	1	14,3 %	2	33,3 %	0	0,0 %	3	50,0 %	3	33,3 %	25,6%	11
10-19 years	1	16,7 %	1	16,7 %	0	0,0 %	3	50,0 %	0	0,0 %	1	16,7 %	4	44,4 %	23,3%	10
20-29 years	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	11,1 %	2,3%	1
30 or more years	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
															answered question	**43**
															skipped question	**0**

Question 6

Figure B-6 for Question 6 shows the respondent's financial responsibility over a year related to project costs. Of all the respondents 39.5% (17) stated that they do not have any responsibility related to project costs. On respondent group level 16.7% (1) of the PTLs, 57.1% (4) of the PEs, 16.7% (1) of the PEP, 33.3% (1) of the SPs and 66.7% (4) of the BD group and 66.7% (6) of the 'Other' group stated this response alternative.

Of all the respondents 2.3% (1) stated that the financial responsibility related to project costs over a year is 0-$24 999. On respondent group level 16.7% (1) of the PTLs stated this response alternative.

None of the respondents have financial responsibility from $25 000 - $99 999 and $100 000 - $249 999.

Of all the respondents 32.6% (14) stated that the financial responsibility related to project costs over a year is $250 000 or more. On respondent group level 100% (6) of the PMs, 16.7% (1) of the PTLs, 33.3% (2) of the PEP, 33.3% (1) of the SPs, 33.3% of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 25.6% (11) stated that they did not know what their financial responsibility is. On respondent group level 50.0% (3) of the PTLs, 42.9% (3) of the PEs, 50.0% (3) of the PEP, 33.3% (1) of the SPs and 11.1% (1) of the 'Other' group stated this response alternative.

Table B-7 shows the data for Question 6.

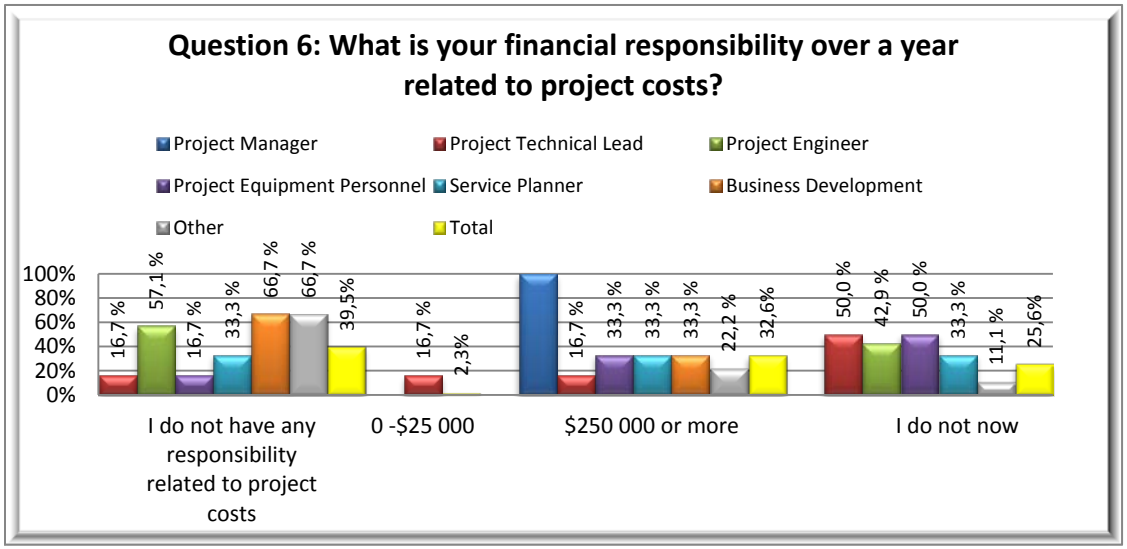

Figure B-6 Question 6 Section1: General

Table B-7 Question 6 Section1: General

Question 6: What is your financial responsibility over a year related to project costs?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Response Percent**	**Response Count**
I do not have any responsibility related to project costs	0	0,0 %	1	16,7 %	4	57,1 %	1	16,7 %	1	33,3 %	4	66,7 %	6	66,7 %	39,5%	17
0 -$24 999	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
$25 000 - $99 999	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
$100 000 - $249 999	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
$250 000 or more	6	100,0 %	1	16,7 %	0	0,0 %	2	33,3 %	1	33,3 %	2	33,3 %	2	22,2 %	32,6%	14
I do not now	0	0,0 %	3	50,0 %	3	42,9 %	3	50,0 %	1	33,3 %	0	0,0 %	1	11,1 %	25,6%	11
															answered question	**43**
															skipped question	**0**

B.2 Section 2: General Financial Understanding

Question 7

Figure 7-2 for Question 7 shows how the respondents find the general understanding of project costs in their team.

None of the respondents finds the general understanding very poor, hence this response alternative is not shown in the figure. Of all the respondents 16.3% (7) find the general understanding quite poor. On respondent group level 50.0% (3) of the PMs, 28.6% (2) of the PEs, 16.7% (1) of the BD group and 11.1% (1) of the 'Other' group find the general understanding quite poor.

Of all the respondents 27.9% (12) finds the general understanding neither good nor poor. On respondent group level 100% (6) of the PTLs, 14.3% (1) of the PEs, 16.7% (1) of the PEP, 33.3% (1) of the SPs and 33.3% of the 'Other' group find the general understanding neither good nor poor.

Of all the respondents 11.6% (5) finds the general understanding quite good. On respondent group level 33.3% (2) of the PMs, 28.6% (2) of the PEs, 66.7% of the PEP 33.3% (1) of the SPs, 33.3% (2) of the BD group and 33.3% (3) of the 'Other' group find the general understanding quite good.

Of all the respondents 11.6% (5) finds the general understanding very good. On respondent group level 16.7% (1) of the PMs, 16.7% (1) of the PEP, 33.3% (1) of the SPs and 33.3% (2) of the BD group find the general understanding very good.

Of all the respondents 11.5% (5) do not know about the general understanding of project costs in their team. On respondent group level 28.6% (2) of the PEs, 16.7% (1) of the BD group 22.2% (2) of the 'Other' group does not know.

Table B-8 shows the data for Question 7.

Table B-8 Question 7 Section 2: General Financial Understanding

Question 7: How do you find the general understanding of project costs in your team?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Very poor	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
Quite poor	3	50,0 %	0	0,0 %	2	28,6 %	0	0,0 %	0	0,0 %	1	16,7 %	1	11,1 %	16,3%	7
Neither good nor poor	0	0,0 %	6	100,0 %	1	14,3 %	1	16,7 %	1	33,3 %	0	0,0 %	3	33,3 %	27,9%	12
Quite good	2	33,3 %	0	0,0 %	2	28,6 %	4	66,7 %	1	33,3 %	2	33,3 %	3	33,3 %	32,6%	14
Very good	1	16,7 %	0	0,0 %	0	0,0 %	1	16,7 %	1	33,3 %	2	33,3 %	0	0,0 %	11,6%	5
I do not know	0	0,0 %	0	0,0 %	2	28,6 %	0	0,0 %	0	0,0 %	1	16,7 %	2	22,2 %	11,6%	5
															answered question	**43**
															skipped question	**0**

Question 8

Figure 7-3 for Question 8 shows a statement that it is difficult to identify all costs in a project. Of all the respondents 14.0% (6) completely agree that it is difficult to identify all costs in a project. On respondent group level 33.3% (2) of the PMs, 28.6% (2) of the PEs, 33.3% (1) of the SPs, 11.1% (1) of the 'Other' group completely agree.

Of all the respondents 62.8% (27) quite agree. On respondent group level 50.0% (3) of the PMs, 100% (6) of the PTLs, 42.9% (3) of the PEs, 83.3% (5) of the Project Equipment Planners, 33.3% (1) of the SPs, 66.7% (4) of the BD Group 55.6% (5) of the 'Other' group quite agree.

Of all the respondents 9.3% (4) quite disagree. On respondent group level 16.7% (1) of the PEP, 33.3% (1) of the SPs, 16.7% (1) of the BD group and 11.1% (1) of the 'Other' group quite disagree.

Of all the respondents 4.7% (2) completely disagree. On respondent group level 16.7% (1) of the PMs and 16.7 % (1) of the BD group completely disagree.

Of all the respondents 9.3% (4) do not know. On respondent group level 28.6% (2) of the PEs and 22.2% (2) of the 'Other' group do not know if it is difficult to identify all costs in a project.

Table B-9 shows the data for Question 8.

Table B-9 Question 8 Section 2: General Financial Understanding

Question 8: It is difficult to identify all costs in a project.																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Completely agree	2	33,3 %	0	0,0 %	2	28,6 %	0	0,0 %	1	33,3 %	0	0,0 %	1	11,1 %	14,0%	6
Quite agree	3	50,0 %	6	100,0 %	3	42,9 %	5	83,3 %	1	33,3 %	4	66,7 %	5	55,6 %	62,8%	27
Quite disagree	0	0,0 %	0	0,0 %	0	0,0 %	1	16,7 %	1	33,3 %	1	16,7 %	1	11,1 %	9,3%	4
Completely disagree	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	16,7 %	0	0,0 %	4,7%	2
I do not know	0	0,0 %	0	0,0 %	2	28,6 %	0	0,0 %	0	0,0 %	0	0,0 %	2	22,2 %	9,3%	4
															answered question	**43**
															skipped question	**0**

Question 9

Figure 7-4 for Question 9 shows whether the respondents have received necessary training in Halliburton to be able to see the relationship between revenue, cost and profit. Of all the respondents 31.6% (14) answered 'Yes'. On respondent group level 16.7% (1) of the PMs, 33.3% (2) of the PTLs, 66.7% (2) of the SPs, 50.0% (3) of the BD group and 66.7% (6) of the 'Other' group answered 'Yes'.

Of all the respondents 67.4% (29) answered 'No'. On respondent group level 83.3% (5) of the PMs, 66.7% (4) of the PTLs, 100% (7) of the PEs, 100% (6) of the PEP, 33.3% (1) of the SPs, 50.0% (3) of the BD group and 33.3% (3) of the 'Other' group answered 'No'.

Table B-10 shows the data for Question 9.

Table B-10 Question 9 Section 2: General Financial Understanding

Question 9: Have you received necessary training in Halliburton to be able to see the relationship between revenue, cost and profit?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Yes	1	16,7 %	2	33,3 %	0	0,0 %	0	0,0 %	2	66,7 %	3	50,0 %	6	66,7 %	32,6%	14
No	5	83,3 %	4	66,7 %	7	100,0 %	6	100,0 %	1	33,3 %	3	50,0 %	3	33,3 %	67,4%	29
															answered question	**43**
															skipped question	**0**

Question 10

Figure 7-5 for Question 10 shows how the respondents who had received necessary training found the training, in total 14 respondents. Of all the respondents who had received necessary training none of the respondents found it very poor or quite poor, hence these response alternatives are not shown in the figure. 57.1% (8) fount it neither good nor poor, 28.6% (4) found it very good, and 14.3% (2) found it very good.

Table B-11 shows the data for Question 10.

Table B-11 Question 10 Section 2: General Financial Understanding

Question 10: If 'Yes' to the previous question, how did you find the training?									
Answer Options	**Project Manager (PM)**	**Project Technical Lead (PTL)**	**Project Engineer (PE)**	**Project Equipment Personnel (PEP)**	**Service Planner (SP)**	**Business Development (BD)**	**Other**	**Total**	
	Count	**Count**	**Count**	**Count**	**Count**	**Count**	**Count**	**Response Percentage**	**Response Count**
Very poor	0	0	0	0	0	0	0	0,0%	0
Quite poor	0	0	0	0	0	0	0	0,0%	0
Neither good nor poor	1	2	0	0	0	1	4	57,1%	8
Quite good	0	0	0	0	1	2	1	28,6%	4
Very good	0	0	0	0	1	0	1	14,3%	2
								answered question	**14**
								skipped question	**29**

Question 11

Figure 7-6 for Question 11 shows if the respondents have seen a tendency of systematic cost deviations in the projects they have been a part of. Of all the respondents 34.9% (15) answered ‘Yes’. On respondent group level 66.7% (4) of the PMs, 33.3% (2) of the PTLs, 28.6 % (2) of the PEs, 33.3% (2) of the PEP, 33.3% (2) of the BD group and 33.3% (3) of the ‘Other’ group answered ‘Yes’.

Of all the respondents 34.9% (14) answered ‘No’. On respondent group level % 33.3 (2) of the PMs, 50.0% (3) of the PTLs, 14.3% (1) of the PEs, 66.7% (4) of the PEP, 66.7% (2) of the SPs, 16.7% (1) of the BD group and 22.2% (2) of the ‘Other’ group answered ‘No’.

Of all the respondents 30.2% (13) do not know. On respondent group level 16.7% (1) of the PTLs, 57.1% (4) of the PEs, 33.3% (1) of the SPs, 50.0% (3) of the BD group and 44.4% (4) of the ‘Other’ group do not know.

Table B-12 shows the data for Question 11.

Table B-12 Question 11 Section 2: General Financial Understanding

Question 11: Have you seen a tendency of systematic cost deviations in the projects you have been a part of?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Yes	4	66,7 %	2	33,3 %	2	28,6 %	2	33,3 %	0	0,0 %	2	33,3 %	3	33,3 %	34,9%	15
No	2	33,3 %	3	50,0 %	1	14,3 %	4	66,7 %	2	66,7 %	1	16,7 %	2	22,2 %	34,9%	15
I do not know	0	0,0 %	1	16,7 %	4	57,1 %	0	0,0 %	1	33,3 %	3	50,0 %	4	44,4 %	30,2%	13
															answered question	**43**
															skipped question	**0**

Question 12

Figure 7-7 for Question 12 shows the respondent's opinion to if all team members take responsibility to reduce project costs. Of all the respondents 2.3% (1) completely agree that all team members take responsibility to reduce project costs. On respondent group level 14.3% (1) of the PEs completely agree.

