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Critical success factors for the efficient conversion of oil tankers to floating production storage offloading facilities [FPSOs]

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Critical Success Factors for the Efficient Conversion of Oil Tankers to Floating Production Storage Offloading Facilities [FPSOs].

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ABSTRACT

The rate of demand for Floating Production Storage and Offloading Facilities (FPSOs) in the offshore frontier areas where hydrocarbon production and pipeline infrastructure is absent continues to increase rapidly due to growing worldwide energy requirements coupled with insufficient supplies. This demand has translated into major shipyard conversion programs of tanker vessels into FPSOs to offset the twin challenges of bridging the absence of oilfield infrastructure and the shortfall in hydrocarbon supply.

The number of marine shipyard tanker conversions has grown threefold between 2005 and 2008. The growing complexity of FPSO conversions has resulted in the majority of conversions being well over planned budget and taking substantially longer time to complete than estimated. Due to different stakeholders, variable drivers and dynamics in the industry, finding a common instant fix solution to this problem has remained elusive.

This study examines the underlying reasons contributing to the poor performance of these expensive conversion projects and attempts to determine the critical success factors that impact on budget and time to completion. The study investigates and analyses feedback from a variety of stakeholders that actively influence project performance.

Exploratory research methodology is adopted to answer this research problem using qualitative and quantitative processes. The methodology employed uses a structured process of focus groups, face to face interviews, and survey instruments. The study examines data from a variety of sources to identify the critical success factors, and an order of importance of these critical success factors. Attempts have been made to identify new techniques that positively

affect project management methodologies and investigate new knowledge derived from the study that could influence future performance.

The study findings identify and rank the major critical success factors and critically analyses them. The study also contributes to the body of knowledge by stressing the importance of project and interface management as key management tools in improving project performance by optimising communication between internal and external stakeholders. It also proposes further investigation into utilisation of the safety case regime and total cost of ownership concepts as added tools. The study will identify an improved project management model for conversions for the offshore oil and gas industry.

Based on the findings this study provides recommendations and guidelines for policy and best practices to industry practitioners in the conversion industry to improve project service delivery and management performance.

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DECLARATION

I hereby certify the work presented in this thesis is, to the best of my knowledge and belief, original, except for those parts which have been acknowledged within the text and referencing of this document and the material has not been submitted, either in whole or in part, for this doctorate at this or any other university.

I also certify that to the best of my knowledge any help received in preparing this thesis, and all sources used have been acknowledged in this thesis.

Ross Mierendorff

Date: .... / .... / 20.......

ACKNOWLEDGMENTS

This thesis would not have been possible to completed and produce without the continued support and direct assistance of a large range of individuals.

First, I dedicate this work to my wife Margaret, our children Jeremy and Scott. I wish to express my gratitude and present my great appreciation to my family for the opportunity to follow through with a dream to embark on this journey. To my brother Neil, who has been a stalwart in his approach, direction and guidance in the formation and structuring of the thesis and in following the path to completion.

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To those people who kindly participated in and contributed to the processes associated with interviews and surveys and, what is moreover, provided me with some very direct, pertinent, honest, applicable responses, and relevant data, which has greatly contributed to this research experience and to the ultimate and final results.

GLOSSARY AND ABBREVIATIONS

ABS	American Bureau of Shipping. The USA international classification society used in the marine, industrial and the worldwide oil and gas industry.
AMSA	Australian Maritime Safety Authority.
API	American Petroleum Institute used as a standard for the application of criteria for the installation of equipment used in the production facilities in the offshore oil and gas industry.
APM	United Kingdom Association of Project Management.
AS/NZS	Australian Standards/New Zealand Standards .
BOD	Basis of Design.
BV	Bureau Veritas. The French international classification society used in the marine, industrial and the worldwide oil and gas industry.
CAPEX	Capital Expenditure.
DRET	Department of Resources Energy & Tourism, USA & Canada.
DNV	Det Norske Veritas. The Norwegian international classification society used in the marine, industrial and the worldwide oil and gas industry.
E & P	Explorations & Production, term used to describe a section and process within the oil and gas industry.
EV	Earned Value.
EVM	Earned Value Management.
FEED	Front End Engineering & Design.
FPSO	Floating Production Offloading Storage facility.
FSO	Floating Storage Offloading facility.
HAZOP	Hazard and Operations Study. Term used throughout the offshore oil and gas industry in reference to analysing hazards and the operations.

HAZID	Hazard Identification Study. Term used throughout the offshore oil and gas industry in reference to identifying hazards associated with the operations.
HSE	Health Safety & Environment.
IMO	International Maritime Organisation.
ISO 31000	International Standards Organisation – ISO 31000, 2009.
ITB	Invitation to Bid.
LR	Lloyds Register of Shipping. The United Kingdom international classification society used in the marine, industrial and the worldwide oil and gas industry.
MAE	Major Accident Event. Term used to describe a major event within the offshore oil and gas industry.
MARPOL	International Convention For the Prevention Of Pollution from Ships.
MOPU	Mobile Offshore Production Unit. Term used to name a type of offshore oil production facility.
NOPSA	National Offshore Petroleum Safety Authority- Australia.
OPEX	Operational Expenditure.
OPGGSA	Offshore Petroleum / Greenhouse Gas Storage Act 2006 Australia.
OPGGS[S]	Offshore Petroleum / Greenhouse Gas [Safety] Regulations 2009, Australia.
PMBOK model	Term is used as a standard throughout the thesis to describe a preferred existing project management model and refers to other available project management criteria used in the offshore oil and gas industry similar to the PMBOK model.
PMBOK Guide	Project Management Book of Knowledge Guide.
PMI	Project Management Institute, USA.

Project Closeout	The completion of the project and the finalisation of all matters pertaining to the project.
Project Initiation	The commencement of the project by the stakeholders.
Scope Creep	The unconscious growth of the project scope resulting from uncontrolled changes to requirements.
SIMOPS	Term used throughout the offshore oil and gas industry in reference to identifying simultaneous operations occurring in the conversion project.
Stanolind Oil & Gas	An early corporate name of British Petroleum (BP).
Superior Oil	An early corporate identity involved within the oil and gas industry.

CHAPTER 1 – INTRODUCTION

1.1. INTRODUCTION

This introduction chapter provides an overview of the research project. The background to this research is introduced giving rise to formulation of the research problem and the specific research questions pertaining to addressing the research problem. A justification for the research is provided followed by an explanation of the research methodology used. The structure of the thesis is explained followed by the limitations of this research.

The following section provides a background to this research.

1.2. BACKGROUND TO THE RESEARCH

This section highlights the background pertaining to this research.

In 2005, there were approximately 97 Floating Production Storage Offloading Facilities (FPSOs) and 60% of these new facilities were conversion projects (Biasotto, Bonniol, Cambos, 2005). In 2010, there are approximately 154 FPSOs and Floating Storage Offloading Facilities (FSOs). There are about 84 more in some stage of development and destined to be completed within the next five years (Worldwide Survey - FPSOs 2008). The industry has been growing for more than 60 years and there have been some substantial and welcome developments in technology along the way. However, the reality is that more than 60% of all the conversions completed to date, by 2010, are either over budget and or late (DNV 2010). FPSOs have become the major facility type selected for shallow and deep water and for both mild and harsh environments (Marin 2009).

The basic FPSO includes the production facility processing the oil offshore on board, through a production/process plant, constructed in modular form and added onto the deck of the tanker (Fig 2.13). After processing, the oil is stored in the existing tanks of the original tanker. The oil is pumped via a flexible floating discharge hose to a tandem shuttle tanker moored to the stern of the facility Fig 2.14). The FPSO operates in an extremely wide range of areas, of weather and sea conditions and has very different support functions from shore-based facilities. The risk evaluation and management strategy, which is to be adopted for field development for FPSO use must be undertaken very early in the concept selection phase and it is here that the project's viability may be questioned (IAOGP 2006).

The development design of the FPSO is particularly challenging, as development, practices and contract familiarity have to accommodate several quite distinct industrial cultures including marine, process and offshore oil and gas regulators (IAOGP 2006). The marine regulating authority comes in the form of the ship classification societies looking after the construction criteria for the original donor vessel.

One of the main worldwide offshore oil and gas industry process and production standards regulators is the American Petroleum Institute (API). This regulator's standards are for the process and production areas installed on board the donor vessel and then individual countries apply their own regulatory functions in conjunction (OGP 2010). Some FPSOs involve classification societies to class the process and production areas, however, their involvement is generally limited to the classing of the pressure vessels, piping and welding procedures, and the associated process operations (Wanda, Todd 2001).

Each conversion uses project management processes and hence Project Management is a parent discipline. In view of the complexity of the conversion as a mega project, and the fact that the conversion is only one part of the overall oil project Interface Management is a key element and forms the second parent discipline. Many of the conversion projects developed are to suit individually or particular oilfield characteristics and there is considerable effort advanced to the pre-engineering for the whole project. For the conversion, this takes the form of the Front End Engineering and Design or FEED. Direct application to the conversion project management leads to the literature review of the FEED within the context of the offshore oil and gas industry.

There is a plethora of information written on the parent disciplines of Project Management, and Interface Management. There has been considerable research and publications on every conceivable aspect of these disciplines, however, large professional international multi-national organisations continue to allow projects to fail in meeting contract deliverables of budget and for time to completion for that particular project.

In the publication, *Megaprojects and Risk - An Anatomy of Ambition*, Flyvbjerg, Bruzelius & Rothengatter (2003) discussed a number of risks and processes in relation to the development of large-scale projects. These risks include:

- Massive cost overruns due to poor project management performance and inept cost estimations;
- Poor financial management resulting in insufficient recognition of on-going progressive project costs;
- Interest rates and currency exchange fluctuations;
- Constructors over-zealous optimism for delivery;
- Project management and accountability issues, processes, procedures and controls;
- Inadequate information on project development risks and/or dysfunctional information involving stakeholder and project participants;
- Questionable and conflicting roles of government towards the project, regulation of approval applications, licensing and associated regimes; and
- Low assessment priority of the cost of environmental compliance and poor performance in terms of economy and environment.

This research will focus on the issues of cost and time overruns in the conversions within the offshore oil and gas industry.

This section, has discussed the background pertaining to this research. In the next section the research problem and the research questions are discussed.

1.3. RESEARCH PROBLEM AND QUESTIONS

In this section the research problem and the specific research questions associated with addressing it are discussed.

Although Flyvbjerg et al. (2003) have identified a number of risks associated with complex projects similar to FPSO conversions there is little evidence in the literature into minimising these risks. One of the objectives for this research is to add to the knowledge and to focus on identifying the factors for the efficiency of conversion. Efficiency can be identified through the ability to construct the conversion within the specified budget and time frame.

The research topic leads to the research problem, which is the starting point for the research and is the common link through the research structure and process (Leedy & Ormrod 2005). The research problem is stated as:

What are the Critical Success Factors for the Efficient Conversion of Oil Tankers to FPSOs?

An objective of the research is to determine the critical success factors for the efficient conversion of Oil Tankers to FPSOs as a means of reducing budget and time overruns.

A number of research questions can be identified to address the research problem. Each of these research questions has a specific objective directed toward addressing the research problem. The research questions, together with the objective in resolving the overall research problem, are:

Research Question RQ1: - *What are the critical success factors associated with conversions of Oil Tankers to FPSOs?*

> **Research Objective RO1:** - *To identify the critical success factors associated with conversions of Oil Tankers to FPSOs?*

Research Question RQ2: - *What is the order of likely importance of the critical success factors?*

> **Research Objective RO2:** - *To determine an order of likely importance of the critical success factors.*

Research Question RQ3: - *What are the key issues to be addressed in each of the critical success factors to improve their efficiency?*

> **Research Objective RO3:** - To *identify the key issues in each critical success factors.*

Research Question RQ4: -*What are the recommendations and or guidelines for stakeholders to enable them to manage projects successfully in terms of cost and time to complete?*

> **Research Objective RO4:** - *To formulate the recommendations and or guidelines for stakeholders to enable them to manage projects successfully in terms of cost and time to complete.*

In this section the research problem has been stated. The specific research questions for the research problem have been decided and each of the research objectives associated with each research question has been noted.

The following section discusses the justification for this research.

1.4. JUSTIFICATION FOR THE RESEARCH

The financial impact of having oil and gas projects completed inefficiently leading to budget and time overruns, is substantial (Nooteboom 2004). The research is designed to address an important gap in the literature on efficiency of conversion by focusing on the interdependencies of Project Management and Interface Management. The research investigates the existing literature in Project

Management and Interface Management to understand why with this extensive and detailed literature available, conversion projects are inefficient.

The literature on Project Management is respected, vast, and widespread. However, like most learning there will always be another point of view and perception on methodology and its application. The researcher needs to be circumspect and self critical in this regard. New literature arising from new techniques and applications that are more complex will continually add to the understanding of Project Management and its application. The parent discipline of Interface Management is defined in its own right. It involves the relationship between all stakeholders in a conversion project. Interface Management is not well recognised or utilised.

This research contributes to policy, theory and practice in relation to these two parent disciplines within the context of the offshore oil and gas industry.

In this section, the justification for this research has been discussed. The research methodology is summarised in the next section.

1.5. RESEARCH METHODOLOGY

The previous section describes a justification for this research. This section provides a summary of the methodology adopted in the research.

An exploratory research approach was adopted because there was little previous definitive research available on the research problem and the literature in the parent disciplines pertaining to the oil and gas industry was limited. Exploratory research allows a better understanding of the dimensions of the problem. Primary data was collected, firstly, by using two focus groups with participants associated with the conversion industry and the operations of the finished FPSO. Secondly, informed key senior management participants, from within the offshore oil and gas industry were, selected for specialised interviews.

Thirdly, an industry survey was used to amplify issues identified by the earlier focus groups and interviews. The survey included personnel from oil companies, operators, shipyards, sub-contractors, suppliers, classification societies, statutory authorities, consultants, and project management organisations. The primary data was collated and the results analysed to find common themes. These themes were combined with secondary data from the literature review to provide detailed outcomes in answer to the research problem.

In this section, the methodology used for this research has been summarised. In the next section, the limitations for this research are shown.

1.6. LIMITATIONS

The limitations for this research are noted in this section.

The available data relevant to the project management of conversion projects has been found to be limited and reasonably inaccessible during this research, due to intellectual property and corporate security requirements for various organisations and to the general availability of participants due to workloads and isolated locations of their work. This situation has extended to the ability to access actual budget and time statistics and data pertaining to actual conversion projects to analyse in a quantitative manner.

The sourcing of the data for this research has been in the regions of Australia and Asia; however, there are other areas and regions, which can be involved such as North and South America, the North Sea, and Scandinavian regions. The primary data collected has come from actively engaged people within the industry covering the vast and intricate network of associated professions, required in order to achieve the completion of a conversion of an oil tanker to be an operating FPSO. The spread of the sampling size associated with accessing these relevant people in various and different locations has limited the conclusions that can be drawn.

The personal experience of the researcher in the industry may have some influence leading to a bias for assessment and problem solving.

In this section, the limitations to this research have been discussed. In the next section, the structure to the thesis is set out.

1.7. STRUCTURE OF THE THESIS

In this section, the structure of the thesis is set out.

The thesis consists of five chapters in total commencing with the introduction providing an overview or the research project. This structure is consistent with that recommended by Perry (2010).

Chapter 1 is an introduction to the research. It consists of a background pertaining to the research, the research problem and research questions followed by a justification for the research and a summary of the methodology used. The limitations found applicable to this research is next, followed by a structure of the thesis. The chapter then has a conclusion.

Chapter 2 sets out a comprehensive literature review of the parent disciplines of Project Management and Interface Management. This is followed by a literature review of the FEED and the context of the offshore oil, and gas industry. The flow through to establishment of a proposed set of critical success factors as a framework for the primary data collection follows.

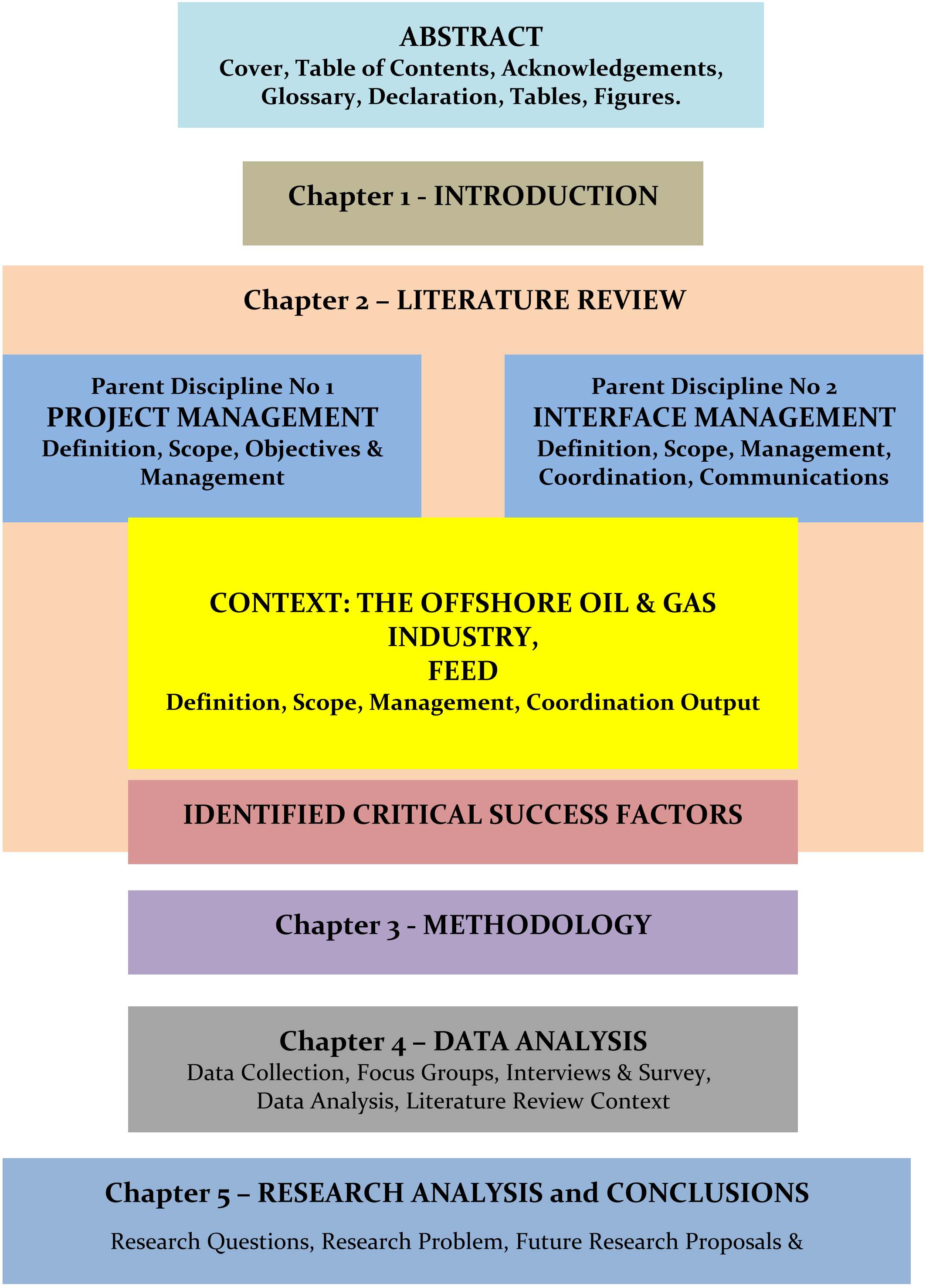
Chapter 3 provides a detailed description of the methodology adopted for the research project. Exploratory research has been adopted, as there was little previous definitive research on the research problem. Using two focus groups followed by a series of interviews with key senior management participants, from the offshore oil and gas industry, primary data was collected. An industry survey was used to confirm and verify issues identified by the earlier focus groups and interviews. The primary data was collated and the results analysed. These themes were combined with secondary data from the literature review to provide detailed outcomes in answer to the research problem.

Chapter 4 presents an analysis of the data from the three methods of data collection used. The data collection resulted in a mixture of qualitative and quantitative data for analysis leading to results for in answer to each of the research questions.

Chapter 5 links the findings described in Chapter 4 to the research questions and then to the research problem. The implications of the research for achieving efficient conversion in terms of meeting budget and time to completion are discussed.

The flow of the research process through the chapters is shown in the Concept Map, Figure 1.1.

Figure 1.1 – The Thesis Concept Map



(Source: Developed for This Research)

In this section, the structure of the thesis has been described. The next section is the conclusion to the chapter.

1.8. CONCLUSION

In this chapter, the research problem and associated specific research questions have been stated, as well as a justification for conducting this research project.
The justification for undertaking this research is that with all the data, operational procedures, applicable standards and set compliances, appropriate management, capability and qualifications, and all the marine building codes, a large percentage of conversion of Oil Tankers to FPSOs are over budget and or late (Nooteboom 2004).

A summary of the methodology adopted for this research is presented. The limitations of this research have been outlined.

In the following chapter, a detailed examination of the existing literature is presented.

CHAPTER 2 – LITERATURE REVIEW

2.1. INTRODUCTION

The research project introduction has been set out in Chapter 1. The aims are to examine the problems associated with managing the conversion of Oil Tankers into FPSOs (1.3), to identify the critical success factors for successful conversion, and to explain how project managers can successfully manage project management philosophies, practices, and procedures (1.4). This chapter sets out a literature review on Project Management and Interface Management in the context of the conversion industry associated with the development and completion of FPSOs.

There are significant project management problems with the conversion of Oil Tankers to (FPSOs), as there has been a large percentage concluded with cost and or time schedule overruns (Nooteboom 2004). International statistics from major rig and FPSO projects have indicated, through the classification society, Det Norske Veritas (DNV), that most FPSO conversion projects have reported cost overruns of 20 – 30 % and greater than six months of time delays in deliveries (Eriksen 2010). Overruns and delays represent uncertainties for stakeholders and the challenge for the industry is to better understand the complex project risk picture better (Eriksen 2010).

As a global leader providing risk management services to the oil and gas industry, DNV has identified common reasons for the cost overruns in offshore conversion developments. These were found to be:

- Orders placed before Engineering Design was completed;
- Poor Front End Engineering & Design (FEED);
- Introduction of new technology without proper qualification;
- Change of Scope (COS) with:
    - Insufficient detailed engineering,
    - Application for operations strength, and

    - Systems maintainability;
- Change/Variation to contract;
- Poor delivery of stores and materials; and
- Documentation when managing fabrication;
- Conversion shipyards resources and competency for the project;
- Insufficient identification or understanding of the Interfaces; and
- Inept selection of the conversion shipyard (DNV 2010).

The literature review into the parent disciplines of Project Management, and Interface Management as applied in the context of the offshore oil & gas industry has highlighted key issues arising from the application of these disciplines. Literature relating to management of a complex project, including an alternative approach in project management, has been investigated and is applicable to conversion projects. Interface Management is a relatively recent addition to the elements of project management, especially as many projects have become larger and more complex.

This research is to investigate the critical success factors associated with the conversion of Oil Tankers to FPSOs, and whether they are included in the existing Project Management and Interface Management disciplines and not being applied correctly, or whether they can be addressed through new techniques.

2.2. PARENT DISCIPLINES

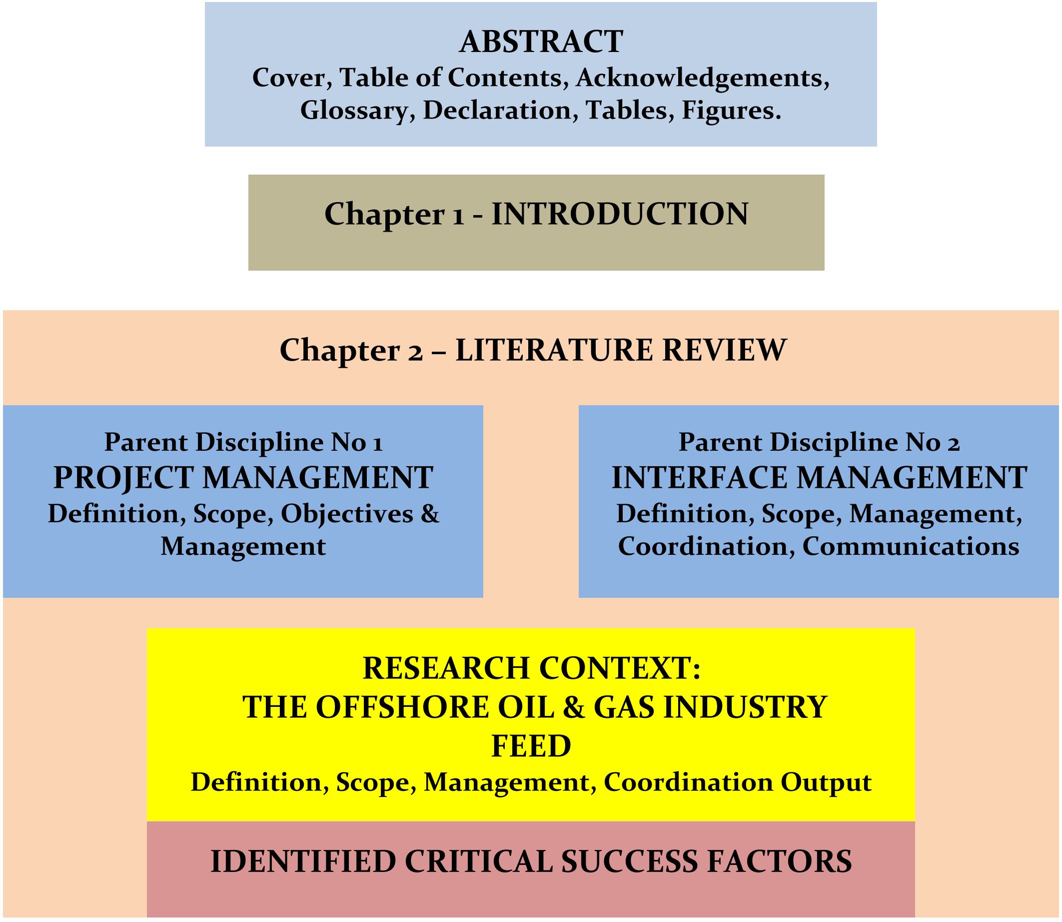
In Chapter 1, a background into the offshore oil and gas industry was provided. This section deals with the two parent disciplines, Project Management, and Interface Management and their relationships and the interdependencies existing in their application to offshore conversion of Oil Tankers to FPSOs.

The concept map illustrates the parent disciplines of this research and their relationship to the context.

2.2.1. The Concept Map

The map in Figure 2.1 is a representation of the interdependencies and flow of the literature review.

Figure 2.1 – The Concept Map



(Source: Developed for This Research)

The two parent disciplines of Project Management and Interface Management are discussed in the following sections.

2.3. PARENT DISCIPLINE 1: PROJECT MANAGEMENT

This section sets out the body of knowledge within project management and the good practices emanating from its application (PMI PMBOK Guide 2008).

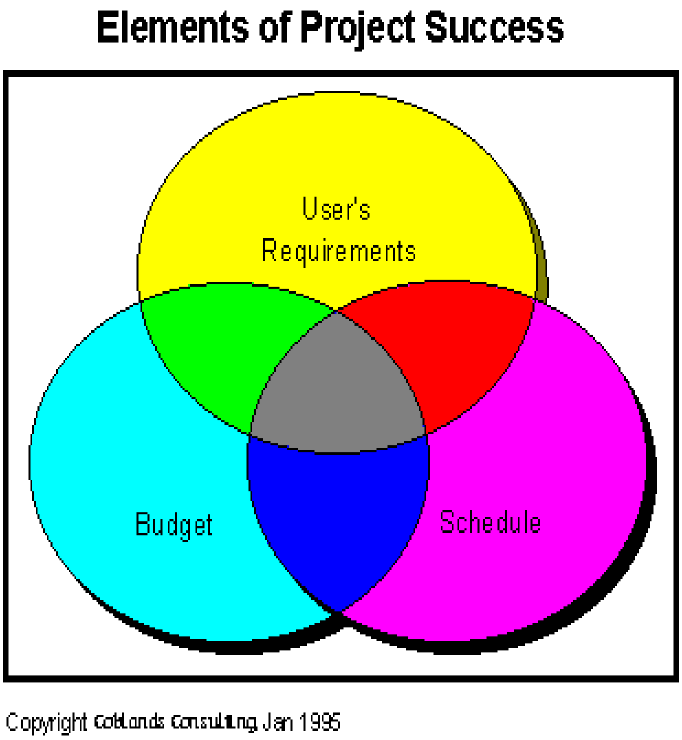
There are a number of well-accepted key organisations in project management such as the Project Management Institute [PMI] with their Project Management Book of Knowledge Guide (*PMBOK Guide®),* the Systems Development Cycle [SDC] (Nicholas & Steyn 2008) the ProjectPRISM® Project Management Methodology (Hill 2010) the UK Association of Project Management (APM) and PRINCE2 (OGC 2011). The *PMBOK Guide® and* ProjectPRISM® will be used as the key references. These formats of project management are well known to worldwide authorities in this field and widely used as the preferred project management tools for the offshore oil and gas industry.

2.3.1. Project Definition

A project is designated as a temporary endeavour in activity undertaken to ultimately create an individual result, product, or service. The conclusion to this endeavour occurs when the objectives for the project have been reached or by the project being terminated as the objectives cannot be met, or when the project is no longer in existence (PMI PMBOK Guide 2008).

Projects exist to bring about a product or service that has not existed before. In this sense, a project is unique. Similar projects may have occurred before but never exactly in the same way (Barron & Barron 2009). A project can be defined by the user's requirements, the budget available to meet these requirements, and the schedule required to complete the project. These three key elements are inter-related and co-exist. The three circles shown in Figure 2.2 demonstrate how the key elements are inter-related, and are arranged to suggest that the user's requirements are paramount (Tusler 1996).

Figure 2.2 – Elements of Project Success



A project lifecycle is a collection of sequential and overlapping stages within a project and these are controlled and managed by the management of the project. A project lifecycle is documented with a methodology, which provides the basic framework for managing the project, regardless of the specific work involved (PMI PMBOK Guide 2008). One representation of the project lifecycle is shown in the Venn diagram of Figure 2.3. Four stages of the life cycle; Initiation, Planning, Execution, and Closure are shown:

- **Initiation** is the development of a business case, conducting feasibility, establishing a project charter, and then creating a project team.
- **Planning** is the overall plan and financial, resources, quality, risk, administration, acceptance, communications, and procurement plans.

- **Execution** is the process of completing the project and covers the time schedule, cost control, quality, changes, risk issues, procurement, acceptance, reporting, and communications.
- **Closure** follows completion of the project including issues related to the project.

Figure 2.3 – Project Lifecycle

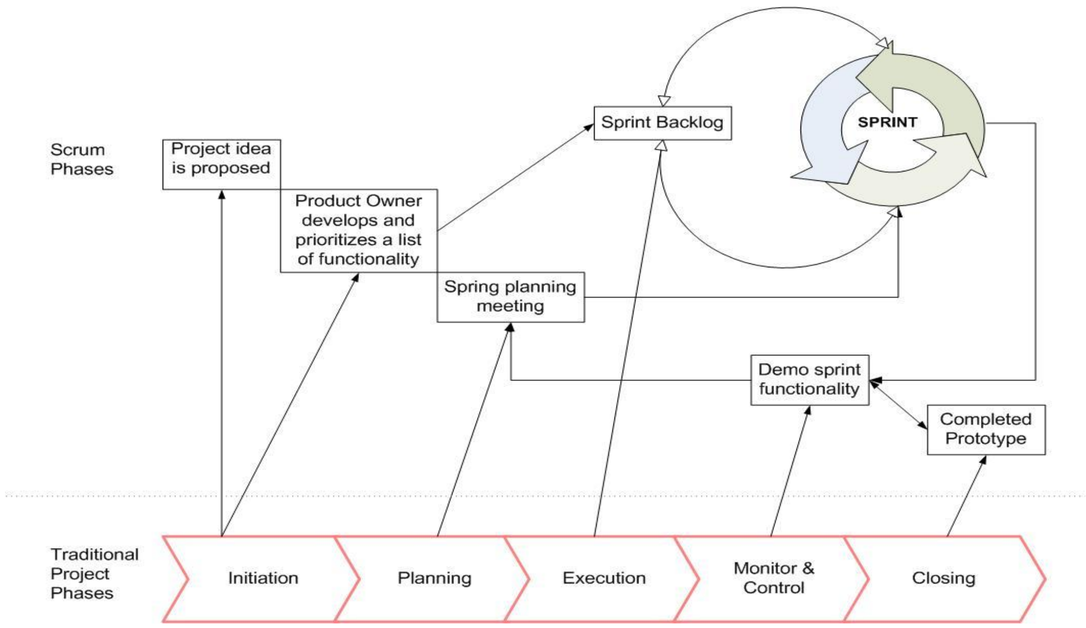
(Source: http://www.method123.com/project-lifecycle.php)

2.3.2. Project Management

Project Management is the application of the body of knowledge, processes, tools, skills, techniques, and activities for successful completion of the project.

Management of a project includes the identification of requirements addressing the various needs, concerns and expectations of stakeholders and balancing these against any competing project constraints such as scope, quality, schedule, budget, resources and risk. Management of the life cycle requires an additional stage, that of monitoring /controlling. These resultant five stages in the process of project management are: Initiation, Planning, Executing, Monitoring/ Controlling and Closing (PMI PMBOK Guide 2008), and are shown diagrammatically in Figure 2.4.

Figure 2.4 – Project Management Process Stages

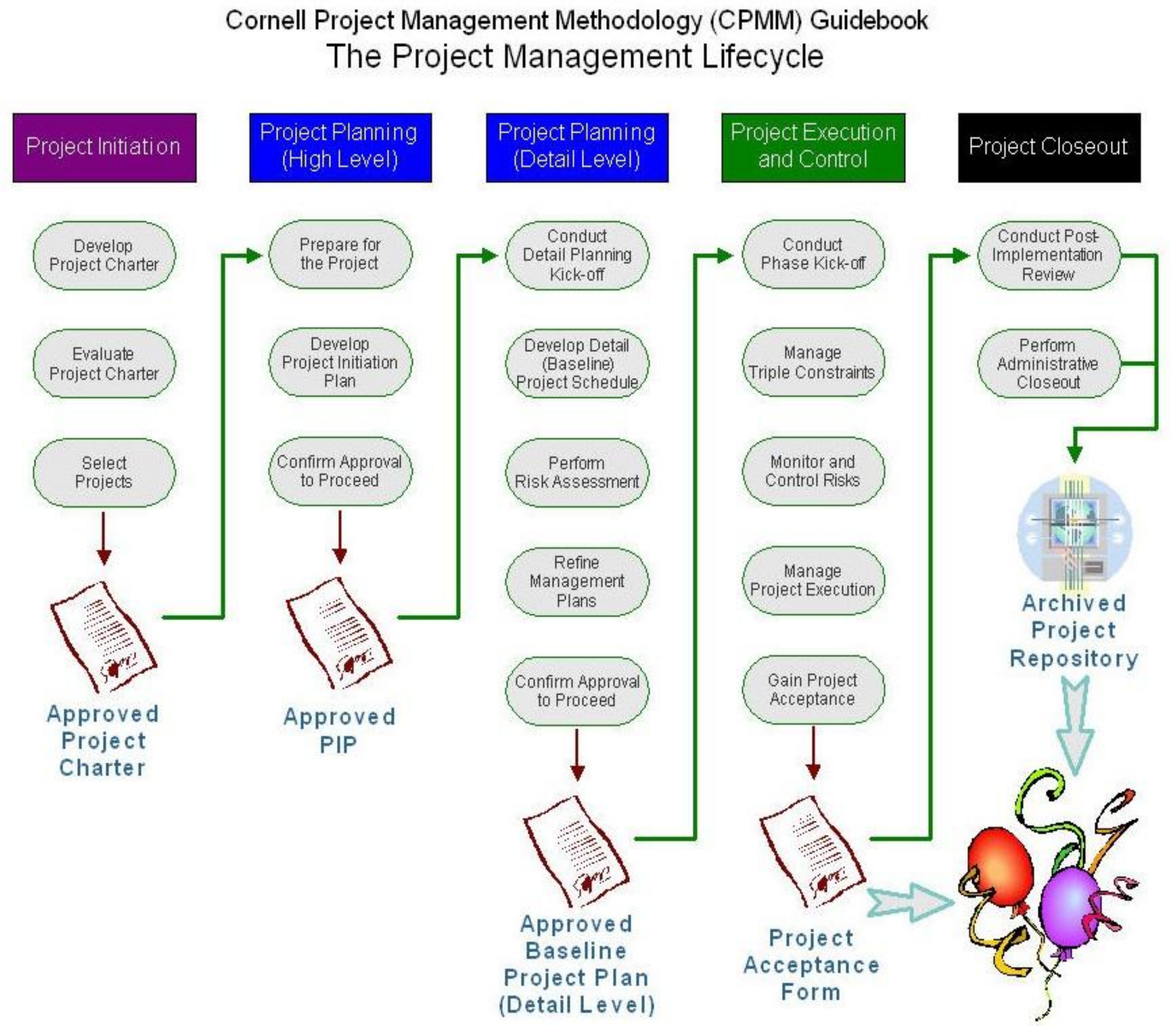


(Source: PMI PMBOK Guide 2008)

Another method of showing the project management stages is provided in the Cornell Project Management Methodology guidebook (CPMM 2010). It shows the project management life cycle diagrammatically in similar terms of five phases: Project Initiation, High and Low Level Project Planning, Project Execution and Control, and Project Closeout. A representation is shown in Figure 2.5. The Cornell approach places a greater emphasis on the project planning stage and includes project monitoring/controlling in the execution phase. There are numerous useful models of project management software (Wikipedia 2011), however the PMBOK model fits succinctly with the conversion project criteria.

In the vast realm of project management worldwide there is no right or wrong answer to the complete process. The methodology adopted can be simplified by the formatting different approaches to similar information.

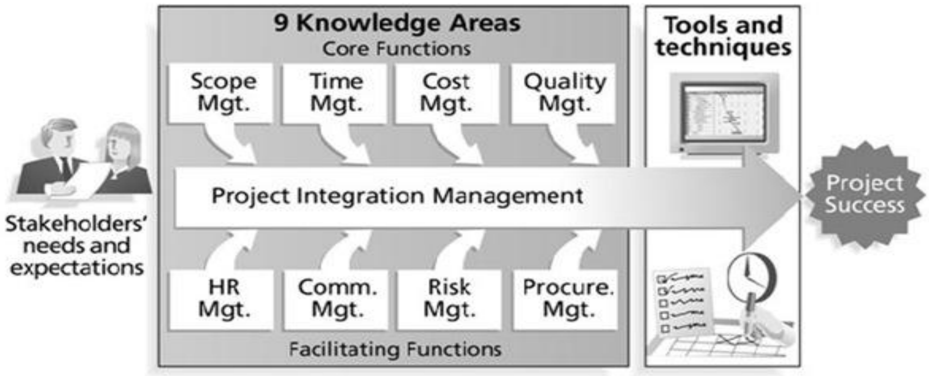
Figure 2.5 – Project Management Lifecycle



(Source: https://confluence.cornell.edu/display/CITPMO/Cornell+Project+Management+Methodology+(CPMM)/)

The PMBOK model as shown in Figure 2.6 will be utilised as an example in this research as it is one of the most widely acknowledged assemblies of the underlying principles of good project management in the world and is used extensively within the FPSO conversion industry (PMI PMBOK Guide 2008).

Figure 2.6 – Nine Knowledge Areas



(Source: PMI PMBOK Guide 2008)

2.3.3. Processes of Project Management

Successful project management is characterised by thorough and extensive planning, effective project scoping, adequate resourcing, realistic expectations of outcomes and strong management support. The more complex a project the more important it is to have rigour applied to its project management through the adoption and use of a project management methodology throughout the project life cycle (PMI PMBOK Guide 2008). A project management methodology is a system of inter-related phases, procedures, activities, and tasks that define the project process from start to finish.

The interaction of the nine elements within Project Management is shown in Figure 2.6. This interaction is controlled through project Integration Management. The PMBOK model details nine knowledge areas in Project Management and the relationship to each of the five stages of the methodology.

2.3.4. Integration Management

Integration Management entails the management of all the internal processes and activities needed to execute the project including managing the inter-dependencies between these processes and activities.

Experienced project management practitioners understand that there is no single well-proven methodology to control and manage a project and no two projects are ever the same. The integrative nature of Project Management needs to incorporate processes of analysing and understanding the scope of the project, understanding how to interpret project information, how to perform activities to achieve deliverables and how to measure and monitor the project's progress to meet the project deliverables (PMI PMBOK Guide 2008).

Due to the nature of projects there can be numerous stakeholders, all bringing difficult challenges. In the initial phases of Project Management Team development, the Project Manager will play an important role in managing developments arising from differences in attitudes, culture, capabilities, and other aspects emanating from the project team members. These types of issues need to be resolved or the result will be inadequate cohesion and respect amongst the project team members thus leading to an adverse affect on overall project performance (Alawi 2009).

The management of this interaction is crucial to the success of the process of project management. The Project Manager being the person in charge of Integration Management and to be a success it is likely that the Project Manager will be a critical success factor to the conversion of an oil tanker into an FPSO.

There are generally five steps throughout a project being the initiation, planning, execution, monitoring and control and the closure for the project, as shown in Figure 2.4, and these are also shown as headings of Table 2.1. The nine processes incorporated in the PMBOK model are listed down under Knowledge Areas in Table 2.1. The resultant matrix shows the individual activities associated with each knowledge area and relative to each project management process or stage of the project. This standard describes the processes, tools, and techniques used to manage a project (PMI PMBOK Guide 2008). Each of the knowledge areas is discussed in the following sections.

Table 2.1 - Project Management Process and Knowledge Mapping

Knowledge Areas	Initiation	Planning	Executing	Monitoring & Controlling	Closing
Project Integration Management	Develop the Project Charter	Develop Project Management Plan	Direct and Manage Project Execution	Monitor and control Project Work Perform Integrated Change Control	Close Project or Phase
Project Scope Management		Collect Requirements Define the Scope Create WBS		Verify Scope Control Scope	
Project Time Management		Define Activities Sequence Activities Estimate Resources Estimate Durations Develop schedule		Control Schedule	
Project Cost Management		Estimate costs Determine budget		Control Costs	
Project Quality Management		Plan Quality	Perform QA	Perform Quality Control	
Project HR Management		Develop HR Resources Plan	Acquire, Develop and Manage Project Team		
Project Communications Management	Identify Stakeholders	Plan Communications	Distribute Information Manage Stakeholder Expectations	Report Performance	
Project Risk Management		Plan Risk Management Identify Risks Perform Quantitative Risk Analysis Plan Risk Responses		Monitor and control Risks	
Project Procurement Management		Plan Procurements	Conduct Procurements	Administer Procurements	Close Procurements

(Source: PMI PMBOK Guide 2008)

The development, control and application of the Project Management Team has to be organised in such a way that all of the project management processes are managed efficiently. The Project Management Team has to be sufficient in size and with the necessary experience and capabilities in order to cover all the necessary disciplines associated with project management applications. The Project Management Team is the main tool used by the Project Manager and it is most likely that the Project Management Team will be a critical success factor within a conversion of an oil tanker to an FPSO.

2.3.5. Project Scope Management

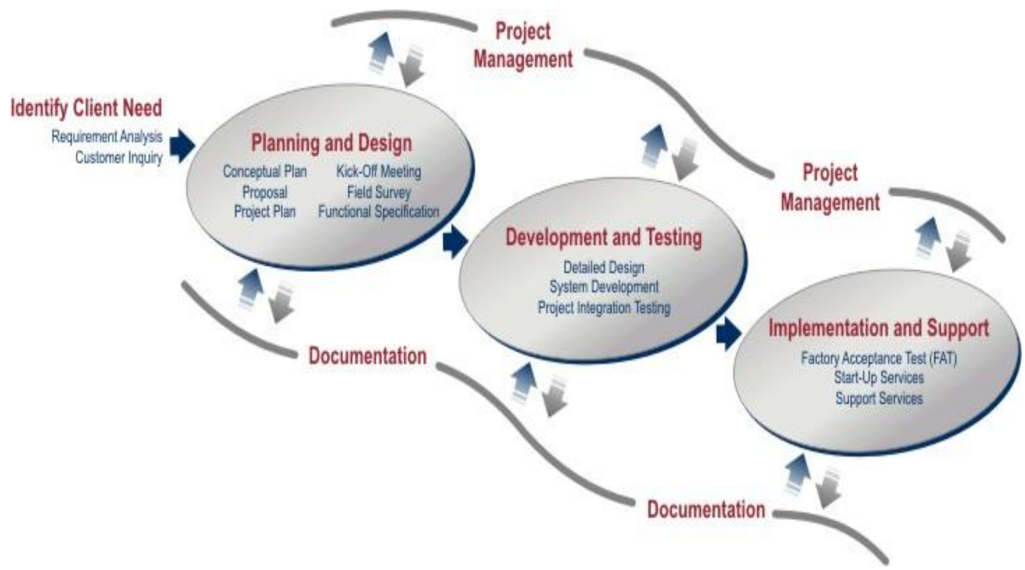
Managing the project scope is primarily concerned with defining and controlling what is included and not included in the project. Scope Management refers to the control of the terms of reference associated with the project objectives, thus ensuring that a project remains within its designed timeframe. Figure 2.8, is a pictorial overview of Project Scope Management. Establishing the management of the project scope must demonstrate what needs to be done, the cost, and the time it will take to complete. Project Scope Management is the process used within a project to manage the Scope of Work. In the conversion project within the oil and gas industry the Scope of Work is made up of three sub-sections of specifications, selection of the donor vessel and conversion yard. The Scope of Work is further discussed in FEED (2.3.14). Managing what has to be done to complete the conversion successfully. The Scope of Work is the basis of all the work done during the conversion and is likely to be a critical success factor in the conversion of an oil tanker to and FPSO. Measurement of achievements must be possible.

Problems to be addressed in establishing the project scope include:

- Ambiguity, which leads to confusion and unnecessary work.
- Clarity; project scope needs to be clear and detailed;
- Incompleteness, which leads to schedule slips and cost overruns;
- Control, which needs to be complete and accurate;

- Variation; project moves from its original purpose, timeline, and budget; and is a primary cause of late deliveries;
- Transient or variation scope; leads to scope creep and refers to the change in a project's scope after the project commences.

Figure 2.7 – Project Scope Management



(Source: http://www.bachelorcontrols.com/capabilities/images/methodology-big.jpg)

Scope creep can come about from poor change control, lack of proper identification of the features to bring about the achievement of project objectives, and/or a weak Project Manager. Project scope needs to be final and remain relatively unaltered for the duration of the project (Alexandrou 2011). Changes to the scope have to be done through a formal change process. Some important tools and techniques useful in project scope are:

- Definition of the project needs;
- Identification of key stakeholders and project drivers;
- Development of operational concepts; and
- Identification of all external factors.

2.3.6. Project Time Management

Disciplined Time Management is essential for effective Project Management. Time Management is said to include the processes necessary to manage a timely end for the project (PMI PMBOK Guide 2008). These processes include definition and sequencing of the required activities, estimation of the duration of each activity, development of a proposed schedule and control of that schedule.

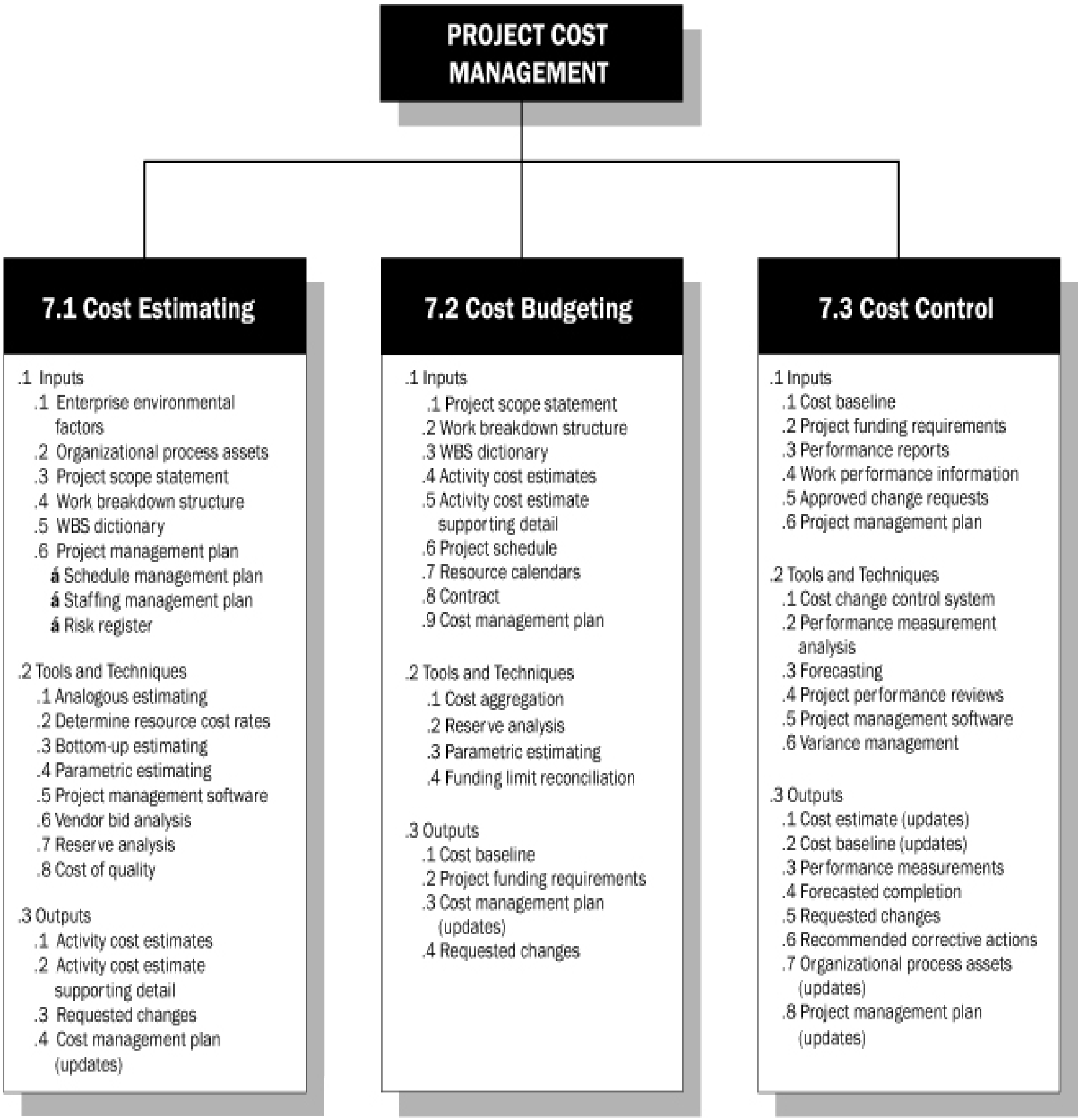
Project Managers often see time as a constraint and the application of effective time management skills turns the constraint into a resource (Kerzner 2009). Lakein (1973), suggested that time management involved the process of determining the relative needs, setting the individual goals to achieve these needs, then establishing a priority and planning all tasks necessary to achieve these goals.
The involvement for time management is not a new fundamental. Several authors proposed methods on how to manage time issues on the job (Drucker, 1967; Lakein, 1973; Mackenzie, 1972; McCay, 1959). These authors made the suggestion of establishing simple remedies by the writing and establishing work plans. These have been set out as common; "to-do lists" and these have been able to increase job performance. The techniques project managers can use in time management are to learn how to delegate, how to say no, how to avoid interruptions, how to manage the time robbers, how to prioritise, and how to schedule and plan (Kerzner 2009).

2.3.7. Project Cost Management

Cost Management includes the processes of estimating, budgeting, and controlling costs for the project to ensure completion within an approved budget. Project Cost Management is mainly concerned with the cost of resources needed for project activities. Figure 2.8 shows the close interrelationship between cost estimating, cost budgeting, and cost control. Cost estimating and cost budgeting are very closely linked and can be described as one process. The influence on costs will be greatest in the very early stages of a project, making the Scope of Work definition critical.

Project Cost Management arises from development of the project management plan, which includes a cost management plan setting out the criteria for planning, structuring, estimating, budgeting and controlling project costs (PMI PMBOK Guide 2008). Prediction and analysis of the prospective financial performance of a project is considered a separate issue to Cost Management of the project itself and this function is generally carried out from outside the direct project management process. The financial reporting and progress analysis is incorporated in whole project finances and the Finance and Cost Management function is most likely to be a critical success factor for a conversion project within the oil and gas industry.

Figure 2.8 – Project Cost Management



(Source: PMI PMBOK Guide 2008)

2.3.8. Project Quality Management

The project Quality Management process involves the planning of quality needs through identifying these relative to the project objectives and standards. It includes the processes of Quality Assurance (QA) and Quality Control (QC). Quality assurance is the process of auditing quality requirements from results of quality control measurements. Quality control is the process of monitoring and recording results of the quality activities to assess performance and to recommend any necessary changes (PMI PMBOK Guide 2008).

2.3.9. Project Human Resources Management

Human Resources Management is the process of organising, managing, and leading the project team. The structure of the project team has to be decided, formalised and the specific roles and responsibilities assigned for each team member. The Human Resources Management process includes development of the human resources plan, recommendations on acquiring the team, development of the management plan and structure for the project team and then the overall management of that team.

2.3.10. Project Communications Management

Effective communications in project management requires the correct information to be presented to the right person in the most cost-effective manner (Kerzner 2009). Project communications management processes include identification of stakeholders (people involved and/or affected within the project), planning communications by deciding what is required and then defining the correct communications approach. The method of distribution and information availability to the stakeholders has to be decided including how to manage the expectations of the stakeholders and how to address all resultant issues. Information to be communicated includes reporting of the project performance, which will include the project performance statistics, progress, and project forecasts (PMI PMBOK Guide 2008). There are two essential ingredients in project work concerning communications: people and the effective exchange of ideas. Without people, nothing is done and without proper communication, stakeholders will not know what and when to do it (Wideman 2000).

Project communications is reported as the transfer of information from one person or persons on a project to other person or persons. The communication process commences from day one of any project and must continue on a daily basis, if not on an hourly basis, throughout the whole of life of a project. The effectiveness of communication will mean each Project Management Team member will be required to be fully appraised of the project status, as it occurs (PMI PMBOK Guide 2004).

Communication is more than just talking. Communication necessarily includes listening. Communication is about the transfer of knowledge and it is deemed as being tough to manage (Phillips 2010). Communication is necessary for all other phases, including design, procurement, delivery, testing, etc., as well as between main contractors, sub-contractors, and suppliers. Projects will require and will have interventions and inputs by stakeholders. This occurs when the entities concerned are external to the actual project proper or are geographically away from the project. PMI PMBOK Guide (2008) indicates communications is one of the most important roles in the project management mantra (Alawi 2009). As such, Communications is likely to become a critical success factor in the successful application or project management within a conversion project.

Communication is often inadequate, of an inferior quality, or just unidirectional because project staff pay little heed to it, concentrating more on time planning, organising, doing and fixing (Llewellyn, Capsey & Dyrkoren 2002). Projects have been carried out elsewhere in the world, leading to value knowledge and practices. The communication of these Lessons Learned data throughout the project team leads to significant improved project performance (Llewellyn 2011).

2.3.11. Project Risk Management

It is necessary to define a number of terms associated with risk and related to project Risk Management. The process of project risk management indicates six separate processes: risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control.

The PMBOK framework is very useful as a process guideline and it defines risk management as; 'the systematic process of identifying, analysing, and responding to the project risk' (PMI PMBOK Guide 2008). The risk management objectives assess the positive and negative events in a project in relation to the probability and impact. i.e., the probability and impact would be increased for the positive and decreased for the negative (PMI PMBOK Guide 2008).

2.3.11.1. Risk Identification

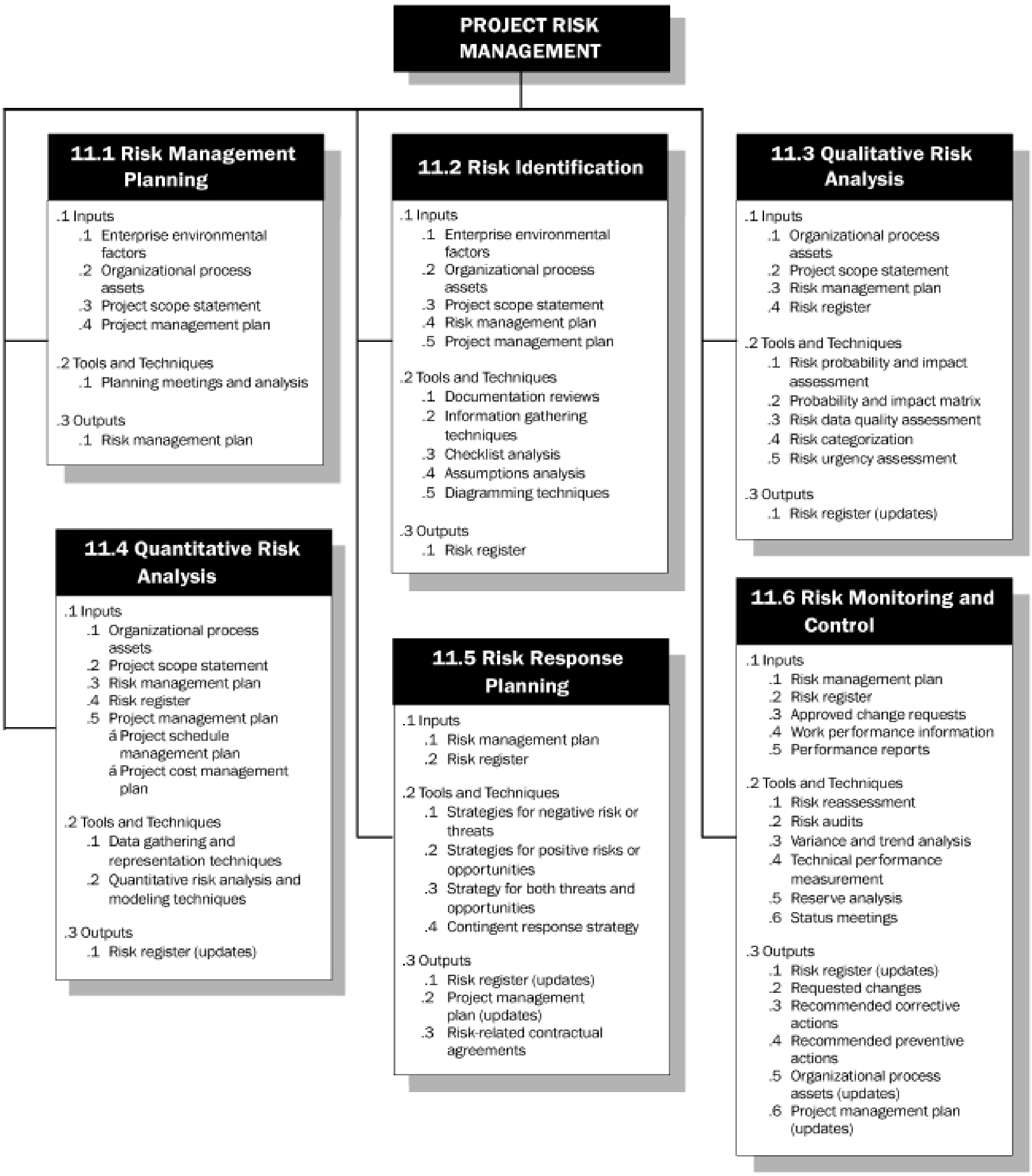
The identification of risk is the process of determining which risks will affect the project and documenting their individual characteristics (PMI PMBOK Guide 2008). A structured risk review for a project will include full documentation, plans, assumptions, previous related files, and the contract and other related information to allow risks to be identified. Information is gathered using techniques such as brainstorming, the 'Delphi Technique' of reaching a consensus of experts, interviewing, and root cause analysis. Other techniques include checklist and assumption analyses, diagramming, strength, weakness, opportunities and threats (SWOT) analysis, and expert judgments (Cooper, Grey Raymond & Walker 2005).

2.3.11.2. Risk Analysis

Project risk analysis is a process enabling an analysis of the risks associated with a project to be assessed. Overall, it will increase the likelihood of success to a project in terms of the indicated cost, time, and performance objectives (PMI PMBOK Guide 2008). The project risk analysis is separated into two parts; the qualitative and quantitative processes.

The output of the risk identification process is a risk register. Figure 2.9 provides a diagrammatic overview of the project Risk Management.

Figure 2.9 – Risk Management



(Source: PMI PMBOK Guide 2008 Fig 11-1, p. 274)

The risk-rating matrix, shown in Figure 2.10, is a diagrammatic analysis of the risks and is a means of developing indicative failure scenarios. Consequences and likelihood for each scenario can be analysed to provide qualitative estimates of the apparent levels of risk. This consequential scale can be linked to the analysis criteria and the results can be a simplified likelihood-rating matrix. This is used to determine the resultant actions for the project (Cooper et al. 2005).

Figure 2.10 – Risk Rating Matrix

		Consequences				
Likelihood		**Insignificant**	**Minor**	**Moderate**	**Major**	**Severe**
	Almost Certain	Medium	High	High	Very High	Very High
	Likely	Medium	Medium	High	High	Very High
	Possible	Low	Medium	High	High	Very High
	Unlikely	Low	Low	Medium	Medium	High
	Rare	Low	Low	Medium	Medium	Medium

(Source: http://education.qld.gov.au/strategic/eppr/finance/fnmpro21/matrixandcategories.pdf)

Consequences

Insignificant	Minor problem easily handled
Minor	Some disruption possible
Moderate	Significant time/resources required
Major	Operations severely damaged
Severe	Business survival is at risk

Likelihood

Almost certain	Is expected to occur in most circumstances - >90%
Likely	Will probably occur in most circumstances - >50% - < 90%
Possible	Could occur at some time - >10% - <50%
Unlikely	Not likely to occur in normal circumstances - > 3% - <10%
Rare	May occur only in exceptional circumstances - < 3%

(Source: http://education.qld.gov.au/strategic/eppr/finance/fnmpr021/matrixandcategories.pdf)

Qualitative analysis aims at achieving a better description of risk, its dimensions, and its characteristics. It is based on a nominal or descriptive pro-forma for describing the consequences and or likelihood of risk (Cooper et al. 2005). Quantitative risk analysis is the measurement using numerical ratio scales for the impact on project timeliness and costs (Cooper et al. 2005). The outputs are prioritised lists of quantitative risk, probability of achieving the original, and planned cost and time objectives (Barkley 2004).

A project risk analysis serves the stakeholders such as, the Project Manager, Project Management Team, and the Clients (Norris et al. 2000).
Examples of the benefits are:

1. Better understanding of the project and the finalisation of realistic cost estimates and timelines;
2. Concise and proper understanding of the risks in a project, the impacts, and the best way to minimise these impacts;

3. Better justification of decisions and risks with more efficient and effective management; and
4. Better financial decisions from the assessment of contingencies that reflect the risk.

2.3.12. Project Procurement Management

The PMBOK model describes six processes within procurement management (PMI PMBOK Guide 2008). These processes are to:

1. plan the purchases,
2. manage the acquisitions and contracting,
3. request seller responses to offers,
4. select sellers after the responses,
5. administer the procurement contract and
6. the closure of the contract on completion of the transaction.

The planning of the purchases, managing the acquisitions and contracting determines what and when to purchase. It creates the requirements for products/services and the project needs. This has to be administered by the project management team to identify potential companies that can supply. Obtaining seller responses and then the selection of a list of appropriate vendors is carried out in regard to capabilities and prices.

The project team may perform much of the work however, it is typically owned by the procurement department. The project team will generally make the final selection although the procurement department normally signs the final contracts. Most companies want people other than the Project Manager to enter legal contractual relationships. This is to avoid any conflict of interest being incurred within the Project Management Team, and provides a responsibility separation.

The Project Manager will use contract administration to work on daily requirements with the vendor's account manager. The actions of contract administration are managing the terms and conditions of the contracts, and relationships between the principal and the constructor. This ensures that the legal and commercial interlinks are adhered too. The contract closure is for the project team to be closely involved with the procurement department to ensure the contracted work is completed in accordance with the requirements of the contract and to provide feedback about the overall vendor relationship.

2.3.13. Recent Project Management Developments

The approach to Project Management, used throughout the world, has been based on repeatable processes, accessing past project management history, either internally or externally, adopting best practices associated with existing project management fundamentals, using some designated common reference, and understanding the responsibilities of the Project Management Team.

The emphasis has moved to focus on achievement of client requirements and project deliverables; to follow, understand, and achieve project schedules; to effect cost control processes; and to predict project performance against baseline criteria. The outcomes will include improved project results, increased profitability, and improved resource planning (Crawford 2000), (Hill 2010), (Ward 2010). The client, who generally has initiated the whole project sets the deliverables for the conversion and, in most cases, applies the schedule for conversion completion. The focus, as mentioned, has shifted towards the Client Input into the conversion. The client wants to achieve a profitable outcome and to have the conversion delivered on budget. The Client Input is the background to the financing of the conversion as part of the whole project. Client input is most likely to be a critical success factor in a conversion project in the oil and gas industry.

2.3.14. Front End Engineering and Design [FEED]

In the early stages of the Engineering for the FPSO, there are four major phases:

1) **The Feasibility Study:** - To determine the field development concept.
2) **Concept Design:** - Optimum method of implementing the components of the field.
3) **FEED:** - Establishing the philosophies to determine the final configuration of equipment,
4) **Detailed Design:** - Specify and purchase the equipment.

Front End Engineering and Design (FEED) is a logical progression from the project selection process to asset commissioning, and finally to the operations. The output is designed to provide information to experienced technical and support staff to create the specifications and Scope of Work. The FEED output contains detailed responsibility matrices to show who is responsible for the various aspects of the project (Harris, Formigli, Crager, Eggen, Reed & Khurana(2004). It assists with specifying all the elements of the system, including safety, environment and operation processes, and provides input into the overall estimate and the initial budget covering all phases of the project (ABB 2010). The Scope of Work is based on the outputs from the FEED phase of the whole project. The Scope of Work is the details of the work to be carried out during the conversion. FEED engineers have to adopt a multi-disciplinary, concurrent workflow to ensure all output decisions are based on sound asset lifecycle data and best practices. Design decisions need to be made at this front end engineering and design, FEED stage (Patel 2009).

During each phase of (FEED) sound engineering judgment and industry best practices are applied to improve the capital expenditure (CAPEX) and operating expenditure, (OPEX) decisions (Morris 2010).

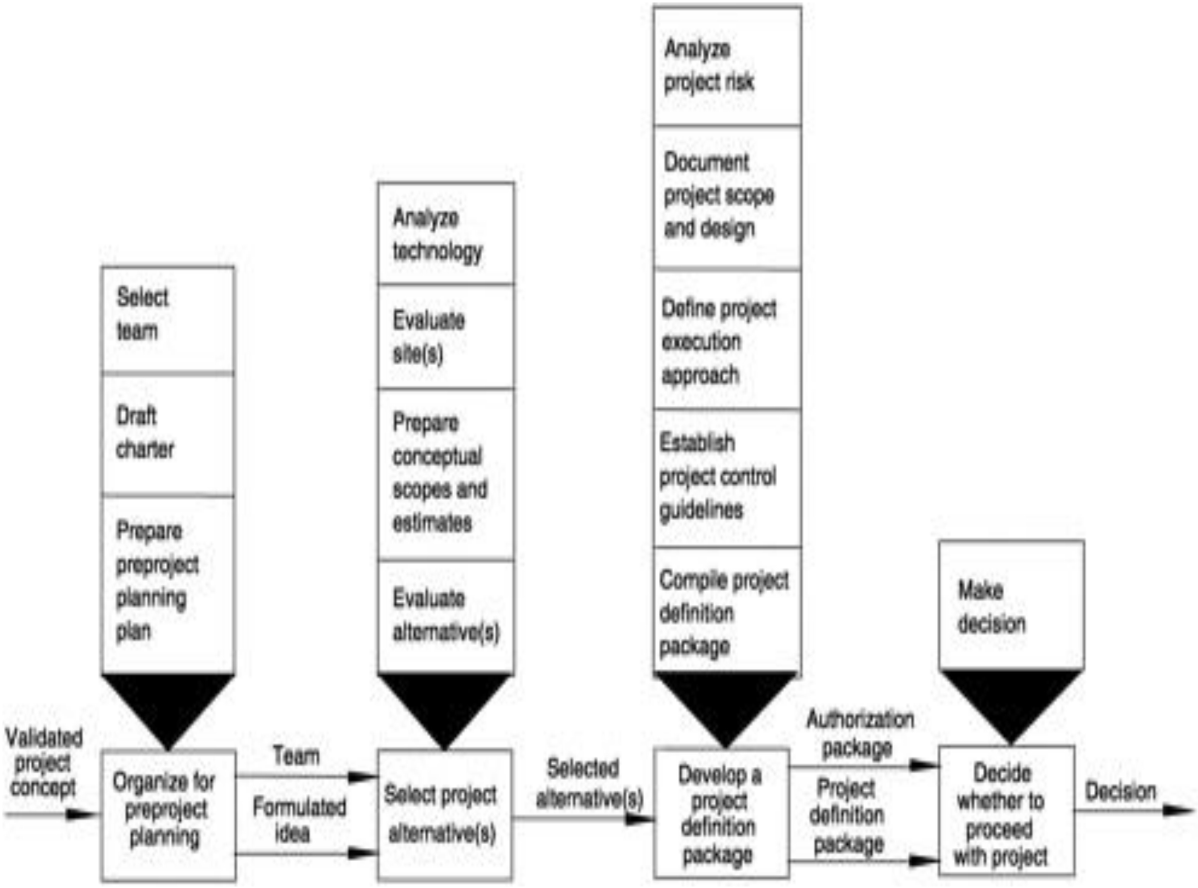
The following is a checklist providing a summary of the main areas to be considered in the process of the Front End Engineering and Design:

- Process design, simulations, preferences/criteria, safety margins and guarantees (with values & liabilities);
- Basis of Design, (BOD);
- Basic Engineering Design Data (BEDD) - (proposed site or location, key plot, climatic conditions, general instructions & information, language, units of measure, environmental regulations/local codes);
- Process flow diagrams and heat & mass balance;
- Standards applicable to the project;
- Preliminary piping & instrumentation drawings;
- Offshore surveys, constructability assessment and a need for third-party technical consultation;
- Merging and tie-in schedules;
- Key operating philosophies;
- On board equipment selection, locations and layouts;
- Specifications for new equipment;
- Technical bid evaluation; and
- Safety assessment. Hazard identification [HAZID] and Hazardous operations [HAZOP] (Lacatena 2010).

FEED is generally not mentioned in the project management process models, however many of the project management processes are directly dependent upon the success of the FEED. FEED is a common building process for complex, high cost projects in the processing industries (Hwang, Lee, Roh, Cha, Ham, Kim, 2009). FEED is an integral part of the success of a conversion project and it is likely that FEED is to be a critical success factor Wyllie, Joynson, 2006).

Figure 2.11 shows the steps to provide information regarding the project to ascertain the worthiness of that project.

Figure 2.11 – Front End Engineering & Design Steps

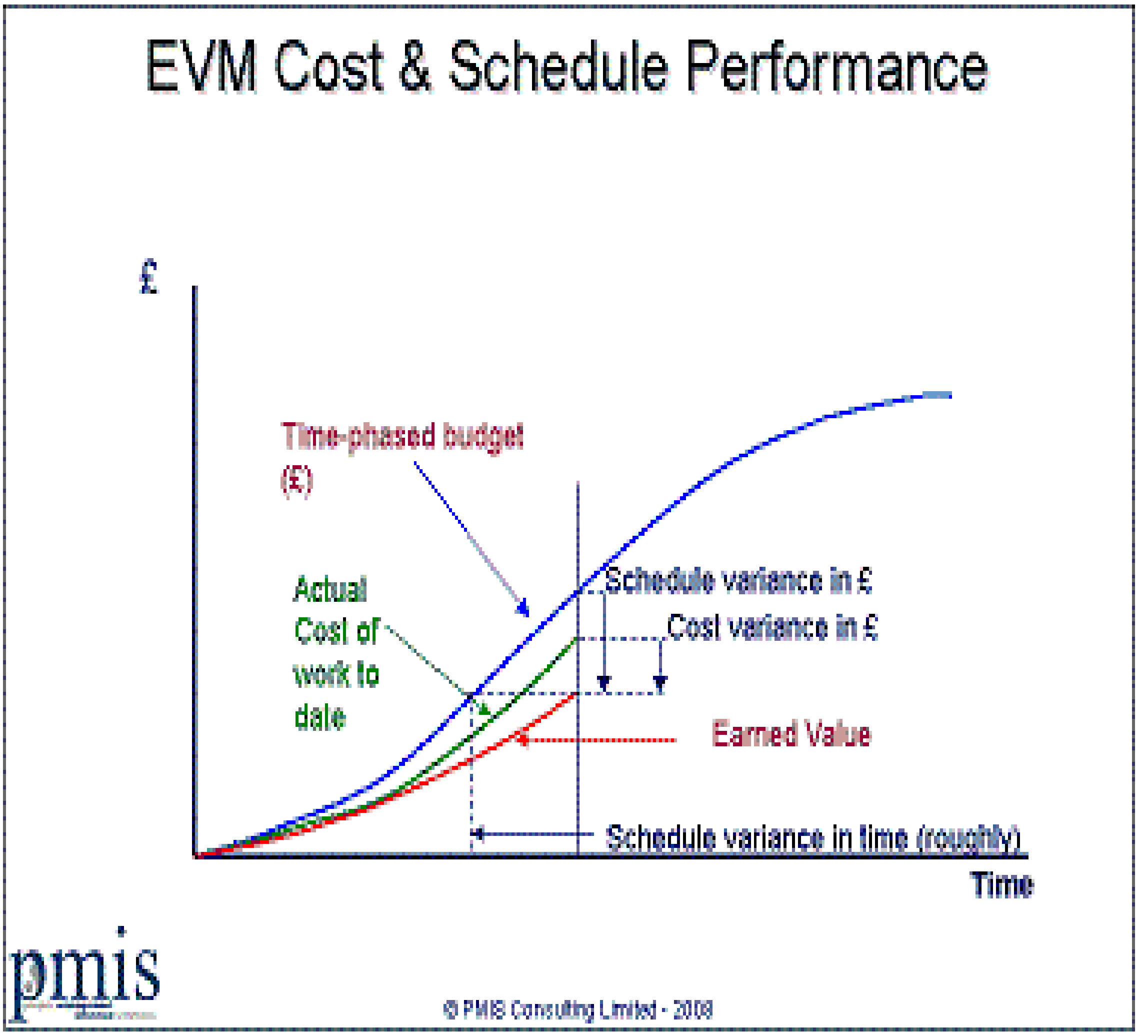


(Source: CII (DoE, NAP 2001))

2.3.15. Earned Value Management

Earned Value Management (EVM) is a management tool by which project managers can improve delivery performance through the analysis of periodic and meaningful cost and schedule performance information, thus increasing the focus and understanding of the status against schedule and budget goals throughout the project lifecycle (PMIS 2005). The Earned Value Management (EVM) metrics are all converted to a single unit of measure (i.e. **$**) so project performance against both the cost and the schedule can be observed. Traditionally these have been viewed separately and can be completely misleading. Integration should be the focus and is fundamental to making Earned Value (EV) work efficiently and concisely (PMIS 2005).

Figure 2.12 – Earned Value Cost & Schedule Performance



The aim is to highlight the cost and schedule issues sufficiently early to provide the managing project team with the maximum amount of time to minimise the impact of variations and to develop a recovery plan (PMIS 2005). The effect of earned value cost represented by the Green Line, the_schedule performance represented by the Budget Blue Line and the resultant output of the actual "earned value " Red Line, at that point in time for the project is shown in Figure 2.12. The output from Earned Value Management has detailed ramifications throughout the project for Cost Management, Time Management, Scope Management, and Change/Variation Management.

2.3.16. Change/Variation Management

The PMBOK model incorporates Change/Variation Management across various internal processes and allots the responsibility to the person maintaining the applicable internal process.

Change/Variation Management is the ultimate responsibility of the Project Manager to achieve the best result. Change/Variation Management goes to the core of the project management process. It is a primary function within Integration Management and involves the nine elements of Project Management (PMI PMBOK Guide 2008). Change/Variation Management being the responsibility of the Project Manager and covering all the elements of project management it is likely that this will become a critical success factor within a conversion project in the oil and gas industry.

2.3.17. Summary

This section has covered the discipline of Project Management. The well-defined processes within Project Management have been explored and discussed. The process of FEED, used in the processing industries including projects such as the conversion of Oil Tankers to FPSOs has been described in Section 2.3.13.

Although the theoretical processes of Project Management are well defined Lacatena (2010) indicates that unfortunately, those involved in the Project Management Team often just do what they are told without ever considering any contractual obligations or recording decisions, and this may differ from contract obligations. This is one of the issues to be explored in this research.

The next section will discuss the second of the parent disciplines, that of Interface Management.

2.4. PARENT DISCIPLINE 2 – INTERFACE MANAGEMENT

2.4.1. Introduction

In the previous section, the parent discipline of Project Management was discussed and it was shown how important the nine separate knowledge areas are to one another in managing and controlling a project. This section of the literature review discusses the parent discipline of Interface Management.

2.4.2. Interface Management

Interface Management is a process to control the myriad of project elements or separate instructions making up the project to ensure that they are properly coordinated, responsibilities assigned, problems identified, conflicts resolved, resolutions documented, and all roles understood and acted upon by all involved (Shirley et al. 2006). Interface Management is the systematic control of all communications associated with the support for the project management operation, which affect the cost, schedule, planning, work-plan and delivery of a project (CCPS 2004).

Interface Management requires excellent skills with a distinct and appropriate approach to project integration management and to Interface Management thus ensuring, the right input at the right time to move the project forward to a successful conclusion (Alawi 2009). It refers to those critical areas and issues, which are interlinked with the project conversion, the Project Management Team, and internal and/or external stakeholders. It occurs within the boundaries and relationships among people, departments, organisations, constructors, suppliers, stakeholders, and project conversion functions (Alawi 2009).

The goal is the early identification of issues, which will adversely impact or affect the cost or schedule, and to minimise or mitigate these issues. The Project Manager will use Interface Management to initiate and manage clear, accurate, timely, and consistent communications with organisations for the exchange of information with scheduled project tasks. Interface Management should include engineering drawings, specifications, designs, construction reports and calculations, detailed equipment details and coordinated project schedule information (Caglar & Connolly 2007).

CEIM (2010) found low level of satisfaction in projects where Interface Management has not been used because of barriers. These barriers have arisen from different languages, the Project Managers themselves, and the lack of:

- experience of staff, and subcontractors;
- recognition of local construction methods;
- government agencies' cooperation; and
- supervisor experience and knowledge.

Associated problems have been in coordination on the project due to unrealistic schedules, limited applied budget, obtaining access to the project work area, and the lack of authority of the project manager (CEIM 2010).

Project incidents in the past decades demonstrate the understanding and need for consistently high quality exchange of detailed and on time information between people involved and responsible for managing complex projects. Interface Management has become a key component of effective leadership in project management in any organisation involved in the offshore oil and gas conversion industry. This refers to all the critical areas and issues linking the project between the stakeholders, components, or project team members, internal or external (Alawi 2009).

Higher degrees of participation of Interface Management within projects tend to highlight the issues of the Project Management Team members' calibre, responsibilities, and accountabilities. There will be less chance of being able to hide errors or mistakes and/or shift the blame thus incurring challenges to the efficacy of team members (Ballard et al. 2001).

The problem of conflict of personnel and project integrity becomes a key issue for the Project Manager (Miles & Ballard 2002).

Typically in smaller projects, the outputs have been designed and engineered principally by one organisation, and one person has managed all the interface information. The program would be fabrication following engineering with a linear progression for the project. Interfaces would be simple in terms of management action. Scheduling, planning and communication conflicts would be resolved informally and verbally, and with only minimal written correspondence (Shirley et al. 2006).

In contrast, complex projects, such as FPSO construction and conversions, are far more complex and advanced in technology and engineering, in that:

- Projects take longer from concept selection to the start-up/ completion;
- Project stakeholders and participants are more highly specialised and are not located in the same regions around the globe;
- Facilities are larger in capacity and represent a larger capital investment;
- Engineering and fabrication of various components are more sophisticated and diverse and are made separately and stored until required; and
- Design/build time phases are more compact and penalties/costs for delays are expensive.

Consequently, there has become a greater need for comprehensive Interface Management to work in conjunction with the existing project management and procedures (Shirley et al. 2006).

In the conversion of tankers to FPSOs, Interface Management has now become critical for managing material and communication interfaces among all stakeholders. These will include handling of project elements such as vessel selection, systems amalgamation, topsides, hull, subsea components, risers, umbilicals, pipelines, drilling and classification and authority approvals, as well as the off-take tanker requirements, transportation, installation and commissioning contractors and the client (Shirley et al. 2006).

2.4.3. Establishing Interface Management

There are three suggested steps to establishing Interface Management for a project. Firstly, to identify and evaluate interfaces, secondly to determine if the current interface management processes are adequate and finally to complete an action plan to improve interfaces (CCPS 2004). It is necessary to decide how well established the interfaces are, whether the interfaces control project risk to a manageable level, and whether a matrix has been developed listing all the sources of information and all receivers of information. Many of the offshore construction industry's performance problems stem from inadequate inter-organisational co-operation formats (Barlow 2000).

2.4.4. Co-Ordination and Procedures

Interface Management crosses organisational and or contractual boundaries and can actively level out the information/material flows between sub-processes or disciplines involved in the project. To implement the project and configure the Interface Management system to specific requirements it is necessary to follow the processes and demands of the stakeholders (Abiodum 2007).

A well-controlled interface between a client and the designers can help incorporate client requirements into the design and will increase the overall output value and flexibility of the project. Efficient Interface Management simultaneously controls other lesser-appreciated interfaces between or among designers, contractors, suppliers, and fabricators (Chen et al. 2007). Interface Management promotes the reduction of actual physical interfaces through component integration and the standardising of project interfaces. Standardising project interfaces lessens the number of variations occurring within a project, reduces the threat of delay and cost alterations and makes the whole project management system simpler and more controllable (Chen et al. 2007).

2.4.5. Management of the Interdependencies and Relationships

Managing and controlling boundary conditions among project participants and stakeholders has allowed Interface Management to assist in building understanding of the overall project complexities. Interface Management has been proven, to address project complexities, allowing for more dynamic and better coordinated construction or conversion project systems (Chen et al. 2007).

The lack of Interface Management concepts can result in a poorly coordinated and controlled peripheral conditions among project participants. Stakeholders causes interface issues, in the form of component design errors, mismatching of parts, operating systems performance failures, coordination difficulties, and general construction conflicts (Chen et al. 2007). Interface Management has become a recognised critical associated area of the project management process.