Of all the respondents 55.8 (24) quite agree. On respondent group level 50.0% (3) of the PMs, 100% (6) of the PTLs, 42.9% (3) of the PEs, 83.3% (5) of the PEP, 66.7% (2) of the SPs, 33.3% (2) of the BD group and 33.3% (2) of the 'Other' group quite agree.

Of all the respondents 26.6% (11) quite disagree. On respondent group level 33.3% (2) of the PMs, 14.3% (1) of the PEs, 16.7% (1) of the PEP, 50.0% (3) of the BD group and 44.4% (4) of the 'Other' group quite disagree.

Of all the respondents 4.7% (2) completely disagree. On respondent group level 16.7% (1) of the BD group and 11.1% (1) of the 'Other' group completely disagree.

Of all the respondents 11.6% (4) do not know. On respondent group level 16.7% (1) of the PMs, 28.6% (2) of the PEs, 33.3% (1) of the SPs and 11.1% (1) of the 'Other' group answered do not know.

Table B-13 shows the data for Question 12.

Table B-13 Question 12 Section 2: General Financial Understanding

Question 12: All team members take responsibility to reduce project costs																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Completely agree	0	0,0 %	0	0,0 %	1	14,3 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
Quite agree	3	50,0 %	6	100,0 %	3	42,9 %	5	83,3 %	2	66,7 %	2	33,3 %	3	33,3 %	55,8%	24
Quite disagree	2	33,3 %	0	0,0 %	1	14,3 %	1	16,7 %	0	0,0 %	3	50,0 %	4	44,4 %	25,6%	11
Completely disagree	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	16,7 %	1	11,1 %	4,7%	2
I do not know	1	16,7 %	0	0,0 %	2	28,6 %	0	0,0 %	1	33,3 %	0	0,0 %	1	11,1 %	11,6%	5
															answered question	**43**
															skipped question	**0**

Question 13

Figure 7-8 for Question 13 shows what activity the respondents think would have the highest potential to reduce costs. The response alternatives included an alternative where the respondents could express other opinions.

Of all the respondents 20.9% (9) chose ‘Be more efficient in engineering’. On respondent group level 16.7% (1) of the PMs, 28.6% (2) of the PEs, 50.0% (3) of the PEP, 33.3% (1) of the SPs, 22.2% (2) of the ‘Other’ group chose this response alternative.

Of all the respondents 27.9% (12) chose ‘Improve quality of MODEM lists to avoid extra mobilisations’. On respondent group level 50.0% (3) of the PTLs, 28.6% (2) of the PEs, 16.1% (1) of the PEP, 66.7% (2) of the SPs, 16.7% (1) of the BD group and 33.3% (3) of the ‘Other’ group chose this response alternative.

Of all the respondents 27.9% (12) chose ‘Improve project management’. On respondent group level 33.3% (2) of the PMs, 16.7% (1) of the PTLs, 14.3% (1) of the PEs, 16.7% (1) of the PEP, 66.7% (4) of the BD group and 33.3% (3) of the ‘Other’ group chose this response alternative.

Of all the respondents 9.3% (4) chose ‘More technical training’. On respondent group level 16.7% (1) of the PTLs, 28.6% (2) of the PEs, 11.1% (1) of the ‘Other’ group chose this response alternative.

Of all the respondents 7.0% (3) chose ‘More financial training’. On respondent group level 16.7% (1) of the PMs, 16.7% (1) of the PEP and 16.7% (1) of the BD group chose this response alternative.

Of all the respondents 7.0% (3) chose ‘Improve tendering process’. On respondent group level 33.3% (2) of the PMs and 16.7% (1) of the PTLs chose this response alternative.

Table B-14 shows the data for Question 13.

Table B-14 Question 13 Section 2: General Financial Understanding

Question 13: What activity do you think would have the highest potential to reduce costs?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Be more efficient in engineering	1	16,7 %	0	0,0 %	2	28,6 %	3	50,0 %	1	33,3 %	0	0,0 %	2	22,2 %	20,9%	9
Improve quality of MODEM lists to avoid extra mobilisations	0	0,0 %	3	50,0 %	2	28,6 %	1	16,7 %	2	66,7 %	1	16,7 %	3	33,3 %	27,9%	12
Improve project management	2	33,3 %	1	16,7 %	1	14,3 %	1	16,7 %	0	0,0 %	4	66,7 %	3	33,3 %	27,9%	12
More technical training	0	0,0 %	1	16,7 %	2	28,6 %	0	0,0 %	0	0,0 %	0	0,0 %	1	11,1 %	9,3%	4
More financial training	1	16,7 %	0	0,0 %	0	0,0 %	1	16,7 %	0	0,0 %	1	16,7 %	0	0,0 %	7,0%	3
Improve tendering process	2	33,3 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	7,0%	3
Other (please specify)																5
															answered question	***43***
															skipped question	***0***

B.3 Section 3: Tendering Process and Forecasting

Question 14

Figure 7-9 for Question 14 shows the distribution of the respondent's knowledge of the tendering process. Of all the respondents 27.9% (12) know little or nothing about the tendering process. On respondent group level 33.3% (2) of the PTLs, 57.1% (4) of the PEs, 33.3% (2) of the PEP, 66.7% (2) of the SPs and 22.2% (2) of the 'Other' group know little or nothing.

Of all the respondents 48.8% (21) know some. On respondent group level 83.3% (5) of the PMs, 66.7% (4) of the PTLs, 42.9% (3) of the PEs, 66.7% (4) of the PEP and 55.6% (5) of the 'Other' group know some.

Of all the respondents 14.0% (6) know quite much. On respondent group level 16.7% (1) of the PMs, 33.3% (1) of the SPs, 33.3% (2) of the BD group and 22.2% (2) of the 'Other' group know quite much.

Of all the respondents 9.3% (4) know very much. On respondent group level 66.7% (4) of the BD group know very much.

Table B-15 shows the data for Question 14.

Table B-15 Question 14 Section 3: Tendering Process and Forecasting

Question 14: How much knowledge do you have about the tendering process?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Little/nothing	0	0,0 %	2	33,3 %	4	57,1 %	2	33,3 %	2	66,7 %	0	0,0 %	2	22,2 %	27,9%	12
Some	5	83,3 %	4	66,7 %	3	42,9 %	4	66,7 %	0	0,0 %	0	0,0 %	5	55,6 %	48,8%	21
Quite much	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	1	33,3 %	2	33,3 %	2	22,2 %	14,0%	6
Very much	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	4	66,7 %	0	0,0 %	9,3%	4
															answered question	**43**
															skipped question	**0**

Question 15

Figure B-7 for Question 15 shows an overview of the respondent's involvement in the tendering process. Of all the respondents 48.8% (21) have been involved in the tendering process. On respondent group level 83.3% (5) of the PMs, 33.3% (2) of the PTLs, 16.7% (1) of the PEP, 100% (6) of the BD group and 77.8% (7) of the 'Other' group have been involved.

Of all the respondents 51.2% (22) have not been involved in the tendering process. On respondent group level 16.7% (1) of the PMs, 66.7% (4) of the PTLs, 100% (7) of the PEs, 83.3% (5) of the PEP, 100% (3) of the SPs and 22.2% (2) of the 'Other' group have not been involved.

Table B-16 shows the data for Question 15.

Table B-16 Question 15 Section 3: Tendering Process and Forecasting

Question 15: Have you ever been involved in the tendering process?																
Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Yes	5	83,3 %	2	33,3 %	0	0,0 %	1	16,7 %	0	0,0 %	6	100,0 %	7	77,8 %	48,8%	21
No	1	16,7 %	4	66,7 %	7	100,0 %	5	83,3 %	3	100,0 %	0	0,0 %	2	22,2 %	51,2%	22
															answered question	43
															skipped question	0

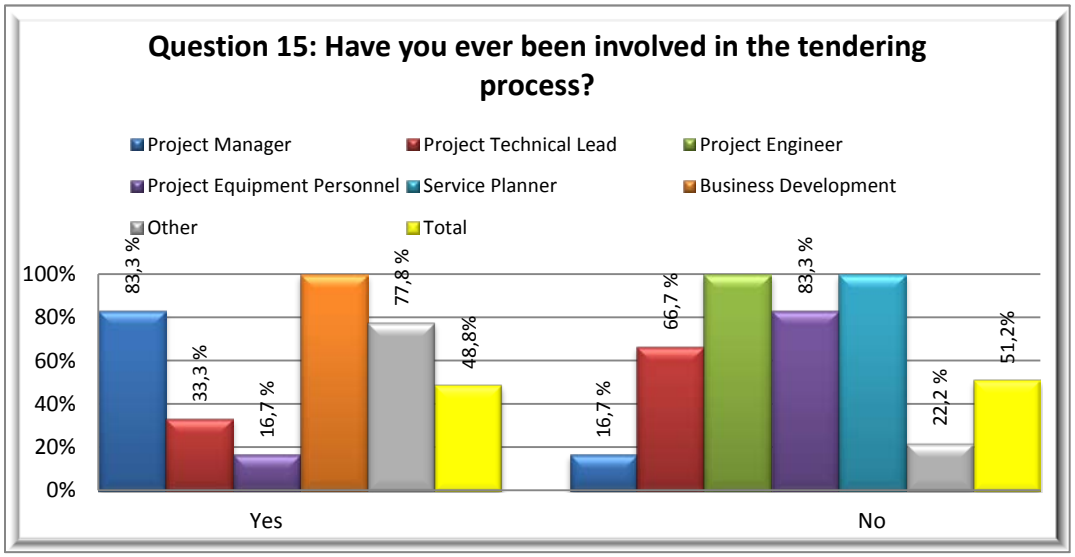

Figure B-7 Question 15 Section 3: Tendering Process and Forecasting

Question 16

Figure 7-10 for Question 16 shows the distribution of how the respondents find the tendering process. None of the respondents finds it very poor or very good, hence these response alternatives are not shown in the figure.

Of all of the respondents 11.6% (5) find the tendering process quite poor. On respondent group level 16.7% (1) of the PMs, 16.7% (1) of the PTLs 16.7% (1) of the PEP, 22.2% (2) of the 'Other' group find it quite poor.

Of all the respondents 25.6% (11) find it neither good nor poor. On respondent group level 50.0% (3) of the PMs, 50.0% (3) of the PTLs, 14.3% (1) of the PEs, 16.7% (1) of the PEP, 16.7% (1) of the BD group and 22.2% (2) of the 'Other' group find it neither good nor poor.

Of all the respondents 30.2% (13) find it quite good. On respondent group level 33.3% (2) of the PMs, 14.3% (1) of the PEs, 16.7% (1) of the PEP, 33.3% (1) of the SPs, 83.3% (5) of the BD group and 33.3% (3) of the 'Other' group find it quite good.

Of all the respondents 32.6% (14) do not know the process. On respondent group level 33.3% (3) of the PTLs, 71.4% (3) of the PEs, 50.0% (3) of the PEP, 66.7% (2) of the SPs and 22.2% (2) of the 'Other' group answered do not know the process.

Table B-17 shows the data for Question 16.

Table B-17 Question 16 Section 3: Tendering Process and Forecasting

Question 16: How do you find the tendering process?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Very poor	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
Quite poor	1	16,7 %	1	16,7 %	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	2	22,2 %	11,6%	5
Neither good nor poor	3	50,0 %	3	50,0 %	1	14,3 %	1	16,7 %	0	0,0 %	1	16,7 %	2	22,2 %	25,6%	11
Quite good	2	33,3 %	0	0,0 %	1	14,3 %	1	16,7 %	1	33,3 %	5	83,3 %	3	33,3 %	30,2%	13
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
I do not know the process	0	0,0 %	2	33,3 %	5	71,4 %	3	50,0 %	2	66,7 %	0	0,0 %	2	22,2 %	32,6%	14
															answered question	**43**
															skipped question	**0**

Question 17

Figure 7-11 for Question 17 shows the distribution of how the respondents find the communication between BD (BD) and operations in the department.

Of all the respondents 7.0% (3) find it very poor. On respondent group level 33.3% (2) of the PEP and 11.1% (1) of the 'Other' group answered find it very poor.

Of all the respondents 14.0% (6) find it quite poor. On respondent group level 33.3% (2) of the PMs, 16.7% (1) of the PTLs, 33.3% (2) of the BD group and 11.1% (1) of the 'Other' find it quite poor.

Of all the respondents 32.6% (14) find it neither good nor poor. On respondent group level 66.7% (4) of the PTLs, 42.9% (3) of the PEs, 50.0% (3) of the PEP, 16.7% (1) of the BD group and 33.3% (3) of the 'Other' group find it neither good nor poor.

Of all the respondents 23.3% (10) find it quite good. On respondent group level 33.3% (2) of the PMs, 28.6% (2) of the PEs, 16.7% (1) of the PEP, 33.3% (2) of the BD group and 33.3% (2) of the 'Other' group find it quite good.

Of all the respondents 4.7% (2) find it very good. On respondent group level 33.3% (1) of the SPs and 16.7% (1) of the BD group find it very good.

Of all the respondents 18.6% (8) do not know how the communication between BD and operations is. On respondent group level 33.3% (2) of the PMs, 16.7% (1) of the PTLs, 28.6% (2) of the PEs, 66.7% (2) of the SPs and 11.1% (1) of the 'Other' group do not know.