2.4.6. Interface Management Registers

Interface Management involves a number of processes. All project interface issues have to be logged into an interface register and managed accordingly. All interface data have to be identified, documented, and monitored until resolution and then closure. Interface registers have to be reviewed by stakeholders at regular meetings and have concise monitoring and controlling processes.

2.4.7. Sources of Communications

Open communications and the capture of information related to stakeholders is a key element to correct and detailed Interface Management. The identification and assessment of all the needs at the very earliest stages of the project provide a basis for concise plans to address the needs and then allows for the allocation of responsibilities. The Project Manager has to rely on the Interface Manager to ensure that there are clear communication avenues for all participants. The Interface Manager has to utilise the communication processes as indicated in the (PMI PMBOK Guide 2008).

Alawi (2007) states that experience shows this approach has had a significant beneficial effect on communications and the project schedule management. Early stakeholder involvement has enabled the preparation of a plan for the purchasing of critical items necessary for the project, and this has enabled the identification of time slots for stakeholder subcontractors to do work applicable to the scheduled project program (Alawi 2009).

2.4.8. Summary

The parent discipline of Interface Management has been discussed and how it bears an integral relationship with the overall project management process as described, in the PMBOK model. The processes of Project Management, unless supported by Interface Management, are unlikely to be able to manage all processes relating to a complex project and meeting the budget requirements for time and cost. The evidence discussed above suggests that there needs to be an external relationship coordinator structuring the interface activities which are generally neglected by an over worked Project Manager.

Interface Management is the effective exchange of information, which is considered crucial to the successful contract execution of any project. Constant monitoring of critical areas that have or may deviate from the project work plan can be quickly assessed and addressed and controlled (Caglar & Connolly 2007). Interface Management can be effective if all project stakeholders embrace the concept and incorporate the fundamental responsibilities into their individual work processes and by making a formal project communication methodology to benefit all involved in achieving the success of the conversion project (Caglar & Connolly 2007).

In this section the details pertaining to the parent discipline of Interface Management have been discussed. Identification, evaluation, controlling and managing the interfaces has been described. Establishment of sources of communication, and the interdependencies and relationships with the parent discipline of Project Management have been discussed. Based on the knowledge and diverse involvement of the Interface Manager in a complex project such as a conversion project it is most likely that it will be a critical success factor within a conversion project in the oil and gas industry.

The next section describes the offshore oil and gas industry to provide the context subject of this research.

2.5. CONTEXT OF THE RESEARCH – OFFSHORE OIL & GAS INDUSTRY

2.5.1. Introduction

In this section, the industry context of this research is highlighted. The nature of the industry and the Scope of Work performed to sustain the continuing growth of the industry is described.

2.5.2. Offshore FPSO Industry

In 1947 Superior Oil erected a drilling/production platform in 20 ft of water some 18 miles off Vermilion Parish, Louisiana. It was Kerr-McGee Oil Industries, as operator for partners ConocoPhillips and Stanolind Oil & Gas (BP) that completed its historic Ship Shoal Block 32 well in October 1947. This was the first development in the area of offshore oil production.

Oceans cover 75% of the earth's surface, so it is no surprise to see, as onshore oil and gas reserves are depleted, exploration and offshore production moving offshore of the world's continents. Today 60% of the world's petroleum comes from offshore operations. To meet energy demands, operations are moving into deeper waters and today oil and gas is produced in the Gulf of Mexico in up to 2000 metres of water (BC Ministry 2007). An offshore platform, often referred to as an oil platform or an oil rig, is a large structure used to house workers and machinery needed to drill wells in the ocean bed, extract oil and/or natural gas, process the produced fluids, and ship or pipe them to shore. Depending on the circumstances, the platform may be fixed to the ocean floor, may consist of an artificial island, or may float.

Oil produced from offshore production platforms can be transported to the mainland either by pipeline or by tanker. When a tanker is chosen as the means of transportation, it is necessary to accumulate oil in some form of storage tanks such that the oil tanker may receive and convey the cargo. One solution was to use a converted oil tanker equipped with facilities and connected to a mooring buoy. This became the beginning of the development of the Floating Production Storage Offloading Facility (FPSO). A shuttle oil tanker would connect to the stern of the FPSO and transfer of oil cargo takes place through a floating discharge hose.

It provides a linkage with previously mentioned developments in the field of offshore operations and the success will depend on the area of operation. FPSOs in the North Sea can be purpose-built and most are permanently moored, rather than being disconnectable, where in the advent of extremely violent weather the FPSO can be disconnected from the anchoring mechanism, and can sail away until the adverse weather has dissipated. An FPSO will carry out oil separation processes on board and away from a connected wellhead oil platform (WHP). Fig 2.15, shows a general layout of an FPSO location, and would be operated in association with a drilling platform (Wikipedia 2006).

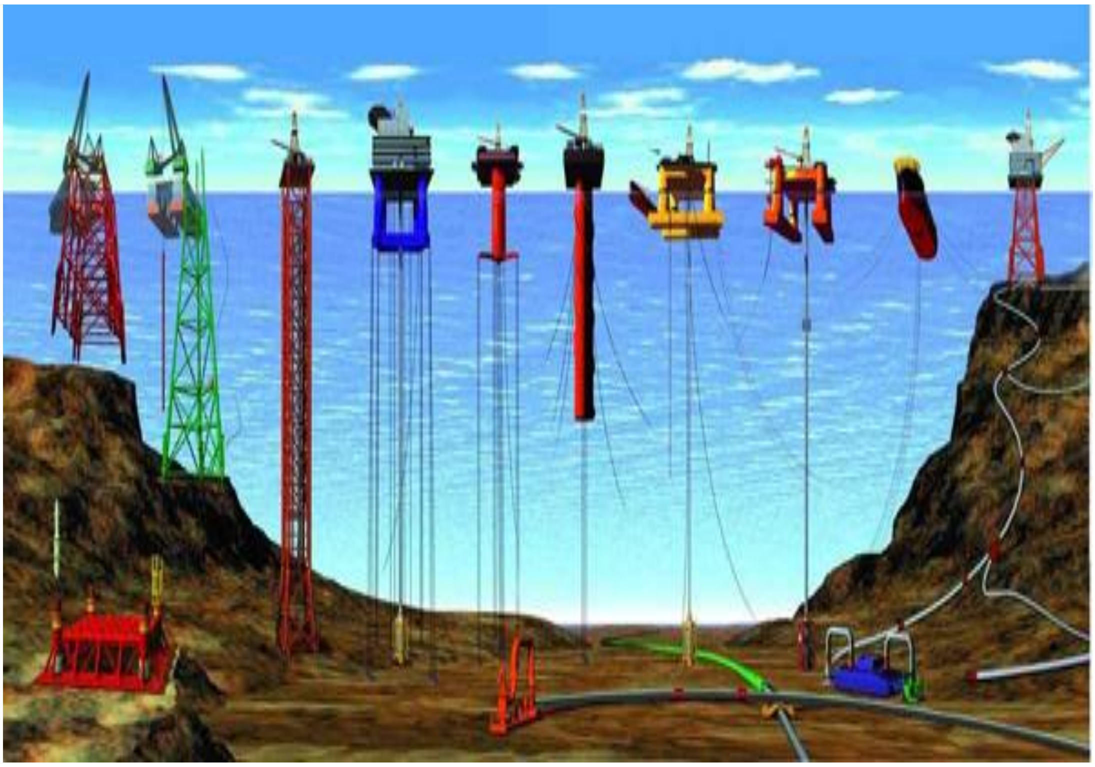
If an offshore storage facility does not have production processes for treating new oil products, it is called a Floating Storage and Offloading Facility (FSO). FPSO's are the most common form of facility to develop offshore fields around the world since the late 1970's and predominately in the North Sea, Brazil, Southeast Asian/South China Seas, the Mediterranean Sea, Australia, and off the West Coast of Africa.

In 2004 there were approximately 70 FPSO's in operation or under construction worldwide and by the end of 2008 there were more than 155 FPSOs and FSOs operating with another 80 units under some degree of development or construction (Worldwide Survey - FPSOs 2008).

The world's largest FPSO is the Kizomba A, with a storage capacity of 2.2 million barrels. It is located in 1200 meters (4,000 ft) of water at 150 statute miles offshore in the Atlantic Ocean from Angola, West Africa (Global Security 2006).

The various types of facilities developed in the offshore industry since those times are shown in Figure 2.13. Many of the modern day units are the FPSO, FSO, Semi-submersible, and mobile offshore production units [MOPUs] (Wikipedia 2010).

Figure 2.13 - Offshore Oil & Gas Industry Platforms

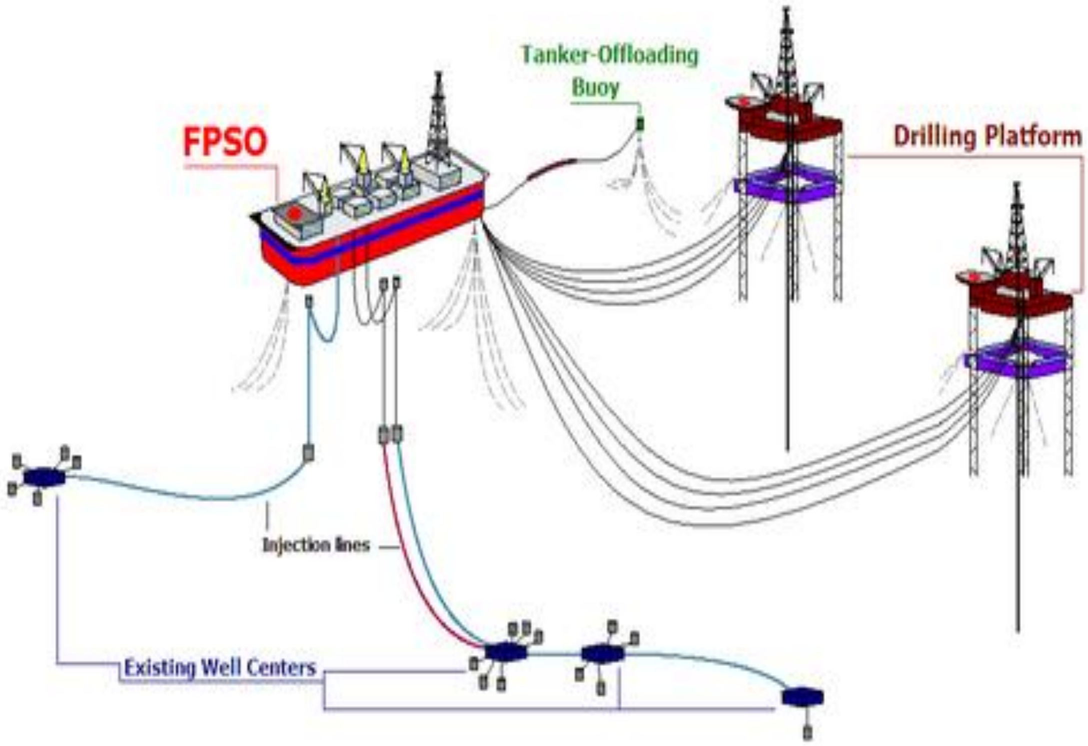


1, 2) conventional fixed platforms; 3) compliant tower; 4, 5) vertically moored tension leg and mini-tension leg platform; 6) Spar; 7,8) Semi-submersibles; 9) Floating production, storage, and offloading facility; 10) sub-sea completion and tie-back to host facility.
Source: http://en.wikipedia.org/wiki/File: Offshore Oil & Gas Platforms).

The description above should be viewed left to right.

The general layout for an FPSO on station is such that the facility is moored in close proximity to one or several wellhead platforms feeding product into it. Additional drilling platforms can be interconnected into the system to generate added exposure as in Figure 2.14.

Figure 2.14 – FPSO Location General Layout



(Source: http://en.wikipedia.org/wiki/File: FPSO_ diagram.PNG)

2.5.2.1. Field Operator

The offshore oil and gas industry has two separate parts. The upstream part, is the exploration and production (E&P) sector of the industry and the downstream part, covers the processing and refining of the product. The upstream sector is where these (E&P) oil companies, known as field operators, focus their operations on exploration for growth. These organisations invest considerable amounts of funds into developing oil and gas fields based on the analysis of scientific seismic and geophysical surveys. They are interested in realising the maximum amount of profit in the shortest time. The E & P company or field operator has to ascertain what will be the rate of extraction of these oil reserves found, and to ensure they can minimise the time taken to extract the product and to arrange product processing and to maximize profits. This factor will be shown later to be a major factor in the decision making process for successful project management of conversions of Oil Tankers into FPSOs.

2.5.2.2. FPSO Operations

The FPSO is part of the downstream process covering hydrocarbon processing and refining. The design for the FPSO will depend on the proposed area of operation. To date generally in calm waters the FPSO may have a simple shape and is that of a converted tanker. The FPSO design has to cope with every increasing depths and more arduous conditions of operations. Complex contracting and logistics requires careful integration. To take advantage of any technical and commercial advantages offered by an (FPSO) vessel, operator have to engage a suitable vessel as an operating platform and with suitable crude oil processing and storage systems. The first phase of the project is design and engineering, from the conceptual design and front-end engineering and design through to the more detailed engineering phase, then the construction or conversion of the hull, followed by the construction of the processing facilities. (Cecil 2008).

Both the new build and the conversion processes have had to change and become more complex. FPSO projects encompass an array of services of topside engineering design, operations, and maintenance services where the full duty holder is accountable for the safe operation of the vessel. Major oil companies view the FPSOs as a packaged operation and the trend is to lease the vessels rather than buy. A valuable feature of FPSOs is the relatively fast turnaround from the design and construction stage to the time of first oil. The need to place additional FPSO facilities into offshore service has created a bigger than normal demand for both conversions and for new-build vessels (Keolanui, Lunde & Jeannin 1998).

The oil reservoirs underground vary greatly depending on geographical locations around the world and have different oilfield characteristics; however, there are opportunities to create facilities with standard layouts, components, and production systems, which will be discussed later in this research.

A solution is to commence the topside construction with unique design modules. A topside refers to the processing units that are attached and installed on the deck of the converted tanker. There are comprehensive databases of proven designs, process layouts, and uniform approaches to address standard modules for most operating conditions. This offers a range of advantages, including a reduction of designing schedules and engineering costs, as well as improving the overall project design and thus, reducing project risk.

Figure 2.15 - A Tanker awaiting Conversion

(Source: http://www.motorship.com/__data/assets/image/0004/480505/varieties/carousel.jpg)

Figure 2.16 - A Tanker completion Conversion to an FPSO

(Source: http://www.modec.com/fps/fpso_fso/projects/songdoc.html)

FPSOs, to date, have proven to be cheaper, faster to develop, with more mobility and more practical in deeper waters. In recent times, with the changes occurring in operational water depth, sometimes down to 1500 metres, new technologies have become necessary and more complex topside production processing designs are adopted, which has lead to higher cost conversions (Keolanui, Lunde & Jeannin 1998). New and improved engineering advancements in materials and processes have changed the designs and capabilities of FPSO systems, giving operators greater choices and efficiencies and thus allowing for the determination of a package that best fits the individual needs of the operator and the field developer (Keolanui, et al 1998).

2.5.2.3. Project Management for Conversions

The successful organisations developing and working in Project Management for offshore conversion projects have access to or have their own in-house capabilities necessary to engineer a complete new FPSO project (SBM 2006).

These capabilities include naval architecture for the structural & mechanical design process, marine design and engineering, piping & mechanical applications for rotating and static equipment, electrical & instrumentation, procurement and purchasing, and onsite supervision. The FPSO designs consists of a vessel or hull and a topsides facility creating many electrical interface issues between the two major parts of the completed vessel. These vessels have more extensive electrical systems than typical fixed platforms. Electrical operating loads may total 40-50 MW or more depending on the vessel configuration. (Brown 2004). The classification societies provide the standards, rule requirements, material selection, stability criteria, and compliance for the donor vessel (Keolanui, et al 1998).

The Project Manager should have hands-on construction experience, as this allows the organisation to utilise its resources to supervise activities during the conversion phase of the project and at other various locations, which may be used for the shipyard, topside fabricators, and process equipment suppliers (SBM Offshore 2006). The overall integrated approach allows the FPSO project to be developed on a consistent fast track schedule, which is a goal of every field operator. The ready availability of engineering documents to the conversion shipyard, allows the process topside fabricators and equipment suppliers early commencement of their individual inputs (SBM Offshore 2006).

A major benefit from this process is that of having a multi-disciplinary Project Management Team at a single location managing the FPSO project. This allows for all the applicable interfaces, human, cultural and technical, to be coordinated, controlled and properly managed. Strategic decisions made during the FEED phase determined the root cause of most of the design and construction problems. There is no "one best way" to execute a project. Each mix of technology and contractors is affected by different drivers, and hence need different approaches. (Green 1999). This is the panacea for project managing a complex project such as a conversion. The success or failure of the overall project management processes is the topic of this research.

The success of the conversion project in the oil and gas industry is thought to be directly related to the importance of coordinating all the stakeholders through the Interface Manager (2.4.2). Interface management will facilitate agreements between stakeholders regarding roles and responsibilities, timing for information and identification of critical interfaces as early as possible through informative and structured processes (Caglar & Connolly 2007).

2.5.3. Summary

In this section of this research, the offshore oil and gas industry has been discussed detailing an overview of the industry and the involvement of the FPSO operator and the operations. This provides the context in which the research is to be carried out. In this section the nature of the industry, and the scope of work that has to be performed to sustain the continuing growth has been discussed.

In the next section the critical success factors are discussed.

2.6. CRITICAL SUCCESS FACTORS

The critical success factors relating to the efficient conversion of an oil tanker to an FPSO, is the subject of this research (1.3). Identification of these critical success factors is discussed in this section.

These can be postulated from the literature review for testing through primary data collection and analysis. Figure 2.15, provides a diagrammatical map and perspective of how each of the necessary project management processes would become interdependent upon each other in order to have successful application and demonstrates the level of difficulty that can be presented to any project manager to successfully manage a conversion project.

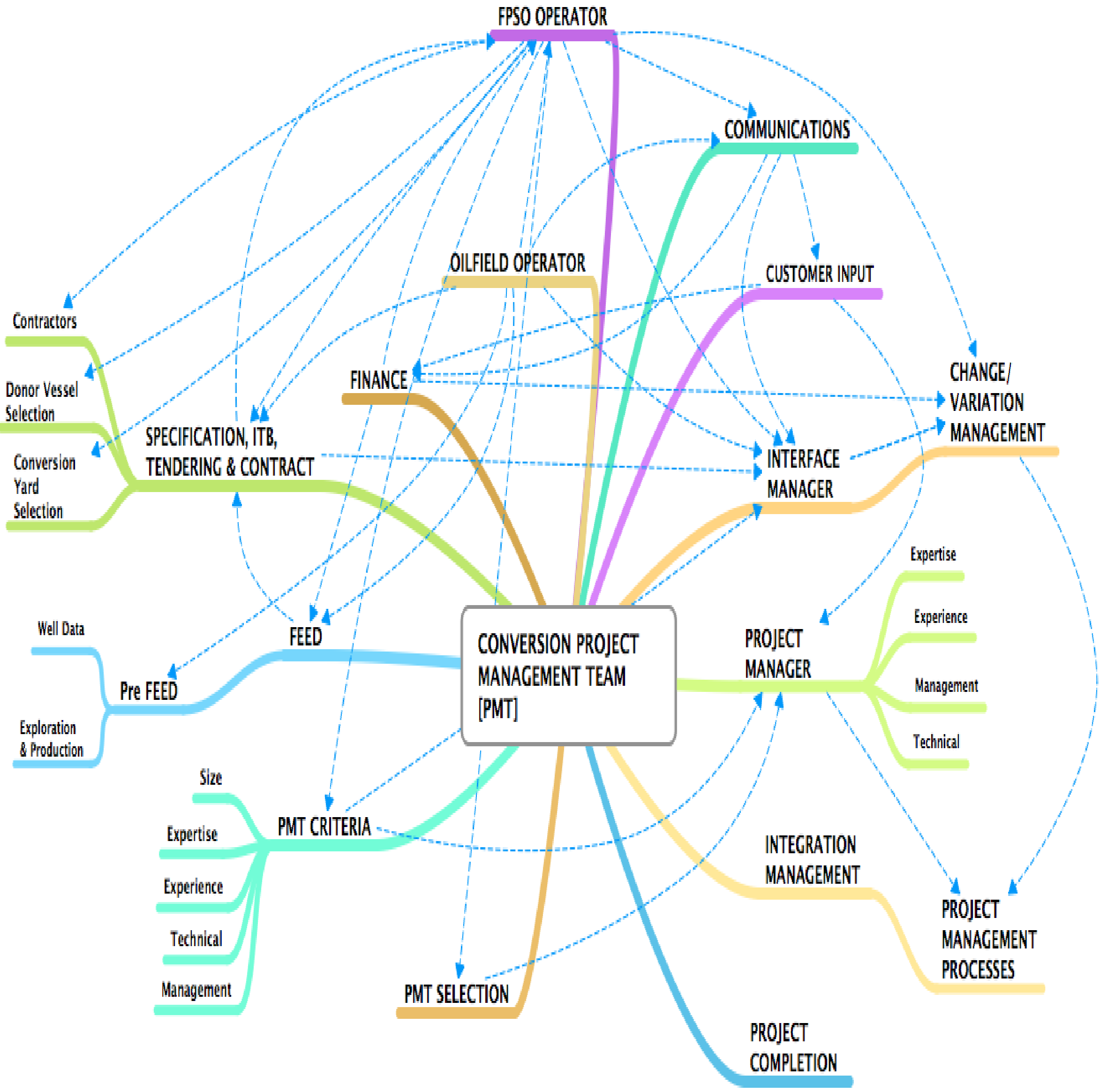
Each applicable process is marked as a CSF, and will be investigated during this research. The project management processes covered in the PMBOK model are not under dispute or for adverse comment. After studying and researching for the literature review there are nine identified main areas or critical success factors, which are to be considered for this research.

These areas are:

1. CSF1 - Project Manager;
2. CSF2 -Project Management Team;
3. CSF3 - Interface Manager;
4. CSF4 –Communications;
5. CSF5 -Customer Input;
6. CSF6 -Finance and Cost Management;
7. CSF7 –FEED;
8. CSF8 - Scope of Work; and
9. CSF9 - Change/Variation Management.

This list above does not imply that these are the only factors affecting the conversion project, however, after reviewing the parent discipline literature, these factors are most likely to be critical factors for the successful outcome of an efficient conversion project.

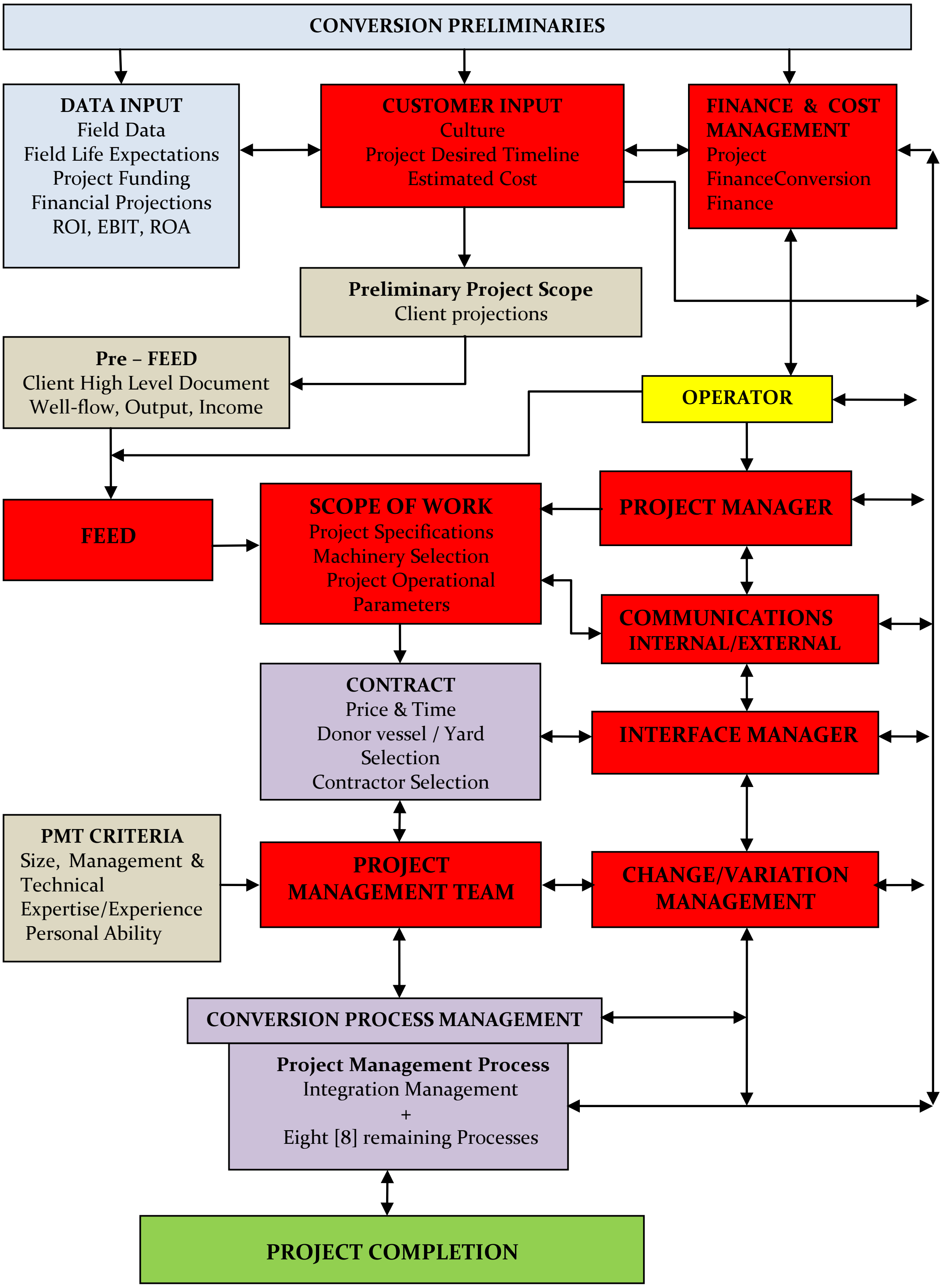
Figure 2.17 - Interdependencies within a Project



(Source: Developed for this Research.)

Figure 2.17 provides an interconnecting flowchart as to how the nine critical success factors mentioned above and shown in **RED**, are thought to be related to one another within a project.

Figure 2.18 - Conversion Critical Success Factors Map



(Source: Developed for this Research)

In this section, critical success factors identified in the discussions of the parent disciplines have been brought together.

In the following section the research problem and research questions are discussed.

2.7. CONCLUSION

The literature review has covered the two parent disciplines of Project Management, and Interface Management. The literature review has shown the plethora of literature in Project Management and to a lesser degree in Interface Management. However, there is a lack of relevant literature available on the subject of the successful application and interrelationship of these two parent disciplines to the efficient conversion of Oil Tankers to FPSOs.

In the next Chapter the methodology to be used in this research will be demonstrated and discussed.

CHAPTER 3 – METHODOLOGY

3.1. INTRODUCTION

The Literature Review of the secondary data set out in the previous chapter led to the identification of nine, critical success factors. These form the basis for the primary data collection.

The nine identified critical success factors are;

- CSF1: - Project Manager;
- CSF2: - Project Management Team;
- CSF3: - Interface Manager;
- CSF4: - Communications;
- CSF5: - Customer Input;
- CSF6: - Finance & Cost Management;
- CSF7: - Front End Engineering and Design (FEED);
- CSF8: - Scope of Work; and
- CSF9: - Change/Variation Management.

This chapter details the research methodology for the primary data collection.

The relationship between primary data collection and secondary data is shown in Figure 3.1. The secondary data derived from the literature review is a component of the research methodology. The literature review sourced information from book references, the Internet, conference papers and proceedings, industry journals and various publications linked to the offshore oil and gas industry (2.1). Additional secondary data emanates from classification society rules and regulations, corporate operations and procedures for the offshore oil and gas industry and the ship-repair conversion industry, and industry based networks for various stakeholders involved in conversion projects.

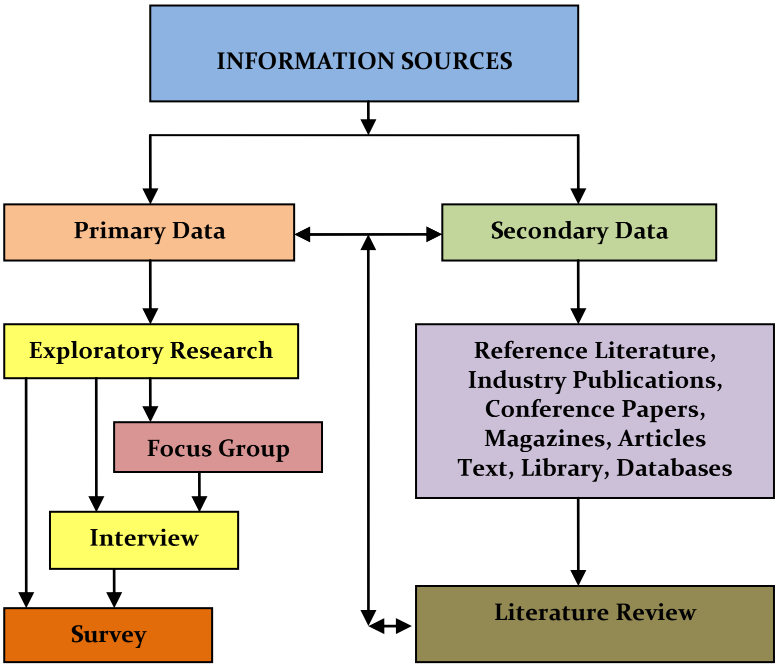
Exploratory research methodology has been selected for this research because the critical success factors identified in the secondary data have not been proven and may not be complete. Primary data will be gathered from focus groups, interviews, and through a survey of participants actively involved in the offshore oil and gas industry.

The focus groups, consisting of invited senior management participants from various directly related stakeholder organisations, will be used to obtain a qualitative exploration of the critical success factors.

The interviews will be conducted with selected senior managers from several stakeholder organisations who have been or are currently directly involved in the FPSO conversion and operations to provide further information on the critical success factors.

A survey will be conducted involving individuals holding middle management roles in past projects in the offshore oil and gas conversion industry to obtain quantitative information on practices in the industry related to the critical success factors. Surveys typically (Zigmund, 2003) assume that the input variables can be obtained from previous research and consequently the survey is a form of descriptive research leading to quantifiable results. There is no prior research into the conversion of oil tankers to FPSOs, which identifies the input variables for such a survey. Therefore the survey becomes a pilot survey as part of an exploratory research where the results can only provide an indication as a basis for further research

Figure 3.1 – Research Design Structure



(Source: Developed for this Research)

3.1.1. Chapter Structure

The introduction to the chapter details the identified nine critical success factors to be the subject of the primary data collection. The relationship between the primary and secondary data collection is discussed leading to where these data collections have come from.

The criteria controlling the exploratory research methodology of inductive and deductive approaches used in this research are explained and how the qualitative and quantitative paradigms are to be used, follow. Figure 3.1 details the information sources and how the different methods of primary and secondary data collection are undertaken.

The primary data collection methodologies are explained and how these contribute as the principal means of collecting data to provide detailed support for the research. Although it is a low risk investigation, it is still necessary to address the considerations of those who become involved and to demonstrate the need to address respondent's rights, obligations, and responsibilities. The ethical considerations that are necessary in conducting any research are discussed and described. The data collection section follows where the actions of researchers in approaching and in conducting an interview are discussed, the processes of data collection, the coding, editing and analysis of the received data and finally how the research database is formulated and controlled. This leads to the conclusion for this chapter and the Appendices.

This format is set out in a step by step flowchart for information progressed through the chapter in Figure 3.2.

Figure 3.2 – Chapter Structure

3.1 INTRODUCTION		
Identified Critical Success Factors	Primary Data Collection	Chapter Structure

3.2 DATA COLLECTION METHODOLOGY				
Introduction	Inductive & Deductive Methodologies	Qualitative & Quantitative Research Approaches	Types of Research	Summary

3.3 CRITERIA FOR EXPLORATORY RESEARCH					
Introduction	Validity and Reliability Reliability Ext. Validity Int. Validity	Trustworthiness	Ontology	Epistomology	Summary

3.4 RESEARCH DESIGN			
Introduction	FOCUS GROUP Background to Focus Groups Focus Group Protocol Focus Group Process	INTERVIEWS interview Protocol interview Questions Interviews & Process Questions and Probes No. of Interviews	SURVEY Survey Protocol Developing Survey Questions Selection & Contacting Participants Selection Protocol Summary

3.5 ETHICAL CONSIDERATIONS				
Introduction	Rights and Obligations of those involved in the Research	Privacy	Informed Consent	Summary

3.6 DATA COLLECTION							
Introduction	Researcher Actions interview Process	Secondary Data with interview Process	Data Collection	Research Process Database	Data Analysis Data Editing, Coding and Analysis	Comparison with Prior Theory	Summary

3.7 CONCLUSION

(Source: Developed for this Research)

In this section, the outcome of the secondary data collection has been described. This has been followed by a description of the way in which the outcomes from the secondary data collection lead to the primary data collection. A summary of the primary data methodology to be used has been set out. This is followed by a description of the structure of the chapter.

In the next section, the data collection methodology is discussed.

3.2. DATA COLLECTION METHODOLOGY

3.2.1. Introduction

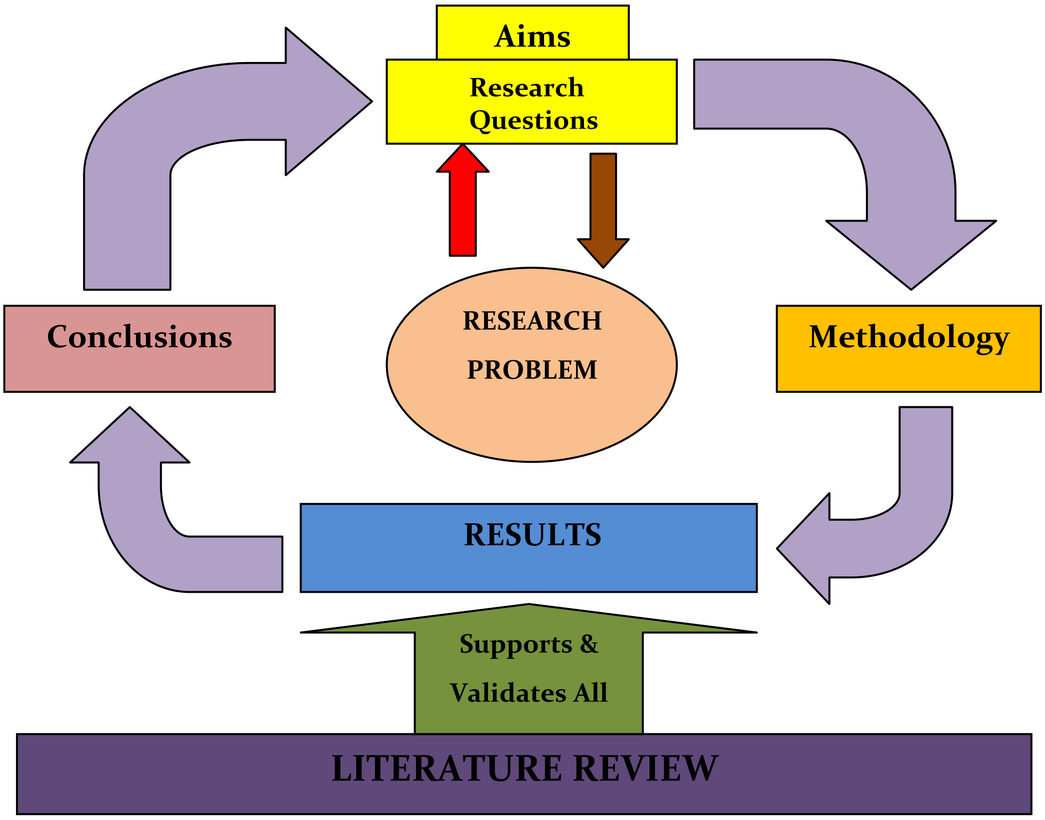
In this section, the methodology for data collection is discussed. Zikmund (2003) states the need in research to show how the research output will be obtained to gain information on the issue under consideration. In this research, the issue under consideration is the application of project management and interface management to improving the efficiency of the FPSO conversion industry.

The methodology aims to address the how, when, where and why questions related to the research topic. It outlines the types of tools the researcher may use. The research tools are generally defined as the direct means or strategies that the researcher can use to collect, gather, manipulate and/or interpret the received data (Leedy & Ormrod 2005).

This research will use exploratory research to determine if the nine critical success factors identified in the literature review (2.1), affect the efficiency of the conversion to FPSOs. The research analysis will provide sufficient data to answer the four research questions identified in Chapter 1 (1.3), as a means of obtaining a solution of the research problem.

Figure 3.3 illustrates a conceptual map of the problem-based research cycle showing the research problem as the central hub of the research process.

Figure 3.3 – Problem-Based Research Cycle



(Source: Adapted from Ellis and Levy 2008)

Figure 3.4 provides the details of the relationships to the individual elements within the methodology. Column 1 shows the move from the general to the specific. Column 2 demonstrates the steps moving from the initial topic, to the research questions, the aims of the research and onto the research problem to be asked in this research. Column 3 indicates details of the initial topic of the FPSO conversion to the research questions that form the basis of this research.

Figure 3.4 – Relationships with Elements

CONCEPTUAL BASIS	STEPS	EXAMPLE
GENERAL	TOPIC	FPSO Economical Conversions
	RESEARCH QUESTIONS	To identify critical success factors associated with conversions, To rate the factors in order of their likely importance, To identify any new techniques that may improve current Project management techniques, To provide recommendations and guidelines for Project Managers to manage projects successfully in terms of cost and time parameters.
	AIMS	An Exploratory Research study to determine how the factors highlighted in the Literature Review affect the Project management performance in the offshore oil and gas conversion industry
	RESEARCH PROBLEM	What are the Critical Success Factors for an efficient conversion of Oil Tankers to FPSOs?
Specific		

(Source: Adapted from Creswell, 2005, p.62)

3.2.2. Inductive and Deductive Methodologies

This research is a combination of the inductive and deductive processes and follows the recommendations of Perry (1998), and Bougeois (1979). Carson et al. (2001) argued that the detail and quantity of (*inductive)* theory building, compared with theory testing (*deduction*) is dependent upon the availability of relevant prior theory.

During this research process, the researcher's experience and involvement in the offshore oil and gas industry has provided the basis for problem definition and identification of the disciplines involved in addressing the problem. The secondary data collection has identified that the resolution of the problem lies in the application of well-established theories of Project Management and Interface Management. This theory needs to be investigated tested through primary data collection as the approach to addressing the problem.

3.2.3. Qualitative and Quantitative Research Approaches

The approach of quantitative research is conducted where a problem is specific or well defined, and the focus is on measuring the relationship between variables or formulating hypotheses. The qualitative approach, however is based on word and observation format, through the case study, expert opinions and/or consultations with participants to the research process (Zigmund 2003).

The emphasis of qualitative research is on concepts and people's perceptions. This can be conceptualised as being just a focus on language of words and the feelings incurred. Page and Meyer (2000) said this would evolve into the quality of the event or the experience

Quantitative and qualitative approaches can be decided upon based on the scope of the research. Initially it has to be decided what research depth is warranted for any particular project. If the approach is to decide on the logistics or the financial impact or the cost benefit then a straight forward quantitative methods would be adopted and if it was necessary to assess the human impacts or needs were concerned then a qualitative approach would be taken.

The interview is one of the major qualitative techniques available to researchers (Denzin 1989). Convergent interviewing can be used to provide deeper insights into the subject of the research than is possible using quantitative methods alone. Convergent interviewees have the capability of sharing their personal views with the interviewer concerning the researched topic. Participants with expert knowledge of the area under considerations are preferred (Dick 2000).

A blend of quantitative and qualitative approaches can be utilised, however, this will depend on the relative importance and the scope of the individual situation. Quantitative methods may be used in qualitative research to obtain or establish relationships between variables, such as the relative importance of each of the nine identified critical success factors for the economical conversion of oil tankers to FPSOs.

Focus groups, interviews, and survey will be used in this research to obtain qualitative data, which includes quantitative relationships and qualitative opinions and justification for quantitative responses. The focus groups and face to face interviews will be researched in a qualitative way to assess opinions and conscious direct inputs from people working within the offshore oil and gas industry and the survey data responses will be assessed in a quantitative statistical manner.

3.2.4. Types of Research

Zigmund (2003, p 58) says there are three main types of business research: exploratory, descriptive and causal. Exploratory research is generally conducted to address some ambiguous problem while descriptive research seeks to determine the; who, what, when, where and how answers to a problem, and causal research is used to ascertain cause and affect relationships. Zigmund (2003) says that exploratory research is to be conducted as early as possible in the decision making process. It should be done when there is some uncertainty of the actual existing problem, whereas descriptive research is used when the parameters of the problem are known about but not to the complete extent. Causal research is used when the parameters of the problem are certain. Table 3.2 demonstrate this point. The exploratory research models are basically concerned with questions that will have implications for future actions leading to a focus on those variables with a greater potential for that future research (Patton 1986).

The exploratory research process can use direct observations, in depth probing questions, reflections of actual experiences and comparisons. In exploratory research, there has to be a consistent amount of collaboration between the researcher and the participants based on mutual interests and experiences (Small 1995). This research is based on exploratory research. The research is designed to increase the understanding of the variables in the research problem (Coughlin & Brannick 2001). The results are intended to directly benefit the sphere of influence and from where the data was gathered. The researcher is concerned with making the results, available to those involved as soon as possible and in a manner, which is easily understood (Small 1995).