Table B-18 shows the data for Question 17.

Table B-18 Question 17 Section 3: Tendering Process and Forecasting

Question 17: How do you find the communication between Business Development (BD) and operations in the department?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Very poor	0	0,0 %	0	0,0 %	0	0,0 %	2	33,3 %	0	0,0 %	0	0,0 %	1	11,1 %	7,0%	3
Quite poor	2	33,3 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	2	33,3 %	1	11,1 %	14,0%	6
Neither good nor poor	0	0,0 %	4	66,7 %	3	42,9 %	3	50,0 %	0	0,0 %	1	16,7 %	3	33,3 %	32,6%	14
Quite good	2	33,3 %	0	0,0 %	2	28,6 %	1	16,7 %	0	0,0 %	2	33,3 %	3	33,3 %	23,3%	10
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	33,3 %	1	16,7 %	0	0,0 %	4,7%	2
I do not know	2	33,3 %	1	16,7 %	2	28,6 %	0	0,0 %	2	66,7 %	0	0,0 %	1	11,1 %	18,6%	8
															answered question	**43**
															skipped question	**0**

Question 18

Figure 7-12 for Question 18 shows the distribution of the respondent's knowledge about forecasting. Of all the respondents 41.9% (18) know little or nothing about forecasting. On respondent group level 50.0% (3) of the PTLs, 85.7% (6) of the PEs, 50.0% (3) of the PEP, 33.3% of the BD group and 44.4% (4) of the 'Other' group know little or nothing.

Of all the respondents 25.6% (11) have some knowledge about forecasting. On respondent group level 16.7% (1) of the PMs, 50.0% (3) of the PTLs, 14.3% (1) of the PEs, 50.0% (3) of the PEP, 66.7% (2) of the SPs, 11.1% (1) of the 'Other' group have some knowledge.

Of all the respondents 27.9% (12) have quite much knowledge about forecasting. On respondent group level 83.3% (5) of the PMs, 33.3% (1) of the SPs, 50.0% (3) of the BD group and 33.3% (3) of the 'Other' group have quite much knowledge.

Of all the respondents 4.7% (2) have very much knowledge about forecasting. On respondent group level 16.7% (1) of the BD group and 11.1% (1) of the 'Other' group have very much knowledge.

Table B-19 shows the data for Question 18.

Table B-19 Question 18 Section 3: Tendering Process and Forecasting

Question 18: How much knowledge do you have about forecasting?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Little/nothing	0	0,0 %	3	50,0 %	6	85,7 %	3	50,0 %	0	0,0 %	2	33,3 %	4	44,4 %	41,9%	18
Some	1	16,7 %	3	50,0 %	1	14,3 %	3	50,0 %	2	66,7 %	0	0,0 %	1	11,1 %	25,6%	11
Quite much	5	83,3 %	0	0,0 %	0	0,0 %	0	0,0 %	1	33,3 %	3	50,0 %	3	33,3 %	27,9%	12
Very much	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	16,7 %	1	11,1 %	4,7%	2
															answered question	**43**
															skipped question	**0**

Question 19

Figure B-8 for Question 19 shows the distribution of how the respondents find the forecasting system format. Of all respondents 4.7% (2) stated that they find the format very poor. On respondent group level 16.7% (1) of the PTLs and 16.7% (1) of the PEP stated this response alternative.

Of all the respondents 14.0% (6) stated that they find the forecasting system format quite good. On respondent group level 33.3% (2) of the PMs, 16.7% (1) of the PTLs, 16.7% (1) of the PEP, 16.7% (1) of the BD group and 11.3% (1) of the 'Other' group stated this response alternative.

Of all the respondents 23.3% (10) stated that they find the forecasting system format neither good nor poor. On respondent group level 16.7% (1) of the PMs, 33.3% (2) of the PTLs, 33.3% (2) of the PEP, 33.3% (1) of the SPs and 33.3% (2) of the BD group, 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 16.3% (7) stated that they find the forecasting system format quite good. On respondent group level 50.0% (3) of the PMs, 16.7% (1) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they find the forecasting system format very good. On respondent group level 66.7% (2) of the SPs stated this response alternative.

Of all the respondents 37.2% (16) stated that they do not know the forecasting system format. On respondent group level 33.3% (2) of the PTLs, 100.0% (7) of the PEs, 33.3% (2) of the PEP, 33.3% (2) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

This indicates that many of the respondents do not know the format and that it should be made more visible to them.

Table B-20 shows the data for Question 19.

Table B-20 Question 19 Section 3: Tendering Process and Forecasting

Question 19: How do you find the forecasting system format?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Very poor	0	0,0 %	1	16,7 %	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	4,7%	2
Quite poor	2	33,3 %	1	16,7 %	0	0,0 %	1	16,7 %	0	0,0 %	1	16,7 %	1	11,1 %	14,0%	6
Neither good nor poor	1	16,7 %	2	33,3 %	0	0,0 %	2	33,3 %	1	33,3 %	2	33,3 %	2	22,2 %	23,3%	10
Quite good	3	50,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	16,7 %	3	33,3 %	16,3%	7
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2	66,7 %	0	0,0 %	0	0,0 %	4,7%	2
I do not know the format	0	0,0 %	2	33,3 %	7	100,0 %	2	33,3 %	0	0,0 %	2	33,3 %	3	33,3 %	37,2%	16
															answered question	**43**
															skipped question	**0**

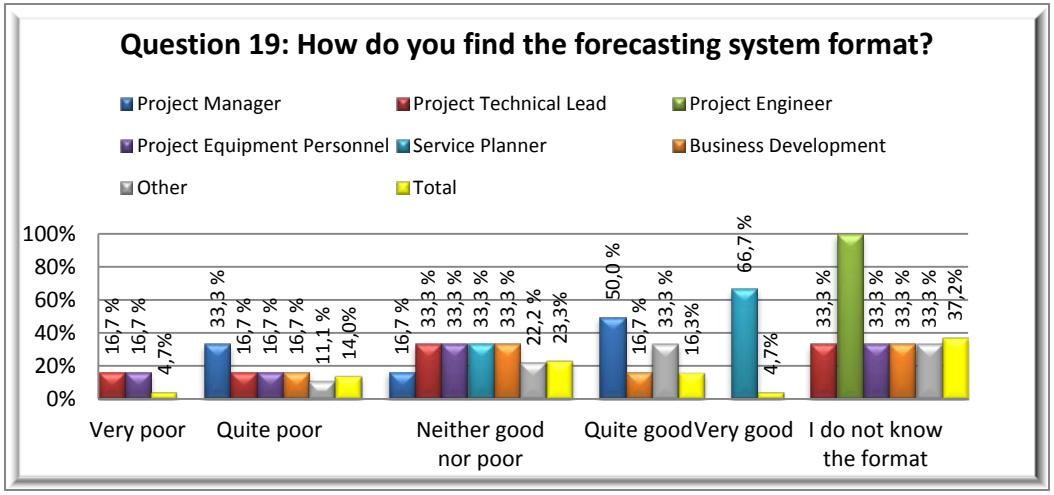

Figure B-8 Question 19 Section 3: Tendering Process and Forecasting

B.4 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 20

Figure 7-13 for Question 20 shows the distribution of the respondent's knowledge about cost estimates. 16.3% (7) of all respondents stated that they *know little or nothing* about cost estimates. On respondent group level 28.6% (2) of the PEs, 33.3% (2) of the PEP and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 46.5% (20) stated that they *have some knowledge about cost estimates*. On respondent group level 16.7% (1) of the PMs, 66.7% (4) of the PTLs, 57.1% (4) of the PEs, 66.7% (4) of the PEP, 33.3% (1) of the SPs, 50.0% (3) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 25.6% (11) stated that they *have quite much knowledge* about cost estimates. On respondent group level 66.7% (4) of the PMs, 33.3% (2) of the PTLs, 14.3% (1) of the PEs, 66.7% (2) of the SPs and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 11.1% (5) stated that they *have very much knowledge* about cost estimates. On respondent group level 16.7% (1) of the PMs, 50.0% (3) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Table B-21 shows the data for Question 20.

Table B-21 Question 20 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 20: How much knowledge do you have about cost estimates?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Little/nothing	0	0,0 %	0	0,0 %	2	28,6 %	2	33,3 %	0	0,0 %	0	0,0 %	3	33,3 %	16,3%	7
Some	1	16,7 %	4	66,7 %	4	57,1 %	4	66,7 %	1	33,3 %	3	50,0 %	3	33,3 %	46,5%	20
Quite much	4	66,7 %	2	33,3 %	1	14,3 %	0	0,0 %	2	66,7 %	0	0,0 %	2	22,2 %	25,6%	11
Very much	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	3	50,0 %	1	11,1 %	11,6%	5
															answered question	**43**
															skipped question	**0**

Question 21

Figure B-9 for Question 21 shows the distribution of how the respondent's find the cost estimate format used for Statoil projects. Of all respondents 2.3% (1) stated that he/she find the format *very poor*. On respondent group level 16.7% (1) of the PMs stated this response alternative.

None respondents find that the cost estimate format used for Statoil projects is *quite poor*.

Of all the respondents 18.6% (8) stated that they find the cost estimate format used for Statoil projects *neither good nor poor*. On respondent group level 33.3% (2) of the PMs, 33.3% (2) of the PTLs, 50.0% (3) of the PEP and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 37.2% (16) stated that they find the cost estimate format used for Statoil projects *quite good*. On respondent group level 50.0% (3) of the PMs, 33.3% (2) of the PTLs, 28.6% (2) of the PEs, 16.7% (1) of the PEP, 33.3% (1) of the SPs, 66.7% (4) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they find the cost estimate format used for Statoil projects *very good*. On respondent group level 66.7% (2) of the SPs stated this response alternative.

Of all the respondents 37.2% (16) stated that they *do not know* the format used for Statoil projects. On respondent group level 33.3% (2) of the PTLs, 74.1% (5) of the PEs, 33.3% (2) of the PEP, 33.3% (2) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

This could indicate that there is no immediate need to change the cost estimate format for Statoil projects.

Table B-22 shows the data for Question 21.

Table B-22 Question 21 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 21: How do you find the cost estimate format for Statoil projects?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Very poor	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
Quite poor	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
Neither good nor poor	2	33,3 %	2	33,3 %	0	0,0 %	3	50,0 %	0	0,0 %	0	0,0 %	1	11,1 %	18,6%	8
Quite good	3	50,0 %	2	33,3 %	2	28,6 %	1	16,7 %	1	33,3 %	4	66,7 %	3	33,3 %	37,2%	16
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2	66,7 %	0	0,0 %	0	0,0 %	4,7%	2
I do not know the format	0	0,0 %	2	33,3 %	5	71,4 %	2	33,3 %	0	0,0 %	2	33,3 %	5	55,6 %	37,2%	16
															answered question	**43**
															skipped question	**0**

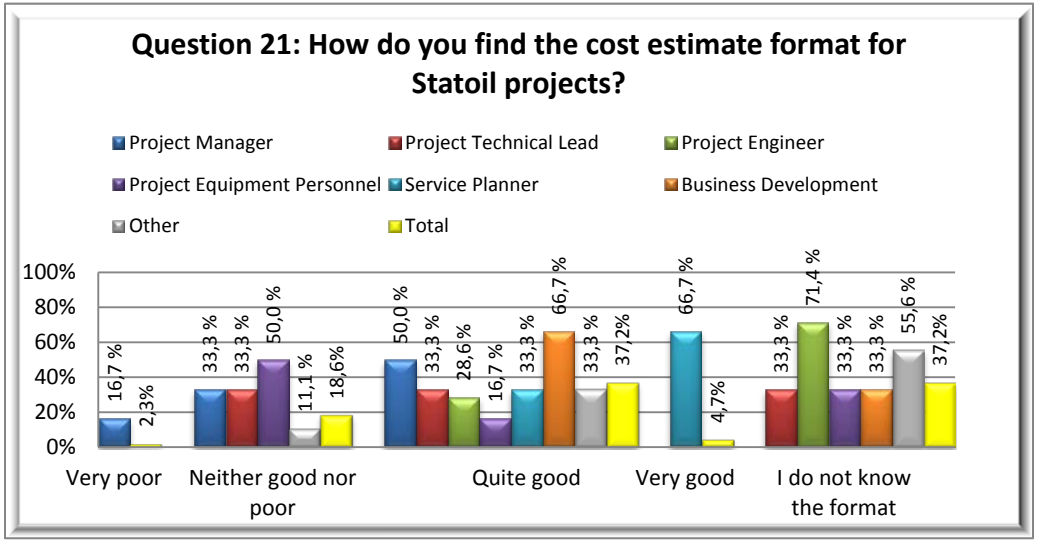

Figure B-9 Question 21 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 22

Figure B-10 for Question 22 shows the distribution of how the respondent's find the cost estimate format used for other customers. Of all respondents 2.3% (1) stated that he/she find the format *very poor*. On respondent group level 16.7% (1) of the PMs stated this response alternative.

Of all the respondents 7.0% (3) stated that they find the cost estimate format used for other customers *quite poor*. On respondent group level 33.3% (2) of the PTLs and 16.7% (1) of the PEP stated this response alternative.

Of all the respondents 25.6% (11) stated that they find the cost estimate format used for other customers *neither good nor poor*. On respondent group level 33.3% (2) of the PMs, 33.3% (2) of the PTLs, 50.0% (3) of the PEP, 33.3% (1) of the SPs, 16.7% (1) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 27.9% (12) stated that they find the cost estimate format used for other customers *quite good*. On respondent group level 50.0% (3) of the PMs, 16.7% (1) of the PTLs, 28.6% (2) of the PEs, 33.3% (1) of the SPs, 66.7% (4) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 2.3% (1) stated that they find the cost estimate format used for other customers *very good*. On respondent group level 33.3% (1) of the SPs stated this response alternative.

Of all the respondents 34.9% (15) stated that they *do not know* the cost estimate format used for other customers. On respondent group level 16.7% (1) of the PTLs, 74.1% (5) of the PEs, 33.3% (2) of the PEP, 16.7% (1) of the BD group and 66.7% (6) of the 'Other' group stated this response alternative.

This could indicate that there may be a need to change or upgrade the cost estimate format for other customers.

Table B-23 shows the data for Question 22.

Table B-23 Question 22 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 22: How do you find the cost estimate format for other customers?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Very poor	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
Quite poor	0	0,0 %	2	33,3 %	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	7,0%	3
Neither good nor poor	2	33,3 %	2	33,3 %	0	0,0 %	3	50,0 %	1	33,3 %	1	16,7 %	2	22,2 %	25,6%	11
Quite good	3	50,0 %	1	16,7 %	2	28,6 %	0	0,0 %	1	33,3 %	4	66,7 %	1	11,1 %	27,9%	12
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	33,3 %	0	0,0 %	0	0,0 %	2,3%	1
I do not know the format	0	0,0 %	1	16,7 %	5	71,4 %	2	33,3 %	0	0,0 %	1	16,7 %	6	66,7 %	34,9%	15
															answered question	**43**
															skipped question	**0**

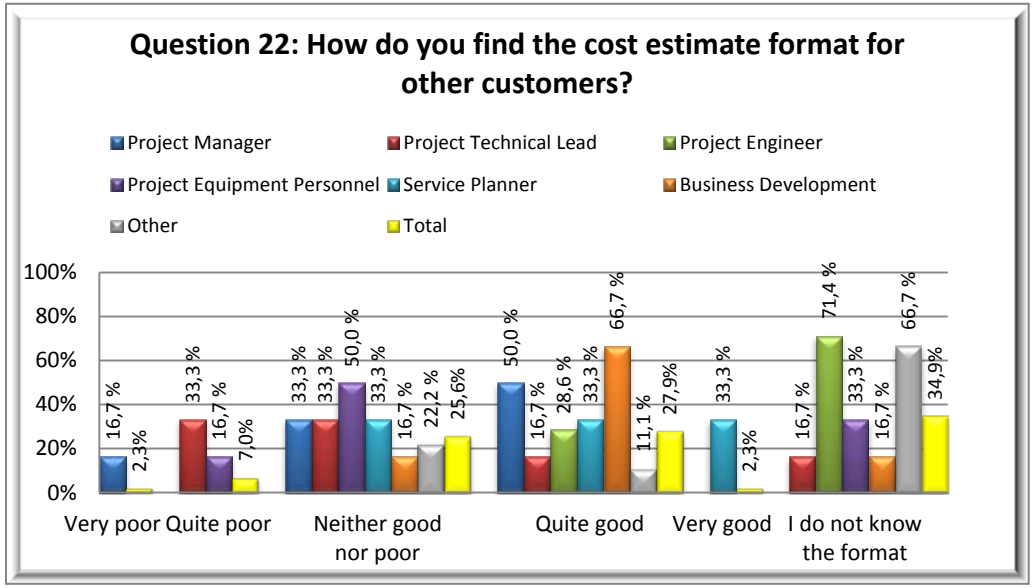

Figure B-10 Question 22 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 23

Figure 7-14 for Question 23 shows the distribution of the respondent's knowledge about cost reports. 41.9% (18) of all respondents stated that they know *little or nothing* about cost reports. On respondent group level 50.0% (5) of the PTLs 71.4% (5) of the PEs, 66.7% (4) of the PEP, 33.3% (2) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

Of all the respondents 32.6% (14) stated that they have *some* knowledge about cost reports. On respondent group level 33.3% (2) of the PMs, 50.0% (3) of the PTLs, 28.6% (2) of the PEs, 16.7% (1) of the PEP, 50.0% (3) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 16.3% (7) stated that they have *quite much* knowledge about cost reports. On respondent group level 66.7% (4) of the PMs, 16.7% (1) of the PEP and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 9.3% (4) stated that they have *very much* knowledge about cost reports. On respondent group level 100.0% (3) of the SPs and 16.7% (1) of the BD group stated this response alternative.

Table B-24 shows the data for Question 23.

Table B-24 Question 23 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 23: How much knowledge do you have about cost reports?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Little/nothing	0	0,0 %	3	50,0 %	5	71,4 %	4	66,7 %	0	0,0 %	2	33,3 %	4	44,4 %	41,9%	18
Some	2	33,3 %	3	50,0 %	2	28,6 %	1	16,7 %	0	0,0 %	3	50,0 %	3	33,3 %	32,6%	14
Quite much	4	66,7 %	0	0,0 %	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	2	22,2 %	16,3%	7
Very much	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	3	100,0 %	1	16,7 %	0	0,0 %	9,3%	4
															answered question	**43**
															skipped question	**0**

Question 24

Figure B-11 for Question 24 shows the distribution of how the respondent's find the cost report format used for Statoil projects. Of all respondents 2.3% (1) stated that he/she find the format *very poor*. On respondent group level 16.7% (1) of the PMs stated this response alternative.

None respondents find that the cost estimate format used for Statoil projects is *quite poor*.

Of all the respondents 18.6% (8) stated that they find the cost estimate format used for Statoil projects *neither good nor poor*. On respondent group level 16.7% (1) of the PMs, 33.3% (2) of the PTLs, 33.3% (2) of the PEP, 33.3% (2) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 27.9% (12) stated that they find the cost report format used for Statoil projects *quite good*. On respondent group level 66.7% (4) of the PMs, 14.3% (1) of the PEs, 16.7% (1) of the PEP, 33.3% (1) of the SPs, 16.7% (1) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they find the cost report format used for Statoil projects *very good*. On respondent group level 66.7% (2) of the SPs stated this response alternative.

Of all the respondents 46.5% (20) stated that they *do not know* the cost report used for Statoil projects. On respondent group level 66.7% (4) of the PTLs, 85.7% (6) of the PEs, 50.0% (3) of the PEP, 50.0% (3) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

This could indicate that there is no immediate need to change the cost estimate format for Statoil projects.

Table B-25 shows the data for Question 24.

Table B-25 Question 24 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 24: How do you find the cost report format for Statoil projects?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Very poor	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
Quite poor	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
Neither good nor poor	1	16,7 %	2	33,3 %	0	0,0 %	2	33,3 %	0	0,0 %	2	33,3 %	1	11,1 %	18,6%	8
Quite good	4	66,7 %	0	0,0 %	1	14,3 %	1	16,7 %	1	33,3 %	1	16,7 %	4	44,4 %	27,9%	12
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2	66,7 %	0	0,0 %	0	0,0 %	4,7%	2
I do not know the format	0	0,0 %	4	66,7 %	6	85,7 %	3	50,0 %	0	0,0 %	3	50,0 %	4	44,4 %	46,5%	20
															answered question	**43**
															skipped question	**0**

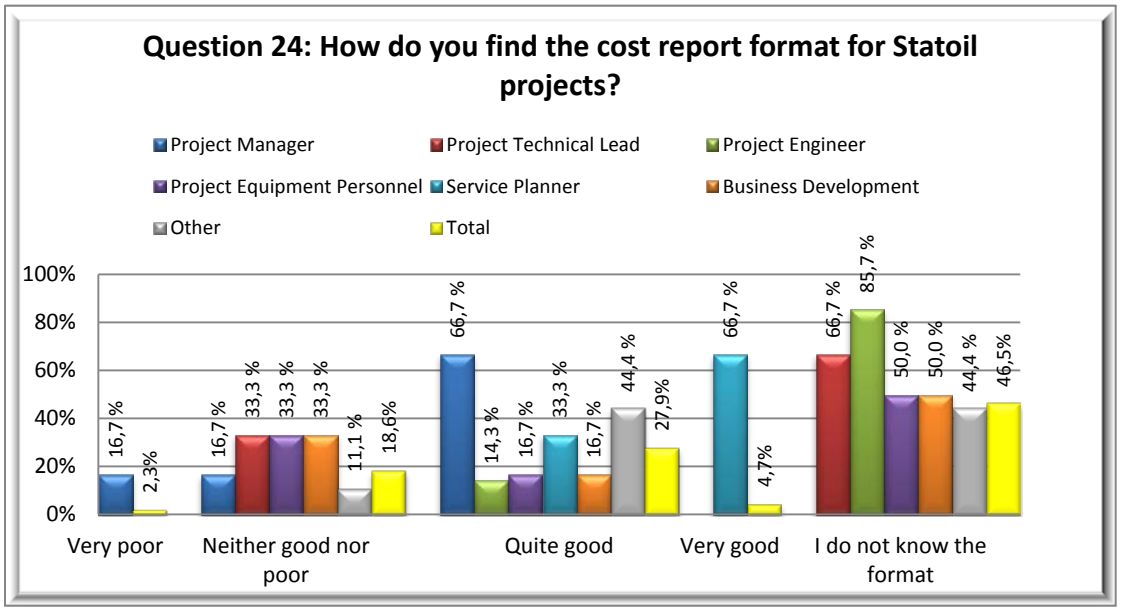

Figure B-11 Question 24 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 25

Figure B-12 for Question 25 shows the distribution of how the respondent's find the cost report format used for other customers. Of all respondents 2.3% (1) stated that he/she find the format *very poor*. On respondent group level 16.7% (1) of the PMs stated this response alternative.

Of all the respondents 7.0% (3) stated that they find the cost report format used for other customers *quite poor*. On respondent group level 16.7% (1) of the PMs, 16.7% (1) of the PTLs and 16.7% (1) of the PEP stated this response alternative.

Of all the respondents 25.6% (11) stated that they find the cost report format used for other customers *neither good nor poor*. On respondent group level 33.3% (2) of the PTLs, 14.3% (1) of the PEs, 33.3% (2) of the PEP, 33.3% (1) of the SPs, 50.0% (3) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 11.6% (5) stated that they find the cost report format used for other customers *quite good*. On respondent group level 50.0% (3) of the PMs, 33.3% (1) of the SPs and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they find the cost report format used for other customers *very good*. On respondent group level 16.7% (1) of the PMs and 33.3% (1) of the SPs stated this response alternative.

Of all the respondents 48.8% (21) stated that they *do not know* the cost report format used for other customers. On respondent group level 50.0% (3) of the PTLs, 85.7% (6) of the PEs, 50.0% (3) of the PEP, 50.0% (3) of the BD group and 66.7% (6) of the 'Other' group stated this response alternative.

This could indicate that there may be a need to change or upgrade the cost report format for other customers.

Table B-26 shows the data for Question 25.

Table B-26 Question 25 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 25: How do you find the cost report format for other customers?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Very poor	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
Quite poor	1	16,7 %	1	16,7 %	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	7,0%	3
Neither good nor poor	0	0,0 %	2	33,3 %	1	14,3 %	2	33,3 %	1	33,3 %	3	50,0 %	2	22,2 %	25,6%	11
Quite good	3	50,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	33,3 %	0	0,0 %	1	11,1 %	11,6%	5
Very good	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	1	33,3 %	0	0,0 %	0	0,0 %	4,7%	2
I do not know the format	0	0,0 %	3	50,0 %	6	85,7 %	3	50,0 %	0	0,0 %	3	50,0 %	6	66,7 %	48,8%	21
															answered question	**43**
															skipped question	**0**

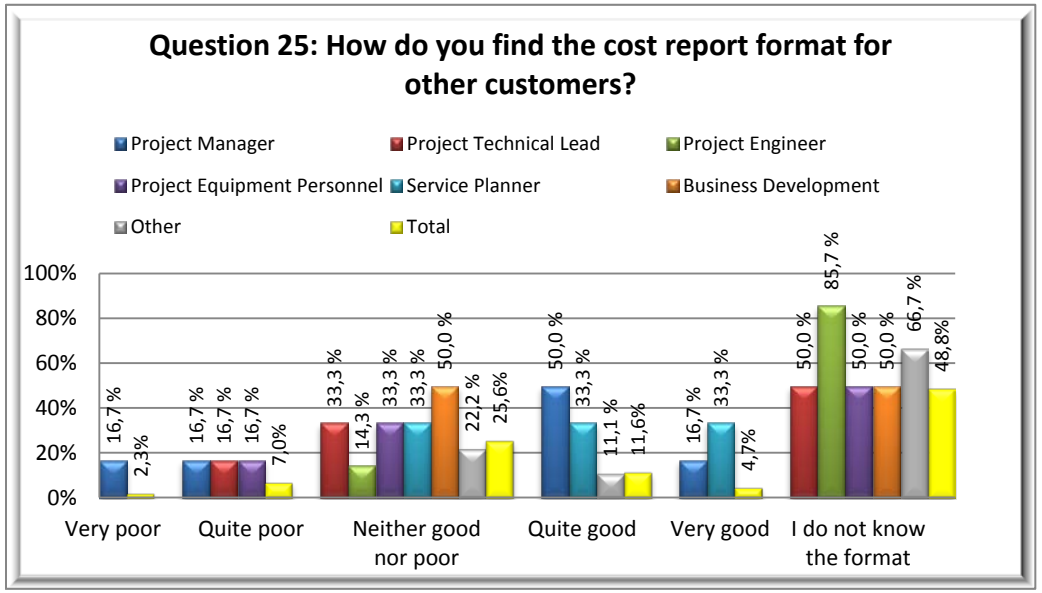

Figure B-12 Question 25 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 26

Figure 7-15 for Question 26 shows the distribution of the respondent's knowledge about variation order request and variation order (VOR and VO). 27.9% (12) of all respondents stated that they know *little or nothing* about VOR and VO. On respondent group level 16.7% (1) of the PTLs, 71.4% (5) of the PEs, 33.3% (2) of the PEP, 16.7% (1) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 34.9% (15) stated that they have *some* knowledge about VOR and VO. On respondent group level 33.3% (2) of the PTLs, 28.6% (2) of the PEs, 66.7% (4) of the PEP, 33.3% (1) of the SPs, 16.7% (1) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

Of all the respondents 25.6% (11) stated that they have *quite much* knowledge about VOR and VO. On respondent group level 66.7% (4) of the PMs, 50.0% (3) of the PTLs, 66.7% (2) of the SPs, 16.7% (1) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 11.6% (5) stated that they have *very much* knowledge about VOR and VO. On respondent group level 33.3% (2) of the PMs and 50.0% (3) of the BD group stated this response alternative.