Table 3.1 – Type of Research

Relationship of Uncertainty To Type of Business Research			
	Exploratory Research (Ambiguous Problem)	**Descriptive Research (Partially Defined) Problem**	**Causal Research (Clearly Defined) Problem.**
Business Problems	Absenteeism is increasing but not known Why? Are people interested in a new product idea? What task conditions influence the leadership process in an organization?	What kind of people favours trade protectionism? Did last year's product recall affect business share price? The average merger rate of savings and loans has increased over the past decade?	Which of two training programs is more effective? Can I predict the value of shares if I know the dividends and rates of growth? Will buyers buy more with a new packaging?

(Source: Zigmund, 2003, Exhibit 4.2, p. 58)

Three principal methods of focus groups, interviews, and survey are used to carry out the exploratory research. Participants who have been or are currently working in the business of conversions, will be asked to provide data to support the proposition that past, current, and a percentage of proposed projects will or were completed budget and or time to completion overruns.

3.2.5. Summary

This section discussed the various primary data collection methods available. It identified and justified the use of exploratory research using both qualitative and quantitative techniques. In the next section, the criteria to be considered in the research design will be discussed.

3.3. CRITERIA OF EXPLORATORY RESEARCH

3.3.1. Introduction

In the previous section the use of exploratory research, using both qualitative and quantitative techniques was identified as the appropriate methodology for this research. The use of the techniques of focus groups, interviews, and survey was identified. In this section the criteria governing exploratory research, the research paradigms and the means of assessing the quality of the research data will be discussed (Perry, Riege & Brown 1999). The definitions of these various criteria are set out followed by a description of the way they relate to the actual research project, as follows:

- Validity and Reliability;
- Trustworthiness;
- Ontology; and
- Epistomology.

3.3.2. Validity and Reliability

Validity and Reliability are fundamental to all measurement. Validity suggests truthfulness and reliability means dependability and consistency of the results. There are many forms of validity. However, in this research external validity and internal validity have been identified as important. Reliability is required and necessary for achieving validity and the achievement of the results is generally easier than validity (Neuman 2006). The methodology used has to enable the research conducted will be sufficiently robust to maintain reliability and validity of the results.

3.3.3. Reliability

Reliability means dependability or consistency. Neuman (2006), say this means that the same test can be repeated under the exact same or very similar conditions. This will be achieved in the research design by having the questions written down clearly and the same questions used for all participants.

3.3.4. External Validity

External validity is considered one of the most difficult of the validity types to achieve. Neuman (2006) says this is the ability to generalize the findings from a specific setting or small group and to another range of settings and people. This will be achieved in the research design by ensuring that the primary data can be related back to the parent disciplines identified in the literature review.

3.3.5. Internal Validity

Internal validity becomes important when the relationship between variables is causal; when there is a relationship between dependent and independent variables, or when the design of an experiment is relevant to the studies that try to establish a causal relationship (Shuttleworth 2009). This research is exploratory but it is anticipated that possible relationships between the variables will be identified. For this reason internal validity is achieved in the research design by ensuring participants in the focus groups and interviews come directly from sources associated with conversions and FPSO operations and the survey is distributed to the broadest possible range of people associated with the offshore oil and gas industry.

3.3.6. Trustworthiness

All research needs to be regarded by all those involved, as having credibility and trust. To achieve this trustworthiness, researchers have found a way to establish the trustworthiness of their findings by looking at internal and external validity, reliability, and objectiveness (Lincoln & Guba 1985).

For quantitative researchers, the internal validities are based on establishing the truth of the implied relationship between the dependent point of interest and the independent variable. External validity is the generalising of some assumed cause/effect relationship between two variables. The reliability talks about consistency, variables need to be accurately measured, predictable and the objectivity is sustained when two or more judging means end up with the same rating (McMurray 2009).

Triangulation is another means of addressing trustworthiness and is the crosschecking of information with multiple sources. When different sources agree it is said to be corroboration. (Webb, Campbell & Schwartz, 1966), referred to triangulation as a means of enhancing confidence in the findings, by suggesting; 'Once a proposition has been confirmed by two or more independent measurement processes, the uncertainty of its interpretation is greatly reduced.' Denzin (1970) extended the notion of triangulation beyond the indicated associations with research methods and designs. Bryman (2007) showed in his theory that there are four ideas of triangulation:

- Data triangulation:- using several sampling strategies to gather data;
- Investigator triangulation:- using several researchers to gather and interpret data;
- Theoretical triangulation:- taking and using several theoretical positions in interpreting data; and
- Methodical triangulation:- using several methods for gathering data.

In this research, it is proposed to use data and methods triangulation as a means of cross checking to obtain the necessary trustworthiness of data responses.

3.3.7. Ontology

Ontological assumptions lead to the view that reality exists quite independently of any observers and is governed by the natural laws which take the form of generalisations and which are context-free (McMurray 2009). The critical paradigm concerns the fact that change comes through the application of a critical challenge to the predominant values. The critical researcher will challenge the accepted wisdom and the dominance of the social reality and then through critique and detailed analysis reflect on the currently prevailing views.

In this research, the researcher is immersed in the problem from his experience and has been able to challenge the prevailing approach to conversions because of his prior knowledge and experience.

3.3.8. Epistemology

Epistemology links the problem being researched and the researcher. Positivist researchers regard themselves as being totally objective, non-interactive, and or distant with no influence on the outcomes. Positivism portrays that a single reality exists, being value free and waiting for discovery. Conversely, constructivism and critical theory advocates that there is a close relationship between the subject matter and a subjective perception.

Healy and Perry (2000), states that realism relies upon multiple perceptions about a single reality. The Interpretivist in a qualitative research sense identifies that the researcher has personal views and attitudes that may bias the manner in which data is collected and analysed (McMurray 2009). The critical paradigm here is to make the researcher aware of the fact that results of the research may be influenced by the unconscious or conscious attitude and past experience of the researcher. If the researcher understands this paradigm then the researcher will be better able to expose weaknesses in the current knowledge.

3.3.9. Summary

The criteria to be taken into account in the research design have been identified as validity, reliability, truthfulness, ontology, and epistemology. The way the criteria will be applied in the research design has been indicated. In the next section, the research design will be discussed.

3.4. RESEARCH DESIGN

3.4.1. Introduction

In the last section, the criteria for the research design have been identified and discussed and their application to the research design indicated.

Chapter 3 describes the principles for this research and these have been prepared taking into consideration the limitations as shown in (1.6). The details to the principles of the research project are described in (4.2).

As shown in Figure 3.2, three methods of conducting the exploratory research have been identified:

- Focus Groups: - a qualitative research technique where a small group of people are informally interviewed in a group arrangement;
- Interviews: - a short-term formal secondary social interaction which is generally between two strangers;
- Survey: - an association amongst variables where the results can be often be measured in a statistical fashion. Qualitative descriptions to add depth to statistical responses may be included.

In this section the design for the focus groups, the face to face interviews, and the survey questions is developed.

3.4.2. Focus Groups

3.4.2.1. Introduction

The focus group method of data collection was considered appropriate for this research as the researcher could not have collected a broader insight into the topic without the use of a group interaction format, or the exposure to the comparison of ideas and industry information between group members (Carson, Gilmore & Perry 2001; Hayes & Tatham 1989). The justification for conducting focus groups is to cover four reasons of: flexibility, group interaction, preliminary information, and time and money saving (Healy 2000). Each of these reasons is discussed.

Flexibility: Focus groups have been used with a combination of interview questions to assist in the exploration of additional findings, or as the sole method of exploring new research areas (Morgan 1998). Questions have to be of a strong probing nature, as well as being both structured and unstructured, allowing the research to be substantially subjective as well as interpretative (Miyauchi 1995).

Group Interaction: The psychology of focus groups identifies that perceptions and attitudes that may not be developed in isolation, come to the forefront through exchanges with others. This group interaction can stimulate new ideas that may not have become apparent in individual interviewing (Morgan 1998). New concepts and or ideas, introduced by group members may cause the group to react in various ways.

Focus groups also allow members to build upon responses of other group members (Stewart & Shamdasani 1990), and some members of a group may not give their opinions until they had listened to others (Kruegar 1993). Mutual support from some group members can also be provided when expressing common or non-standard opinions and feelings (Morrison 1998).

Preliminary Information: Use of the focus group research method is the most appropriate means for the exploratory phase of research where little is known about the topic (Carson, Gilmore & Perry 2001; Morgan 1998; Stewart & Shamdasani 1990). Focus groups can elicit strong and contemporary rich experimental data (Morgan 1998), and the qualitative data can assist in gaining a sociological and psychological understanding and perspective of human experiences from within an industry as a whole (Merton 1987). Exploratory focus groups were used to gather background information about the topic, with the added benefit of stimulating new ideas.

Time and Money Saving: Data collected from focus groups is a quicker process and costs less than if each person is individually interviewed (Morgan 1998). Other advantages include a high degree of structure and flexibility, low level of moderator bias, good respondent response rate, with some complex, often sensitive, industry information collected. Each session can be audiotaped and transcribed, which can provide a cost saving (Carson, Gilmore & Perry 2001; Morgan 1998). The open response format allows for a larger and detailed amount of data to be collected in a very short period of time (Stewart & Shamdasani 1990), as well as with additional probing questions collection of more concise data.

Focus groups are a way to reach out to potential participants for feedback and comment. Focus groups concentrate on gathering opinions, beliefs, and attitudes. They are particularly valuable as a means of testing research models interpreted from the literature review. Focus groups encourage discussion, build a certain excitement from spontaneous reactions from participants' comments, and provide all involved the opportunity to learn more about the issue (Simon 1999). The identity of the participants has to be established, generally between six and ten in number.

A focus group is an orchestrated production to obtain the necessary and required data for research purposes (Dick 1998). Open-ended questions are asked or presented in such a way as to trigger further discussion among a group of participants. The topics are set and the facilitator will guide the format and coordinate the entire proceedings of the focus groups. During the production, the subject matter to be discussed can range somewhat to areas outside the designed script.

3.4.2.2. Focus Group Protocol

The focus group protocol enables the research to probe deeper into the ways the participants perceive the value of looking into the research problem. The open-ended question protocol format enables participants to offer information about unique uses of processes. Structured questionnaires may not reveal this point (Ehrmann & Zuniga 1997).

The identifying characteristic for a focus group is the interaction with the participants throughout the discussion, which follows a predetermined structure, set by the researcher. It is not a group interview, a participant observation, or a debate. The focus group participants were considered to have experience in regards to knowledge and respect for the topic and the objective of the focus group is to highlight where there is agreement coming from within that group (Kahan 2001).

3.4.2.3. Focus Group Process

Zikmund (2003 p 117) provides an overview of the format for focus groups to obtain data in a relatively brief period. This format was adopted in conducting the focus groups at the same time as the Annual Conference in Singapore.

The process of the focus groups is to allow those who have agreed to participate a format to express their individual opinions on the subject matter in conjunction with their peers. Focus groups are normally made up of people who are considered to have experience in the topic under consideration. Focus groups normally begin with an invitation for participants to attend, their acceptance, and an indication of the time and venue. The introduction includes a welcome, an explanation of the purpose of the discussion and why people were selected, explanation of the recording device, ground rules, breaks, issues of confidentiality, the group discussion process and the protocol for the discussion. This was followed by a set of guidelines for participants covering: informality, explanations of questions, identification of confidentiality with the group, audio recording protocol, and note taking. This is important as it goes to the core of validity and reliability of responses. The obligations of participants about truthfulness, as well as confidentiality are emphasised. Participants were informed of the ethical obligations of the researcher and that it was necessary to obtain permission from each participant to be involved in this research. A letter of consent was circulated highlighting the obligations and as all participants were at the focus group then permission was considered to have been given.

The researcher maintains direct observation of the group to see how members respond and react to one another (Hayes & Tatham 1989). There may be a need to ask deeper and more exact probing questions in order to obtain clarification, as well as watching for nonverbal responses (Byers & Wilcox 1991; Stewart &

Shamdasani 1990). The researcher also indicated the process for brainstorming on topics, if the circumstances were to evolve. Brainstorming is commonly used as a process to explore solutions or ideas to a given problem. (Linton 2005). The researcher has to make concise planning for exactly where the participants need to be taken, what their experiences will be, how to track and to what result (Linton 2005).

The researcher has to set the boundaries and guidelines for the focus group, as to how the dialogue is conducted. Zigmund (2003, p 117) provides a blueprint to be followed to ensure there is a brief, easy to execute, inexpensive and quickly to be analysed form of gathering primary data. The researcher has to be prepared for variation from the designed script and will need to decide promptly, if this development is to be considered in the process. The researcher must balance between letting participants discuss the topics without being disturbed and actively intervening in the discussion to clarify and direct the process. The research can be intertwined with the researcher's knowledge and will be adopted while collecting the data (Reventlow & Tulinius 2004).

On completion of the discussion, it is necessary to wrap up the focus groups by summarising the meeting, thanking the participants for their attendance. It is necessary to provide a detailed access for the participants to obtain feedback, impressing upon the participants the way the data is to be used and offer the participants an avenue for further input into the research, should the need arise.

The final section is to analyse the data, look for trends and any surprises. It is necessary to keep in mind the context, tone, and dynamics of the discussion. It is vital to understand mood swings of participants, to elicit emotional responses from participants, which may trigger further comments from others (Simon 1999).

In this research the questions to be considered in the focus group discussion were well defined, being directed to obtaining views on the nine critical success factors. Consequently it was possible for the researcher to summarise the responses of the participants in note form as the discussion proceeded. This process was particularly useful because there was clear consensus or disagreement by a number of participants to a particular issue. The audio recording was used as a backup for reference where there was confusion in the notes. While the use of quotations can be helpful where the objective of the focus groups is to obtain wide ranging input, this was not the case in this research.

3.4.2.4. Selection of Participants

The selection of participants was carried out taking advantage of the attendance at the Annual FPSO Conference, held in Singapore each year. The conference held two streams: These were the Business and Technical Streams for active involvement of conference attendees. Although the conference is set in the Asian region it involves industry players from various parts of the world who have central interests in developments within the oil and gas industry. The researchers eligibility to attend this conference enabled direct approach to interested persons willing to participate in the focus groups. The researcher had direct access to the focus group members' employer details together with a profile of their individual experience in the FPSO industry.

A direct approach was made to various members for their permission to partake in the focus groups. The broadest coverage of participants for the conversion industry was sort to enable direct input into the proposed questions for this research. Each member of the focus group was asked if they wanted to see the summary of the focus groups however all have requested a copy of the finalised thesis on the subject.

3.4.2.5. Application to this Research

Focus groups were found to be appropriate in the study for this topic taking into consideration the limitations as shown in 1.6. The format of the focus group meetings and the questions asked to lead the discussion are contained in Appendix 1.

3.4.3. Interviews

3.4.3.1. Introduction

A major qualitative technique available to researchers is the interview (Denzin 1989). Interviews yield responses about the interviewees' experiences, perceptions, opinions, feelings, and knowledge. There are two main types of interview; structured or unstructured, with questions ranging from closed to open-ended (Creswell 1994; Lincoln & Guba 1985; Patton 2002).

The type of interview design used in this research is considered in terms of a secondary social interaction and takes place between two apparent strangers as participants in the interview where there is an explicit goal of one person to obtain specific information from another. This information is obtained through a structured conversation using prearranged probing questions (Neuman 2006).

Face to face interviews allow the researcher to elicit more in-depth responses, employ different data collection techniques, have certainty about who provided answers to questions, use extensive probing and obtain detailed information. Face to face interviews are convenient to the respondent (Muise & Olson 2007) and can follow a semi-structured format with open-ended questions regarding the chosen topic and in-depth questioning in order to cover one or two separate issues within the parameters of the interview scope.

Interviewees must have the ability to share their personal views concerning the researched topic with the interviewer and participants with expert knowledge of the area under scrutiny should be chosen (Dick 2000).

3.4.3.2. Interview Protocol

Face to face interviews have to each follow the same pattern and if the answers are written down by the interviewer then this has to occur on a standard coding sheet.

Each interview has to consist of;

- The same questions;
- Questions must be asked in the same context;
- The purpose of the research has to be explained to the respondent;
- Face to face interview offers the ability to dispel any ambiguity as the interviewer will be next to and first hand to the respondent; and
- The interviewer must not use leading prompts to elicit answers or ask questions in a leading manner.

Interviewers must maintain an atmosphere of 'conversation', whilst maintaining a standard pattern to the interview (Cano 2000). The interviewer has to obtain cooperation and build rapport, and remain neutral and objective. The interviewer should be non-judgemental and not reveal opinions. It is necessary to maintain a control of the time and the content of the process like a stage managed production (Neuman 2006).

After the introduction, an opening question should be designed to offer the participant an opportunity to relate a story of their individual experiences. This is intended to build confidence and a calming nature with the intention of endeavouring to reduce or minimize any apprehensions from the respondents (Carson et al. 2001; Perry 2001).

3.4.3.3. Interview Questions

Probing questions form the majority of the interview questions and have been designed to provide the ability for later analysis of the data received (Carson et al. 2001; Perry 2001; Neuman 2006). The probe is described as a request to clarify an ambiguous answer or obtain a relevant response (Neuman 2006). Probing questions commencing with: How, does .., Can you relate ..., What is ..., have been used. The questions have been designed to ensure there are no; Yes or No type answers to the questions. The semi and full structured interview questionnaire has been provided in Appendix 2.

3.4.3.4. Interviews and Interview Process

The interview process begins with an inductive methodology leading into a more closely structured deductive means of gathering data.

In structured interviews, the Interviewer asks all respondents the same set of pre-established questions with a limited set of response categories. There is considered little or no room for variation except where infrequent open-ended questions have been used to develop further discussion on relevant points of interest. Structured interviews were adopted for this research because the interview process was aimed at exploring particular aspects raised by the focus groups. The interviews were not aimed at widening the range of data established by the focus groups.

Unstructured interviews can provide a greater depth of data than other types of interviews. They can attempt to gain some insight into the respondent's understanding of the industry, situation, or process. The questions are open-ended, so that the respondent's answers are not limited by any kind of prior input indicated by the Interviewer. The type of unstructured interview conducted will give rise to whether previously developed, open-ended questions, to be necessary or not (Creswell 1994; Lincoln & Guba 1985; Patton 2002). Interviewees were informed of the ethical obligations of the researcher and that it was necessary to obtain permission from each participant to be involved in this research. Each interviewee was informed that they could terminate the interview at any time and they were under no obligation to continue.

3.4.3.5. Questions and Probes

Interviewees can shape their individual answers to match the researcher's interest rather than provide their own related ideas about the particular topic (Bogdan & Biklen 2006). To avoid this, open-ended questions tell the interviewee the information specific responses are not being sought but rather, the desire to establish their ideas coming from their own perspective. The open-ended questions put to the Interviewee are designed to encourage participation and then to gain further information in regard to that question (Glesne 2006; Morgan 1997; Patton 2002). Probes can be utilised by the researcher during the interview as the need arises. This can be a helpful action to provide an alternative angle to presenting the same or similar question again (Creswell 2009; Glesne 2006; Maykut & Morehouse 1994; Patton 2002). The probes and open-ended questions are designed to gather in-depth responses and to gather further information.

The question technique for the face to face interviews in this research will be semi-structured with in-depth probing into responses made about individual points or factors as presented (Muise & Olson 2007).

3.4.3.6. Number of Interviews

Sampling decisions should consider the sampling design and the corresponding sampling size. According to Miles and Huberman (1994), it is essential to be explicit about what the subject is and what needs to be studied, and then deciding the reasons why. This will avoid the collection of irrelevant data gathered in association with the required data.

3.4.3.7. Selection of Interviewees

The selection of the Interviewees was undertaken based on the facts they were senior management within existing, well-known and current organisations actively involved in the FPSO industry. The Interviewees had had experience in past FPSO conversions and had done so in various positions of employment. The interviewees had experiences from various points of view within their own organisations. All the interviewees were personally known to the researcher and are considered respective authorities within their own experiences. The locations for these interviews varied from the interviewee's office and annual conference location in Singapore.

3.4.3.8. Application to this Research

Interviews were found to be appropriate in the study for this topic taking into consideration the limitations as mentioned in (1.6). The format for the interviews, the probing questions asked lead to the discussion and responses from the Interviewees are contained in Appendix 2.

3.4.4. Surveys

3.4.4.1. Introduction

A survey is designed to ask each respondent to respond the same question. In view of the diverse background of the respondents, different responses will be received. The questions are normally closed-ended, to allow the respondent to provide a fixed response based on the available choices indicated. This type of response allows quantitative techniques to be used to obtain the response data. In some cases a limited number of open-ended questions may be included to obtain an idea of the rationale for a particular response or to seek data outside that contained in the questions. Questions are singular in nature, not of a leading nature based on the necessary approach to the requirements for this survey, and are aimed at the respondent's direct input. Question contexts are aimed at the knowledge of the respondent in regard to the topic (Neuman 2006).

3.4.4.2. Structure of the Survey

The Survey was designed to be one component of an Exploratory Research Project, conducted to collect preliminary information on a specific problem (i.e., identifying reasons for time and budget overruns in the construction of FPSOs – a particular class of complex projects). The survey was designed as a preliminary survey, which is best viewed as a form of pilot study. There was little information available in the literature on which the research could be based, and certainly insufficient to form the basis of a full survey. The expectation was that the exploratory research would indicate directions for further descriptive research to confirm and amplify the findings.

Zikmund (2003, p 175) notes that most survey research is descriptive because it seeks to identify characteristics of the problem being studied. Due to the exploratory nature of the research, the purpose of this survey was to indicate the characteristics of the problem in a preliminary manner and to identify the direction of possible further descriptive research.

The structure of the survey needed to be as informal as possible because of the nature of the people being targeted. The focus was on cost and time overruns as this is what their intimate interest was. It may appear to be leading in terms of being involved in the theoretical approach to research, however within the frame of this record it was not considered to be of a leading nature. The questioning and nature of the questions was presented to ensure there was active involvement into the survey.

Questions were emailed to applicants accompanied by a short explanation letter detailing what was required to be done in completing the survey. An e mail address was given for persons to return the completed surveys. Participants were informed of the ethical obligations of the researcher in the email and that it was necessary to obtain permission from each participant to be involved in this research. By completing the survey form permission was deemed to have been given

3.4.4.3. Survey Protocol

When formatting and developing an effective questionnaire it is advisable to:

- Write a good introduction- the beginning of the survey should have an introduction. State the objectives in a way that grabs the attention of potential respondents;
- Ask questions that provide the information you need - always keep the

objectives and the information needed in mind while asking the questions;

- Ask important questions first and demographic questions last;
- Organise the questions in logical groups - it is easier for the respondents to understand and answer the questions;
- Always use plain understandable language - the most effective surveys;
- Avoid technical terms, jargon, acronyms - respondents may not understand them;
- Use even number of responses - for multiple choice questions - whenever possible;
- Randomise the responses – whenever it makes sense, randomise the order in which responses are displayed. This will remove any order bias from the responses;
- Be sensitive to the feelings of respondents; and
- Keep it short and simple (Web Based Survey Software 2004).

3.4.4.4. Developing Survey Questions

Designing and developing the questions for the survey is undoubtedly the most important part of conducting a survey. The question quality will determine the quality of the results of the survey (Web Based Survey Software 2004).

The questions need to avoid the use of jargon, slang, and/or abbreviations. It is necessary to ensure there is no ambiguity, vagueness, or confusion with the meaning of questions. Emotional language or bias must be avoided to present an accurate picture of the resultant responses (Neuman 2006). Probing closed-ended questions are generally easier to analyse. Answers can be assigned a value so statistically an interpretation can be made. Closed-ended questions can be made more specific, thus more likely to be able to replicate similar meanings.

Detailed consideration was given to avoid leading questions and unbiased responses.

Multiple responses questions such as Q2 asks for the main reasons for budget and time overruns and possible responses could be:

- Only 1
- A number less than the ten asked for,
- All, and
- Other

To design the questions and to pick up all the possibilities would have lead to leading questions, directing the respondents to the possibilities. The aim of the question was to obtain the view of the respondent without indicating any possible direction. The simplest form of question was therefore selected as a means of removing bias.

This process has been used for questions Q1b, Q2, Q2a, Q4, Q7, Q8, Q9, Q10, Q11, Q13, Q14a, Q14c, Q15, Q16, Q20, Q21, Q24, Q25, and Q26 for the same reasons.
Demographic questions such as Q1 ask for the experience in conversions to FPSOs.

A number of possibilities exist determining how nay projects the respondents have been involved in. Theses include:

- None, 1, 2-5, and >5. The significance in selecting numbers like 2-5 is arbitrary at best and sends a message to the respondent of the respondent's degree of experience.
- None, One, Several and Many. This was selected because it did not imply whether the respondent was experienced or not in specific terms. A more specific response was of no value to the objectives of this research

All questions were considered in this manner in determining the final survey; in particular, because of the nature of the respondents, the questions were designed to be as simple as possible.

3.4.4.5. Selection of Participants

The selection of the people to be approached in relation to the survey was based on finding people who were actively involved in the past and/or currently in conversions, FPSO operations, constructors, suppliers and owners. The aim of the researcher was to find respondents who were prepared to provide constructive input and a broad point of view to the state of the questioning. The overwhelming involvement of the respondents has come from conversion project management, operators, constructors, suppliers and client representatives.

3.4.4.6. Application to this Research

Interviews were found to be appropriate in the study for this topic taking into consideration the limitations as mentioned in (1.6). The Survey was based on the nine critical success factors identified in the literature review (3.1). The sub-questions were designed to cover the ideal traits and relationships necessary for the critical success factors to be successfully implements. These were drawn from the focus group and interview responses and are shown in Table 3.2.

Table 3.2 – Quantitative Questions

Quantitative Questions	
Factors	**Traits / Relationships**
Project Manager (CSF1)	Selection Criteria /Selection Timing & Capabilities Experience / Expertise Management / Technical
Project Management Team (CSF2)	Selection / Timing Experience / Expertise Technical
Interface Manager (CSF3)	Appointment / Responsibilities Risk Management
Communications (CSF4)	Instigation Systems / Responsibilities
Customer Input (CSF5)	Well Data / FEED Contract Deliverables Management / Finance Change/Variations
Finance and Cost Management (CSF6)	Project input Cost Control system Project Progress Analysis

	Project management Risk Management
FEED (CSF7)	Attendees Specifications / Engineering Safety Case / Risk Management Contract
Scope of Work (CSF8)	Specifications Risk / Reporting T&Cs / Contract Formation Assessment / Clarification
Change/Variation Management (CSF9)	Management / Finance Interface Manager Project Manager Project Management Team

(Source: Developed for this Research)

The following Table 3.3, the relationship of each survey question to the research questions and the identified critical success factors are shown.

Table 3.3 - Relationship between the Survey Questions, the Research Questions, and Critical Success Factors

	Survey Question	**Relationship to Research Question or Critical Success Factor**
1	Can you relate your experiences in the management of conversion of oil tankers to FPSOs?	Qualifications of Survey Respondents.
1a	What was your position and involvement in a project?	RQ2,
2	What was the main reason for the success of the project in regards to budget and time?	RQ1, RQ2, CSF1,CSF2, CSF3, CSF4, CSF5, CSF6, CSF7, CSF8, CSF9
3	What experience did the Project Manager have on similar projects?	RQ1, RQ2,CSF1,
4	Who was primarily responsible for managing Project risk?	RQ1, RQ2, CSF2, CSF4, CSF8, CSF9
4a	How often was the Risk Register updated?	CSF4, CSF8, CSF9
5	When was the Project Manager appointed?	RQ1, RQ2, CSF1
5a	When was the Project management Team appointed?	RQ1, RQ2, CSF2,
6	Was there an Interface Manager appointed or any type of Interface Co-coordinator?	RQ1, RQ2, CSF1, CSF2, CSF3,
7	Who primarily handled conflicts, negotiations, and disputes resolutions for the project?	RQ3, RQ4, CSF1, CSF3

8	When it was found that the project was falling behind what was done to re-schedule or devise an alternative plan to get the project back to schedule?	RQ3, RQ4, CSF4, CSF8,
9	Where does Finance fit into the Project management Team and involved in the Project management?	RQ1, CSF1, CSF6, CSF9
10	Who was primarily responsible for Finance?	CSF6,
11	How did budget meetings cope with project performance and project progress?	CSF1, CSF2, CSF6,
12	How was project progress reported?	CSF2, CSF4, CSF6,
13	What was the attitude of senior management when it was found the project was falling behind?	RQ1, RQ2, CSF5,
14	When was the FEED carried out?	RQ1, RQ2, RQ3, RQ4, CSF7,
14a	Who involved in FEED?	CSF7,
14b	Who controlled FEED?	CSF7,
15	Who primarily formatted the specifications for the project?	CSF1, CSF3, CSF8,
16	Who primarily set the time schedule parameters for the project?	RQ1, RQ2, CSF2, CSF4, CSF9,
17	Was the time schedule reasonable to achieve a successful project?	RQ3, RQ4,CSF2,
18	If not when this point was made?	CSF2,
19	How were "lessons learned" handled in your organisation?	RQ3, RQ4,
20	Who primarily managed Change/Variations?	RQ1, RQ2, RQ3, RQ4,CSF!, CSF9,
21	What Project management processes were used to manage changes and maintain schedule?	RQ1, RQ2, CSF2, CSF4, CSF6,CSF8, CSF9
22	How much say did the client have into the project progress?	RQ1, RQ2, CSF5,
23	How was communications set up in the Project management?	RQ1, RQ2, CSF4,
24	Who was primarily responsible for Communications?	RQ1, RQ2, CSF4,
25	How were documents and document control maintained throughout the project?	RQ3, RQ4,CSF2, CSF4,
26	What happened if the Project Manager or one or more of the Project management team were replaced or left?	RQ1, CSF1, CSF2, CSF8, CSF9

(Source: Developed for this research)

The statistical analysis of the responses will use of Microsoft Excel software with appropriate scale of measurement (Page, Meyer 2000). A survey was found to be appropriate in the study for this topic (Levine, Stephan Krehbiel, Berenson 2002).

The format of the survey and the list of final questions asked are contained in Appendix 3.

The analysis of the data is further discussed in Section 3.6.

3.4.4.7. Summary

The research design has been based on the methodology principles set out in this Section. Application of these principles to the research has been indicated and the method of structuring the Survey questions has been set out. The structure of the survey had to be as informal as found necessary and targeted at the required audience of people actively involved in conversion projects.

In the next section ethical considerations that need to be taken into account in carrying out the primary data collection will be discussed.

3.5. ETHICAL CONSIDERATIONS

3.5.1. Introduction

Addressing ethical issues is very important to ensure the validity of the research and to avoid actions that breach legal and community standards of ethical conduct. Because of the nature of this research, dealing with non-personal issues of a technical nature with participants experienced in the technical field, the number of ethical issues to be addressed is relatively small, but important.

This section of the methodology outlines the key ethical issues associated with this research project: the rights and obligations of those involved, privacy, and informed consent.

3.5.2. Rights and Obligations of those Involved in Research

Participants involved in research are obliged to be truthful and to provide the best cooperation. In return for being truthful the participants have the right to expect a certain level of anonymity and confidentiality (Zigmund 2003). The researcher is also expected to be equally truthful and honest, to represent the real purpose of the research, to be objective in his/her approach, and at all time to protect the rights of all the participants. Consideration has to be given to the involvement of organisations in this research. It needs to be remembered that the researcher is working for an organisation, which could be construed as a competitor in this industry in this region. The involvement of people in the focus groups, their selection process and profiles and their contribution to the data is been further explained in (4.3).

3.5.3. Privacy

Privacy of all participants should be given the upmost attention throughout any research. The details of individuals or organisations should not be published, referenced, or indicated without express written permission. Privacy should also extend to whether the participant chooses to answer the researcher's questions; sometimes a participant may choose to protect his/her privacy by not answering. It is the researcher's obligation to maintain confidentiality and not to reveal the participant's identity in the proceedings (Zigmund 2003).

3.5.4. Informed Consent

All participants should be made fully aware of any risks to allow them to provide an informed consent for participation. Those involved in interviews should be asked to provide written confirmation of consent to participate whereas those involved in a survey need not. Consent of the latter can be implied if the survey is completed. In addition, the survey should be anonymous and confidential (Neuman 2006).

Each participant should be provided with a written letter explaining the purpose of the research before becoming involved. The letter should describe the researcher's aims and objectives of the research. University Ethics Committee contact details should be provided to participants should they require additional information or wish to make a complaint. The letter should also explain that participants may decline their permission to participate at any time.

3.5.5. Summary

In this section ethical considerations that need to be taken into account in carrying out the primary data collection have been discussed. This research project has approval of the Southern Cross University Human Research Ethics Committee **(Approval No: ECN-10-121).**

In the next section the primary data collection processes together with the mode of analysis and the criteria associated with the data results will be discussed.

3.6. DATA COLLECTION

3.6.1. Introduction

In the previous section the ethical questions and considerations associated with this type of research were discussed. In this next section, the primary data collection process is discussed together with the mode of analysis and the criteria associated with the presentation of the results.

The methods of collecting data for this research are through focus groups, interviews, and survey. There is a need to review the major sources of error in collected data. Without a concise appreciation of these, the belief that the data collected is perfect may lead to placing too much confidence in the conclusions that are drawn (Goodman 2003).

There are three types of errors that can occur in the analysis of survey data:

- Sampling error - where there are errors in defining and selecting the sample, results may be biased by making the sample less representative of the target population.
- Observation error - where the errors found are in generating data during the data collection process and,
- Processing error – where errors occur during the processing stage after the data has been coded and collated. These types of error can never be eliminated, as it is largely caused by human error (Goodman 2003).

3.6.2. Researcher Actions - Interview Process

The Interviewer, being the Researcher, needed to possess appropriate management skills to allow some flexibility to extract pertinent information. The Interview protocol ensures that all questions are confirmed using a preset checklist (Ticehurst & Veal 2000).

3.6.3. Data Collection

The focus group and interview data will be collected using semi-structured interview techniques with the interviewer scribing notes and using a portable audio recorder. Probing in-depth questions will be used to seek out specific answers to questions, as where applicable. The focus group is regarded as a group interview, which capitalises on the inter-relationship communications between the research participants. Each individual interview will require approximately 45 minutes to complete and all will be conducted face to face. Some participants may submit follow up data associated with various conversion projects.

The survey data will be obtained by distributing the survey questions to participants in the offshore oil and gas industry. The researcher will provide detailed simple instructions to follow for the completion of the survey and an indicated period for completion and collection. The data will then be subjected to processes as detailed below.

3.6.4. Data Analysis

The responses need to be measured in a suitable manner.

The focus group responses represent the researcher's interpretation based on;

- Notes made during the focus group meetings,
- A review of the focus group audio recordings, and
- The content analysis of the typed transcripts.

Analysing focus group data is similar to analysing any qualitative self-report data. It is necessary to capture the impact of the group dynamic and to take full advantage of any interactions, which may occur between participants. The data gathered can be cumbersome and complex however the report should include some illustrations of the dialogue between the participants rather than just making a presentation of some individual quotations, which may be taken out of context (Kitzinger 1995).

3.6.4.1. Editing, Coding and Analysis

The major reason for analysing data is to reduce the data complexity to a suitable level (Goodman 2003). The stages of data analysis are shown in Figure 3.9.

The process of analysis commences after the initial collection of data. Within the analysis stage, there are several inter-related procedures to be performed to summarise and rearrange the data (Zigmund 2003). The interview data responses need to undergo a transformation of the raw data into a form that may be interpreted.

3.6.5. Comparison with Prior Theory

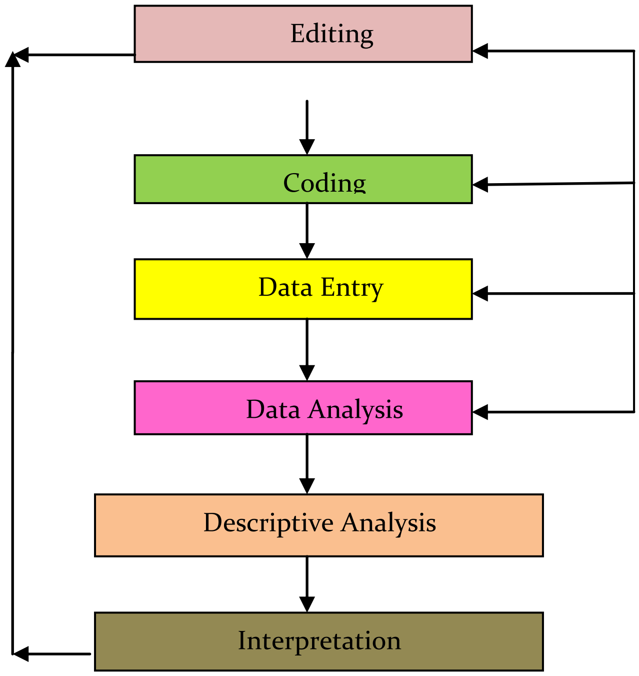
Prior theory is used to develop the quantitative and qualitative formats and structure for primary data collection and analysis of the results of the interviews and questionnaires. The results need to be compared with the prior theory.

The prior theory development can permit a detailed comparison between the expected results based on the literature review and the results achieved through the processes of in-depth face to face interviews, focus groups and survey.

3.6.6. Research Process Database

The research database consists of the database of the results from the primary data collection process from the focus groups, face to face interviews, and survey (Webb et al. 1966). Methodical triangulation of the data has been achieved using the different primary data collection methods of focus groups, interviews, and survey. Figure 3.5 details the stages of data analysis.

Figure 3.5 - Stages of Data Analysis



(Source: Zigmund, 2003, p.453)

3.6.7. Summary

This chapter has given the details and justification of the methodology associated with the primary data collection and analysis. This includes how the study research will be conducted to achieve the reliability and validity necessary. The focus group, interview, and survey framework has been described including the development of the questionnaires and the processes of data gathering. The methodology to be used for analysis has been described.

The next chapter will discuss the data obtained through this exploratory research methodology of focus groups, interviews, and survey.

CHAPTER 4 – DATA ANALYSIS

4.1. INTRODUCTION

The justification for the research methodology and the process of analysing the data as exploratory research using focus groups, in depth face to face interviews and surveys was described in Chapter 3. Gathering the primary data through this process is described in this chapter, followed by the analysis of the data collected.

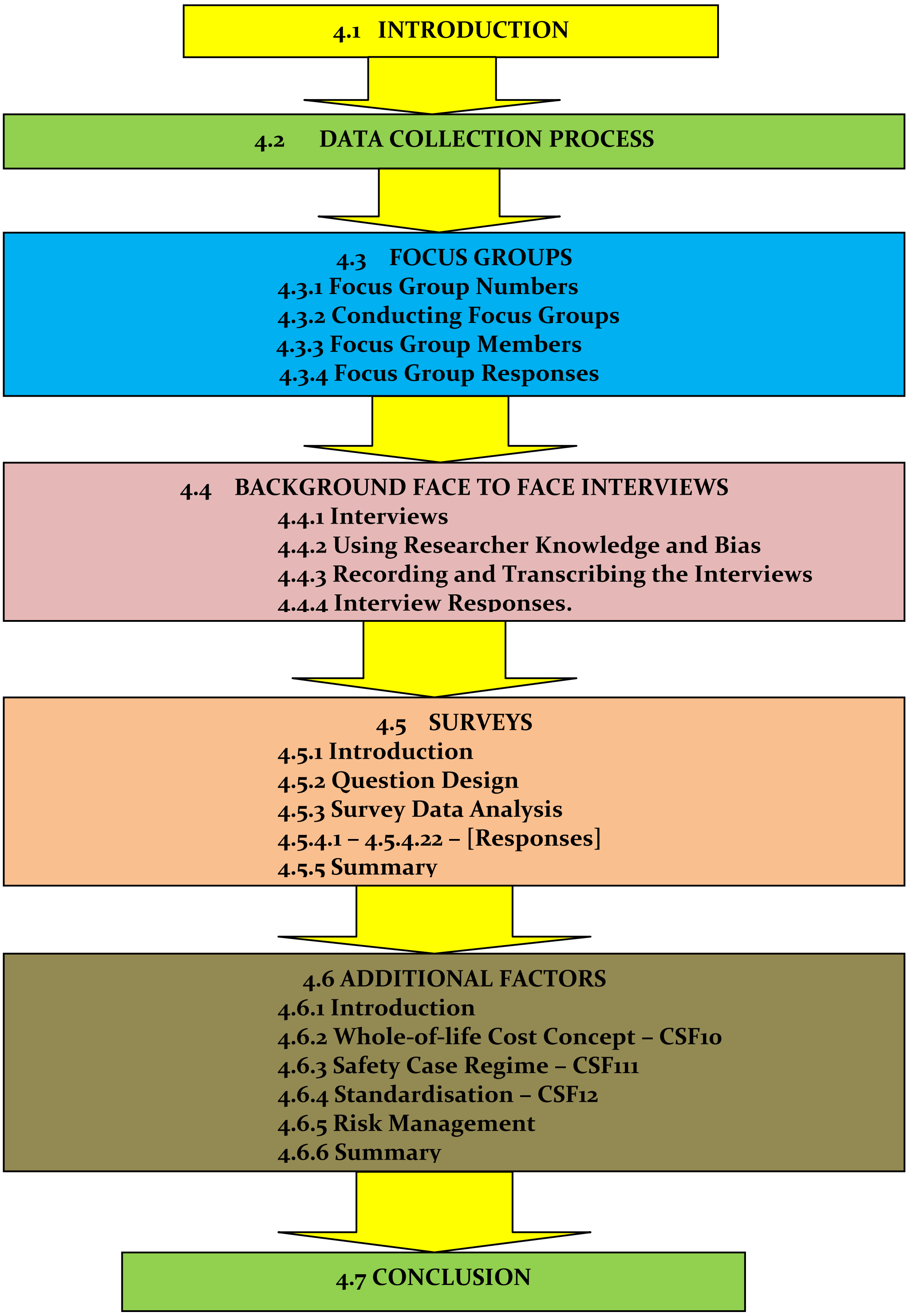
The purpose of the exploratory research was to obtain primary data to investigate the following four research questions incorporating individual research objectives that were developed in (1.3). The exploratory research methodology was selected as it provided a combination of the inductive (Yin 1993) and deductive process (Bougeois 1979; Miles & Huberman 1994). The mixing of the techniques used in inductive and deductive investigations can occur in several ways (Carson et al. 2001).