Table B-27 shows the data for Question 26.

Table B-27 Question 26 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 26: How much knowledge do you have about Variation/Change Order Request and Variation/Change Order (VOR/COR and VO/CO)?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Little/nothing	0	0,0 %	1	16,7 %	5	71,4 %	2	33,3 %	0	0,0 %	1	16,7 %	3	33,3 %	27,9%	12
Some	0	0,0 %	2	33,3 %	2	28,6 %	4	66,7 %	1	33,3 %	1	16,7 %	5	55,6 %	34,9%	15
Quite much	4	66,7 %	3	50,0 %	0	0,0 %	0	0,0 %	2	66,7 %	1	16,7 %	1	11,1 %	25,6%	11
Very much	2	33,3 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	3	50,0 %	0	0,0 %	11,6%	5
															answered question	**43**
															skipped question	**0**

Question 27

Figure B-13 for Question 27 shows the distribution of how the respondent's find the VOR and VO formats used for Statoil projects. None of the respondents finds the format very poor, hence this response alternative is not shown in the figure.

Of all the respondents 4.7% (2) stated that they find the VOR and VO formats used for Statoil projects quite poor. On respondent group level 33.3% (2) of the PMs stated this response alternative.

Of all the respondents 16.3% (7) stated that they find the VOR and VO formats used for Statoil projects neither good nor poor. On respondent group level 16.7% (1) of the PMs, 16.7% (1) of the PTLs, 50.0% (3) of the PEP and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 25.6% (11) stated that they find the VOR and VO formats used for Statoil projects quite good. On respondent group level 16.7% (1) of the PMs, 33.3% (2) of the PTLs, 14.3% (1) of the PEs, 66.7% (2) of the SPs, 33.3% (2) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 2.3% (1) stated that they find the VOR and VO formats used for Statoil projects very good. On respondent group level 33.3% (1) of the SPs stated this response alternative.

Of all the respondents 51.2% (22) stated that they do not know the VOR and VO formats used for Statoil projects. On respondent group level 33.3% (2) of the PMs, 50.0% (3) of the PTLs, 85.7% (6) of the PEs, 50.0% (3) of the PEP, 66.7% (4) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

This could indicate that there may be a need to change or upgrade the cost estimate format for Statoil projects.

Table B-28 shows the data for Question 27.

Table B-28 Question 27 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 27: How do you find the VOR and VO formats for Statoil projects?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Very poor	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
Quite poor	2	33,3 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	4,7%	2
Neither good nor poor	1	16,7 %	1	16,7 %	0	0,0 %	3	50,0 %	0	0,0 %	0	0,0 %	2	22,2 %	16,3%	7
Quite good	1	16,7 %	2	33,3 %	1	14,3 %	0	0,0 %	2	66,7 %	2	33,3 %	3	33,3 %	25,6%	11
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	33,3 %	0	0,0 %	0	0,0 %	2,3%	1
I do not know the format	2	33,3 %	3	50,0 %	6	85,7 %	3	50,0 %	0	0,0 %	4	66,7 %	4	44,4 %	51,2%	22
														answered question		**43**
														skipped question		**0**

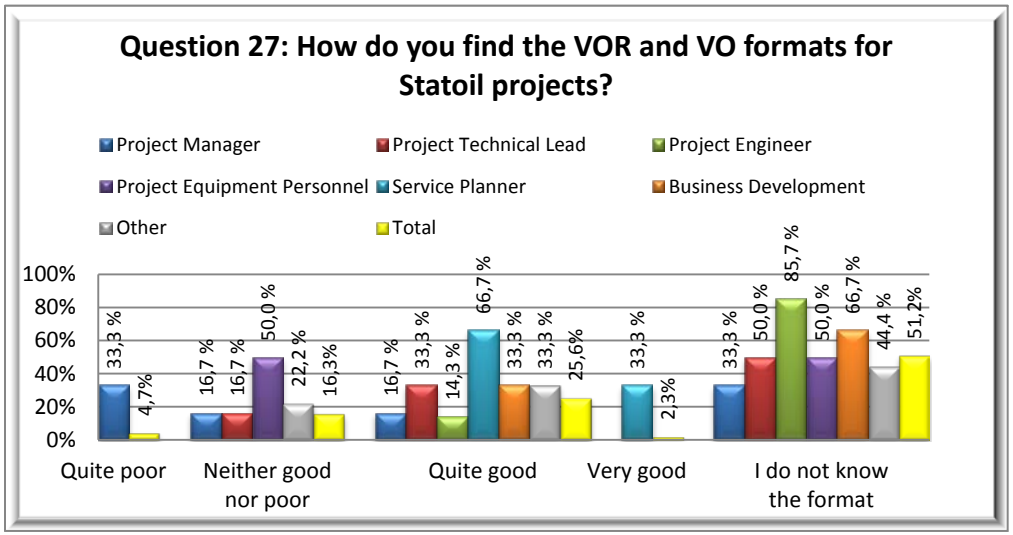

Figure B-13 Question 27 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 28

Figure B-14 for Question 28 shows the distribution of how the respondent's find the VOR/COR and VO/CO formats for other customers. None of the respondents stated that they find the format very poor, hence this response alternative is not shown in the figure.

Of all the respondents 2.3% (1) stated that they find the VOR/COR and VO/CO formats for other customers quite poor. On respondent group level 16.7% (1) of the PTLs stated this response alternative.

Of all the respondents 25.6% (11) stated that they find the VOR/COR and VO/CO formats for other customers neither good nor poor. On respondent group level 16.7% (1) of the PMs, 50.0% (3) of the PTLs, 50.0% (3) of the PEP, 16.7% (1) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 30.2% (13) stated that they find the VOR/COR and VO/CO formats for other customers quite good. On respondent group level 83.3% (5) of the PMs, 33.3% (2) of the PTLs, 33.3% (1) of the SPs, 66.7% (4) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they find the VOR/COR and VO/CO formats for other customers very good. On respondent group level 66.7% (2) of the SPs stated this response alternative.

Of all the respondents 37.2% (16) stated that they do not know the VOR/COR and VO/CO formats for other customers. On respondent group level 100.0% (7) of the PEs, 50.0% (3) of the PEP, 16.7% (1) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

This could indicate that there is no need to change or upgrade the cost estimate format for other customers.

Table B-29 shows the data for Question 28.

Table B-29 Question 28 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 28: How do you find the VOR/COR and VO/CO formats for other customers?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Percent	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Very poor	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
Quite poor	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
Neither good nor poor	1	16,7 %	3	50,0 %	0	0,0 %	3	50,0 %	0	0,0 %	1	16,7 %	3	33,3 %	25,6%	11
Quite good	5	83,3 %	2	33,3 %	0	0,0 %	0	0,0 %	1	33,3 %	4	66,7 %	1	11,1 %	30,2%	13
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2	66,7 %	0	0,0 %	0	0,0 %	4,7%	2
I do not know the format	0	0,0 %	0	0,0 %	7	100,0 %	3	50,0 %	0	0,0 %	1	16,7 %	5	55,6 %	37,2%	16
															answered question	**43**
															skipped question	**0**

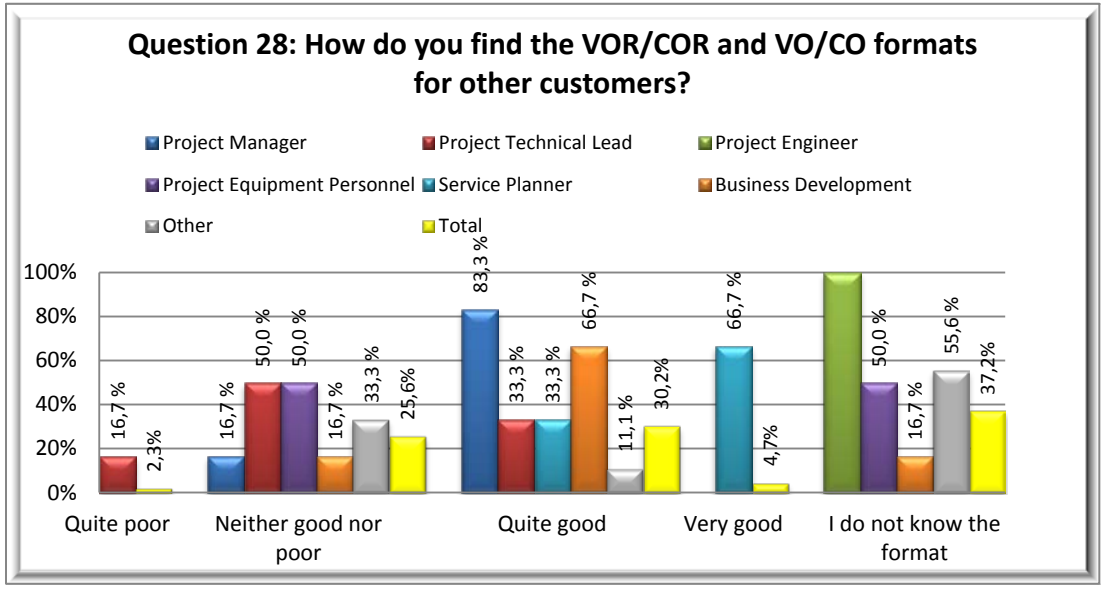

Figure B-14 Question 28 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 29

Figure 7-16 for Question 29 shows the distribution if the respondents often find that the original cost estimates have to be updated with a VO/CO. Of all the respondents 51.2% (22) stated that they often find that the original cost estimates have to be updated with a VO/CO. On respondent group level 66.7% (4) of the PMs, 100.0% (6) of the PTLs, 14.3% (1) of the PEs, 16.7% (1) of the PEP, 100.0% (3) of the SPs, 33.3% (2) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

Of all the respondents 7.0% (3) stated that they do not often find that the original cost estimates have to be updated with a VO/CO. On respondent group level 33.3% (2) of the PMs and 14.3% (1) of the PEs stated this response alternative.

Of all the respondents 41.9% (18) stated that they do not know if the original cost estimates have to be updated with a VO/CO. On respondent group level 71.4% (5) of the PEs, 83.3% (5) of the PEP, 66.7% (4) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

Table B-30 shows the data for Question 29.

Table B-30 Question 29 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 29: Do you often find that the original cost estimates have to be updated with a VO/CO?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Yes	4	66,7 %	6	100,0 %	1	14,3 %	1	16,7 %	3	100,0 %	2	33,3 %	5	55,6 %	51,2%	22
No	2	33,3 %	0	0,0 %	1	14,3 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	7,0%	3
I do not now	0	0,0 %	0	0,0 %	5	71,4 %	5	83,3 %	0	0,0 %	4	66,7 %	4	44,4 %	41,9%	18
															answered question	**43**
															skipped question	**0**

Question 30

Question 30 was asked to 22 respondents who answered that the original cost estimates often have to be updated with a VO/CO. Figure 7-17 for Question 30 shows the distribution of who these respondents mean is normally requesting the updates. Of these respondents 54.5% mean that the Client is normally requesting the change, and 45.5% mean that Halliburton is normally requesting the change. This could indicate that Halliburton could be more active to request variation orders if a change is discovered.

Table B-31 shows the data for Question 30.

Table B-31 Question 30 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 30: If 'Yes' to the previous question, who is normally requesting the change?									
Answer Options	**Project Manager (PM)**	**Project Technical Lead (PTL)**	**Project Engineer (PE)**	**Project Equipment Personnel (PEP)**	**Service Planner (SP)**	**Business Development (BD)**	**Other**	**Total**	
	Count	**Count**	**Count**	**Count**	**Count**	**Count**	**Count**	**Response Percentage**	**Response Count**
Customer	1	4	0	0	1	2	4	54,5%	12
Halliburton	3	2	1	1	2	0	1	45,5%	10
								answered question	**22**
								skipped question	**21**

Question 31

Figure 7-18 for Question 31 shows the distribution of if the respondents have ever noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time. Of all the respondents 41.9% (18) stated that they have noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time. On respondent group level 50.0% (3) of the PMs, 16.7% (1) of the PTLs, 14.3% (1) of the PEs, 50.0% (3) of the PEP, 83.3% (5) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

Of all the respondents 27.9% (12) stated that they have never noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time. On respondent group level 16.7% (1) of the PMs, 66.7% (4) of the PTLs, 42.9% (3) of the PEs, 16.7% (1) of the PEP, 66.7% (2) of the SPs and 16.7% (1) of the BD group stated this response alternative.

Of all the respondents 30.2% (13) stated that they do not know if project costs could have been covered by the customer, but it was forgotten to raise a VOR in due time. On respondent group level 33.3% (2) of the PMs, 16.7% (1) of the PTLs, 42.9% (3) of the PEs, 33.3% (2) of the PEP, 33.3% (1) of the SPs and 44.4% (4) of the 'Other' group stated this response alternative.

Table B-32 shows the data for Question 31.

Table B-32 Question 31 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 31: Have you ever noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Yes	3	50,0 %	1	16,7 %	1	14,3 %	3	50,0 %	0	0,0 %	5	83,3 %	5	55,6 %	41,9%	18
No	1	16,7 %	4	66,7 %	3	42,9 %	1	16,7 %	2	66,7 %	1	16,7 %	0	0,0 %	27,9%	12
I do not know	2	33,3 %	1	16,7 %	3	42,9 %	2	33,3 %	1	33,3 %	0	0,0 %	4	44,4 %	30,2%	13
															answered question	***43***
															skipped question	***0***

Question 32

Question 32 was asked to the respondents who answered that they have noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR in due time. Multiple answers were allowed for this question. Figure 7-19 for Question 32 shows the categories that VORs should have been made for. 33.3% of these respondents have experienced that VORs should have been made for Management & Services, 61.1% for Engineering, 33.3% for Procurement, 66.7% for Mobilisation & Demobilisation and 38.9% for Field Operations.

Table B-33 shows the data for Question 32.

Table B-33 Question 32 Section 4: Cost Estimates, Cost Reports and Variation Orders

Question 32: If 'Yes' to the previous question, for what category should a VOR have been made? Multiple answers are allowed.									
Answer Options	**Project Manager (PM)**	**Project Technical Lead (PTL)**	**Project Engineer (PE)**	**Project Equipment Personnel (PEP)**	**Service Planner (SP)**	**Business Development (BD)**	**Other**	**Total**	
	Count	**Count**	**Count**	**Count**	**Count**	**Count**	**Count**	**Response Percentage**	**Response Count**
Management & Services	2	0	0	0	0	4	0	33,3%	6
Engineering	3	1	0	1	0	3	3	61,1%	11
Procurement	1	1	1	1	0	1	1	33,3%	6
Mobilisation & Demobilisation	1	1	1	3	0	4	2	66,7%	12
Field Operations	1	0	1	0	0	3	2	38,9%	7
								answered question	**18**
								skipped question	**25**

B.5 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 33

Figure 7-20 for Question 33 shows the distribution if the respondents find that extra work and cost related to an extra (not planned) mobilisation is visible or not. Of all the respondents 44.2% (19) stated that they mean that the extra work and cost related to an extra (not planned) mobilisation is visible to themselves and their project teams. On respondent group level 50.0% (3) of the PMs, 66.7% (4) of the PTLs, 42.9% (3) of the PEs, 100.0% (6) of the PEP, 66.7% (2) of the SPs and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 30.2% (13) stated that they do not find that extra work and cost related to an extra (not planned) mobilisation is visible. On respondent group level 50.0% (3) of the PMs, 33.3% (2) of the PTLs, 28.6% (2) of the PEs, 33.3% (1) of the SPs, 33.3% (2) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

Of all the respondents 25.6% (11) stated that they do not know if extra work and cost related to an extra (not planned) mobilisation is visible to themselves or their project teams. On respondent group level 28.6% (2) of the PEs, 66.7% (4) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

Table B-34 shows the data for Question 33.

Table B-34 Question 33 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 33: Is the extra work and cost related to an extra (not planned) mobilisation visible to you and the rest of your project team?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Yes	3	50,0 %	4	66,7 %	3	42,9 %	6	100,0 %	2	66,7 %	0	0,0 %	1	11,1 %	44,2%	19
No	3	50,0 %	2	33,3 %	2	28,6 %	0	0,0 %	1	33,3 %	2	33,3 %	3	33,3 %	30,2%	13
I do not know	0	0,0 %	0	0,0 %	2	28,6 %	0	0,0 %	0	0,0 %	4	66,7 %	5	55,6 %	25,6%	11
															answered question	**43**
															skipped question	**0**

Question 34

Figure 7-21 for Question 34 shows the distribution if the respondents find the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, is visible or not. Of all the respondents 41.9% (18) stated that they find the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, visible to themselves and their project team. On respondent group level 33.3% (2) of the PMs, 66.7% (4) of the PTLs, 42.9% (3) of the PEs, 100.0% (6) of the PEP, 33.3% (1) of the SPs, 16.7% (1) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 32.6% (14) stated that they do not find the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, visible to themselves and their project team. On respondent group level 66.7% (4) of the PMs, 16.7% (1) of the PTLs, 42.9% (3) of the PEs, 66.7% (2) of the SPs, 16.7% (1) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 25.6% (11) stated that they do not know if the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, visible to themselves and their project team. On respondent group level 16.7% (1) of the Technical Lead, 14.3% (1) of the PEs, 66.7% (4) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

Table B-35 shows the data for Question 34.

Table B-35 Question 34 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 34: Are the consequences of not returning rental equipment in time, or as soon as possible after demobilisation, visible to you and your project team?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Yes	2	33,3 %	4	66,7 %	3	42,9 %	6	100,0 %	1	33,3 %	1	16,7 %	1	11,1 %	41,9%	18
No	4	66,7 %	1	16,7 %	3	42,9 %	0	0,0 %	2	66,7 %	1	16,7 %	3	33,3 %	32,6%	14
I do not know	0	0,0 %	1	16,7 %	1	14,3 %	0	0,0 %	0	0,0 %	4	66,7 %	5	55,6 %	25,6%	11
															answered question	**43**
															skipped question	**0**

Question 35

Figure 7-22 for Question 35 shows the distribution of how the respondent's find the efficiency of onshore resources. Of all the respondents 2.3% (1) stated that they find the efficiency of onshore resources quite poor. On respondent group level 16.7% (1) of the PTLs stated this response alternative.

Of all the respondents 27.9% (12) stated that they find the efficiency of onshore resources quite poor. On respondent group level 50.0% (3) of the PMs, 16.7% (1) of the PTLs, 28.6% (2) of the PEs, 66.7% (4) of the PEP and 33.3% (2) of the BD group stated this response alternative.

Of all the respondents 23.3% (10) stated that they find the efficiency of onshore resources neither good nor poor. On respondent group level 33.3% (2) of the PMs, 33.3% (2) of the PTLs, 28.6% (2) of the PEs, 33.3% (2) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 32.6% (14) stated that they find the efficiency of onshore resources quite good. On respondent group level 16.7% (1) of the PMs, 33.3% (2) of the PTLs, 28.6% (2) of the PEs, 16.7% (1) of the PEP, 100.0% (3) SPs, 16.7% (1) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

None of the respondents stated that they find the efficiency of onshore resources very good, hence this response alternative is not shown in the figure.

Of all the respondents 14.0% (6) stated that they do not know the efficiency of onshore resources. On respondent group level 14.3% (1) of the PEs, 16.7% (3) of the PEP, 16.7% (1) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Table B-36 shows the data for Question 35.

Table B-36 Question 35 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 35: How do you find the efficiency of onshore resources?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Very poor	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
Quite poor	3	50,0 %	1	16,7 %	2	28,6 %	4	66,7 %	0	0,0 %	2	33,3 %	0	0,0 %	27,9%	12
Neither good nor poor	2	33,3 %	2	33,3 %	2	28,6 %	0	0,0 %	0	0,0 %	2	33,3 %	2	22,2 %	23,3%	10
Quite good	1	16,7 %	2	33,3 %	2	28,6 %	1	16,7 %	3	100,0 %	1	16,7 %	4	44,4 %	32,6%	14
Very good	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
I do not know	0	0,0 %	0	0,0 %	1	14,3 %	1	16,7 %	0	0,0 %	1	16,7 %	3	33,3 %	14,0%	6
															answered question	**43**
															skipped question	**0**

Question 36

Figure 7-23 for Question 36 shows the distribution of how the respondent's find the efficiency of offshore resources. None of the respondents stated that they find the efficiency of onshore resources quite poor, hence this response alternative is not shown in the figure.

Of all the respondents 2.3% (1) stated that they find the efficiency of offshore resources quite poor. On respondent group level 16.7% (1) of the PTLs stated this response alternative.

Of all the respondents 18.6% (8) stated that they find the efficiency of offshore resources neither good nor poor. On respondent group level 16.7% (1) of the PTLs, 28.6% (2) of the PEs, 50.0% (3) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 44.2% (19) stated that they find the efficiency of offshore resources quite good. On respondent group level 83.3% (5) of the PMs, 50.0% (3) of the PTLs, 42.9% (3) of the PEs, 66.7% (4) of the PEP, 16.7% (1) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they find the efficiency of offshore resources very good. On respondent group level 16.7% (1) of the PMs and 33.3% (1) of the SPs stated this response alternative.

Of all the respondents 30.2% (13) stated that they do not know the efficiency of offshore resources. On respondent group level 16.7% (1) of the PTLs, 28.6% (2) of the PEs, 33.3% (2) of the PEP, 66.7% (2) SPs, 33.3% (2) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

Table B-37 shows the data for Question 36.

Table B-37 Question 36 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 36: How do you find the efficiency of offshore resources?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Very poor	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
Quite poor	0	0,0 %	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2,3%	1
Neither good nor poor	0	0,0 %	1	16,7 %	2	28,6 %	0	0,0 %	0	0,0 %	3	50,0 %	2	22,2 %	18,6%	8
Quite good	5	83,3 %	3	50,0 %	3	42,9 %	4	66,7 %	0	0,0 %	1	16,7 %	3	33,3 %	44,2%	19
Very good	1	16,7 %	0	0,0 %	0	0,0 %	0	0,0 %	1	33,3 %	0	0,0 %	0	0,0 %	4,7%	2
I do not know	0	0,0 %	1	16,7 %	2	28,6 %	2	33,3 %	2	66,7 %	2	33,3 %	4	44,4 %	30,2%	13
															answered question	**43**
															skipped question	**0**

Question 37

Figure 7-24 for Question 37 shows the distribution of how the respondent's find the efficiency of contractors. None of the respondents stated that they find the efficiency of contractors quite poor, hence this response alternative is not shown in the figure.

Of all the respondents 7.0% (3) stated that they find the efficiency of contractors quite poor. On respondent group level 16.7% (1) of the PMs, 16.7% (1) of the PTLs and 14.3% (1) of the PEs stated this response alternative.

Of all the respondents 34.9% (15) stated that they find the efficiency of contractors neither good nor poor. On respondent group level 33.3% (2) of the PMs, 66.7% (4) of the PTLs, 14.3% (1) of the PEs, 33.3% (2) of the PEP, 33.3% (2) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

Of all the respondents 30.2% (13) stated that they find the efficiency of contractors quite good. On respondent group level 50.0% (3) of the PMs, 16.7% (1) of the PTLs, 42.9% (3) of the PEs, 33.3% (2) of the PEP, 33.3% (1) of the SPs, 16.7% (1) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they find the efficiency of contractors very good. On respondent group level 14.3% (1) of the PEs and 33.3% (1) of the SPs stated this response alternative.

Of all the respondents 23.3% (10) stated that they do not know the efficiency of contractors. On respondent group level 14.3% (1) of the PEs, 33.3% (1) SPs, 50.0% (3) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Table B-38 shows the data for Question 37.

Table B-38 Question 37 Section 5: Equipment, Mobilisations and Resource Efficiency

Question 37: How do you find the efficiency of contractors?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Very poor	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0,0%	0
Quite poor	1	16,7 %	1	16,7 %	1	14,3 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	7,0%	3
Neither good nor poor	2	33,3 %	4	66,7 %	1	14,3 %	2	33,3 %	0	0,0 %	2	33,3 %	4	44,4 %	34,9%	15
Quite good	3	50,0 %	1	16,7 %	3	42,9 %	2	33,3 %	1	33,3 %	1	16,7 %	2	22,2 %	30,2%	13
Very good	0	0,0 %	0	0,0 %	1	14,3 %	0	0,0 %	1	33,3 %	0	0,0 %	0	0,0 %	4,7%	2
I do not know	0	0,0 %	0	0,0 %	1	14,3 %	2	33,3 %	1	33,3 %	3	50,0 %	3	33,3 %	23,3%	10
															answered question	**43**
															skipped question	**0**

B.6 Section 6: Non-productive Time and Cost of Poor Quality

Question 38

Figure 7-25 for Question 38 shows the distribution of the respondents who have or do not have experienced Non-Productive Time (NPT) for field operations that Halliburton had to pay for. Of all the respondents 53.5% (23) stated that they have experienced Non-Productive Time (NPT) for field operations that Halliburton had to pay for. On respondent group level 83.3% (5) of the PMs, 50.0% (3) of the PTLs, 14.3% (1) of the PEs, 66.7% (4) of the PEP, 66.7% (2) of the SPs, 50.0% (3) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

Of all the respondents 27.9% (12) stated that they have not experienced Non-Productive Time (NPT) for field operations that Halliburton had to pay for. On respondent group level 16.7% (1) of the PMs, 33.3% (2) of the PTLs, 57.1% (4) of the PEs, 33.3% (2) of the PEP, 16.7% (1) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 18.6% (8) stated that they do not know of Non-Productive Time (NPT) for field operations that Halliburton had to pay for. On respondent group level 16.7% (1) of the Technical Lead, 28.6% (2) of the PEs, 33.3% (1) of the SPs, 33.3% (2) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Table B-39 shows the data for Question 38.