The chapter begins with an introduction followed by a structure diagram of this chapter. The exploratory research process of this primary data collection process consisting of focus groups, interviews and survey are detailed. This is followed by the setting out the basis and knowledge of the operations of the focus groups, the purpose, structure and application of the interviews and followed by how the survey is used to expand on the data already gathered through the focus groups and interviews.

This section is followed by the revelation of new additional factors applicable to successful project management and their relativity to the project management process for the conversion industry. These additional factors became known during the focus group responses from the participants.

The chapter is completed with a descriptive and detailed conclusion.

Figure 4.1 – Structure of Chapter 4



(Source: Developed for this Research)

4.2. DATA COLLECTION PROCESS

In this section the process for data collection has been discussed.

The exploratory research process for the collection of the primary data from people actively involved in the conversion of Oil Tankers to FPSOs used the three techniques of focus groups, interviews, and survey.

The primary data was collated and qualitatively and statistically assessed as appropriate. These responses were grouped to provide a summary for cross analysis to find solutions to the research questions and ultimately a solution to the research problem (Appendices 1,2 & 3).

4.3. FOCUS GROUPS

4.3.1. Focus Group Numbers

The number of participants needed for a focus group has been discussed in (3.4.2.4).

The participants to the focus groups were all attendees at the Annual FPSO Conference, held in Singapore each year. The conference holds the Business and Technical Streams for active involvement of conference attendees. The researcher's eligibility to attend this conference enabled direct approach to interested persons willing to participate in the focus groups. A direct approach was made by the researcher to various members for their permission to partake in the focus groups. The broadest coverage of participants for the conversion industry was sort to enable direct input into the proposed questions for this research. Each member of the focus group was asked if they wanted to see the summary of the focus groups however all have requested a copy of the finalised thesis on the subject.

The participants in the two focus groups were familiar with one another before the groups met and idea generation on the topics was not hindered. For this research, two focus groups were conducted.

4.3.2. Conducting the Focus Groups

The focus groups were held during breaks and after conference sessions in separately arranged rooms. This provided a degree if seclusion and confidentiality. The beginning of each session was informal and friendly, with a warm welcome given to participants (Healy & Perry 1998). It was necessary for the moderator to put the participants at ease in order to achieve rapport and some element of trust. The moderator assured the participants of anonymity and the value of each of the participants' opinions (Sweeney & Soutar 2001).

Each participant was asked at the time of the focus groups; "if they required a copy of the data summary for validation". However, all declined but did ask for a copy of the completed thesis to be sent to them.

A topic overview was provided, followed by an introduction by the moderator who explained the rules. Because the session was being recorded, each participant was asked to speak and finish what was to be said without side conversations between participants. The moderator wanted to hear a range of different experiences to gain valuable insight and there were to be no right or wrong answers. Finally, all participants were encouraged to expand on their experiences and not be dominated by any one person (Healy & Perry 1998). An important role of the moderator is time management, as participants are engaged for a specific time schedule (Stewart & Shamdasani 1990). Two introductory questions were asked of the participants to gain an understanding of their experience.

The first was:

What has been your involvement in the FPSO conversion industry and in what capacity?

The second was:

If you were in charge of a conversion ideally, when would you be first become *involved in the project?*

The questions (Table 4.1) were open-ended and related to issues associated with the identified critical success factors (2.10).

Table 4.1 – Focus Group Questions

Questions were directed to the following Issues		Responses
1	Project Manager	
2	Project Management Team,	
3	Interface Manager,	
4	Communications,	
5	Customer Input,	
6	Finance and Cost Management,	
7	Front End Engineering and Design (FEED),	
8	Scope of Work,	
9	Change/Variation management,	
10	Additional Factors,	

(Source: Developed for this Research)

Before the end of the session a short debrief was given providing more information about the research. It was explained that the results of the focus groups were to be used to refine the questions for the second phase of the primary data collection, individual Interviews. A paper copy of the interview questions was given to each focus group, so participants could discuss the proposed content.

An important role of the moderator is time management, as participants are engaged in specific time schedules (Stewart & Shamdasani 1990).

4.3.3. Focus Group Members

4.3.3.1. Introduction

The participants to the focus groups have been sourced from organisations, which have been actively involved in conversions of oil tankers to FPSOs. There collective experience totals many hundreds of years and their direct involvement into the topics was vital to the success of the focus groups. The researcher has elected to use a summary technique rather than make direct quotes, based on the time available to the participants. The necessity to get the participants involved in discussing the indicated critical success factors coming from the literature in both a positive and negative perspective was considered to be most important and also to see if there were perceptions of additional factors to those already known. Two focus groups were conducted in accordance with procedures set out in (4.3.2). To assure anonymity, each participant has been given a number in order across the two focus groups.

Focus Group No.1 consisted of eight persons. Participants came from a range of interests from FPSO owners, Constructors, Project Managers, Consultants, Suppliers, and Operators (3.2.4.2). The group is designated in Table 4.2.

Table 4.2 – No.1 Focus Group Members

	Focus Group Member	Participant No.
1	FPSO Owner / Operator	Participant P1
2	Industry Consultant	Participant P2
3	Conversion Constructor	Participant P3
4	Operator	Participant P4
5	Materials Supplier	Participant P5
6	Project Manager	Participant P6
7	FPSO / FSO operator	Participant P7
8	Consultant - Safety	Participant P8

(Source: Developed for this Research)

Focus Group No.2 consisted of seven persons. Participants came from a range of interests from Constructors, Project Managers, Consultants, and Operators. The group is designated in Table 4.3 below.

Table 4.3 - No. 2 Focus Group Members

	Focus Group Members	Participant No.
1	Operator	Participant P9
2	Conversion Constructor	Participant P10
3	Project Manager	Participant P11
4	Consultant	Participant P12
5	Constructor	Participant P13
6	Consultant	Participant P14
7	Project Manager	Participant P15

(Source: Developed for this Research)

4.3.4. Focus Group Responses

The focus group sessions data was summarised rather than the use of individual respondent quotations. Because the issues to be discussed had been identified from the Literature Review, the discussion was focused on these rather than an open-ended type of discussion. Consequently, the results could be summarised. In discussion with the Supervisor, it was agreed that a summary of the results would provide the data necessary to support the research outcomes particularly as this summary was backed up by an audiotape.

The issues discussed in the focus groups were to test whether there was agreement that the nine critical success factors identified from the literature review were appropriate, to gain insight into the underlying issues necessary for achievement of the critical success factors, and to identify any additional critical success factors.

4.3.4.1. Q1: Project Manager

Participant [P1], indicated that the appointment of the right Project Manager is the project maker. Participants [P1], [P10], [P12] and [P13] stated that this appointment has to occur as early as possible in the whole project and preferably at the end of the initial design stage.

Participants [P2], [P4] and [P6] indicated that the successful Project Manager had a history of projects completed and his ability would precede his arrival. His CV would be his calling card for the future. Participant [P8] demonstrated that the experience criteria for the Project Manager should include knowledge of the most up-to-date industry perspectives. However, demonstrated adherence to the basic principles of planning, scheduling, and contract management is also necessary and backed up with appropriate qualifications.

Participants [P9], [P11] and [P14] made the point that the criteria for the Project Manager appointment should be one based on successfully recognised experience from conversion projects and the successful Project Manager should bring an understudy for the duration of the project.

Participants [P11] and [P15] indicated that senior management of many organisations do not have firsthand knowledge of the requirements of the responsibilities of the Project Manager. The selection of an experienced, strong willed and capable manager for the role of Project Manager is vital to the success of the conversion. A successful Project Manager has to have a strong character to stand up in particular organisations and to show a superior knowledge of the principles of project management, which will be used for the duration of the project. This will either go one of two ways and in some cases participant [P6] has walked away from the role before commencement due to constraints being imposed.

Participants [P2], [P6], [P8], [P11], [P13] and [P14] agreed that the Project Manager is the logical person to control the FEED process and the required outcomes of the FEED. Participant [P13] added that the Project Manager should also control the people attending the FEED. Participant [P15] added that this concept had not previously been put forward. However, the concept has merit, as it would enable a scrutiny of the actual overall project management process.

Participants [P1], [P3], [P6], and [P7] showed that the Project Manager should have control of Finance and Cost Management during and after the conversion project. This should be through the appointment of a qualified project Finance and Cost Manager who would be a senior member of the Project Management Team.

Participants [P10], [P12] and [P13] indicated that the Project Manager is currently selected by the client or some external party associated with the actual conversion project and instead, should be appointed from an experienced third party as being an independent constructor. Participant [P15] asked the question as to who would make the actual selection and based on what criteria.

Participants [P1], [P4], [P7] and [P9] mentioned the fact the Project Manager should be involved in the process for the selection of a donor vessel for the conversion project as well as being totally involved in the process of deciding on the proposed shipyard for the conversion. This was a strongly mentioned comment.

Participant [P6] indicated that as a constructor to different organisations, it is difficult to follow a set pattern for project management as most organisations have their own policies, procedures, and methodologies.

4.3.4.1.1. Summary

The participants agreed that the Project Manager was a critical success factor. The following is a summary of the key issues that emerged from the discussion. The Project Manager:

- Appointment should be made as early as possible in the project timeline;
- Should have detailed up-to-date qualifications and experience in project management processes;
- Should control the FEED process and required outcomes and the various people attending the FEED;
- Should have references of past experience in a similar type of project,

- Appointment should be made by persons who understand the role in question;
- Should control the Finance and Cost Management although through a Finance and Cost Manager as part of the Project Management Team;
- Should select the Project Management Team;
- Should have a strong character to withstand the onslaught of various stakeholders projecting their individual points of view;
- Should be involved in the selection of donor vessel and conversion shipyard.

4.3.4.2. Q2: Project Management Team

This question aroused all participants of the first focus group and there was an agreed view that the Project Manager should select the Project Management Team. The team needed to be large enough in size, experienced in all the disciplines for the management of the conversion and include a team member capable of managing each jurisdiction and discipline being used in the conversion project.

Participant [P6] advocated that the Project Management Team selection enabled the Project Manager to have a team of people that can be trusted, have previously demonstrated skills, can work as a team, understand the responsibilities for project conversions, and have the necessary experience within projects.

Participants [P1], [P7] and [P11] indicated that the Project Management Team has to be appointed as soon as possible after the appointment of the Project Manager.

Participant [P7] went on to explain that having the Project Manager and the Project Management Team independent from all other stakeholders allowed them to concentrate on the conversion project, and to manage the contract and delivery of the FPSO as indicated in the specifications. It was also stated that the Project Manager and the Project Management Team were, in general, appointed far too late in the whole project time scale. They were generally presented with the already completed specifications, selection of vessel and yard, and a signed contract with a constructor. They were then told to make it work. It was agreed that this type of practice is counterproductive and would be one of the major reasons for being over budget and time to completion.

Most members of the group stated that the client has in the past appointed the Project Manager, Project Management Team and selected the conversion constructor. This has been changed to reflect current practices where the owner of the facility carrying out the conversion makes the Project Manager appointment.

Participants [P1], [P6] and [P15] agreed that the members of the Project Management Team should attend the FEED process, as required, for familiarisation and direct input.

In relation to the participation or contributing to the selection process for the donor vessel and conversion shipyard, as mentioned by several of the participants above, it would be necessary for the Project Manager and Project Management Team to demonstrate that there was no evidence of any conflict or pecuniary interest in these various selection processes.

The methodology to be adopted to verify the state for this requirement would vary according to the means whereby the Project Manager and or the Project Management Team were employed for the project.

Participants [P7] and [P11] said that there has to be a specific budget allocated very early in the process for the formation of the Project Management Team.

4.3.4.2.1. Summary

The participants agreed that the Project Management Team was a critical success factor. The following is a summary of the key issues that emerged from the discussion. The Project Management Team:

- Should be select by the Project Manager;
- Should be sufficient in size and skills to cover all required disciplines in the Scope of Work;
- Should be independent;
- Should be structured & experienced in the type of project;
- Should have a budget to cover the formation of the team;
- Members should attend the FEED as required;
- Should be selected as soon as possible after the Project Manager appointment, as currently appointments made too late;
- Should be involved in selection of donor vessel and conversion shipyard.

4.3.4.3. Q3: Interface Manager

Participants [P5], [P14] and [P15] presented the fact that having an Interface Manager as part of the Project Management Team allowed for a smoother flow of organised communications. In the case of changes/variations management, delays in production or supply, completion of negotiations and general dealing with matters affecting many of the parties who are not directly involved in the day to day conversion project operations, the Interface Manager can provide expert advice on various situations.

Participant [P6] indicated that the role of Interface Manager should be independent. Participants [P14] and [P15], added that the Interface Manager should have the role as the deputy to the Project Manager and would be part of the senior structure within the Project Management Team.

Participants agreed that there is a greater chance of a conversion project being delivered on time and on budget using an Interface Manager than otherwise. The added cost to have an Interface Manager is minimal within the overall cost. Participant [P11] made the point that the Interface Manager was useful in attending to the interests of mainly the external parties associated with the conversion contract.

Participant [P2] indicated that the Interface Manager, from his experience, had been involved in the establishment of a structured document control and communications system. This enabled all the communications and recording of data to be controlled. Participant [P12] added that it also assisted in referencing documents and providing a library service throughout the conversion.

4.3.4.3.1. Summary

The points shown in the literature review in Section 2.7.4 appear to be verified by the participants. The view was presented that the poor performance of projects in the offshore oil and gas industry and the lack of development and innovation have come at a time when customers were demanding bigger and more elaborate offshore projects.

The Participants acknowledged that the nature of projects, now with numerous stakeholders, brings difficult challenges.

The participants agreed that the Interface Manager was a critical success factor. The following is a summary of the key issues that emerged from the discussion. The Interface Manager:

- Should be appointed for the conversion project;
- Should be a senior member of the Project Management Team;
- Should manage all external matters to contract and, manage the project communications in conjunction with Project Manager;
- Should handle all external stakeholders and commitments associated with the project;
- Should manage culture management for the stakeholders;

- Should be actively involved in the conversion project communications;
- Should be actively involved in the setting up of document control and the process for maintaining project communications control.

4.3.4.4. Q4: Communications

Participants [P2], [P3], [P7] indicated that communications is one of the major tools for the project management process and should be controlled through the Project Manager. Formal control systems should be introduced, referenced, tabulated, reported on and the data distributed as required. This allows referenced records to be maintained where anybody with the correct “codes and rights” can access documents, records, drawings, change/variations, lessons learned and correspondence input and output from people involved in the project, allowing for the best possible decision making process to be adopted.

Participants [P9] and [P15] showed that communications should be a structured and have a rigid controlled referencing system for all incoming and outgoing correspondence, drawings, e-mails, contract communications, change/variation documents and internal and external reporting.

Participant [P14] reiterated that it was imperative to have a strongly controlled document regulatory system to enable referencing, systematic control, archiving, and formation of library facilities both in hard copy and in electronic forms. Participants [P6] and [P15] made the point that a complete and detailed controlled communications process allowed for a precise approach to the transfer of information amongst all the involved parties. The information is conveyed to appropriate and necessary parties and recorded for library history.

Participants [P1], [P9] and [P15] made the point that, as the Interface Manager was dealing with all external matters, but also influencing, the actual conversion contract, he/she should have the responsibility for all communications and be regulated through the Document Controller for the project under the control of the Project Manager. This would result in strict communications referencing, leading to format controls on all inputs and outputs for the project. Those who have to know are told and those who do not need to know are not bombarded with data and information not directly applicable to their roles within the project.

4.3.4.4.1. Summary

The participants agreed that communications was a critical success factor. The following is a summary of the key issues that emerged from the discussion:

- Project Manager & Interface Manager should manage project communication;
- Internal conversion project communications should be controlled within the Project Management Team;
- Interface Manager should have a strong involvement of control of all communications for the project;
- Communications should be controlled in a structured and detailed manner;
- Communications could involve access to lessons learned from past projects;
- Communications includes Information Technology control.

4.3.4.5. Q5: Client Input

Participants [P1] and [P7] made the point that ultimately the conversion is delivered to the client. The client would most likely contract with the owner on completion of the conversion contract. However, this is a separate contracting agreement, commonly called a time charter, and should not be confused with the conversion contract.

Participant [P8] and [P14} indicated that the client may endeavour to influence the progress of the conversion but ultimately it all comes back to the contract and the terms and conditions. The client needs to be involved in the FEED; however, it is in the capacity of input rather than control of output.

Participants [P2], [P4], [P8], [P14], [P15] and [P16] agreed that, generally, the client was to be the owner of the FPSO and that the specifications of the conversion contract have to be adhered to. The successful completion of this part of the whole of life project could influence the outcome of the ongoing contracts for the FPSO operation, which is certainly governed by the finance facility CAPEX provisions. The Customer should be kept informed of the progress of the conversion, of any delays, problems, and the ensuing outcomes. There could be some involvement in the conversion process. However, the communications should be through the formal communication channels.

4.3.4.5.1. Summary

The participants agreed that the Client Input was a critical success factor. The following is a summary of the key issues that emerged from the discussion:

- Client should have access, however it has to be through a structured and controlled process;
- Client should be involved in the FEED process but not controlling the actual outcomes and process of completion;
- Client should set the contract parameters for the deliverables of the conversion project.

4.3.4.6. Q6: Finance and Cost Management

Participant [P12] demonstrated that it is imperative for the Project Manager to control the cost accounting during the conversion and there should be a direct reporting responsibility back to the financier of the project.

Participants [P9] and [P11] explained that the financing of the project was for a whole of life provision with generally 90% to 92% allotted to the conversion and the remainder for the OPEX for the duration of the operating period. However, the OPEX period was backed up with a daily Operations and Maintenance (O&M) operating fee levied at the establishment of the time charter for the FPSO operations. All participants agreed that it was imperative that the budget and time scheduling be directly geared to the specifications and the scope of work. It is useless setting a budget if the schedule is not achievable against the scope of work.

Participants [P1], [P3], [P4], [P6] and [P8] noted that management of project accounting and the inter-relationship with financing of the whole project need constant attention throughout, not only the conversion, but the whole of life of the project.

Participant [P11] stated that the role of the Finance and Cost Manager is one of the most difficult to fulfill, and before the project commences there will be a need to travel back to the Estimator and have a detailed discussion on the projections made and the proposed purchasing commitments made. It is a good strategy for estimators, through the Project Manager, to look at setting initial purchasing commitments generally in principle only, so as to warn the supplier and put them on notice of an intended purchase. This would provide the ability to have a streamlined approach to equipment and material supply.

Participant [P6] added that the original estimate documents used to assess the viability of the project have to be passed onto the Project Management Team to ensure that there is rigid compliance to what was indicated in the beginning of the project. Participant [P6] stated that it was vital for the Project Manager to have an accounting function as part of the Project Management Team working closely with the schedulers and planners to administer the spending cost for both the present, but more importantly, for the future with a high degree of focus on projections and reporting.

Participants [P3] and [P5] explained that in many instances they have been supplied with a budgeted cost of equipment, supplies, etc., which is not achievable or will have to be severely restricted because the initial budget was developed too early, was out of date, was ill informed or was just plain wrong.

Participants [P1], [P4], [P6], [P7] and [P8] all agreed that the management of the whole Project Management Team impacts so much on the costs and accounting for the project that it is necessary for the entire project team to regularly report, through a formal timed schedule, all activities commenced, current, completed, and planned for the next reporting period. This enabled the Project Manager to assess the status of progress and to compare the scope of work, specifications, and conversion progress and place them into a financial progress analysis. This in turn would generate the necessary report giving the final delivery.

Participants [P1], [P4], [P6], [P7], [P9], [P11] and [P15] all expressed the knowledge that from day one of the contract being signed, all costs have to be known, tabulated and recorded against the Scope of Work, specifications and contract documents. The Scope of Work has to contain a bill of materials and this would detail what has to be purchased and when in the schedule.

Participant [P15] explained that in the time charter, the FPSO owner would charge the client; a daily rate to lease the FPSO and that 99% of these funds went to pay for the initial financing loan.

4.3.4.6.1. Summary

The participants agreed that the Finance and Cost Management was a critical success factor. The following is a summary of the key issues that emerged from the discussion:

- Finance is for the whole of life for the project and should be assessed accordingly;
- Finance & Cost Manager appointment should be as early as possible and continue after the completion of conversion project;
- Finance & Cost Manager has to be involved in procurement;
- Finance and Cost Management should be robust and statistically structured;

- Budget for the conversion will take 90% of the whole project costs and importance needs to be assigned accordingly;
- Project Manager should be strong enough in character to manage the Project Management Team and organise the conversion budget;
- Budget has to mirror the Scope of Work and specifications in detail.
- Bill of Materials should be established first.

Estimates of all proposed conversion work should be completed in line with Scope of Work.

4.3.4.7. Q7: Front End Engineering and Design [FEED]

There was an agreed view that the FEED in conversion projects is one that needed the most attention.

Participant [P9] showed that from his experience the FEED was done very early in the development of the project and the outcomes were used for contract bid assessment. It was very rare for anyone from the operations side of the FPSO to be involved in any decision-making. Participant [P11] advocated that in order for the FEED to have any relevance to the actual project the operations and project management personnel need to be involved to obtain an appropriate outcome, which is useful during the conversion contract.

Participants [P1], [P2], [P4], [P6], [P7] and [P8] discussed individual cases of FEED or the lack of it and the resulting consequences. Clients were generally taking control of FEED with little or no input or representation from operations personnel for clarification and or comment. Participant [P15] emphatically indicated that in the vast majority of conversion projects there was little or no FEED conducted. What was developed was limited to the proposed operational functionality of the FPSO with commercial input from the safety, environmental, statutory, and engineering concepts in association with the geological data from the well reports. The output from a client controlled FEED, is a report on the functionality of the FPSO with only basic input from safety, environmental, statutory and engineering personnel.

Participants [P11], [P12], [P14] and [P15] indicated that the scope of work for the FEED needs to be concise and detailed and the control and output should be formally stated. The FEED must assess all the risks associated with the project and this should cover the risks associated under the 'whole-of-life' cost concept. Participants [P6], [P8] and [P12] went on to state that the FEED process should be governed by the Safety case regime.

It was agreed that if the following conditions were met, the output would most likely be the setting of accurate specifications detailing the scope of work, which would allow an accurate proposed time schedule for completion. This would be the beginning of the planning stage of the conversion project leading to the construction phase. The conditions are that the FEED should:

- Be conducted as early as possible in the project;
- Have a concise budget assigned to a Scope of Work;
- Have participants with the authority to make decisions and capable of analysing the engineering data; and
- Have access to all well data, with involvement of all related and stakeholder parties.

Participants [P1] and [P2] made the point that at the initial stage when the specifications and parameters of the project are being discussed there should be effort made to try not to reinvent the wheel, and to analyse the previous operational history of FPSOs. The fact that there has been more than 30 years of conversion and operational history for FPSO operations in the world implies that there will have been a similar facility developed before the current project and the lessons learned from that project should be incorporated into the current proposal. At the end of the day, a conversion that is as similar as possible to the current proposal should be selected and if necessary a maximum of 20% of the project should be changed, rather than redesigning the whole project from scratch.

4.3.4.7.1. Summary

The participants agreed that the Front End Engineering and Design [FEED] was a critical success factor. They also identified recent issues - that of whole of life costing, and safety case regime- having a significant impact on the success of a conversion. These factors are discussed under the responses in Q10 below.

The following is a summary of the key issues that emerged from the discussion. The FEED:

- Stakeholders should pay more attention to the FEED for the conversion.
- Needs to conducted early in the whole-of-life of the project;
- Outcomes need to be the basis for the specifications of the project;
- Should be controlled by the Project Manager;
- Should have standardisation input provisions;
- Should refer to and or have access the Lessons Learned data;
- Outcomes should consider the type of project;
- People have to have sufficient authority to make decision on project specifications etc;
- Output is a guide for the specifications for the whole project and not just for a commercial verification of existing well data.

4.3.4.8. Q8: Scope of Work

Participants [P3], [P5] and [P7] considered that the accuracy of the Scope of Work allowed for a better understanding of the requirements for equipment selection for the project, whether this was for supply through Client Input or independent supplier. They agreed that the specifications for equipment should include a provision for service contracts and the supply of spare parts for the duration of the project. This would allow suppliers to provide the best possible pricing for the whole of life costing for the project. It would also cater for the requirements of minimal CAPEX for the conversion as well as providing a provision for budgeting in relation to the OPEX requirements for operational contracts.

Participants [P11] and [P15] noted that the Scope of Work have to be relevant to the project as this was the basis for the issuing of the ITB to constructors. In many cases, these specifications are ambiguous in nature for both the intended constructor and the tenderer.

Participant [P1] showed that the setting of the specifications is the basis for all that will follow in the conversion, as the Scope of Work. Engineers need to understand what they are designing, what the operating environment is, what the operational period is, and what are the oil characteristics coming from the wells.

Participant [P12] indicated that the issuing of the ITB and the attached specifications was to give a basis for constructors and tenderers to get together and arrive at a satisfactory agreement. In the discussion regarding the bid and assessment stage of the process, Participant [P2] made the point that the ITB has to be as clear and concise as possible to avoid protracted clarification meetings later.

Participant [P3] indicated that to date the specifications appearing on the invitation to bid have been written in such a fashion to engender a high degree of ambiguous language, which causes confusion not only for the constructor but also in the interpretation of the bids at a later phase. Participant [P9] indicated that the project specifications come from the outcome of the FEED together with the input given to the project provisions by the client. Participant [P12] indicated that the expertise of the assessing team was often less than could be desired and experience was often an understatement. This has led to a one-sided argument giving the constructor the benefit of the doubt for the contract and in more than one case, the bid was accepted as presented.

Participants [P3] and [P9] made mention of the setting of unrealistic schedules stemming from and being based on wrong parameters. Schedules may not be geared to the Scope of Work for the conversion; rather they are set by commercial and contractual terms & conditions set generally by the external influences associated with the conversion contract. Participants [P1], [P3] and [P10] stated that if the contract terms and conditions covered all applicable aspects of the Scope of Work and the specifications were sufficiently detailed in explanation and requirements, the chances of any changes or variations occurring would be minimised.

Participants [P6] and [P8] added that this is where the data from Lessons Learned has to be taken into consideration when starting a new project. Apart from the projects moving into the deepwater drilling arena, most FPSOs have been constructed to cover most possibilities of engineering parameters over the past thirty years. Apart from changes for the better in technology, the mixtures of processes needed have been engineered, constructed, and operated successfully in the past. There is a need to research these libraries of data to avoid the tendency of reinvent the wheel, a philosophy generally adopted in new projects.
Most participants agreed the bid and assessment of the bid had to be conducted with a standard scope to avoid ambiguous results. The bids need assessment by the same personnel to avoid complex opinions and points of view and a structured assessment process of scoring needs to be used.

Participants [P3] and [P5] made the point that the constructors should have the opportunity to make a presentation of their individual bid to the tendering group. The tendering group has the opportunity to clarify any contentious points of the bid and to ask questions in regard to equipment selection, timing, conversion processes and procedures, management teams and programming for the conversion.

Participants [P1], [P3] and [P7] made the point that the bid assessment has to consider the criteria for the selection of the donor vessel and the selection of the conversion yard. Both of these items have distinctive and definitive outcomes for the whole of life of the project. The tendering process for many projects to date has not placed sufficient importance on these points, which has resulted in delays, changes/variations and cost increases.

Participant [P14] and [P12] have worked together on more than one project and the commercial negotiating skills of the constructor during the bid and bid assessment period were such that it took a very experienced Project Manager and Contract Administrator to control this period and to arrive at a consensus and agreement relative to the specifications for the project. The constructor would have an advantage during the contract conversion; e.g., the Project Manager agreeing to the constructor supplying an alternative selection of equipment as being an equivalent to the specifications. The project manager has to be firm and concise, stipulate what is required, and not to accept additional factors without sufficient technical backup and proof of equipment capabilities.

4.3.4.8.1. Summary

The participants agreed that the Scope of Work was a critical success factor. They also identified recent issues; i.e., Whole of Life Cost Concept, and Standardisation have a significant impact on the success of a conversion. These factors are discussed under the responses in Q10, below.

The following is a summary of the key issues that emerged from the discussion:

- Scope of Work has three sub sections. These are the specifications, scheduling, and selection of the donor vessel and conversion shipyard,
- Specifications should be agreed and settled by all parties prior to signing the contract,

- Project Manager and Project Management Team should be involved in the process of Scope of Work, specification, invitation to bid, tenders, evaluations and contract formation,
- Invitation To Bid [ITB] must be written in clear terms to avoid ambiguous circumstances arising in the future,
- Specifications should be detailed enough to limit the selection scope of equipment supply, servicing, maintenance and spares,
- Contract terms and conditions need to be so precise that with reference to the Scope of Work and the specifications, would make the need and ability for change or variation minimised,
- There should be a degree of standardisation in specifications,
- Constructors should make presentations after ITB submissions,
- Constructors need professional negotiators to be successful.

4.3.4.9. Q9: Change/Variation Management

Participant [P6] indicated that the Project Manager controls Change/Variation Management. This is linked to the contract terms and conditions, which the Project Manager is directly responsible. There is no problem in delegating this responsibility. However, the Project Manager must maintain control. The change management process has to involve all people within the Project Management Team as well as external stakeholders in the conversion.

Participant [P3] expressed the view that stakeholders have to understand the contract and the terms and conditions. These contracts have to be administered correctly and otherwise the constructor will take advantage of poor contract administration and change/variations. Ambiguous tendering and bid process allows for loopholes in contract terminology. The process canvassed in Q8 has to be concise and as accurate as possible.

Participants [P6], [P11] and [P15] stated that the change/variation process is the most difficult to manage. The change or variation goes to the core of the specifications, engineering and production process for the project. Avoiding a change is the best option unless there is some fundamental problem that has merit to be changed. Changes that come from a whim or unsubstantiated idea should be avoided.

Participant [P15] explained that had the contract been administered robustly from the beginning, the ability to have changes would be diminished.

Participant [P2] added that change/variation management is the most time consuming and difficult provision to manage within the process of project management. Participants agreed that change/variation management would be a critical success factor. Also identified is the recent issue, of Whole of Life cost Concept, as having a significant impact on the success of a conversion. This factor is discussed in Q10, below.

Participant [P8] stated that one of the reasons why the Whole of Life Cost Concept should be seriously considered from the beginning of the project and stressed the importance of the safety case regime.

Participant [P4] made the point that many of the variations or changes are deliberately delayed to a later date thus allowing the CAPEX to remain the same. The responsibility can then be transferred to the OPEX provisions for the operating period.

4.3.4.9.1. Summary

The following is a summary of the key issues that emerged from the discussion:

- The originally identified nine critical success factors were discussed in varying degrees applicable to the conversion project with the outcomes summarised in Table 4.4;
- Project Manager should control change/variation process;
- Contract terms and conditions have to structured so as to avoid loop holes and the ability to foreclose changes and variations;

- Initial contract was too ambiguous;
- Change/Variations are time constraints and schedule breakers;
- Change/Variations facilitate moving work during conversion from capital expenditure [CAPEX] to operational expenditure [OPEX];
- Whole of life cost concept should be considered;
- Change/Variation Management context should begin at the time of contract signing.

4.3.4.10. Q10: Additional Factors

The floor was opened to the participants for input as to any other criteria that should be considered for conversion projects apart from the nine areas that were being discussed.

Participants [P8], [P12] and [P14] indicated that the development of the Whole of Life Cost Concept for conversion projects has to be considered, as without this functionality there will always be a scenario of; 'he said you said' in regard to responsibilities. Participant [P1] quoted; 'that the whole of life concept is an integral part of turning a client's business related functional requirements into a physical asset providing whole life value for that client. The whole of life costing includes the investment of a certain amount of money at today's level, which will be repaid with higher value sometime in the future'. The participant pointed out that it is a method of project economic evaluation in which all costs arising, and benefits accrued from development, installations, operations and maintenance, and ultimately demob and disposal of project hardware are considered as important to the whole project financial status.

Participant [P1] added that the object of the Whole of Life Cost Concept analysis together with the technical, environmental, social, and other evaluations is to provide the project decision makers with sufficient information on which to base a proper financial judgment. Participant [P2} stated that it is often assumed that the solution with the lowest whole life cost is automatically the one with the highest initial cost. However, this is not always the case.

A majority of Participants [P1], [P2], [P4], [P6-P9], [P12], [P14], and [P15] mentioned that involvement of the safety case regime from the beginning of the project is beneficial to the selection of all the critical equipment, assets, and operating processes. The safety case regime provides a set of guidelines and conditions for the control of all facets of the FPSO, from development to departure at the end. It is a different approach to managing an offshore facility as it governs all the processes for the whole project. All stakeholders are aware of the criteria for control of safety for the facility from the development, the FEED, the conversion workforce and onto the operations and maintenance phase and ending with the demobilisation of all equipment at the end of the field.

Participant [P1], [P8], [P12] and [P14] indicated standardisation of FPSO projects and incorporation of past Lessons Learned was important. This was backed up by Participants [P4] and [P7]. Standardisation of the conversion industry is related to the Scope of Work, and the specifications. Instead of designing a complete new facility, there is a propensity to look at the Lessons Learned of previous conversion projects and their incorporation into the design of a new conversion as far as possible. Participants suggested that previous Lessons Learned would assist but new idea and design should be limited to 20% in the conversion project.

Participants [P2], [P6], [P9] and [P14] stated that the specifications of previous conversion projects, would suit current conversion projects apart from adding some modernisation in these specifications. Setting specifications utilising standardisation in the selection of particular brands of equipment, including the organisation of maintenance, service, and spare parts regimes. This would limit to the selection of suitable various equipment.

Participant [P2], [P6], [P8] and [P12] indicated that the identification, and assessment of risk throughout the whole production project needs greater attention to ensure organised and diligent project management The initial risk assessment and analysis needs to updated and progressed throughout the whole of life project and the conversion is only one section of the whole production project.

4.3.4.10.1. Summary

The participants agreed that these additional factors presented have a direct bearing on the indentified critical success factors and these Alternatives have an equal importance to having a successful conversion project.

The following is a summary of the key issues that emerged from the discussion:

- A Whole of Life Cost Concept should provide a better understanding of costs. Stakeholders should understand the concept and see their financial responsibility for the project and the timing of that responsibility. The whole project costs should be indicated at the beginning of a contract;
- Whole production project risk should have more attention paid to it by all stakeholders;
- Safety case regime parameters should be adopted in the whole production project. The use of additional methodologies to promote safer operations. It has a commercial application as the safety case regime promotes the application of safety requirements into the design, thus minimising any on-going affects into the operation stage after the conversion project;
- Stakeholders should look at standardisation in the specifications by making better use of the Lessons Learned data for the industry and new or updated concepts and designs should have a limit of (20%) into the specifications for the conversion project.

Table 4.4 offsets the identified critical success factors and the conditions for success for each based on the summaries from the focus groups.

Table 4.4 – Focus Group Summary

Critical Success Factors	Conditions for Success
CSF1- Project Manager [PM]	• PM appointment timing should be made as early as possible in the project timeline, • PM should have detailed up-to-date qualifications and experience in Project Management processes, • PM should control the FEED process and required outcomes and the various people attending the FEED, • PM should have references of past experience in a similar type of project, • Persons making PM appointment have to understand the role in question, • PM should control the Finance and Cost Management although through a Finance and Cost Manager as part of the PMT, • PM should select the PMT, • PM should be on strong character to withstand the onslaught of various stakeholders projecting their individual points of view, • PM should be involved in the selection of Donor vessel and Conversion Shipyard. • PM is an Internal CSF
CSF2- Project Management Team [PMT]	• PMT should be select by the PM, • PMT should be sufficient in size and skills to cover all required disciplines in the Project Scope of Work, • PMT has to be independent, • PMT has to be structured & experienced in the type of project, • A budget has to be made to cover the formation of the PMT, • PMT members should attend the FEED as required, • PMT should be selected as soon as possible after the PM appointment; generally, appointments made too late, PMT should be involved in selection of Donor vessel and Conversion shipyard. • PMT is an Internal CSF.
CSF3- Interface Manager [IM]	• IM should be appointed for the conversion project, • IM should be a senior member of the PMT, • IM should manage all external matters to contract, manage the project communications in conjunction with PM, • IM should handle all external stakeholders and

	commitments associated with the project. • IM should manage Culture management for the stakeholders, • IM should be actively involved in the conversion project Communications, • IM should be actively involved in the setting up of Document Control and the process for maintaining Project communications control. • IM is an Internal/External CSF.
CSF4- Comm's	• PM & IM should manage project communication, • Internal Conversion Project communications should be controlled within the PMT, • IM should have a strong involvement of control of all Communications for the project, • Communications should be controlled in a structured and detailed manner, • Communications could involve access to lessons learned from past projects. • Communications includes IT control. • Communications is an Internal CSF.
CSF5- Customer Input	• Client should have access however it has to be through a structured and controlled process, • Client should be involved in the FEED process but not controlling the actual outcomes and process of completion, • Client should set the contract parameters for the deliverables of the conversion project, • Client Input is an External CSF.
CSF6 -Finance and Cost Management	• Finance is for the whole-of-life for the project and should be assessed accordingly, • Finance & Cost Manager appointment should be as early as possible and continue after the completion of conversion project, • Finance & Cost Manager has to be involved in Procurement, • Finance and Cost Management practices should be robust and statistically structured. • Budget for the conversion will take 90% of the whole project costs and importance needs to be assigned accordingly, • PM should be strong enough in character to manage the PMT and organise the conversion budget, • Budget has to mirror the Specifications and Scope of Work in detail.

	• Bill of Materials should be established first, • Estimates of all proposed conversion work should be completed in line with Scope of Work. • Finance & Cost Management is an Internal CSF.
CSF7- Front End Engineering and Design (FEED)	• More attention should be paid to the FEED by all stakeholders to the conversion, • FEED needs to conducted early in the whole project, • FEED outcomes need to be the basis for the specifications of the project, • Who should control the FEED and outcomes? • FEED should have standardisation input. • FEED needs to access the "Lessons learned" data, • FEED outcomes should consider the type of project, • People in the FEED have to have sufficient authority to make decision on project Specifications etc, • FEED output is for the specifications for the whole project and not just for a commercial verification of existing well data. • FEED is an External CSF.
CSF8- Scope of Work	• Scope of Work has three sub sections. They are Specifications, Scheduling, and the Selection of the donor Vessel and conversion Shipyard, • Specifications should be agreed and settled by all parties prior to signing the Contract, • Project Manager and Project Management Team should be involved in the process of Scope of Work, Specification, Invitation to Bid, Tenders, Evaluations and Contract formation, • Invitation To Bid [ITB] has to be written in clear terms to avoid ambiguous circumstances arising in the future, • Specifications should be detailed enough to limit the selection scope of equipment supply, servicing, maintenance and spares, • Contract terms and conditions need to be so precise that with reference to the Scope of work and the specifications, would make the need and ability for change or variation could be minimised, • There should be a degree of Standardisation in Specifications, • Constructors should make presentations after ITB submissions, • Constructors need professional negotiators to be successful. • Scope of Work is an External CSF.

CSF9- Change/ Variation Management	• The originally identified nine critical success factors were discussed in varying degrees applicable to the conversion project with the outcomes summarised in Table 4.4. • PM should control Change/Variation process, • Contract Terms & Conditions have to structured so as to avoid loop holes and the ability to foreclose changes and variations, • Initial contract has to be unambiguous, • Change/Variations are time constraints and schedule breakers, • Change/Variations facilitate moving work during conversion from Capital Expenditure [CAPEX] to Operational Expenditure [OPEX], • Whole-of-Life Cost Concept should be considered, • Change/Variation management context should begin at the time of contract signing. • Change/Variation management is an Internal CSF.
CSF10 – Whole of Life Cost Concept	• A whole-of-life cost concept should provide a better understanding of costs. All stakeholders should understand the concept and see their financial responsibility for the project and the timing of that responsibility. The whole project costs should be indicated at the beginning of a contract, • Whole of Life Project Risk should have more attention paid to it by all project stakeholders. • Whole of Life Cost Concept is an External CSF.
CSF11 – Safety Case Regime	• Safety case regime parameters should be adopted in a whole of life project allowing many problems associated with the conversion project to be minimised. This is an additional methodology promoting safer operations. It has commercial application as well. The safety case regime will promote the application of safety requirements into the design, thus minimising the on-going affects into the operation stage after the conversion project, • Safety Case Regime is an External CSF.
CSF12 – Standard'tn	• Stakeholders should look at Standardisation in the Specifications by making better use of the lessons learned data for the industry, • New or updated concepts and designs involving the Specifications should be limited to approximately 20% of the whole project design for the conversion project, • FPSO projects should utilise existing design and

	structure for new facilities and add some new concepts into the design. These new concepts have to have in depth proving to be incorporated into the design process. • Standardisation is an External CSF.

(Source: Developed for this Research)

4.3.5. Summary

In this section the participant contributions in the focus groups have been discussed.

The focus group responses agreed that the nine critical success factors identified in Chapter 2 were correct. Four additional factors were identified. Conditions for successful application of the critical success factors were provided and have been summarised in Table 4.4. In the next section the process of face to face interviews is discussed.

4.4. FACE TO FACE INTERVIEWS

In the previous section the focus groups were discussed. In this section the process for face to face interviews are discussed and the results presented.

4.4.1. Interviews Process

Five face to face interviews were conducted with senior participants from the offshore oil and gas industry who had individually been actively involved in the conversion of several tankers to FPSOs. The reasoning behind this approach stemmed from the need to obtain first hand precise responses to a range of questions from senior operations management in the oil and gas industry. Senior management in this industry consists of professional individuals at the General Manager level and above. The proposed questions were to be expanded and put to a larger sample of personnel actively involved within the industry through a survey.

For this research the convergent interview was a more appropriate approach to data gathering. The interviews followed five definable stages of convergent Interviews as detailed by Dick (1998, 2000). At the beginning of the interview rapport and trust was built, by providing details of the researcher's professional involvement and background, followed with details regarding the purpose of the interview. Issues of consent and confidentiality were addressed and details as to the use of the interview transcripts were discussed. Interviewees were asked if they required a summary and all declined, however all have requested a copy of the completed thesis. Interviewees were reminded they were free to terminate the Interview at any stage.

The opening question was broad and allowed the respondents to answer freely. The following question was used: 'Can you tell me about how you have been involved in this industry at, Company name…?' The next stage of the interview had the objective of keeping the Interviewee engaged and talking, without being asked any specific questions. A response by the Interviewee was through verbal and non-verbal signals. In the last stage of the Interview, the Interviewer would summarise the key points raised, and to prompt the Interviewee to think of other information pertaining to the questions asked. Thanks were offered to the Interviewees and all issues of confidentiality were confirmed.

Immediately following the interview, notes were made of the interview, detailing the researcher's impressions and thoughts, and other issues, such as question response content, opinions and points of view. The strength of this approach was that it provided opportunities for flexibility, spontaneous responses to individual differences and situational changes, and personalised questions to deepen communication with the respondent.

Any biases and preconceived ideas brought to the interview by the researcher were minimised using convergent questions, with the researcher's directing the content of the discussion after asking the Interviewee broader scope questions.

This allowed respondents to talk about issues they considered most relevant to this topic, rather than simply answering a number of pre-prepared questions. As a follow-up to the interviews, a Thank You note was sent to each respondent as soon as possible after the Interview for their participation.

4.4.2. Recording and Transcribing the Interviews

Audio recordings of each face to face interview were used. The respondents were asked at the beginning of the interview if there was an agreement to the interview process being audio recorded and all agreed. Respondents were advised that the tape recorder could be turned off at any time.

It was confirmed with respondents that the audio recordings would be personally transcribed by the researcher and the typed transcripts would not contain any personal, company or individual names; instead using individual codes.

A code for respondents was assigned and detailed in a codebook that was kept separate from the transcripts and tapes, thus ensuring confidentiality. Interviewees were coded; Interviewee [A1], for example.

Interviews were transcribed verbatim so that no information or context was removed. In addition to the audio recording, brief notes were taken during the interviews to both prompt further probing questions during the interview if necessary, and provide at least some record of the interview content in the case of a faulty audio recording.

4.4.3. Interview Responses

The interviewees were known to the researcher, and were actively involved in current and past conversions and their current employer organisations were considered leaders in the industry. Each interviewee was asked to participate in this research. Each interviewee was verbally informed of the obligations, rights and choices for both the interviewee and the researcher before the commencement of the interview.

The Interviewees were:

- A consultant with more than 20 years experience in FPSO conversion projects and a career working with a major oil company. Management experience has been at General Manager level and above, managing more than 300 persons.
- An corporate manager who has just less than 20 years working experience with a major oil exploration organisation. Management has been with direct involvement at Board level within the organisation and managing more than 450 people.
- An Offshore Installation Manager [OIM] with more than ten years offshore senior experience managing more than 120 people on rotation in an offshore environment as well as being actively involved in the pre-specification, vessel selection and conversion project management of two FPSO projects.
- A commissioning engineer with more than twenty years in operations and ten years in offshore projects. On projects this person had more than eight direct reportees involved in the project completion.
- A health safety & environment [HSE] manager and lead safety engineer with more than 25 years in HSE and safety administration and has been involved in several offshore FPSO conversions. Management has covered the responsibility of more than 250 people in various locations worldwide.

Table 4.5 – List of Interviewees

	Interviewee	**Participant Number**
1	Senior Consultant	Interviewee 1 [A1]
2	Senior Corporate General Manager	Interviewee 2 [A2]
3	Senior Offshore Manager	Interviewee 3 [A3]
4	Senior Commissioning Engineer	Interviewee 4 [A4]
5	Senior HSE Manager	Interviewee 5 [A5]

(Source: Developed for this Research)

A list of questions asked is shown in Appendix 2.

Interviewee [A1] had experience over six conversions, four offshore projects, and one new build with estimated project costs of USD3b in value. Interviewee [A2] had experience over three conversions with estimated project costs of USD1.2b. Interviewee [A3] had experience over four conversions and one new build with estimated project costs of USD1.95b. Interviewee [A4] had been actively involved in three conversions, two new builds, and six offshore installations with estimated project costs of USD2.45b. Interviewee [A5] has been involved in three FPSO conversions and two offshore construction projects with estimated project costs of USD1.42b.

Interviewees [A1] and [A4} mentioned that the Scope of Work has to incorporate the specifications, and that the design outcome did reflect what was actually going to be built. Interviewees [A2] and [A3] indicated they were not involved in the setting of the Scope of Work and came to the projects after this phase. Interviewee [A5] indicated that good design philosophies come from a thorough FEED.

Interviewees [A1] and [A2] reiterated that the experience and qualifications of the Project Manager governed the project outcome. Interviewees [A3] and [A4] indicated that if the schedule was reasonable relative to the Scope of Work then there was a reasonable chance of success and provided the Project Management Team was allowed to do its job.

Interviewee [A5] indicated that some Project Managers had little FPSO experience and came from a range of backgrounds, from exploration to drilling. Those without specific experience of FPSOs and the respective interface issues tended to struggle for success. There was no understanding of the demands and requirements of this type of project.

The Senior General Manager, Interviewee [A2] was high enough up the corporate ladder and was responsible. This was verified by Interviewee [A2].

Interviewee [A3] mentioned that the risk identification and assessment should be done during the development stage and continued through the whole of life for the project; further the CEO of the organisation should sign off on the risk management plan. Interviewees [A1], [A2], [A3] and [A4] stated that the handling of risk management was governed by corporate power and the size of the organisation managing the risk. Large organisations do it well and smaller organisations tend to take more risk and use less people.

Interviewee [A5] indicated that nominally the Project Manager would be responsible for the entire conversion project, however often this was delegated to the project services manager/contracts manager. Their understanding of project risk was limited to commercial aspects and was not wide-ranging, to the extent of risk management principles (ISO 31000, 2009). The risk register was typically only updated two or three times in a two to three year project.

Interviewee [A1] was appointed at the corporate levels, whereas in the case of Interviewees [A2] and [A3] the constructor management made the appointments based on the complexity of the project and participant availability.

Interviewees [A1] and [A3] went on to say that the role of Project Manager is actually a discipline and in all cases there was a structured team filling this role, due to the complexity of the project.

Interviewee [A4] indicated the Project Manager for several projects appointed him; however, in several cases the appointment came from a corporate level.

Interviewee [A5] mentioned the Project Manager appointment depended on who was running the project. If the oil company was running the design project themselves, then the oil company's project group appointed the Project Manager and the Project Management Team. If an FPSO constructor was running the design project, then they appointed the Project Manager and Project Management Team.

All Interviewees indicated that there was an Interface Manager or Coordinator appointed to a project and was a part of the senior section of the Project Management Team. In most cases the Interface manager doubled as the Deputy Project Manager. Interviewee [A5] said that there was only one project where a specific role for Interface Coordinator was appointed.

When the project was falling behind schedule Interviewee [A1] indicated that the method of getting the project back onto schedule depended on the contractual requirements and corporate relationships. Many joint venture organisations require a, no surprises, approach to reporting of budget anomalies and normally budget/schedule reviews had to indicate a, lead and lag condition to actions taken and proposed changes and alterations. A detailed analysis of schedule and Scope of Work had to be maintained for smaller projects over designated set periods and small increments of improvement were administered.

Interviewee [A2] was involved in this process except for major delays, which necessitated a contract review with the client and a decision to be made at corporate level.

Interviewees [A3] and [A4] indicated that at the end of each month a detailed budget/ schedule analysis was reported with proposed changes to scope of work, thus reducing the lag to bring the project back to the schedule. Much of the reduced Scope of Work was earmarked for completion after delivery to site, so the CAPEX would remain the same and the OPEX would be handed the responsibility.

Interviewee [A1] demonstrated that the finance reporting responsibility was through the Project Manager. Interviewees [A2] and [A3] stated that the cost accounting process throughout the project was less than impressive on more than one project, so much so that an external accounting firm had to be employed to manage the cost accounting and report as to the current status and projections based on the scope of work. This led to a reduction in the Project Management Team morale and work ethic, which in turn lead to terminations and then resignations. This then led to delays in schedules, budget, and delivery.

Interviewee [A4] mentioned that his involvement in the conversion project had been after the commencement of the project, however, it is generally seen that the format for the completion of the conversion is hindered due to the initial poor scope of work, equipment selection, specifications and project management.

Interviewee [A5] showed that responsibility for Finance and Cost Management varied. Some projects had a specific project services manager/contracts manager who fulfilled that role, with several calling this role, that of the Deputy Project Manager, whereas other projects left that to the Project Manager and the Engineering Manager.

All Interviewees explained that had the experienced Project Manager and a well coordinated Project Management Team been appointed initially then these types of problems would be minimised. All Interviewees indicated that senior management would unfortunately take the role of project budget or time delays, and adopt, a slash and burn, approach. This did not assist the project progress; in fact it was demonstrated that in many cases it was non-productive.

Interviewee [A1] explained that it took an exceptionally experienced Project Manager to be able to handle this corporate approach and if handled correctly the first time it tended to negate any further brash approaches.

Interviewee [A5] indicated that when the project started to fall behind in some projects, the Project Manager and Engineering Manager simply decreed to the discipline leads that they had to guillotine work. In other projects, a more systematic approach was taken with the Project Manager/Engineering Manager working with the discipline leads to determine where schedule savings could be made.

Interviewee [A3] has adopted the approach that it is better to let the responsible person carry out the work but have a backup plan in operation to circumvent any awkward situations. Interviewee [A2] had the opportunity to fight; fire with fire, by demonstrating that a more conciliatory approach including the provision of reasons for the occurrence and a methodology to recoup the situation to the benefit of all parties generally resulted in a better outcome.

Interviewee [A4] being appointed late in the project had the benefit of hind sight to comment on project progress, however, it was stated that a documentary record of the project progress had to be maintained by individual members of the Project Management Team to ensure that project reporting was conducted in a clear and proper fashion.

Interviewee [A1] was adamant that not many organisations actually carry out a proper FEED. The FEED needs to be conducted as early as possible in the project and it is necessary to have experienced project and operations personnel; these people must have some sort of authority to commit. In large well run organisations the Project Manager has actually determined a FEED budget and if the project initiators say that a FEED was not necessary then the budget, which had previously been approved, would surface and be utilised.

Interviewee [A2] indicated that in all of his projects a FEED was conducted very early in the process. However, it was more geared toward the commercial aspects related to the data from the wells. Interviewee [A3] stated that the FEED was carried out at the time of contract bid stage and used the specifications formed by the Project Management Team to verify the outcomes of the FEED.

Interviewee [A5] expounded that, in some projects, there was a clearly defined FEED phase, run by the oil company. For some of these projects, this involved a third party engineering constructor who put together the specification and bid documents that was used for the request for quotation [RFQ] for the FPSO constructors. In two projects, the FEED phase was run as a design competition between two FPSO constructors before final award of contract. In other projects, there was no real FEED phase, just an initial design phase for the FPSO constructor, which was supposed to serve as a FEED, but actually failed.

All Interviewees indicated that the time schedules of the projects initially seemed reasonable. However, after a very short period it was found that the Scope of Work could not be completed within the time schedule.

Interviewees [A1], [A4] and [A5] indicated Change/Variation Management is the most difficult area to manage as it covers the contract terms and conditions and the engineering feasibility.

Interviewees [A1], [A3] and [A5] indicated that the Project Manager was responsible for this discipline. In many cases it was delegated to the Engineering Manager who would liaise with the Accountant, the relevant Project Management Team members and the Interface Manager as found appropriate.

Interviewees [A1] and [A3] stated that the selection of the donor vessel for the conversion had not been assessed against the design specifications and contract requirements. The Scope of Work assigned to the donor vessel was not sufficiently detailed to ensure complete satisfaction of the outcome of the project. All Interviewees said the selection of the donor vessel and the proposed conversion shipyard are the external parameters that can make or break the proposed conversion contract. There is generally scant regard paid to the detail of these items in relation to the conversion project either for the conversion or in respect of the whole-of-life capabilities of the project. Interviewee [A1] elaborated that the selection of the donor vessel was one of the major contributors to the success of the project based on the whole life cost analysis.

Interviewee [A2] indicated that many constructors and conversion project owners had a range of donor vessels available and a choice was made against the client well data and the proposed production outputs for the facility.

Interviewees [A1] and [A3] made the point that the selection of the proposed shipyard for the conversion was generally based on where the project can be completed in the time required for the work to be done. Additional involvement in the process would be to conduct an independent survey on the shipyard operational capabilities, the existing workload, the current workforce, previous work history in this field, material availability, location and capability of delivering the project at the time required.

The ideal selection process would have to be based on;

- Correct specifications based on the proposed location environmental conditions;
- Locating a donor vessel for the right price and age to satisfy the whole of life projections for the project;
- In-depth independent third party naval architect and marine engineering analysis by classification surveyors, structural engineers, shipyard conversion experts, and operational oil and gas consultants. These investigations would provide detailed assessments of risk analysis, structural parameters, classification based on stability and structural hull movement analysis, corrosion assessment, pumping and piping conditions, and power requirements;
- The condition of the donor vessel and a proposal for a maintenance plan for the time the vessel would be undergoing conversion; and
- A proposed time of delivery to a specific conversion shipyard.

All interviewees agreed that the project communications cover spoken and written forms. Ultimately, the Project Manager is responsible. However, it would generally be delegated to the Document Controller and in later cases in conjunction with the Interface manager.

Interviewee [A1] stated that part of his role was to establish a systematic referencing methodology for document correspondence inward and outward, a sequenced numbering system for e-mail traffic, and a recognised procedures and drawing numbering system. Information transfer was diligently and thoroughly controlled. Interviewee [A2] explained the virtues of the large oil company and the controls on correspondence related to company business and penalties for abuse of the system. The Project Manager would delegate this role to a Document Controller as a member of the Project Management Team.

Interviewee [A3] followed a standard corporate referencing system and the distribution of data was controlled to those who actually had to know the information. Interviewee [A5] said a successful project would have good vertical communications, both ways; however, this depends so heavily on the individual characters involved in the Project Management Team.

Interviewee [A1] was the only Interviewee who had to replace someone in the Project Management Team or had someone leave the project. He stated that it caused a problem because the Project Management Team was comfortable with the existing Project Manager. After the departure the schedule was affected somewhat until the replacement was capable of controlling the group. The replacement came from an external source, which caused some discontent amongst the existing Project Management Team. This was soon overcome and the project actually ended up finishing ahead of schedule and in line with the original specifications.

Interviewee [A5] talked about a project, where a succession of Engineering Managers came and went, with at least one change in Project Manager. All of these individuals were from a marine background and had no appreciation of FPSO conversion industry interface issues. The project lurched from disaster to disaster and never recovered. Interviewee [A5] stated that in some cases, the replacement of personnel proved to be of great benefit to the project.

Interviewees [A1] and [A5] indicated that Lessons Learned is a concept that although used by many organisations, is not totally and effectively utilised. An investigation is conducted at the end of each project and a person is assigned to report on this. The report is then either pushed into the archives and generally rarely accessed or is used at the beginning of the next project, as a reference tool.
Interviewees [A1], [A2] and [A4] had experience with Lessons Learned investigations at the end of each project and these organisations archived the data in a centralised library. The entire company history could be accessed. The Lessons Learned were a part of the development of all subsequent projects and could be referenced back.

Interviewee [A3] indicated that although the Lessons Learned process was conducted it was very rare that past projects were referenced at the beginning of the next project.

The face to face Interviews raised more questions than were originally proposed especially in the areas of the Project Manager role and responsibilities, the risk management process within Project Management, the project accounting process, the Change/Variation Management role and the data for and from the FEED.

Although the data from the interviews was invaluable, it demonstrated that by conducting a survey amongst personnel actually and actively involved in conversion projects a broader access to data could be usefully obtained This gathering net should be extended to cover clients, customers, classification societies, suppliers, consultants, constructors, owners, financiers and operators. The responses from the Interviewees indicated that further data gathering should be undertaken, as the opinions and facts portrayed in the interviews indicated that opinions varied considerably.

The Interviewees agreed that the indentified critical success factors are important to the conversion project and have an importance to having a successful conversion project.

The following is a summary of the key issues that emerged from the discussion:

- Interviewees had good overall experience in the industry;
- The Scope of Work, design and specifications had to be suitable for the conversion;
- Project Manager experience and ability governed the success of the Project;
- Project Manager position can be a structured one;
- Interface Manager should always be appointed to the project;
- Risk should be a corporate discipline and applied to the whole production project, however the risk management within the conversion project would be handled by the existing PMBOK model project management process;
- Senior management expected a no surprises approach to managing the project and communications as to budget and time overruns. However if a problem was raised then a solution was expected to be presented;
- Blaming people only caused further problems;
- Cost management on conversion projects has always been a problem;
- FEED is important to the specifications and in many cases the FEED was only geared to commercial issues;
- Time schedules were reasonable;

- Change/Variation Management needs strict control to be successful;
- Selection of the donor vessel and conversion shipyard is imperative to the overall success of the whole of life project;
- Document control and communications must be rigid and structured; and
- Lessons Learned data needs to be accessed as part of every project.

The interviews were conducted using open-ended questions and a qualitative response was provided to all questions. The researcher has analysed the qualitative results and made comparisons across the five interviews. The aim is to ascertain the existence of any like-minded results. The results are shown in a quantitative display in the Table 4.6 below.

Table 4.6 – Interview Summary

	Interview Questions	**Responses**	
1	What was your involvement / experience in conversion projects?	Nil	
		One	1
		3-5	1
		>5	3
2	How was the Scope of Work established?	Based on Specifications.	3
		Not involved	2
3	What did you see as the Success of the Conversion Project?	Qualifications & Experience	2
		Schedule v Scope of Work	3
4	Who managed the Risk for the Conversion Project?	GM	2
		CEO	1
		Corporate Responsibility	4
5	Appointment of Project Manager [PM]?	Corporate	5
6	Should there be an Interface Manager [IM]?	Senior Member of PMT	5
7	What happened when project falling behind?	Depends on Contract Terms and Conditions and a review	1
		Corporate level	1
		Revised Scope of Work	2
		Revised Scope of Work, Sch. and transfer from Capital Expenditure [CAPEX] to Operations Expenditure [OPEX]	3
		Full Review. Who to blame.!!	4

8	Who was responsible for Finance/Cost Management for the Conversion Project?	Project Manager	4
		Not appropriate and caused problems.	3
		Finance Mgr	1
		Corporate	1
9	Have you been involved with the FEED process?	Yes	3
		No	2
10	When was the FEED done?	Field Develop.	3
		Time of Contract	1
		Only for Well data verification for corp.	1
		Never done	1
11	Was Schedule suitable for Scope of Work?	Initially OK	4
		Initially OK but after one month found to be unrealistic	4
12	Who was primarily responsible for Change/Variation management?	Internally - PM	1
		Externally - IM	1
		PM totally	4
		PM & PMT	2
13	When was Donor Vessel selected and by Whom?	Owner	3
		Constructor	2
		Against Specs	4
		Where located & Condition	1
14	Who selected Shipyard?	Client	1
		Owner	4
		PM & PMT	1
15	Who controlled Communications for the Conversion Project?	Lge Co & well structured	2
		Owner/ controller middle structure	2
16	What happened when someone left?	Replace Internally	3
		Replace Externally	1
		Not replaced	2
17	Were Lessons Learned discussed?	Yes	3
		No	2
18	Did it make any difference to the Project?	Yes	1
		No	4

(Source: Developed for this Research)

4.4.3.1. Summary

The data from the interviews has provided a basis for the design of the survey. The initial outcome from the interviews was to obtain in-depth information about how senior management portrayed their involvement in a conversion project. It was envisaged that senior management would take a big picture approach and allow those responsible for the project to get on and complete the tasks.

It was found that, through the questions and responses that the senior management had become involved in detailed project management by:

- Attempting to influence the Scope of Work from Client Input;
- Budget over-runs required rectification input;
- Lack of engineering definition in the specifications;
- Client pressure for early delivery;
- Feedback on competency of project management staff; and
- Arbitration of contract disputes with external partners.

The responses to the questions put to the Interviewees indicated that further useful data could be obtained from personnel working within the conversion contract project via a survey. The outcome of this data gathering was to broaden the scope of questions and to allow for verification of the indicated nine critical success factors for successful conversion projects. Detailed responses have been included in Appendix 2.

In this section the input from the participants in the face-to-face interviews has been discussed and the process has been set out including the outcomes. The responses have been initially presented in a qualitative manner and then using comparisons with respective responses, a quantitative summary, Table 4.6, has been prepared highlighting the similarities and differences in the responses from the interviewees. The initial responses from the interviews have provided the basic scope to have additional questions tested over a wider sample of the conversion industry population. Several of the questions have been expanded to cover a broader application to the industry. The results of the interviews have provided the researcher with a verification of the types of questions to be asked in the survey.

In the following section the survey process and responses are discussed.

4.5. SURVEY

4.5.1. Introduction

In this section the process of gathering the data by survey is discussed. The survey questions have been developed from the responses of the focus groups and the face to face interviews.

Some potential conference participants selected for the Survey were approached at the Conference. Because of the difficulty of maintaining interest following the Conference, the design for the survey was made to be as informal as possible to ensure some concise input and candid responses of their own involvement in the oil and gas conversion industry, without the temptation to "just throw the survey away" as just another interference in their daily lives.

Basic instructions were given to the selected survey participants verbally at the Conference. Email instructions were included with the survey when it was forwarded to the participants who had agreed to participate at the Conference.

4.5.2. Question Design

The survey used predominantly closed-ended questions. However, in some cases where 'Other' was included as an optional answer, the opportunity to comment was provided in the form of an open-ended question.

On completion of the interviews described in Section 4.4 above, the question design was reviewed to achieve a better scope of cover on the topics of interest. The final survey is set out in Appendix 3. Twenty-six questions were included as listed in Table 4.7 below together with relationships between the four research questions, and the nine identified critical success factors.

Questions were deliberately structured to allow for multiple responses, however, it was left to the respondent to indicate the number of projects he/she was involved in, and their actual involvement in the details of the question being asked. A degree of latitude was given to the respondents to allow for their individual interpretation of their own actions within a project. Instructions were forwarded to each respondent as to what was considered appropriate in multiple responses and the decision was left to that respondent.

Table 4.7 - Relationship of Survey, Research Questions & Critical Success Factors

	Question	Relationship to Research Question or Critical Success Factor
1	Can you relate your experiences in the management of conversion of Oil Tankers to FPSOs?	Qualifications of Survey Respondents.
1a	What position was your involvement in a project?	RQ2,
2 & 2a	What was the main reason for the success of the project in regards to budget and time?	RQ1, RQ2, CSF1, CSF2, CSF3, CSF4, CSF5, CSF6, CSF7, CSF8, CSF9
3	What experience did the Project Manager have on similar projects?	RQ1, RQ2, CSF1,
4	Who was primarily responsible for managing Project Risk?	RQ1, RQ2, CSF2, CSF4, CSF8, CSF9
4a	How often was the Risk Register updated?	CSF4, CSF8, CSF9
5	When was the Project Manager appointed?	RQ1, RQ2, CSF1
5a	When was the Project Management Team appointed?	RQ1, RQ2, CSF2,
6	Was there an Interface Manager appointed or any type of Interface Co-coordinator and what was his role?	RQ1, RQ2, RQ4, CSF1, CSF2, CSF3,
7	Who primarily handled conflicts, negotiations, and disputes resolutions for the project?	RQ3, RQ4, CSF1, CSF3

8	When it was found that the project was falling behind what was done to re-schedule or additional plan to get the project back to schedule?	RQ3, RQ4, CSF4, CSF8,
9	Where does Finance fit into the Project Management Team?	RQ1, CSF1, CSF6, CSF9
10	Who was primarily responsible for Finance?	CSF6,
11	How did Budget meetings cope with project performance and progress?	CSF1, CSF2, CSF6,
12	How was project progress reported?	CSF2, CSF4, CSF6,
13	What was the attitude of senior management when it was found the project was falling behind?	RQ1, RQ2, CSF5,
14	When was the FEED carried out, who involved, and who controlled?	RQ1, RQ2, RQ3, RQ4, CSF7,
14a	Who was involved in FEED?	CSF7,
14 b	Who controlled FEED?	CSF7,
15	Who primarily formatted the Specifications for the conversion project?	CSF1, CSF3, CSF8,
16	Who primarily set the time schedule parameters for the conversion project?	RQ1, RQ2, CSF2, CSF4, CSF9,
17	Was the time schedule reasonable to achieve a successful conversion project?	RQ3, RQ4, CSF2,
18	If not when this point was made?	CSF2,
19	How were "Lessons Learned" primarily managed in your organisation?	RQ3, RQ4,
20	Who primarily managed Change/Variations?	RQ1, RQ2, RQ3, RQ4, CSF1, CSF9,
21	What project management processes were used to manage changes and maintain schedule?	RQ1, RQ2, CSF2, CSF4, CSF6, CSF8, CSF9
22	How much say did the Client have into the project progress?	RQ1, RQ2, CSF5,
23	How was communications structure set up within the project management?	RQ1, RQ2, CSF4,
24	Who was primarily responsible for Communications?	RQ1, RQ2, CSF4,
25	How were documents and document control maintained throughout the project?	RQ3, RQ4, CSF1, CSF2, CSF4,
26	What happened if the Project Manager or one or more of the Project Management	RQ4, CSF1, CSF2, CSF8, CSF9

	Team were replaced or left?	

(Source: Developed for this Research)

4.5.3. Survey Data Analysis

The procedure was adopted throughout this research to determine if there was any difference to the results and whether the actual data returned could be used for the purpose of identifying results. In all cases it was found that the date could be used.

The analysis of the Question data has been carried out in three parts, as follows:

1. Analysis of the experiences of the people responding to the Survey to ensure that appropriate persons responded;
2. Prioritising multi-responses, where these have been provided, to identify their relative importance. This is particularly relevant to answer research question 2; and
3. Interpreting the data including description of responses, tables and bar charts of frequencies to validate the critical success factors to enable a response to the research questions to be ascertained.

4.5.4. Survey Responses

4.5.4.1. Data Analysis Methodology

Analysing the data received during the survey has been carried out using an Excel format (Levine, Stephan, Krehbiel, Berenson 2002). The data file is shown in Appendix 6.

Some of the questions had multiple response options.

For example Q2 and Q2a of the survey asked: What were the main reasons for the budget and time overruns? Question 2 responses were for the budget and Question 2a responses were for the time overruns. There were eleven available answers to each question (3.4.4.5)

Many respondents indicated more than one selection and a number selected All possible responses. Including all responses in the analysis of the results would distort the results in favour of respondents who gave multiple responses. Because it was possible for a respondent to select all items as equally important one method of analysis would be to treat missing items in the normal statistical analysis manner. However this would distort the results in favour of all items being equally important. The preliminary analysis of the data showed this not to be the case. Therefore a method had to be selected that would reduce the affect of multiple responses. This is not a common problem in statistical analysis, the more common ones being the treatment of missing values and or outliers. There is no reference to the treatment of this situation in the literature.

Interpretation of quantitative data commences with descriptive analysis (Zikmund 2003, p 473). The data was analysed in this way using frequency distributions and cross tabulation as appropriate. In some questions, data was examined to ascertain the effect, if any, of multiple responses. This was particularly important in Question 2, as an example, where respondents could indicate as many of the options as they agreed were equally important. A response to Research Question 2 could reasonably be that all nine critical success factors were equally important. A detailed analysis was conducted to ensure that there was a reasonable indication of relative importance by applying a number of different methods of analysis to the data. The method restricting the number of choices does not have a precedent in the literature.

Interpretative statistics were well known to the researcher and would have been used if appropriate. The Examiner has queried why ranking methodologies were not used to investigate differing views of respondents with different roles in the conversion of FPSOs. The focus groups identified the very important role of the Project Manager, who, together with the Constructor, has the primary responsibility for the conversion. The research question was "does the Constructor have a different view of the relative importance of the critical success factors from the respondents as a whole". This is a very important question and the result could lead to further research. Therefore, the ranking to be tested was between that of the Constructor against that of the group as a whole. The results using descriptive analysis were quite clear and at that stage, it was considered not necessary to apply any of the interpretative statistical methods.

To correct for this the following process was followed:

- Firstly, all responses were tabulated and summed (Line 55, Appendix 6). The summed results were then expressed as a percentage of the total responses (Line 64, Appendix 6).
- Secondly, the items were prioritised in order of the frequency scores and a number chosen to equal at least two thirds of total responses. Each respondent's data was then reviewed and limited to this number. In this reduction process preference was given to the identified highest frequency items. In almost all cases this process was sufficient to rationalise the responses. The final prioritized results are shown (Line 131 Appendix 6).
- Thirdly, the results were again summed and new prioritised frequencies obtained. These were compared with the original frequencies to ensure that there were no major changes to the original frequencies. The prioritized frequencies were used as the outcome data for the question.
- Fourthly, a similar process was used for each of the multi-response questions with the number of items chosen varying for each question to ensure that the number chosen represented at least two-thirds of all responses.

This process has been used for questions Q1b, Q2, Q2a, Q4, Q7, Q8, Q9, Q10, Q11, Q13, Q14a, Q14c, Q15, Q16, Q20, Q21, Q24, Q25, and Q26.

Questions Q1a, Q3, Q4a, Q5, Q6, Q12, Q14, Q17, Q18, Q19, Q22, and Q23 asked for a specific answer between the number response range of one to five. The frequencies were determined by adding the results for each specific answer and converted to percentages.

For example in question Q3, the question put was; “What experience did the project manager have on similar projects?” the choices were from 1 to 4, Nil, Basic, Intermediate and Experienced Professional. The answers are shown in cells B62 to B65 in Appendix 6 and shown as a percentage. The results for all questions are shown in Section 4.5.4.5.

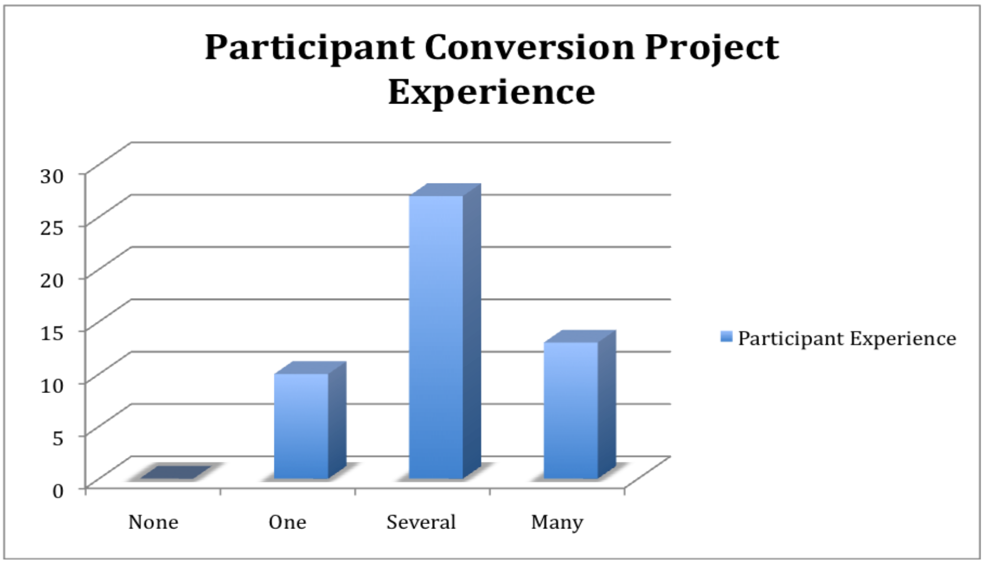
4.5.4.2. Data Results

There were approximately 100 survey forms sent to people and the researcher obtained through 52 responses to the twenty-six questions presented during the survey have provided analytical data relative to this research. Two responses were not considered appropriate and were not considered in the results. The respondents have provided an insight into the depth or project management currently evident within the conversion industry.

4.5.4.3. Experience of Participants

Participants have come from those working in the offshore oil and gas industry, who have been working directly in the actual conversion of tankers to FPSOs. Of the 50 responses received 53% of cases have had experience in several conversions, 27% of cases have been involved in many and in 20% of cases have only had experience with only one conversion. The researcher specifically did not ask for actual precise numbers because the survey respondents could not be expected to set out the responses in minute detail (3.4.4.4). It was to indicate an approximate involvement in projects. The results are shown in Figure 4.2.

Figure 4.2 - Participant's Conversion Project Experience

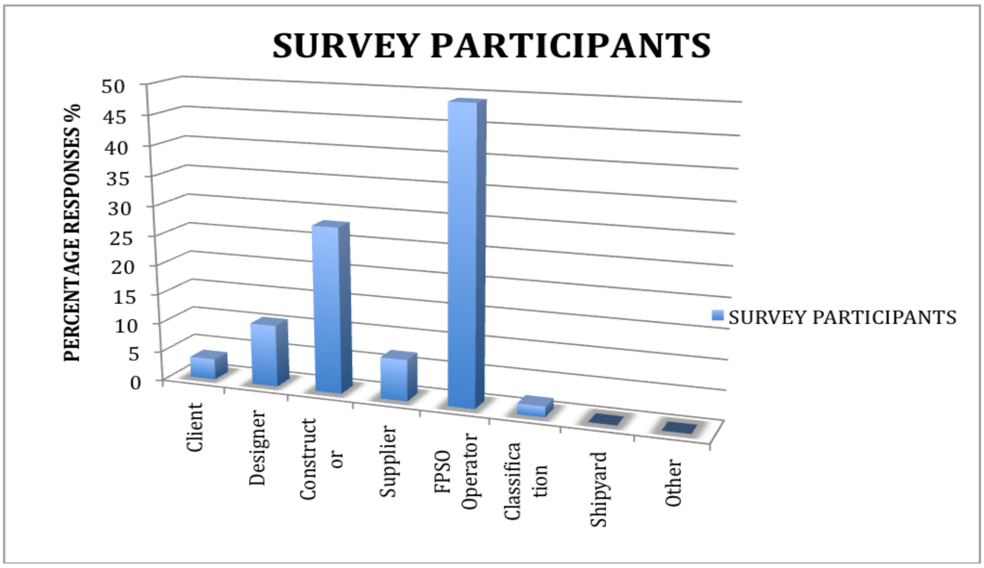


(Source: Developed for this Research)

4.5.4.4. Participant Involvement

The survey participation covered eight separate designations of involvement in conversions. These are as a client, designer, constructor, supplier, operator, classification society surveyor, shipyard employee, and other; [interested stakeholders]. There has been some "rounding up" as the results have been taken to one decimal point. For exploratory research purposes this has been deemed sufficient for analysis purposes (McMurray 2009). Details are shown in Figure 4.3.

Figure 4.3 – Respondent Participation



(Source: Developed for this Research)

The respondents to the survey for this research as asked in question 1a, were made up of Operators 49%, Constructors 25%, Designers 11%, Suppliers 7%, Clients, and Shipyard 3.5%, and Classification Societies at 1.8%. For the purpose of this research it is assumed that the respondents with involvement from constructor and shipyard could and would most likely be the same category, as it was found that the constructor is the shipyard owner or operator.

The number of operators and constructors in this research was sufficient to separate these groups in analysing the responses in Section 4.5.4.3.

Table 4.8 – Survey Respondents

	Respondents to the Survey	Involvement
1	Client	3.5%
2	Designer	11%
3	Constructor / Shipyard	28.5%
4	Supplier	7%
5	Operator	49%
6	Classification	1.8%

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

4.5.4.5. *Main Reasons for Budget and Time Overruns*

The results for the reasons for Budget and Time overruns were obtained from Question 2. The question was framed to obtain separate responses for Budget and Time to completion. The frequency results are shown in Table 4.9 and graphically in Figure 4.4.

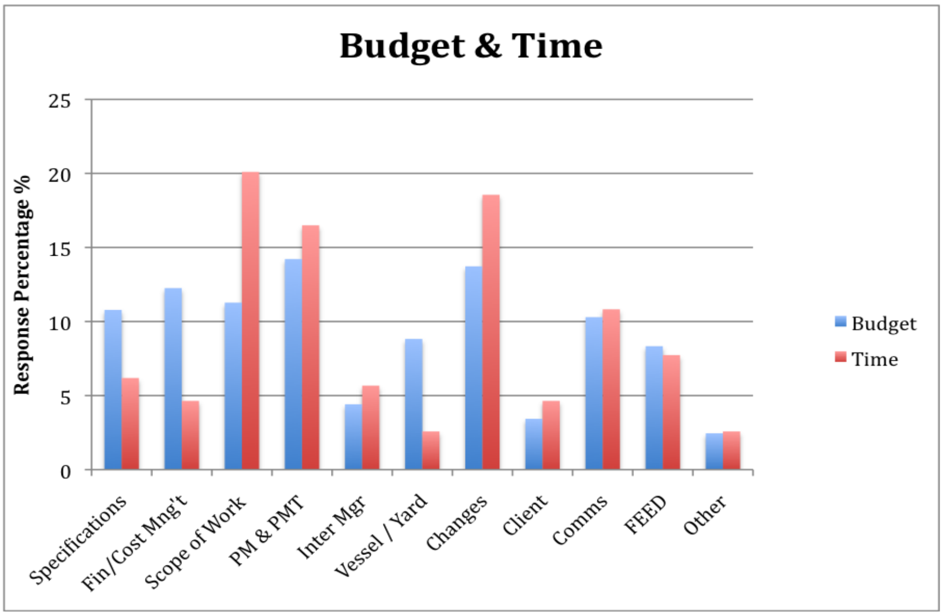
Table 4.9 – Budget and Time Analysis

	Reason	Impact BUDGET	Impact TIME
1	Specifications and Contract	11%	6.2%
2	Finance & Cost Management	12%	4.6%
3	Scope of Work, Schedule	11%	20%
4	Project Manager & Project Management Team	14%	16%
5	Changes / Variations Management	14%	19%
6	Communications	10%	11%
7	FEED	8.3%	7.7%
8	Selection of Donor vessel / Shipyard	8.8%	2.6%
9	Interface Mgr	4.4%	5.7%
10	Client Input	3.4%	4.6%
11	Other	2.5%	2.6%

(Sourced: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

Figure 4.4 – Graphical Budget and Time Analysis



(Sourced: Developed for this Research)

Respondents were not limited to the number of responses they considered critical or applicable. Consequently, the responses were prioritised as set out in Section 4.5.4.1. For consistency, six highest percentages of responses indicated on Figure 4.4 were used for prioritising the Budget Time results. The responses impacting Budget and Time were Project Manager & Project Management Team, Scope of Work/Scheduling, Changes/Variations, Communications, FEED, and Finance & Cost Management.

The aggregated frequency responses exceeded 70% for the six as shown in Table 4.10.

Table 4.10 – Aggregated Percentage of Total Responses for Budget and Time

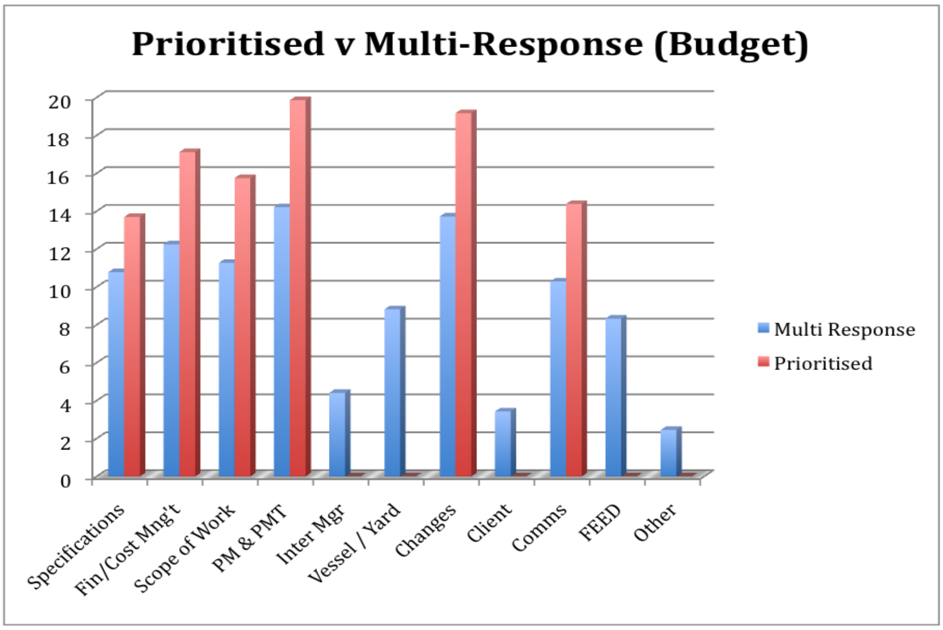
Critical Success Factors	Aggregated % Total Responses	
	Budget	Time to complete
Project Manager & Project Management Team	14	16
Finance & Cost Management	26	20.6
Changes/Variation Mgt.	40	39.6
Communications	50	50.6
Specifications & Contract	61	56.8
Scope of Work/Scheduling	72	76.8

(Source: Developed for this Research)

The respondent data was prioritised as set out in Section 4.5.4.1 by limiting individual responses to six. Frequency results were calculated for the prioritised data and compared with the original frequency responses as shown in Figure 4.5 for budget and in Figure 4.6 for Time.