Table B-39 Question 38 Section 6: Non-productive Time and Cost of Poor Quality

Question 38: Have you ever experienced Non-Productive Time (NPT) for field operations that Halliburton had to pay for?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Yes	5	83,3 %	3	50,0 %	1	14,3 %	4	66,7 %	2	66,7 %	3	50,0 %	5	55,6 %	53,5%	23
No	1	16,7 %	2	33,3 %	4	57,1 %	2	33,3 %	0	0,0 %	1	16,7 %	2	22,2 %	27,9%	12
I do not know	0	0,0 %	1	16,7 %	2	28,6 %	0	0,0 %	1	33,3 %	2	33,3 %	2	22,2 %	18,6%	8
															answered question	**43**
															skipped question	**0**

Question 39

Figure 7-26 for Question 39 shows the distribution of the respondent's knowledge about Cost of Poor Quality (COPQ). 20.9% (9) of all respondents stated that they know little or nothing about COPQ. At the same alternative the answers from the respondent groups were as follows: 16.7% (1) of the PTLs, 42.9% (3) PEs, 16.7% (1) PEP, 33.3% (2) of the BD group and 22.2% (2) of the 'Other' group.

Of all the respondents 53.5% (23) stated that they have some knowledge about COPQ. On respondent group level 66.7% (4) of the PMs, 66.7% (4) of the PTLs, 57.1% (4) of the PEs, 66.7% (4) of the PEP, 100.0% (3) of the SPs, 33.3% (2) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 23.3% (10) stated that they have quite much knowledge about COPQ. On respondent group level 33.3% (2) of the PMs, 16.7% (1) of the PTLs, 16.7% (1) of the PEP, 33.3% (2) of the BD group and 44.4% (4) of the 'Other' group stated this response alternative.

Of all the respondents 2.3% (1) stated that they have very much knowledge about COPQ. On respondent group level 11.1% (1) of the 'Other' group stated this response alternative.

Table B-40 shows the data for Question 39.

Table B-40 Question 39 Section 6: Non-productive Time and Cost of Poor Quality

Question 39: How much knowledge do you have about Cost of Poor Quality (COPQ)?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Little/nothing	0	0,0 %	1	16,7 %	3	42,9 %	1	16,7 %	0	0,0 %	2	33,3 %	2	22,2 %	20,9%	9
Some	4	66,7 %	4	66,7 %	4	57,1 %	4	66,7 %	3	100,0 %	2	33,3 %	2	22,2 %	53,5%	23
Quite much	2	33,3 %	1	16,7 %	0	0,0 %	1	16,7 %	0	0,0 %	2	33,3 %	4	44,4 %	23,3%	10
Very much	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	11,1 %	2,3%	1
															answered question	**43**
															skipped question	**0**

Question 40

Figure B-15 for Question 40 shows the distribution of if the respondents have experienced COPQ in any of current or earlier projects. Of all the respondents 9.3% (4) stated that they have never experienced COPQ in any of current or earlier projects. On respondent group level 16.7% (1) of the PTLs, 28.6% (2) of the PEs and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 25.6% (11) stated that they have experienced COPQ 1-2 times in any of current or earlier projects. On respondent group level 33.3% (2) of the PMs, 33.3% (2) of the PTLs, 33.3% (2) of the PEP, 33.3% (1) of the SPs, 16.7% (1) of the BD group and 33.3% (3) of the 'Other' group stated this response alternative.

Of all the respondents 20.9% (9) stated that they have experienced COPQ 3-5 times in any of current or earlier projects. On respondent group level 66.7% (4) of the PMs, 16.7% (1) of the PTLs, 33.3% (2) of the PEP, 33.3% (1) of the Service Planner and 16.7% (1) of the BD group stated this response alternative.

Of all the respondents 4.7% (2) stated that they have experienced COPQ 5-10 times in any of current or earlier projects. On respondent group level 16.7% (1) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they have experienced COPQ 10 or more times in any of current or earlier projects. On respondent group level 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 34.9% (15) stated that they do not know if they have experienced COPQ in any of current or earlier projects. On respondent group level 33.3% (2) of the PTLs, 74.1% (5) of the PEs, 33.3% (2) of the PEP, 33.3% (1) of the Service Planner, 50.0% (3) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Table B-41 shows the data for Question 40.

Table B-41 Question 40 Section 6: Non-productive Time and Cost of Poor Quality

Question 40: Have you ever experienced COPQ in any of your current or earlier projects?																
Answer Options	**Project Manager (PM)**		**Project Technical Lead (PTL)**		**Project Engineer (PE)**		**Project Equipment Personnel (PEP)**		**Service Planner (SP)**		**Business Development (BD)**		**Other**		**Total**	
	Percent	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Response Percent**	**Response Count**
Never	0	0,0 %	1	16,7 %	2	28,6 %	0	0,0 %	0	0,0 %	0	0,0 %	1	11,1 %	9,3%	4
1-2 times	2	33,3 %	2	33,3 %	0	0,0 %	2	33,3 %	1	33,3 %	1	16,7 %	3	33,3 %	25,6%	11
3-5 times	4	66,7 %	1	16,7 %	0	0,0 %	2	33,3 %	1	33,3 %	1	16,7 %	0	0,0 %	20,9%	9
6-9 times	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	16,7 %	1	11,1 %	4,7%	2
10 or more times	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2	22,2 %	4,7%	2
I do not know	0	0,0 %	2	33,3 %	5	71,4 %	2	33,3 %	1	33,3 %	3	50,0 %	2	22,2 %	34,9%	15
															answered question	**43**
															skipped question	**0**

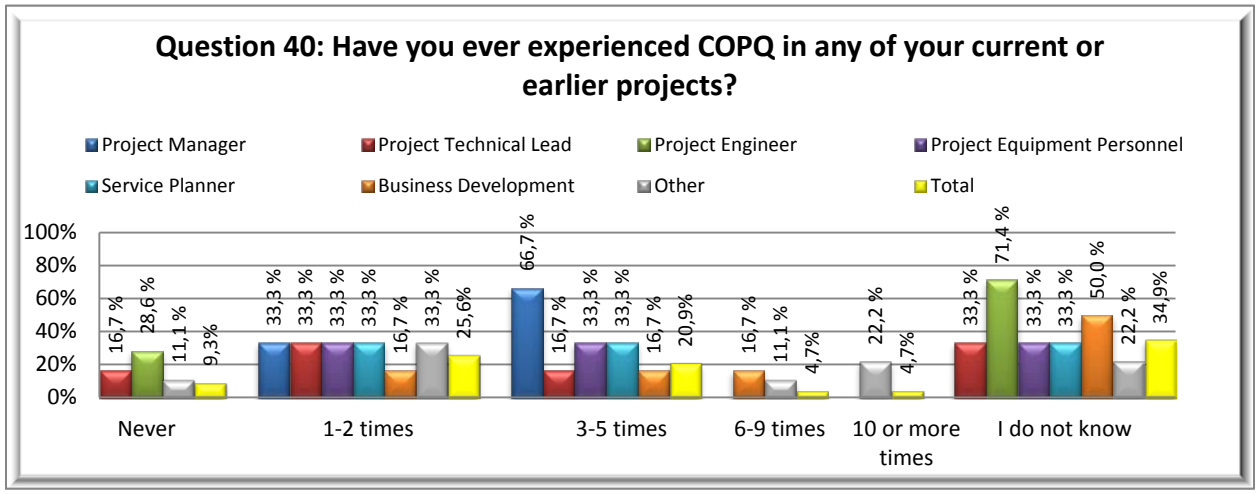

Figure B-15 Question 40 Section 6: Non-productive Time and Cost of Poor Quality

Question 41

Question 41 was asked to the respondents who answered that they have experienced COPQ in any of their current or earlier projects, in total 24 respondents. Figure B-16 for Question 41 shows the range of the sum of the COPQ that have been experienced. 37.5% of the respondents have experienced COPQ in the range 0 - $25 000, 33.3% in the range $25 000 - $100 000, 8.3% in the range $100 000- $250 000, 8.3% in the range $250 000 or more and 12.5% do not know.

Table B-42 shows the data for Question 41.

Table B-42 Question 41 Section 6: Non-productive Time and Cost of Poor Quality

Question 41: If you have experienced COPQ in any of your current or earlier projects, in what range was the sum of the COPQ?									
Answer Options	**Project Manager (PM)**	**Project Technical Lead (PTL)**	**Project Engineer (PE)**	**Project Equipment Personnel (PEP)**	**Service Planner (SP)**	**Business Development (BD)**	**Other**	**Total**	
	Percent	**Count**	**Count**	**Count**	**Count**	**Count**	**Count**	**Response Percent**	**Response Count**
0 -$24 999	3	1	0	1	2	1	1	37,5%	9
$25 000 - $99 999	3	1	0	2	0	1	1	33,3%	8
$100 000 - $249 999	0	0	0	0	0	1	1	8,3%	2
$250 000 or more	0	0	0	0	0	0	2	8,3%	2
I do not now	0	1	0	1	0	0	1	12,5%	3
								answered question	***24***
								skipped question	***19***

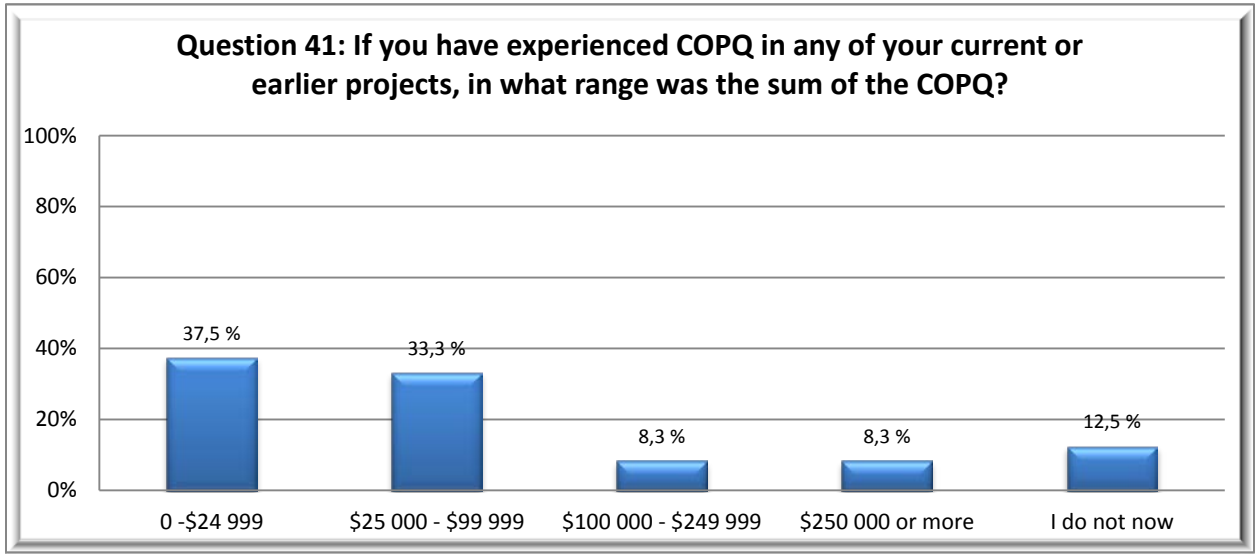

Figure B-16 Question 41 Section 6: Non-productive Time and Cost of Poor Quality

B.7 Section 7: Business Case and Project Final Account/Job Profitability

Question 42

Figure 7-27 for Question 42 shows the distribution if the respondents have been involved in performing a Business Case. Of all the respondents 64.7% (9) stated that they have never been involved in performing a Business Case. On respondent group level 66.7% (4) of the PMs, 100.0% (6) PTLs, 100.0% (7) of the PEs, 66.7% (4) of the PEP, 66.7% (2) of the Service Planner, 16.7% (1) of the BD group and 55.6% (5) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they been involved in performing a Business Case 1-2 times. On respondent group level 16.7% (1) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 16.3% (7) stated that they been involved in performing a Business Case 3-5 times. On respondent group level 33.3% (2) of the PMs, 16.7% (1) of the PEP, 33.3% (1) of the Service Planner, 33.3% (2) of the BD group and 11.1% (1) of the 'Other' group stated this response alternative.

Of all the respondents 4.7% (2) stated that they been involved in performing a Business Case 5-10 times. On respondent group level 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 7.0% (3) stated that they been involved in performing a Business Case 10 or more times. On respondent group level 16.7% (1) of the PEP and 33.3% (2) of the BD group stated this response alternative.

Table B-43 shows the data for Question 42.

Table B-43 Question 42 Section 7: Business Case and Project Final Account/Job Profitability

Question 42: Have you ever been involved in performing a Business Case?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Percent	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Never	4	66,7 %	6	100,0 %	7	100,0 %	4	66,7 %	2	66,7 %	1	16,7 %	5	55,6 %	67,4%	29
1-2 times	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	1	16,7 %	1	11,1 %	4,7%	2
3-5 times	2	33,3 %	0	0,0 %	0	0,0 %	1	16,7 %	1	33,3 %	2	33,3 %	1	11,1 %	16,3%	7
6-9 times	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	0	0,0 %	2	22,2 %	4,7%	2
10 or more times	0	0,0 %	0	0,0 %	0	0,0 %	1	16,7 %	0	0,0 %	2	33,3 %	0	0,0 %	7,0%	3
															answered question	**43**
															skipped question	**0**

Question 43

Figure 7-28 for Question 43 shows the distribution of the respondent's knowledge about the final account/job profitability for a project. 51.2% (22) of all respondents stated that they know little or nothing about final account/job profitability for a project. At the same alternative the answers from the respondent

groups were as follows: 83.3% (5) of the PMs, 50.0% (3) of the PTLs, 71.4% (5) PEs, 50.0% (3) PEP, 16.7% (1) of the BD group and 55.6% (5) of the 'Other' group.