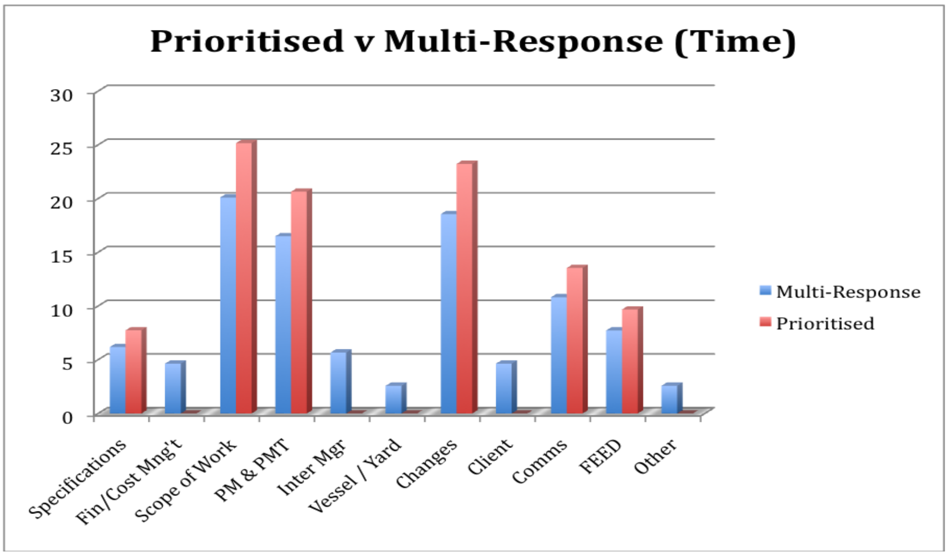
The prioritised results show an increase in the percentage of the higher frequency prioritised responses over the multi-response results, as would be expected, but did not significantly change the structure of the results.

Figure 4.5 – Prioritised vs Multi-Responses (Budget)



(Sourced: Developed for this Research)

Figure 4.6 – Prioritised vs Multi-Response (Time)



(Sourced: Developed for this Research)

A comparison of the percentage results for multi-response results and prioritised results is provided in Table 4.11 for both budget and time to completion.

Table 4.11 – Prioritised Multi-Responses (Budget and Time)

	Reasons	Impact on BUDGET	Impact on TIME
1	Project Manager & Project Management Team	20%	21%
2	Changes / Variations	19%	23%
3	Scope of Work	16%	25%
4	Finance and Cost Management	17%	-
5	Communications	14%	14%
6	Specifications and Contract	14%	7.7%

(Sourced: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

The Project Manager and Project Management Team give consistent and high-recorded responses with 20% impacting on Budget and 21% on Time to completion, respectively. Change/Variation Management is slightly lower for Budget 19% but have greater significance for time to completion 23%. Scope of Work & Scheduling has the highest recorded response 25% for Time to completion. Scope of Work & Scheduling gives a slightly lower recorded response (16%) than for Finance and Cost Management 17% for Budget. However, this difference is too small to be regarded as significant. The results are consistent for both the multi-response results and the prioritised results. Finance and Cost Management is not significant for Time to completion. The fifth highest recorded response for both budget and time to completion was Communications at 14% (Table 4.11).

All six reasons for Budget over-runs are approximately the same order (varying from 20% to 14%). The three most significant reasons for time to completion, Project Manager & Project Management Team, Changes/Variation Management, and Scope of Work / Scheduling, are the major reasons for time to completion (25% to 21%). Communications is the fifth highest at 14% (Table 4.11).

This research is exploratory and not designed to give precise and definitive answers to the order of priority. Where there are only small differences in results, it is not reasonable to conclude that there is a difference or that the order of importance can be precisely determined.

The aggregated percentage responses comparing budget and time to completion are replicated in Table 4.12. These results are compared against the operator and the constructor responses. The four highest frequency responses for the Budget are shown on the left of the table coloured in blue while the four highest frequency responses for Time are shown on the right of the table and coloured in a separate blue shade. The reason is to show the differences in the classification of critical success factors.

Table 4.12 - Comparison of Operators, Constructors Responses vs. Multi-Response

	Budget	Time				
	Multi	Opera's	Cons'	Multi	Oper'r	Cont'r
Specifications	11	13	12	6.2	6.3	9.5
Finance / Cost	12	14	12	4.6	4.5	4.8
Scope of Work	11	9.7	12	20	20	19
PM & PMT	14	13	15	16	19	14
Change/Var'ns	14	14	13	19	17	14
Communications	10	8.8	8.8	11	11	9.5
FEED	8.3	7.1	12	7.7	6.3	14
Vessel /Yard	8.8	7.1	8.8	2.6	1.8	3.2
IM	4.4	5.3	4.4	5.7	7.1	6.3
Client	3.4	5.3	2.9	4.6	4.5	4.8
Other	2.5	3.5	-	2.6	3.6	-

(Source: Developed for this Research)

As part of the feedback from the interviews (4.4.6), it was recommended that a broad cross section of personnel in the industry be included in the survey. It is likely that personnel from different sectors will have different views of the significant factors affecting budget and Time to completion. The sectors where the personnel who responded worked were addressed in Section 4.5.4.1. , Two of these groups, Constructors and Operators were large enough to allow a separate analysis to compare their views with the total multi-responses. To allow for clearer analysis, eliminating multi-responses of the least significant factors, has been done and the responses have been prioritised in the same manner as for the overall results.

In Table 4.12 the differences in the multi-responses for Time to completion are recorded. The respondent categories of Constructor gave lower percentages for Project Manager, Project Management Team, Change/Variation Management, and Communications compared to the Multi-responses and that of the Operator.

The Constructor results show FEED to be important for budget and for time to completion as shown in Table 4.12. The Constructor is the category directly responsible for carrying out the conversion. Thus, there is justification for placing more credence on their responses. In particular, the FEED outcomes lead directly to the specifications and contract on which the conversion is based.

The Operator is important, if not most important because it is the operator's responsibility for the whole future operations of the FPSO and all the factors affecting the conversion have a direct bearing on the success of the operator to complete the operations role efficiently.

4.5.4.5.1. Mann – Whitney Testing.

Mann-Whitney tests were conducted to ascertain whether there were significant differences between the Budget and Time results and between the multi-responses and the Operator and Constructor results. There were no significant differences between any of the results as shown below and referenced in the Appendix 4.

The multi-response results for Time were clearly different to those for Budget. Similarly, the Constructor places greater emphasis on the FEED as a critical success factor than the Operator or the aggregate of all responses (multi-responses).

Table 4.13 - Mann-Whitney Rankings

RANKINGS TO BE TESTED	TEST DATA	TEST STATISTIC CV = 1.96	RESULT
Budget vs Time	Multi-responses	-1.182	No significant difference
Multi-responses vs Constructor	Budget	0.394	No significant difference
Multi-responses vs Constructor	Time	0.197	No significant difference
Multi-responses vs Operator	Budget	0.066	No significant difference
Multi-responses vs Operator	Time	0.197	No significant difference

(Source: Developed for this Research)
(Gosling Jenny. Introductory Statistics. Pascal Press 1995.)

4.5.4.5.2. Summary

Question 2 of the survey was to ascertain what reasons impact on the budget and the time to completion. The multi-response data was compared to the results of the two highest categories of participants in the survey, that of the Operator and the Constructor.

The highest responses impacting on budget were:

- Project Manager;
- Project Management Team;
- Change/Variation Management;
- Finance & Cost Management; and
- Scope of Work.

- Scheduling.

While for time to completion the highest responses were:

- Scope of Work,
    - scheduling;
- Change/Variation Management;
- Project Manager;
- Project Management Team; and
- Communications.

It was not reasonable to conclude from the results that there is any difference or that the order of importance can be determined precisely. Rather than distinguishing a precise order between factors, the more important ones can be grouped together. It was noted that the Constructor placed a higher order of importance on FEED than the other respondents.

4.5.4.6. Project Manager Experience

Experience of the Project Manager on similar projects in the conversion industry was obtained from Question 3.

Respondents indicated that in 41% of cases the Project Manager had only a basic level of up to three conversions and in 33% of cases the Project Managers have had more than five projects in experience and were considered to be an experienced professional. Respondents also indicated that in 24% of cases an intermediate level of between three and five conversion projects was evident and the respondents indicated that in only 2% of cases the Project Manager had no experience on similar projects.

4.5.4.7. Responsibility for Project Risk

The person primarily responsible for the conversion project risk was obtained from Question 4. The initial results included multi-responses and are set out in Table 4.14.

Table 4.14 - Risk Responsibility

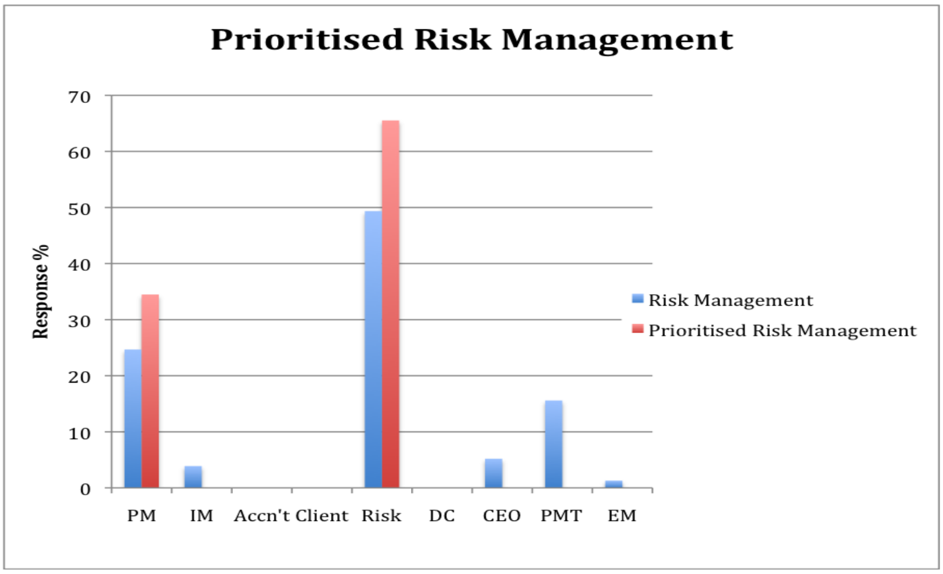
	Person	Response %
1	Project Manager	25%
2	Interface Manager	3.9%
3	Finance & Cost Management	-
4	Client	-
5	Risk Manager	49%
6	Document Controller	-
7	CEO	5.2%
8	Engineering Manager	16%
9	Other	1.3%

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

The Risk Manager 49% was shown as having primary responsibility, followed by the Project Manager 25% and the Engineering Manager 16%. The data was prioritised to remove the multi-response affect using a maximum of two categories per respondent. The primary responsibility still rested with the Risk Manager 66% and the Project Manager 34%.

Figure 4.7 – Prioritised Risk Management



(Source: Developed for this Research)

The frequency of updating the Risk Register was obtained from Question 4a. Responses showed that 60% have the Risk Register updated on a weekly basis, 19% say on a monthly basis. However 21% have indicated the register was never updated throughout the conversion project.

4.5.4.8. Appointment of Project Manager and Project Management Team

Results for the timing of the appointment of the Project Manager were obtained from Question 5 and the results are shown in Table 4.15.

Table 4.15 - Project Manager Appointment Timing

Timing	PM
Beginning of Field Development	45%
FEED	35%
Contract / Specification forming	16%
Selection of Constructor/ Yard	4%
Beginning of Conversion	-

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

Respondents stated that 45% of the Project Managers were appointed at the beginning of the Field Development Stage. Respondents also indicated 35% of the appointments were delayed until the FEED stage and 16% at the contract stage and the remaining 4% indicated at the constructor/shipyard selection stage.

Results for the timing of the appointment of the Project Management Team were also obtained from Question 5 and the results are shown in Table 4.16.

Table 4.16 - Project Management Team Appointment Timing

Timing	PMT
Beginning of Field Development	2%
FEED	18%
Contract / Specification forming	29%
Selection of Constructor/ Yard	16%
Beginning of Conversion	35%

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

In contrast to the high percentage of Project Managers appointed at the beginning of the field development, Table 4.15 shows that the majority of the Project Management Teams were appointed later. At the beginning of the conversion 35%, specifications & contract stage 29%, FEED 18%, and finally at the constructor/shipyard selection 16%.

Frequency responses in Table 4.15 show that 80% of the appointments were made on or after the signing of the contract.

4.5.4.9. Replacement of Project Manager or Project Management Team Member

Respondents indicated (Question 26) that where a need arose for replacement of the Project Manager or someone in the Project Management Team during the course of the project, the task was commonly undertaken using internal project personnel 31%, or the Second In-charge 19%.

The Second In-charge position is the Deputy Project Manager and this position would normally be held by one of the members of the Project Management Team. Internal personnel are considered others apart from the Deputy Project Manager/Second In-Charge. The operator of the completed conversion took over in 18% of cases. An outside person, that is someone recruited from outside the existing conversion project, was brought in as a new player. This accounted for 22% of the responses and 10% indicated there were no replacements.

4.5.4.10. Interface Manager

The frequency of appointment of an Interface Manager was obtained from Question 6. Most projects where respondents were involved had an Interface Manager appointed 71%.

4.5.4.11. Conflicts, Negotiations and Disputes

Responsibility for conflict negotiations and disputes was obtained from Question 7. Results show that the Project Manager was responsible in 37% of the cases. The Interface Manager was responsible in 29% of cases.

Multiple responses were received to the question suggesting that the responsibility was often shared amongst a number of people and not confined to the Project Manager or Interface Manager. The results were prioritised to two responses only. The results confirmed that the responsibility rested almost equally between the Project Manager 56% and the Interface Manager 44%.

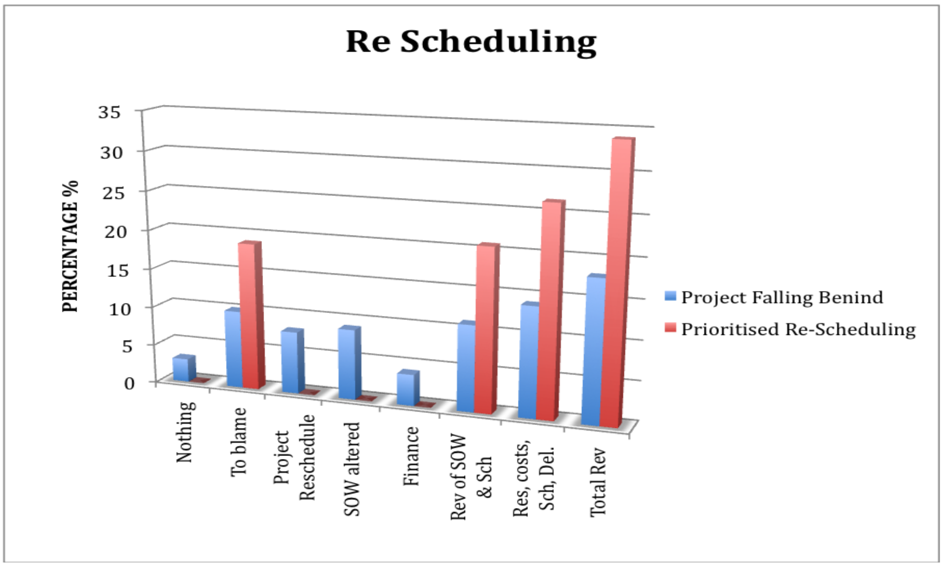
4.5.4.12. Project Falling behind, Plans for Project Improvement

Respondents were asked In Question 8 what was done when it was found that the project was falling behind. Responses to the actions taken are shown in Figure 4.8. After prioritising of the data to remove the multi-response affect, the responses show that every effort was made to ensure delivery on Time and on Budget in 34% of the cases.

A revision was carried out on resources, costs, schedule and client delivery; occurred in 26% of cases, while 21% of respondents reported that the Scope of Work and schedule were revised and short cuts were common.

In 19% of cases, ‘someone,’ was held out to blame for the situation in the project progress.

Figure 4.8 – Project Scheduling



(Source: Developed for this Research)

4.5.4.13. Finance Responsibilities

The responsibility and reporting arrangements for Finance were obtained from Question 9 and 10 and the results are shown in Table 4.17.

Table 4.17 - Reporting & Responsibility for Finance

	Project Management	Finance Reporting Line	Responsibility
1	Project Manager	51%	19%
2	Interface Manager	7.9%	-
3	Accountant / Finance Manager	4.5%	53%
4	Client	-	1.3%
5	Risk Manager	-	2.5%
6	Document Controller	-	-
7	CEO	31%	22%
8	Engineering Manager	3.4%	2.5%
9	Other	2.2%	-

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

Respondents indicated that 51% in of the time finance reported to the Project Manager who was responsible for managing the Finance in 19% of cases. Finance was thought to report to the CEO in 31% of cases, but the CEO only took direct responsibility in 22% of cases. The results indicate that the reporting and responsibility functions were managed between the Project Manager and the CEO of the project. Consequently, the Accountant/Finance Manager would have to report to two different persons in the project.

The respondents indicated that the primary responsibility for Finance rested with the Finance Manager in 53% of cases. Respondents reported 2.2% to Others. There is no method to ascertain whom the others were, however they have been considered as external parties to the Project Management Team, as all other participants have been identified within the Survey responses.

To allow the Accountant/Finance Manager to fulfill his obligations there will have to be a statistical analysis and forecasting of financial information, to the Project Manager and the Project Management Team. One method that can be used is the tried and tested process of Earned Value Management as mentioned in (2.4) and during the Focus Groups.

4.5.4.14. Budget Meetings - Performance & Progress

Arrangements for budget meetings to cope with project performance were obtained from Question 11 and the results are shown in Table 4.18. These results are what the respondents considered to have occurred during the conversion projects that they had been involved in.

In 29% of respondents the results indicated that following budget meetings, the budget was revised to be in line with the proposed delivery. Repercussions and options were then discussed at following progress meetings. At these meetings the Scheduler was instructed to revise the schedule to be in line with the budget in 25% of cases. In 2.7% of cases progress was never reported, and very rarely in 6.8% of cases. In these cases there was little communication being demonstrated. In 4.1% of cases all departments reported but nothing was done.

Table 4.18 - Project Performance & Progress

	Action	Responses
1	Never	2.7%
2	Vary Rarely	6.8%
3	All Department reported but nothing done	4.1%
4	Scheduler told to revise Schedule in line with budget	25%
5	Accountant told to cut Budget	8.2%
6	Project Manager told to cut Scope of Work	15%
7	Client informed of changes to Budget and Time	9.6%
8	Budget forecasts revised, all options discussed for plans to improve.	29%

(Source: Developed for this Research)

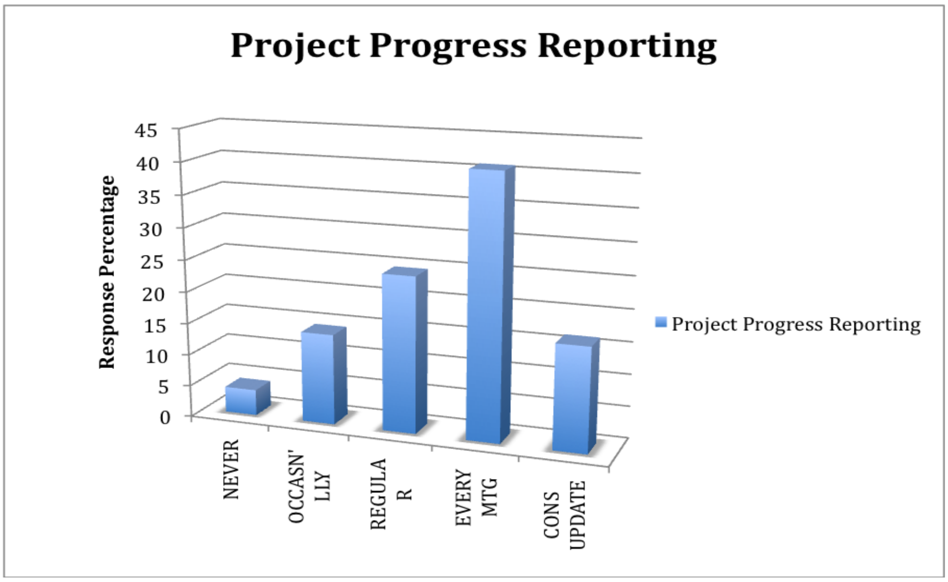
NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

It was thought that the Accountant was told to cut the budget in 8.2% of cases, the Project Manager told to cut the Scope of Work in 15% of cases, and the client informed of changes to the Budget and time to completion in 9.6% of cases. Overall, up to 13% of responses indicated that there was no consideration given to budgets on conversion projects.

The extent of project progress reporting was obtained from Question 12 and the frequency response results are shown in Figure 4.9.

Figure 4.9 shows the regularity of progress reporting varying from 41% of cases reporting every meeting, 24% of cases reporting regularly, 16% of cases reporting constantly, 14% of cases reporting occasionally, and 4.1% of cases reporting never.

Figure 4.9 – Project Progress Reporting



(Source: Developed for this Research)

The reporting statistics are interesting in that it provides information back to the client. The respondents have indicated in Question 22 that the client constantly asked for progress reports and the responses also indicate that the client had a strong interest in the schedule and the specifications for the conversion project.

4.5.4.15. Senior Management

Senior management was considered to be at a level equal to General Manager and above in any specific organisation, and of whom had direct control of performance budget and resources capable of delivering a project. The survey asked the question as to what was the attitude of the senior management when it was found the project was falling behind and responses were obtained from Question 13. Multi-responses were received. However, after prioritising the data to remove the multi response affect and limiting the responses to two individual categories, it was found that the results produced a distorted view and were rejected. Multi-responses were made available for several questions and by removing several responses from the analysis process negated some of the important response inputs. The results are shown in Table 4.19 and Figure 4.10.

In 27% of cases, senior management have taken the approach to have the Scope of Work, schedule and budget analysed to find a suitable recovery plan. In 20% of cases, it was decided to undertake an analysis to reduce the work associated with the contract. The Project Manager and Project Management Team combined were blamed in 21.6% of cases. Only 13% of responses indicated that an enquiry was instigated to find out the reason or reasons why and to plot a path to recover. In 10% of cases, more resources were added to the Project Management Team.

These results indicate that there appears to be a considerable lack of appreciation of the detail of the conversion project by senior stakeholders with a lack of guidance and assistance to the Project Manager and the Project Management Team to ensure the conversion project runs smoothly and with suitable forecasting and planning.

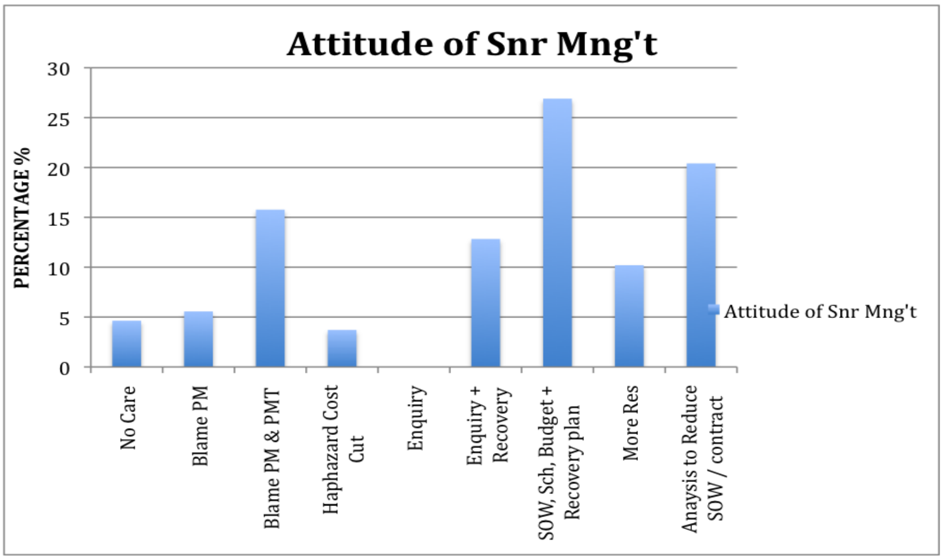
Table 4.19 - Senior Management Attitude - Project Schedule

	Attitude	%Responses
1	Could not careless	4.6%
2	Blamed the Project Manager	5.6%
3	Blamed the Project Manager and the Project Management Team	16%
4	Haphazard cost cutting ordered	3.7%
5	An enquiry to find out why	-
6	An enquiry to find out why and how to recover	13%
7	Scope of Work, schedule and budget analysed to find out a recovery plan	27%
8	More Resources added to the Project Management Team	10%
9	Analysis conducted to see how to reduce work load in view of Contract	20%

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

Figure 4.10 - Senior Management Attitude



(Source: Developed for this Research)

4.5.4.16. FEED

Information on how the FEED was conducted, who was involved and who controlled it were obtained from Question 14 and are shown in Table 4.20 and Figure 4.11. The results indicated that FEED was undertaken at the time of Field Development in 74% of cases. The remainder 26% indicated it was undertaken at the time of contract signing. The personnel involved in the FEED were obtained from Question 15. Multi-responses were received. Prioritising to remove the multi-responses was carried out. Two categories were allowed for each respondent. The results indicated that the Client 33%, the CEO 30%, and the Engineering Manager 30% all had significant involvement. The Project Manager 1.5%, and the Operator 1.5% had little involvement and the Project Management Team had no involvement.

Control of the FEED, was shown to be in the hands of the Client 48%, with the Engineering Manager 32% also having significant control. The CEO 9.7% had little control. These results indicate that the Engineering Manager was working directly with the CEO and the Client during the FEED and without much consultation with the Project Manager or other members of the Project Management Team.

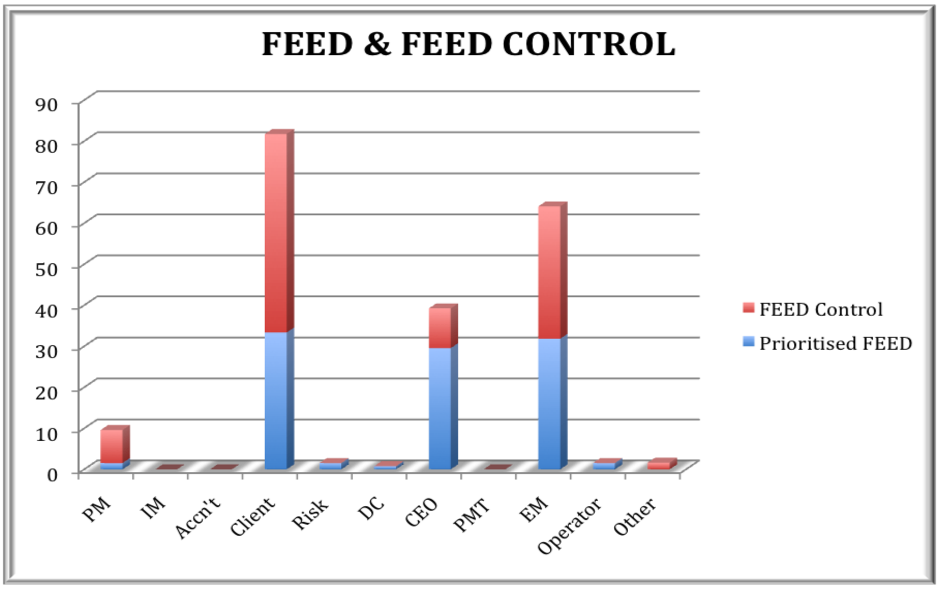
Table 4.20 - FEED, Involvement, and Control

When Feed was done.		Personnel Involved	Involv'mt	Control
Not done	-	Project Mgr	1.5%	8.1%
Field Dev.	74%	Interface Mgr	-	-
Cont Sign	26%	Accountant	-	-
Conv Start	-	Client	33%	48%
Delivery	-	Risk Mgr	1.5%	-
		Doc Controller	0.8%	-
		CEO	30%	9.7%
		PMT	-	-
		Eng Mgr	32%	32%
		Operator	1.5%	-

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

Figure 4.11 - FEED Involvement & Control



(Source: Developed for this Research)

4.5.4.17. Specifications

Information on the responsibility for the conversion project Specifications was obtained from Question 15 and the results are shown in Table 4.20.

Multi-responses were received. The data was prioritised to remove the multi-responses affect and limit the responses to two responses from each respondent. The results show that the responsible stakeholders have not changed from the multi-response results. However, there was substantial distortion of the original results and they have not been used.

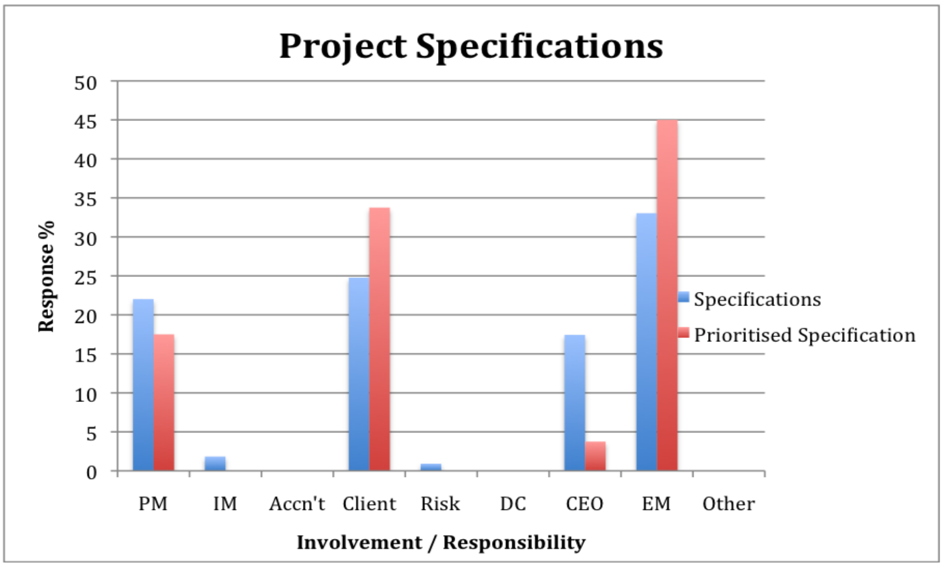
The results show that in 26% of cases it was indicated that the Engineering Manager has been directly involved in the FEED. The Client 20%, the Project Manager 18% and the CEO 14% were also involved. Multi-responses were received. After prioritising to remove the multi-response affect and allowing a maximum of two categories per respondent, the Client 34% and the Engineering Manager 45% were more heavily involved, but the involvement of the CEO, 14% reduced to 2.2%, was significantly reduced (Figure 4.12). Ideally, as mentioned earlier, the Project Manager should appoint the Project Management Team and together this group should be involved from the Concept/Development and the FEED phases of the conversion project. Table 4.21 indicates that this is not normally the case and is consistent with the results of Question 15.

Table 4.21 - Responsibility for Specifications

	Responsibility	**Response**
1	Project Manager	18%
2	Interface Manager	-
3	Accountant / Finance	-
4	Client / Client Representative	20%
5	Risk Manager	-
6	Document Controller	-
7	CEO	14%
8	Engineering Manager	26%
9	Other	-

(Source: Developed for this Research)

Figure 4.12 - Responsibility for Specifications



(Source: Developed for this Research)

4.5.4.18. Schedule

Results for the persons responsible for setting the time schedule for the conversion project were obtained from Question 16 and the responses are shown in Table 4.22 below. One half of the respondents indicated that external persons set the schedule parameters, namely, the Client and the CEO with 25% of the responses each. The Project Manager had input into the conversion project schedule in 23% of cases.

Under the PMBOK model (2.3.5) the schedule would be set in accordance with the Scope of Work, specifications, engineering, and procurement. The contract may stipulate a delivery date. However, this should not be agreed with unless a detailed schedule has been made relative to the matters raised above and presented to senior management.

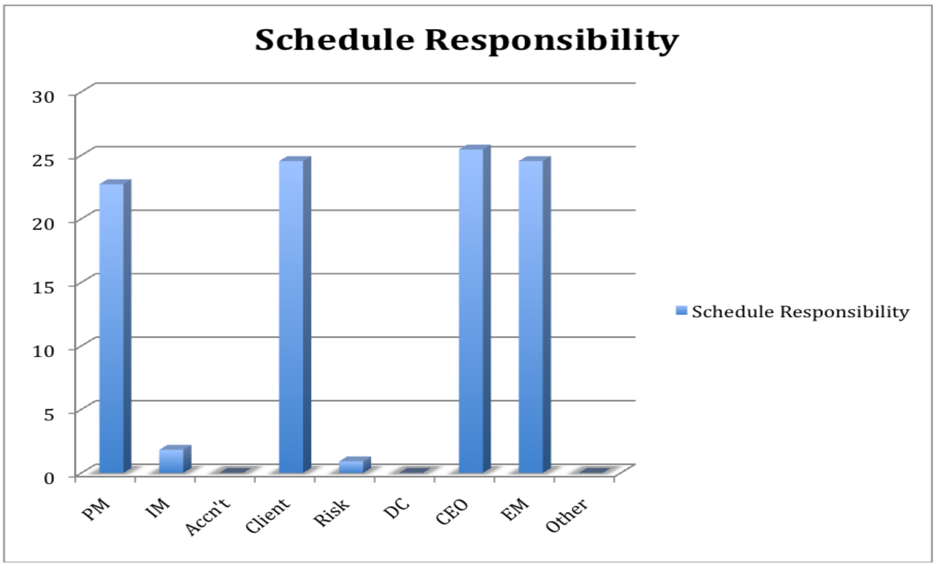
Table 4.22 - Time Schedule Responsibility

	Responsibility	% Response
1	Project Manager	23%
2	Interface Manager	1.8%
3	Accountant / Finance	-
4	Client / Client Representative	25%
5	Risk Manager	1%
6	Document Controller	-
7	CEO	25%
8	Engineering Manager	25%
9	Other	-

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

Figure 4.13 - Schedule Responsibility



(Source: Developed for this Research)

In Question 17, the respondents were asked if the time schedule for the conversion project was suitable for that conversion project. Respondents reported that the schedule was achievable in 55% of cases, but that in 43% of cases the schedule was unrealistic. A schedule was not prepared in 2% of cases.

4.5.4.19. Lessons Learned

The extent to which previous lessons learned were considered was investigated in Question 19, and the responses are shown in Table 4.23.

Table 4.23 - Lessons Learned

	Lessons Learned	**% Responses**
1	Lessons Learned never undertaken	23%
2	Lessons Learned investigation carried out and a process to consult commenced and someone was responsible	6.3%
3	Lessons Learned investigation carried out and a process to consult commenced but process not carried through.	13%
4	Lessons Learned mentioned at beginning of contract only.	6.3%
5	Lessons Learned mentioned at beginning of contract and then at the end.	17%
6	Lessons Learned investigation carried out and a process to consult commenced and someone made responsible and mentioned throughout the project duration	35%

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

The results show the two highest responses are at both ends of the spectrum for this question. Lessons Learned data was available throughout the conversion project in 35% of cases. In contrast, 23% indicated that there was no Lessons Learned data available.

4.5.4.20. Change/Variation Management

Question 20 explored the personnel who had control of the Change/Variation Management process. The results are shown in Table 4.24.

Table 4.24 - Change/Variation Management

	Personnel	Control
1	Project Manager	29%
2	Interface Manager	8.1%
3	Accountant / Finance	-
4	Client / Client Representative	3.5%
5	Risk Manager	7%
6	Document Controller	-
7	CEO	1.2%
8	Engineering Manager	49%
9	Other	2.3%

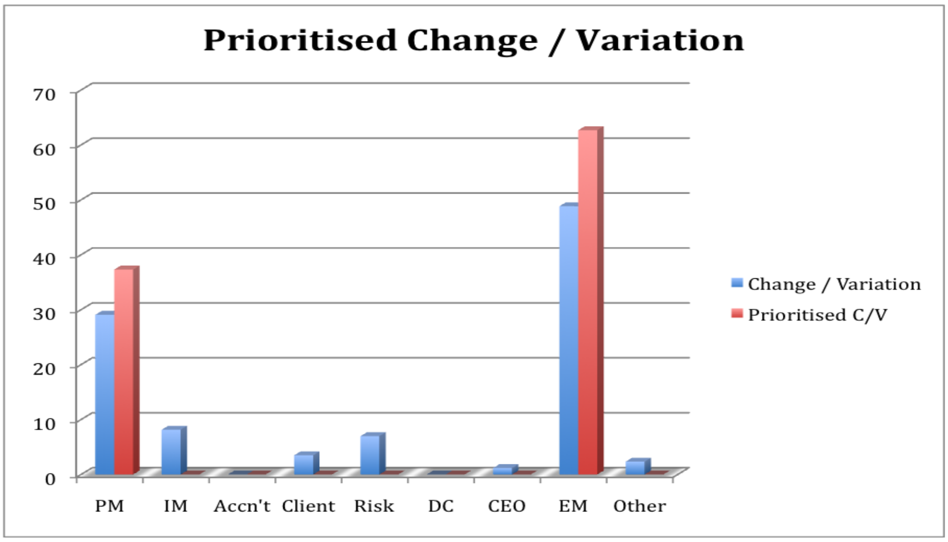
(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

Control of the Change/Variation management rested with the Engineering Manager in 49% of cases, but a significant number reported that control rested with the Project Manager 29%. The Risk Manager 7% and Interface Manager 8.1% had less control. Several respondents 2.3% indicated 'Other' as a category. However, as they did not distinguish whom these could be the response has been discounted for this research.

Multi-responses were received. The data was prioritised to minimise the multi-responses affect and each respondent was assigned two categories in their responses. Control of the Change/Variation Management has reverted to the Engineering Manager 63% and with the Project Manager 37%. The results are shown in Figure 4.14.

Figure 4.14 - Prioritised Change/Variation Management

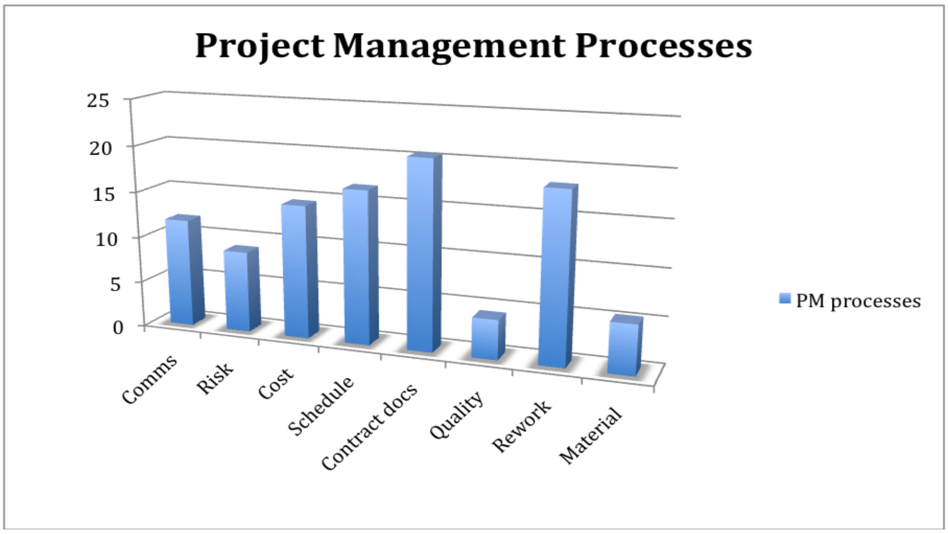


(Source: Developed for this Research)

4.5.4.21. Project Management Processes – Schedule

Question 21 asked the respondents for their input to indicate what project management processes were used to maintain the schedule. The initial results are shown in Figure 4.15. Most of the processes were reported as important in maintaining the schedule. The multi-response affect was investigated by limiting the number of responses to two categories for each respondent.

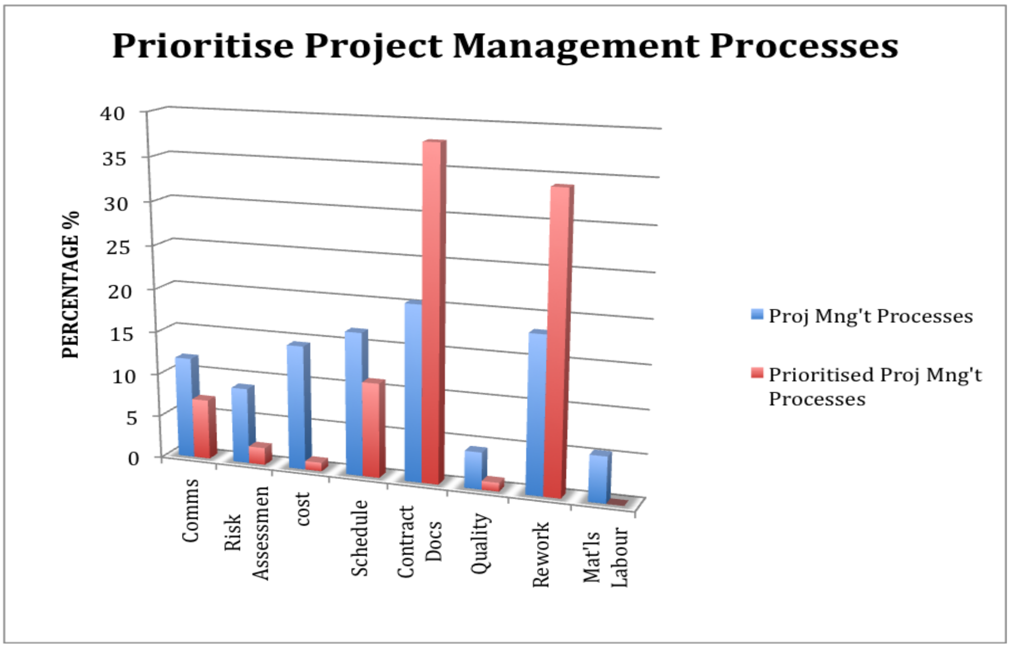
Figure 4.15 - Project Management Processes to Maintain the Schedule



(Source: Developed for this Research)

The results are shown in Figure 4.16, which identifies two items, impacting the schedule, contract documents 38%, and Rework 34%. Rework is that work which is not completed in accordance with the specifications or associated standards and is most likely to need to be altered, or repeated.