Of all the respondents 32.6% (14) stated that they have some knowledge about final account/job profitability for a project. On respondent group level 50.0% (3) of the PTLs, 28.6% (2) of the PEs, 50.0% (3) of the PEP, 66.7% (2) of the SPs, 33.3% (2) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

Of all the respondents 16.3% (7) stated that they have quite much knowledge about final account/job profitability for a project. On respondent group level 16.7% (1) of the PMs, 33.3% (1) of the SPs, 50.0% (3) of the BD group and 22.2% (2) of the 'Other' group stated this response alternative.

None of the respondents stated that they have very much knowledge about final account or job profitability for a project, hence this response alternative is not shown in the figure.

Table B-44 shows the data for Question 43.

Table B-44 Question 43 Section 7: Business Case and Project Final Account/Job Profitability

Question 43: How much knowledge do you have about the final account/job profitability for a project?

Answer Options	Project Manager (PM)		Project Technical Lead (PTL)		Project Engineer (PE)		Project Equipment Personnel (PEP)		Service Planner (SP)		Business Development (BD)		Other		Total	
	Percent	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Response Percent	Response Count
Little/nothing	5	83,3 %	3	50,0 %	5	71,4 %	3	50,0 %	0	0.0%	1	16,7 %	5	55,6 %	51,2%	22
Some	0	0.0%	3	50,0 %	2	28,6 %	3	50,0 %	2	66,7 %	2	33,3 %	2	22,2 %	32,6%	14
Quite much	1	16,7 %	0	0.0%	0	0,0 %	0	0,0 %	1	33,3 %	3	50,0 %	2	22,2 %	16,3%	7
Very much	0	0.0%	0	0.0%	0	0,0 %	0	0,0 %	0	0.0%	0	0.0%	0	0,0 %	0,0%	0
															answered question	**43**
															skipped question	**0**

APPENDIX C – INTERVIEW GUIDES

Role	No. of Personnel	Interview Guide	No. of Questions
Project Manager	2	#1	43
Project Team Member	2	#2	38
PSL Manager	1	#3	32

1. Interview Guide I – for Project Managers

Interview Guide I – for Project Managers
The questions in the interview guide are based on the survey and the intention is to go into depth to get a more detailed picture of the financial knowledge and to capture improvement suggestions related to reduction of project costs and increase of profit.
Interview guide I is for the department's middle management who are working with project costs daily. The questions in the guide will try to reflect that the respondents are familiar with project lifecycle costs and are leading personnel.
Section 1 – General:
Date:
Place:
Time:
Informant/Respondent information:
Name:
Role:
Highest level of education:
Length of experience in Halliburton:
Duration in management position:
Questions:
Section 2 – General Financial Understanding
1. What are your financial responsibilities as a Project Manager?
2. What are the greatest financial challenges related to your job role?
3. How do you find the general understanding of project costs in your team?
4. What are your suggestions to improve the general understanding of costs in the department?
5. What do your team members currently do to reduce project costs and what can be done to ensure all take ownership of project costs?
6. Which HMS-documents are you and your project team members using for financial tasks in your projects?
7. Which costs do you or your team find difficult to identify and why?
8. Which areas and activities do you think the department should focus on to reduce costs and how do you mean that your suggestions could be implemented?
9. What are your suggestions to better capture all project costs?

Interview Guide I – for Project Managers
10. What do you do to visualise the project cost picture in your team? What improvements could be done?
Section 3 - Tendering Process
11. What do you suggest could be done to improve the tendering process, especially related to pricing?
Section 4 – Cost Estimates, Cost Reports and Variation/Change Orders
12. What are your improvement suggestions to the cost estimate format, cost report format and VOR/VO format for Statoil projects to make it easier to capture all project costs and to make it more difficult to create mistakes? a) Cost Estimate (Statoil) b) Cost Report (Statoil) c) VOR/VO (Statoil)
13. What are your improvement suggestions to the cost estimate format, cost report format and VOR/VO format for other customers to make it easier to capture all project costs and to make it more difficult to create mistakes? a) Cost Estimate (Other customers) b) Cost Report (Other customers) c) VOR/VO (Other customers)
14. What are your improvement suggestions to the invoicing process against Statoil?
15. What are your improvement suggestions to the invoicing process against other customers?
16. What are your improvement suggestions to the VOR/VO process against Statoil?
17. What are your improvement suggestions to the COR/CO process against other customers?
18. In which cases do you find it difficult to create a VOR/COR?
19. In which cases have you noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR/COR in due time?
20. Which examples do you have of costs that have been captured in last minute, but should have been captured and invoiced at an earlier stage?
21. Which examples do you have of costs that have not been captured for a project, but have appeared after final cut-off?
22. How do you find the monthly close-out/invoicing process? Do you have enough time to go through and do a proper check of all the costs prior to the invoices being sent to the customers? If not, what are your improvement suggestions to ensure proper checks are performed?
23. How do you find internal financial audits?
Section 5 – Equipment, Mobilisations and Resource Efficiency
24. Extra mobilisations are normally costly. Which actions could be done to reduce the amount of extra mobilisations?

Interview Guide I – for Project Managers
25. How can the costs involved in an extra mobilisation be made more visible to the team members?
26. The profit on cost plus items is generally very low. How has the use of cost plus items been on your projects?
27. What are your suggestions to reduce the use of cost plus items in the department?
28. Which examples do you have of cost plus items that could have been day rate items instead?
29. What experiences do you have with rental equipment and costs related to it?
30. Have you experienced that some equipment is frequently damaged and what are your suggestions on how to reduce the damage?
31. What are your suggestions that could be implemented to a) Reduce the use of rental equipment b) How the equipment can be handled in a better way c) How the equipment can be faster returned to the suppliers
32. What are your suggestions on how to communicate and visualise how important it is to return rental equipment in time to the project team members and the offshore personnel?
33. What are your suggestions on how contractors can be utilised more efficiently?
Section 6 – Non-Productive Time (NPT) and Cost of Poor Quality (COPQ)
34. Can you describe situations where you have experienced Non-Productive Time (NPT) for field operations that Halliburton had to pay for?
35. The use of NPT among the customers has increased. What can be done to avoid NPT?
36. Have you experienced COPQ in any of your current or earlier projects, what was involved in the COPQ and what was the reason behind it?
37. How can COPQ be reduced?
Section 7 – Lease vs. buy, Business Case and Project Final Account/Job Profitability
38. Which methods and evaluations do you use to decide whether to lease or buy equipment?
39. When are you performing a Business Case?
40. What weaknesses do you see in the lease vs. buy process and what are your suggestions to improve it?
41. How could final project accounts be beneficial?
42. What are your suggestions on how to increase job profitability?
43. Do you have other improvement suggestions on how to reduce costs and increase profit?

2. Interview Guide II – for Project Team Members

Interview Guide II – for Project Team Members
The questions in the interview guide are based on the survey and the intention is to go into depth to get a more detailed picture of the financial knowledge and to capture improvement suggestions related to reduction of project costs and increase of profit.
Interview guide II is for the department's project team members who are working with project costs daily. The questions in the guide will try to reflect that the respondents are familiar with project lifecycle costs and are working in team.
Section 1 – General:
Date:
Place:
Time:
Informant/Respondent information:
Name:
Role:
Highest level of education:
Length of experience in Halliburton:
Duration in project team position:
Questions:
Section 2 – General Financial Understanding
1. What are your financial responsibilities as a Project Team Member?
2. What are the greatest financial challenges related to your job role?
3. How do you find the general understanding of project costs in your team?
4. What are your suggestions to improve the general understanding of costs in the department?
5. What does your team currently do to reduce project costs and what can be done to ensure all take ownership of project costs?
6. Which HMS-documents are you and your project team using for financial tasks in your projects?
7. Which costs do you or your team find difficult to identify and why?
8. Which areas and activities do you think the department should focus on to reduce costs and how do you mean that your suggestions could be implemented?
9. What are your suggestions to better capture all project costs?

Interview Guide II – for Project Team Members
10. What is done to visualise the project cost picture in your team? What improvements could be done?
Section 3 – Tendering Process
No questions in this section to Project Team Members.
Section 4 – Cost Estimates, Cost Reports and Variation/Change Orders
11. What are your improvement suggestions to the invoicing process against Statoil?
12. What are your improvement suggestions to the invoicing process against other customers?
13. What are your improvement suggestions to the VOR/VO process against Statoil?
14. What are your improvement suggestions to the COR/CO process against other customers?
15. In which cases have you noticed project costs that could have been covered by the customer, but it was forgotten to raise a VOR/COR in due time?
16. Which examples do you have of costs that have been captured in last minute, but should have been captured and invoiced at an earlier stage?
17. Which examples do you have of costs that have not been captured for a project, but have appeared after final cut-off?
18. How do you find the monthly close-out/invoicing process?
Section 5 – Equipment, Mobilisations and Resource Efficiency
19. Extra mobilisations are normally costly. Which actions could be done to reduce the amount of extra mobilisations?
20. How can the costs involved in an extra mobilisation be made more visible to the team members?
21. The profit on cost plus items is generally very low. How has the use of cost plus items been on your projects?
22. What are your suggestions to reduce the use of cost plus items in the department?
23. Which examples do you have of cost plus items that could have been day rate items instead?
24. What experiences do you have with rental equipment and costs related to it?
25. Have you experienced that some equipment is frequently damaged and what are your suggestions on how to reduce the damage?
26. What are your suggestions that could be implemented to a) Reduce the use of rental equipment b) How the equipment can be handled in a better way c) How the equipment can be faster returned to the suppliers
27. What are your suggestions on how to communicate and visualise how important it is to return rental equipment in time to the project team members and the offshore personnel?

Interview Guide II – for Project Team Members
28. What are your suggestions on how contractors can be utilised more efficiently?
Section 6 – Non-Productive Time (NPT) and Cost of Poor Quality (COPQ)
29. Can you describe situations where you have experienced Non-Productive Time (NPT) for field operations that Halliburton had to pay for?
30. The use of NPT among the customers has increased. What can be done to avoid NPT?
31. Have you experienced COPQ in any of your current or earlier projects, what was involved in the COPQ and what was the reason behind it?
32. How can COPQ be reduced?
Section 7 – Lease vs. Buy, Business Case and Project Final Account/Job Profitability
33. Which methods and evaluations do you use to decide whether to lease or buy equipment?
34. When are you performing a Business Case?
35. What weaknesses do you see in the lease vs. buy process and what are your suggestions to improve it?
36. How could final project accounts be beneficial?
37. What are your suggestions on how to increase job profitability?
38. Do you have other improvement suggestions on how to reduce costs and increase profit?

Interview Guide III – for PSL Management

Interview Guide III – for PSL Management
The questions in the interview guide are based on the survey and the intention is to go into depth to get a more detailed picture of the financial knowledge and to capture improvement suggestions related to reduction of project costs and increase of profit.
Interview guide III is for the PSL Managers who have the overall financial responsibility of the department. The questions in the guide will try to reflect that the respondents are familiar with project lifecycle costs as well as department costs.
Section 1 – General:
Date:
Place:
Time:
Informant/Respondent information:
Name:
Role:
Highest level of education:
Length of experience in Halliburton:
Duration in PSL management position:
Questions:
Section 2 – General Financial Understanding
1. What are your financial responsibilities as a PSL Manager?
2. How do you find the general understanding of project costs in the department?
3. What are your suggestions to improve the general understanding of costs in the department?
4. How can the management ensure continuous improvement and follow-up of the financial knowledge amongst all employees?
5. What plans do the management have to reduce costs and increase profit?
6. What do your employees currently do to reduce project costs and what can be done to ensure all take ownership of project costs?
7. Which costs do your employees find difficult to identify and why?
8. Which areas and activities do you think the department should focus on to reduce costs and how do you mean that your suggestions could be implemented?
9. What are your suggestions to better capture all project costs?

Interview Guide III – for PSL Management
10. What do you do to visualise the cost picture in the department to your employees? What improvements could be done?
Section 3 – Tendering Process
11. What do you suggest could be done to improve the tendering process, especially related to pricing?
Section 4 – Cost Estimates, Cost Reports and Variation/Change Orders
12. What are your improvement suggestions to the invoicing process against Statoil?
13. What are your improvement suggestions to the invoicing process against other customers?
14. What are your improvement suggestions to the VOR/VO process against Statoil?
15. What are your improvement suggestions to the COR/CO process against other customers?
16. How do you find the monthly close-out/invoicing process?
17. How do you find internal financial audits?
Section 5 – Equipment, Mobilisations and Resource Efficiency
18. Extra mobilisations are normally costly. Which actions could be done to reduce the amount of extra mobilisations?
19. How can the costs involved in an extra mobilisation be made more visible to the team members?
20. What are your suggestions to reduce the use of cost plus items in the department?
21. Have you experienced that some equipment is frequently damaged and what are your suggestions on how to reduce the damage?
22. What are your suggestions that could be implemented to a) Reduce the use of rental equipment b) How the equipment can be handled in a better way c) How the equipment can be faster returned to the suppliers
23. What are your suggestions on how to communicate and visualise how important it is to return rental equipment in time to the employees?
24. What are your suggestions on how contractors can be utilised more efficiently?
Section 6 – Non-Productive Time (NPT) and Cost of Poor Quality (COPQ)
25. The use of NPT among the customers has increased. What can be done to avoid NPT?
26. How can COPQ be reduced?
Section 7 – Lease vs. Buy, Business Case and Project Final Account/Job Profitability
27. What are your suggestions to increase the knowledge of how the employees should decide whether to lease or buy equipment?

Interview Guide III – for PSL Management
28. When should you or someone else perform a Business Case?
29. What weaknesses do you see in the lease vs. buy process and what are your suggestions to improve it?
30. How could final project accounts be beneficial?
31. What are your suggestions on how to increase job profitability?
32. Do you have other improvement suggestions on how to reduce costs and increase profit?