Figure 4.16 - Prioritised Project Management Processes to Maintain the Schedule



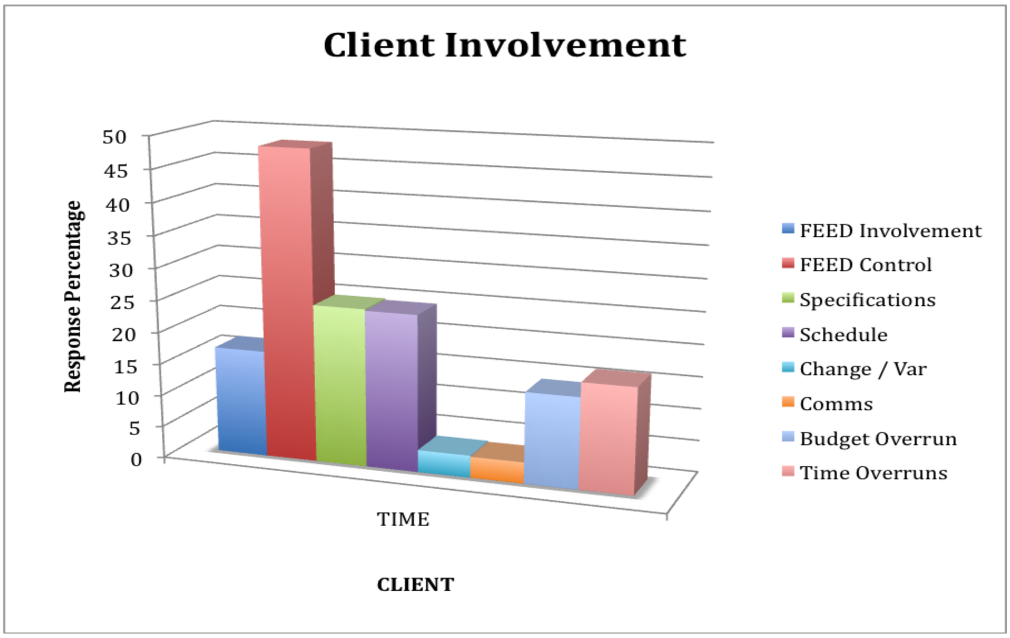
(Source: Developed for this Research)

4.5.4.22. Client Input

Results for the extent of Client input into the conversion project were obtained from Question 22 and the results are shown in Figure 4.17.

The responses indicated that the client had a constant involvement in the project progress in 38% of cases, some involvement in 34% of cases, and minimal involvement in 24% of cases. There was no involvement reported in 4% of cases.

Figure 4.17 - Client Involvement in the Project



(Source: Developed for this Research)

The analysis in Question 22 found that the client was actually involved in various areas within the project as shown in Table 4.25. The respondents indicated that in 48% of the cases the client controlled the FEED, and in 17% of the cases was actively involved in the FEED, 34% of the cases the client controlled the specifications and in 25% of the cases the client controlled the Scheduling and the client had minor percentage involvements in most other areas on the conversion such as budget 2%, time to completion 9% Change/Variation 3.5% and Communications 3%. These responses show that the Client was involved across the conversion project in various categories at the same time thus giving multiple responses.

Table 4.25 - Change Involvement in Various Processes of the Project

	Client Involvement	% Response
1a	In the Project as a Respondent	2%
2	Budget	7%
2	Time	9%
4	Project Risk	-
7	Conflicts, Negotiations and Disputes	-

9	Finance Reporting	-
10	Finance Responsibility	1.3%
14a	FEED involvement	17%
14b	FEED Control	48%
15	Specifications	34%
16	Schedule	25%
20	Change/Variation Management	3.5%
24	Communications	3.3%

(Source: Developed for this Research)

NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

4.5.4.23. Communications Set Up and Responsibility

Results for how the communications were established for the project and the extent of structure in the communications control system were obtained from Question 23. A structured communications control system was established in 51% of cases, a basic system in 37% of cases and a detailed structured system in only 13% of cases. Results for where the responsibility for communications rested were obtained from Question 24 and the results are shown in Table 4.26.

Table 4.26 - Responsibility for Communication

	Project Management	**Response**
1	Project Manager	38%
2	Interface Manager	27%
3	Accountant / Finance	-
4	Client / Client Representative	3.3%
5	Risk Manager	1.1%
6	Document Controller	21%
7	CEO	1.1%
8	Engineering Manager	8.5%
9	Other	-

(Source: Developed for this Research)

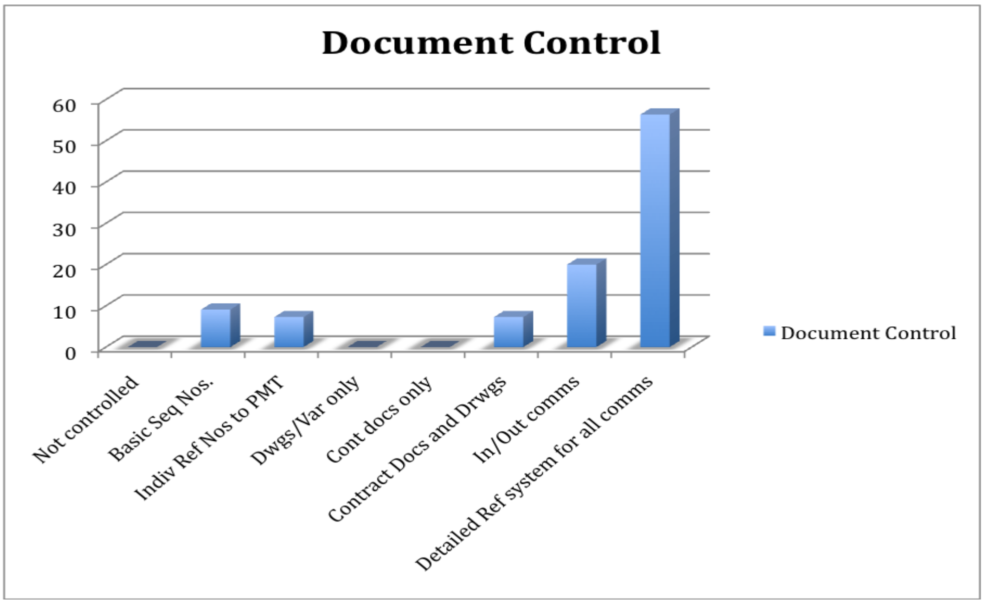
NB: Percentage totals may not add up to 100% due to rounding up to one decimal place.

The Project Manager was reported as being responsible for communications in 38% of cases. Within the Project Management Team, respondents indicated that communications were handled in association with the Interface Manager in 27% of cases and in association with the Engineering Manager in 8% of cases. The Document Controller charged with managing the conversion project document retentions, distribution, revision and archiving has been shown to have control of communications in 22% of cases.

4.5.4.24. Document Control

Question 25 addressed the extent of document control used. Respondents indicated that detailed referencing of all documents, including e-mail traffic, was used in 56% of cases, and incoming and outgoing written communications were sequentially numbered for library purposes, referencing, and archiving in 20% of cases. A basic sequence numbering system was used in 9% of cases, individual numbers were issued to members of the Project Management Team in 7% of cases, and only contract documents and drawings were referenced and controlled in 7% of cases.

Figure 4.18 - Document Control Methods



(Source: Developed for this Research)

Table 4.27 - Survey Summary

Questions	Responses
1. Can you relate your experiences in the management of conversion of Oil Tankers to FPSOs?	Chapter 4, Section 4.5.4.1
a) In what position were you involved in a project?	Chapter 4, Section 4.5.4.2 and Figure 4.3,
2. What, in your words, was the main reason for the success of the project in regards to budget and time?	Chapter 4, Section 4.5.4.3 and Figure 4.4, Figure4.5, figure 4.6, Table 4.10, Table 4.11, Table 4.12.
3. What experience did the Project Manager have on similar projects?	Chapter 4, Section 4.5.4.4
4. Who was primarily responsible for managing Project risk?	Chapter 4, Section 4.5.4.5 and Table 4.13
a. How often was the Risk Register updated?	Chapter 4, Section 4.5.4.5 and Figure 4.7
5. When was the Project Manager appointed?	Chapter 4, Section 4.5.4.6 and Table 4.14
a. When was the Project Management Team appointed?	Chapter 4, Section 4.5.4.6 and Table 4.15
6. Was there an Interface Manager or any type of Interface Co-coordinator appointed?	Chapter 4, Section 4.5.4.7
7. Who primarily handled conflicts, negotiations, and disputes resolutions for the project?	Chapter 4, Section 4.5.4.8
8. When it was found that the project was falling behind what was done to re-schedule or develop an alternative plan to get the project back to schedule?	Chapter 4, Section 4.5.4.9 and Figure 4.8

9. Where did Finance fit into the Project Management Team and or others involved in the project management?	Chapter 4, Section 4.5.4.10
10. Who was primarily responsible for Finance?	Chapter 4, Section 4.5.4.10 and Table 4.16
11. How did budget meetings cope with project performance and progress?	Chapter 4, Section 4.5.4.11 and Table 4.17,
12. How was project progress reported?	Chapter 4, Section 4.5.4.11 and Figure 4.9, Table 4.17.
13. What was the attitude of senior management when it was found the project was falling behind	Chapter 4. Section 4.5.4.12 and Figure 4.10, Table 4.18.
14. When was the FEED carried?	Chapter 4, Section 4.5.4.13 and Table 4.19 and Figure 4.11
a. Who involved in FEED?	Chapter 4, Section 4.5.4.13 and Table 4.19 and Figure 4.11
b. Who controlled FEED?	Chapter 4, Section 4.5.4.13 and Table 4.19 and Figure 4.11
15. Who primarily formatted the Specifications for the project?	Chapter 4, Section 4.5.4.14, Table 4.20, Figure 4.12.
16. Who primarily set the time schedule parameters for the project?	Chapter 4, Section 4.5.4.15 and Table 4.21, Figure 4.13.
17. Was the time schedule reasonable to achieve a successful project?	Chapter 4 Section 4.5.4.14 and Table 4.21
18. If not when this point was made?	Chapter 4 Section 4.5.4.15
19. How were "Lessons Learned" primarily handled in your organisation?	Chapter 4 Section 4.5.4.16 and Table 4.20
20. Who primarily managed Change/Variations?	Chapter 4, Section 4.5.4.17 and Table 4.23 and Figure 4.14

21. What project management processes were used to manage changes and maintain schedule?	Chapter 4 Section 4.5.4.18 and Figures 4.15 and Figure 4.16
22. How much say did the Client have into the project progress?	Chapter 4, Section 4.5.4.19 and Table 4.21.
23. How was communications set up in the project management?	Chapter 4, Section 4.5.4.20
24. Who was primarily responsible for Communications?	Chapter 4, Section 4.5.4.20 and Table 4.26
25. How were documents and document control maintained throughout the project?	Chapter 4, Section 4.5.4.21 and Figure 4.17
26. What happened if the Project Manager or one or more of the Project Management Team were replaced or left?	Chapter 4, Section 4.5.4.6.1

(Source: Developed for this Research)

4.5.5. Summary

In this section the responses to the survey questions have been reported and analysed.

The focus groups and face to face interview responses were qualitative; they could only give some indication of which critical success factors were the most important; e.g., there is an indication that the Project Manager and Project Management Team appointments were very important. Question 2 was added to the survey to address Research Question RQ2 examining the relative importance of the critical success factors.

The survey responses have covered a wider audience of the conversion industry and provided data for analysis for ascertaining the critical success factors and performance of these factors in practice.

4.6. ADDITIONAL FACTORS

4.6.1. Introduction

During the focus groups, interview participants identified additional critical success factors to those determined from the literature review.

The additional factors provide a different approach to the important factors in development of a project, however they can be incorporated into the PMBOK model. This will lead to an enhancement rather than a replacement of the model. The details of these additional factors are discussed in this section.

4.6.2. Whole of Life Cost Concept – CSF10

Participants in the focus groups and interview responses indicated that the correct approach to planning for a conversion should be by the adoption of a whole of life project cost analysis.

Participants [P8] and [P14] stated that the long term costs calculated over the life of the proposed project are more reliable indicators of value for money than considering the construction costs of the conversion project. The integrated approach to the design, construction, operations, and maintenance will improve the HSE, operational sustainability, asset reliability, and lead to the reduction of waste and maintenance costs. The money spent on a good design, based on the whole project, will be saved in the conversion and operations periods. The costs for the whole of life project are made known at the beginning of the project, thus allowing all stakeholders to be aware in the beginning of the entire cost for the life of the project and when these are likely to occur.

These costs include all internal resources and organisational overheads. The risk allowances, flexibility of the assets such as refurbishment, maintenance, upgrading, sustainability and health and safety aspects for the facility (OGC 2007).

One participant [P1] in focus group 1 indicated that in assessing the whole of life costs it is necessary to understand what whole of life project meant. It has to consider the design, service, project economics, operational useful, and technological. An independent designer consultant in the focus group responded that in many cases the FEED was used as a commercial tool for the Client to verify the future production parameters, however, it should be considered as a basis for the Scope of Work and specifications for the conversion project.

4.6.3. Safety Case Regime – CSF11

Three Participants [P2], [P8} and [P12] indicated that integration of the safety case regime into the design and construction of the conversion avoided to a great extent, the need and provisions for change/variations to meet safety requirements set by regulatory authorities and relevant to the location of the field using the conversion. Further, the design of the vessel requirements, taking into account the safety requirements for systems and all the operations, makes the operations of the facility far easier than a facility constructed without the provisions of a safety case regime, and so comply with regulatory requirements, which generally exist in the conversion industry for FPSOs today.

All plant modifications, variations on operating conditions and or new ownership mean that the risk picture is subject to change. Regulators and other stakeholders will ask to justify the continuing operation of the installation through the application of a safety case. Regulatory compliance is essential to the business operations (BV 2007).

Safety case is used to describe a sophisticated, comprehensive, and integrated risk assessment found in the safety management system. It must be a true reflection of the state of safety arrangements for the existing or proposed facility. The claim to safety has to be supported by a formal safety assessment of the major risks identified at that operation described in the facility description (Rasche 2001). The safety case is used to cover the operations, however it is necessary to extend the beginning of the claim back to the time of the FEED and the specifications. If the design is not correct and the equipment is not correct then the operations cannot be correct.

Participant [P4] made the point that the safety case is actually a document, which is produced by the operator of the facility. The document will set out the identification of all the hazards and risks associated with the proposed project. It will describe, in detail, how all hazards and risks will be controlled, and then it will describe the safety management system, which will be put in place to ensure there are sufficient controls in place to be effectively, efficiently and consistently applied to all activities for the whole life of the project. Participant [P8] added that the safety case has to identify and assess all the critical safety aspects of the facility in both a technical and managerial format.

4.6.4. Standardisation – CSF12

Participants have commented in responses within their focus groups, that there should be a degree of standardisation made in the specifications and Scope of Work for the conversion project. Standardisation should be used at the time of designing or establishing the Scope of Work for the conversion. Standardisation is that process of utilising the history of the conversion industry and applying it to current and future projects. Use of past learning and experience in design, construction, and operation of FPSOs should allow the addition of new processing, procedures, technology, and equipment involved in the conversion to be limited to approximately (20%) of the total design, rather than trying to redesign the entire facility.

There has been thirty years of converting tankers to FPSOs and a large percentage of these have been individual conversions with little comparison to previous conversions completed. This may have been a major factor in budget and time overruns for these projects. The result is likely to reduce budget and time overruns.

4.6.5. Risk Management – CSF13

Although participants and respondents in the focus groups and survey respectively presented their inputs, several participants in the second focus group indicated that, in their experiences, risk identification and analysis was carried out at the beginning of the project; e.g., at about the time of the FEED. However, the continuous reporting of risk and risk assessment has not advanced from the initial stage of project development onto throughout the conversion project. The lack of this risk reporting interfered with the progress of the conversion project to completion. Once the conversion project began, the internal project management process incorporated into the PMBOK model managed Risk Management accordingly. Participants highlighted the fact that the identification, assessment, and management of risk had to continue throughout the whole production project.

A specific question on conversion project risk was included in the survey (Question 4). The results are shown in Figure 4.18. The Risk Manager was stated as the responsible person in 64% of responses. A number of respondents indicated the Project Manager (32%) and the Interface Manager (1.7%) had a minor responsibility.

Risk associated with the conversion project as mentioned above is reported to be managed within the internal project management processes within the PMBOK model and has not been treated as an additional critical success factor.

4.6.6. Summary

In this section the views of the participants of the focus groups on additional critical success factors have been discussed. These points have been presented as additional critical success factors to existing practices however they can be applied to the existing project management processes as a means of enhancing the PMBOK model.

The input from the focus groups, interviews, and survey responses in relation to risk are considered applicable to the whole production project rather than the conversion phase of the whole project. Risk management for the whole production project may include that of the conversion project, however, it is not within the scope of this research. The input in (4.6.5) relating to risk management, in CSF13, has been discounted to the conversion project and will not be included as a critical success factor for this research.

These additional factors are external to the existing project management processes. They apply to the disciplines, which begin before or at the formation of the conversion project parameters. The additional critical success factors directly affect the disciplines of FEED and then the resultant specifications for the conversion project.

4.7. CONCLUSIONS

This chapter has described the data collection and analysis used in this research. The identified responses impacting on the project management of a conversion project have been discussed.

Three methods of data collection have been used:

- Focus groups to confirm critical success factors and identify any additions;
- Interviews for a concise understanding from senior management and to confirm the Survey; and
- A Survey put to respondents in the conversion industry.

The data collection has resulted in a mixture of qualitative and quantitative data. The data has provided a basis for analysis, to verify or negate the research questions and to solve the research problem.

Chapter 2 identified nine critical success factors and the focus groups have discussed, referenced, and commented upon them. The focus groups have also identified additional critical success factors and raised issues within the critical success factors that warranted further investigation. To do this, 18 questions were developed from these indicated issues raised, for testing in a survey. These questions were tested through a set of face to face interviews.

The outcome from these interviews was that the interviewees agreed that a survey would add value and should be directed to the widest possible range of personnel in the industry. Some of the initial questions needed to be expanded further to cover the conversion project spectrum and so the number of questions for the survey increased to 26.

The 26 survey questions are related back to the critical success factors as shown in Table 4.7.

The next chapter seeks to link the findings and outcomes to the research questions. Responding to the research questions will lead to drawing conclusions about the research problem and indicating possible future directions for extending this research.

CHAPTER 5 – RESEARCH OUTCOMES AND CONCLUSION

5.1. INTRODUCTION

The previous chapter described the analysis of the primary data and the linkages between the literature review and the research findings for the project. This chapter expounds this data and draws a number of conclusions from the research by answering the following research questions (1.3).

Research Question RQ1: - *What are the critical success factors associated with conversions of Oil Tankers to FPSOs?*

> **Research Objective RO1:** - *To identify the critical success factors associated with conversions of Oil Tankers to FPSOs?*

Research Question RQ2: - *What is the order of likely importance of the critical success factors?*

> **Research Objective RO2:** - *To determine an order of likely importance of the critical success factors.*

Research Question RQ3: - *What are the key issues to be addressed in each of the critical success factors to improve their efficiency?*

> **Research Objective RO3:** - To *identify the key issues in each critical success factors.*

Research Question RQ4: -*What are each recommendation and/or each guideline for stakeholders to enable them to manage projects successfully in terms of cost and time to complete?*

> **Research Objective RO4:** - *To formulate recommendations and/or guidelines for stakeholders to enable them to manage projects successfully in terms of cost and time to complete.*

Figure 5.1 provides an outline structure for Chapter 5. The chapter structure begins with an introduction summarising the research process. The section covering the research questions and research objectives follows this. The research questions have been answered individually and include a summary at the end of each question. An overall summary covers the points elaborated during the responses to the questions, at the end of the four questions section. The chapter continues with a section covering the limitations found during this research. The limitations begin in Chapter 1 through to Chapter 5 where additional constraints have become known, as the research progressed.

A section on the suggestions for future research follows, which provides details of proposed topics that warrant further research. The suggestions have been identified after considering the limitations and the outcomes from this research. The final section in this chapter is a section on the conclusions, which summarises the findings of the research project.

Figure 5.1 – Outline Structure for Chapter 5

5.1 - INTRODUCTION

5.2 RESPONSES TO RESEARCH QUESTIONS

5.2.1 - RQ1

5.2.2 – RQ2

5.2.3 – RQ3

5.2.4 – RQ4

5.2.5 - SUMMARY

5.3 - LIMITATIONS

5.4 - FUTURE RESEARCH

5.5 - CONCLUSIONS

(Source: Developed for this Research)

Figure 5.2 is a map of the flow of data through this chapter from the introduction, followed by the identification of the research questions (Chapter 1.3). At the end of each research question is a conclusion relative to that question. A summary of the results follows RQ4. The next section covers limitations followed by proposals for future research. The chapter is completed with a conclusion.

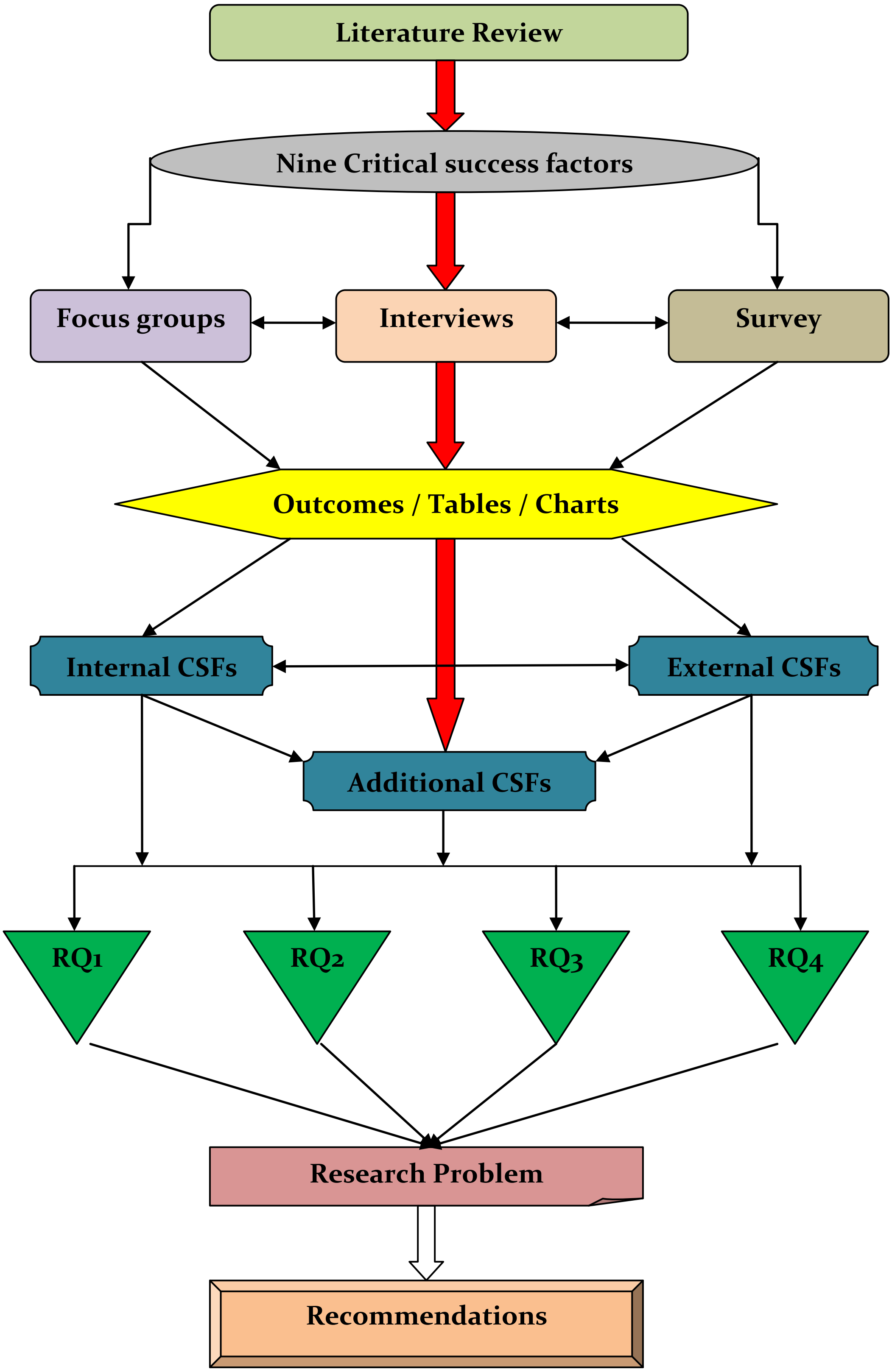
The primary data collection methods utilised focus groups, face to face interviews, and survey (Chapter 3).

Focus group members were asked to approach this research from the point of view of determining the most significant critical success factors and identifying the conditions necessary for those critical success factors to be achieved. Additional critical success factors were identified The responses from the focus groups were qualitative and could only give some indication of which critical success factors were the most important.

The face to face interviews sought the experience, within the oil and gas industry, of the interviewees to respond to the application of the critical success factors. It was possible to quantify the denominators from the responses received from industry veterans during the face to face interviews for summarising the results although the detailed qualitative responses were recorded and used in the research.

Quantitative type questions were developed for the survey based initially on the responses from the focus groups and interviews. The questions were designed to determine the actual practices in use in conversions as a means of comparing actual practice against the most desirable requirements identified by the focus groups. The survey also included questions to obtain an indicative quantitative priority of the order of importance of the critical success factors, which could not be obtained from the qualitative results of the focus groups. The results of the primary data collection are set out in Table 4.4.
The research outcomes and conclusions are set out in this chapter including the formulation of a set of recommendations pertaining to this conversion industry, as shown in the final section of the diagram (Figure 5.2).

Figure 5.2 - Concept Map for Data Flow



(Source: Developed for this Research)

The data analysis results for the research questions are discussed in this chapter, thus partly addressing the requirements for the research problem.

5.2. RESPONSES TO THE RESEARCH QUESTIONS

Each of the four research questions has been addressed in turn, drawing on the responses from the focus groups, the interview responses, and survey as set out in detail in (5.1).

5.2.1. RQ1 – What are the Critical Success Factors Associated with the Conversion of Oil Tankers to FPSOs?

The literature review identified nine critical success factors (2.9). The focus groups confirmed the existence of the nine critical success factors. Four additional critical success factors were identified during the focus group sessions and from the interview responses. However, these were reduced to three in the final list (4.6.6). The twelve critical success factors were categorised into those that directly impacted on the steps in the PMBOK conversion process (Internal) and those that impacted the formulation of the conversion project (External). The revised list of Critical Success Factors and their categorisation into Internal and External are shown coloured **RED** and **BLUE** in Table 5.1.

The focus group and interviewees, and the survey respondents' views of each of the critical success factors, set out in detail in Chapter 4 have been summarised in the following text.

Table 5.1 – Critical Success Factors

NAME	CRITICAL SUCCESS FACTOR	Category
CSF1	Project Manager	Internal
CSF2	Project Management Team	Internal
CSF3	Interface Manager.	Internal/External
CSF4	Communications.	Internal
CSF5	Customer Input.	External

CSF6	**Finance &Cost Management**	**Internal**
CSF7	**Front End Engineering and Design (FEED)**	**External**
CSF8	**Scope of work**	**External**
CSF9	**Change/Variation management**	**Internal**
CSF10	**Whole of Life Cost Concept**	**External**
CSF11	**Safety Case Regime**	**External**
CSF12	**Standardisation**	**External**

(Source: Developed for this Research)

The Project Manager (CSF1) is one of the most important critical success factors for the conversion project (4.3.4.1). The Project Manager is the person responsible for the successful management of the conversion project and has to be able to cope with the complexity of the whole project. Experience and capability are crucial to achieving the goals of a successful conversion project.

The Project Management Team (CSF2) needs to be appointed as soon as possible after the appointment of the Project Manager. The Project Manager must control the appointment of the Project Management Team, including selection criteria, and timing (4.3.4.2). Project Management Team members may be multi-skilled to cover more than one discipline or category; however, it will be an obligation of the Project Manager to manage the team members.

The Interface Manager (CSF3) role has to be positioned within the project management structure to administer the relationships and interfaces between the external and internal stakeholder needs (4.3.4.3). The Interface Manager should control conflicts, negotiations, and disputes, which involve both internal and external stakeholders, in conjunction with the Project Manager. This has the benefit for the smooth flow of project management processes. The Interface Manager is not directly mentioned in the PMBOK model. The Interviewees were unanimous in indicating that there should be an Interface Manager appointed on all conversion projects (4.5.4.8).

Communications (CSF4) is the connection between all the processes within the project (4.3.4.4). It is a prime project management process within the PMBOK model and this process has to include the external stakeholder needs and influences associated with the conversion project, as well as the internal communications within the conversion project management process. A detailed structured system is mandatory to enable referencing, control and archiving of data and information to be maintained. This allows ongoing revision of documentation to be made known to those concerned. As changes and alterations occur, they can be managed in accordance with set standards (4.5.4.20).

Client Input (CSF5) provides direct access to the requirements of the client and to the conversion contract deliverables. The Interface Manager provides the link between the client and the internal conversion processes. The client is rarely involved in conversion project management internal conflicts, negotiations or disputes resolution, Finance and Cost Management, Communications, and Change/Variation Management (4.3.4.5).

Finance and Cost Management (CSF6) covers the accounting during the project, as money is being spent. This will include the conduct of budgeting, forecasting, projecting and tracking cost performance against plan for the project and periodic reviews. The process will include a review process of performance against original plan and project versus project. Finance and Cost Management has been described as one of the most significant critical success factors for the conversion project (4.3.4.6).

FEED (CSF7) has to involve all controlling stakeholders (4.5.4.14). In the early stages of any new project, there is a need to define the basic scope, parameters, and economic impact of what is to be involved. The parameters of the FEED need to be concise and detailed and formally controlled, through the Project Manager.

The focus group responses indicated that the FEED was necessary to identify the total capital costs required especially if the project is intended to be project financed (4.3.4.7).

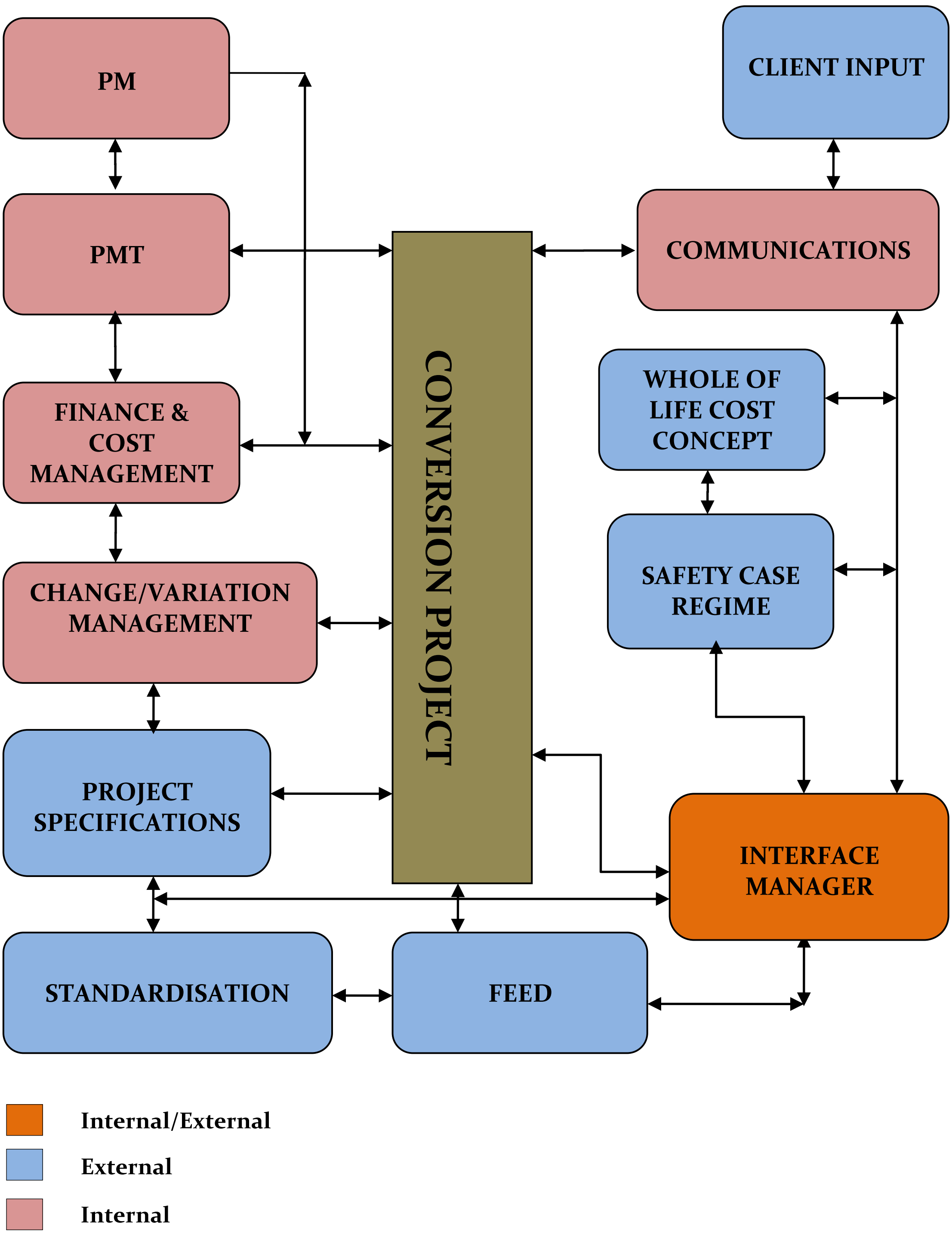
Scope of Work (CSF8) is the definition in the contract of what has to be done to achieve the contract deliverables (4.3.4.8). It has three sub-sections; specifications, scheduling, and selection of a donor vessel and shipyard (4.3.4.8, and 4.5.4.14). Determining the Scope of Work needs to involve the Interface Manager, the client, external engineering personnel, suppliers, equipment manufacturers, statutory authorities, safety representatives, and all personnel involved in the FEED process (4.3.4 and 4.5.4.13).

Change/Variation Management (CSF9) is the administration of any necessary changes and/or variations during the conversion project. The propensity to have changes/variations is minimised if the terms and conditions of the contract are concise and accurately reflect the specifications (4.3.4.9).

The Whole of Life Cost Concept (CSF10) covers the oil production project from initial geology/drilling and through to the final decommissioning. An integrated approach to the design, construction, operations, and maintenance of all elements in the whole project, including the conversion, will improve the health safety & environment [HSE], operational sustainability and asset reliability, and lead to reduction of waste and maintenance costs (4.3.4.10 and Appendix 4).

The Safety Case Regime (CSF11) should be used as a format for the specifications for equipment selection, and a format for project management to adopt during conversion (4.3.4.10, and Appendix 5).

Figure 5.3 - Revised Twelve Critical Success Factor Relationships



(Source: Developed for this Research)

Integration of the Safety Case Regime into the design and construction of the conversion minimises the need for change/variations to meet safety requirements set by regulatory authorities and relevant to the location of the field using the conversion (4.3.4.10 and Appendix 5).

Standardisation (CSF12) is a process of utilising the history of the conversion industry and applying it to current and future projects. A general limit of 20% of the specifications for new technology was suggested (4.3.4). The application of the process of standardisation has been shown to be effective in reducing costs of conversion projects using the data stored in Lessons Learned files (4.3.4.10 and Appendix 6).

Figure 5.3 shows the twelve critical success factors and the individual relationships within the conversion project. The relationships with each of the factors, is indicated, whether internal or external to the conversion project management process.

5.2.1.1. Conclusion to RQ1

The response to this research question has identified twelve critical success factors associated with a conversion project. These are listed in Table 5.1 and have been categorised as being internal or external to the project management processes. The Interface Manager is classified as fitting both the internal and external critical success factor categories and has the role of the management of the interfaces existing within the conversion project.

5.2.1.2. Reflection of Findings on the Literature

The literature review (2.6) indicated nine potential critical success factors for the efficient conversion of an oil tanker to an FPSO. These original nine critical success factors have been verified through this research, as being actively involved in the conversion industry and have integral parts to play with a conversion project. The research has indicated that these nine critical success factors should be expanded to include three additional critical success factors making a total of twelve critical success factors after the research. Eleven of the total critical success factors have been able to be categorised as internal or external to the PMBOK model of project management, with one, being that of Interface manager, categorised as both internal and external to the PMBOK model.

The next section provides findings for the second research question.

5.2.2. RQ2 – What is the Order of Likely Importance of the Critical Success Factors?

This research question looks to rate the twelve critical success factors shown in Table 5.1 in an order of importance.

The following steps were used in rating the critical success factors:

1. Questions 2 & 2a in the survey was included to ascertain the relative importance of a number of issues that could be related to the nine critical success factors identified in Chapter 2. The importance of the critical success factors to contain budget and time to completion overruns was ascertained. These issues were compared to determine if there was any commonality or whether there were particular critical success factors that applied for budget and different ones for time to completion (4.5.4.5).
2. The research was exploratory. Consequently, the extent to which the priority order for each critical success factor could be reliably determined was closely examined.
3. Survey respondents came from various conversion industry disciplines. The results were examined to determine if there were different views of the critical success factors between the operator, the constructor and all respondents (Table 4.12)
4. Additional critical success factors were identified (4.3.4.10 and 5.2.1). The

relationship between the original nine critical success factors and the additional critical success factors was examined to ascertain:

a. Can any of these additional critical success factors be incorporated into the original critical success factors?
b. Can any of the additional critical success factors be removed?

As explained in Section 5.2.1 the Scope of Work critical success factor includes the specifications, scheduling, and the donor vessel and shipyard and have been grouped together. Therefore, the Scope of Work results only have been included in the examination of the relative order of importance of the critical success factors. The Project Manager and Project Management Team critical success factors were linked into one question (4.5.4.5) and the results have been assumed to apply equally to these two critical success factors.

Table 14.2 in Chapter 4 demonstrates the results of the four highest frequency responses for the highest two groups of respondents to the survey, being those of the Operator and the Constructor.

Responses to Questions 2 and 2a have been summarised in Table 5.2. The responses for all respondents (Multi-responses) have been listed together with those of the operator and constructor groups.

Table 5.2 - Comparison Operator & Constructor Responses Vs. Multi-Responses

	Budget			Time		
	Multi	Oper'r	Const'	Multi	Oper'r	Const'
Scope of Work	11	9.7	12	20	20	19
Specifications	11	13	12	6.2	6.3	9.5
Vessel /Yard	8.8	7.1	8.8	2.6	1.8	3.2
PM & PMT	14	13	15	16	19	14
Change/Variation Management	14	14	13	19	17	14
Finance & Cost Management	12	14	12	4.6	4.5	4.8
Communications	10	8.8	8.8	11	11	9.5
FEED	8.3	7.1	12	7.7	6.3	14
Client	3.4	5.3	2.9	4.6	4.5	4.8
I M	4.4	5.3	4.4	5.7	7.1	6.3
Other	2.5	3.5	-	2.6	3.6	-

(Source: Developed for this Research)

It was not possible to determine a precise relative order of importance of the critical success factors from the data analysis. The results of an exploratory research survey with a relatively small number of respondents cannot be expected to be definitive but can only give an indication of the likely order of importance.

The results for relative order of importance on budget for six critical success factors (Table 4.9) were similar. Results varied from 14% to 10%. Because of the relatively small sample and the exploratory research paradigm, it would be unreasonable to differentiate an order of importance between each of these.

However, the results for FEED, Client Input and Interface Manager show them to be clearly of lesser importance (Table 4.12). The six critical success factors were:

CSF 1 - Project Manager;

CSF 2 - Project Management Team;

CSF 9 – Change/Variation Management;

CSF 6 – Finance and Cost Management;

CSF 8 - Scope of Work;

- Sub Section of CSF8 - Specifications;
- Selection of Donor Vessel and Conversion Shipyard

CSF 4– Communications;

There was a much sharper differentiation evident in the results for relative order of importance in time to completion. Five critical success factors give results varying from 20% to 11%, namely;

CSF 8 – Scope of Work

CSF 9 – Change/Variation Management;

CSF 1 - Project Manager

CSF 2 - Project Management Team;

CSF 4 – Communications;

The remaining four were clearly of lesser importance (Tables 4.9, 4.12, & 5.2).

Client Input and Interface Manager are low in Table 5.2, as they did not fair as a high response percentage critical success factor for the Operator and/or Constructor relative to Multi-Responses for the budget and time overruns, responses in the survey. Client Input and Interface Manager were found significant and this was indicated in sections 4.5.4.22 and 4.5.4.23 respectively.

The constructor is a person most directly involved and has one of the largest responsibilities within the conversion project. The views of the constructor are therefore of particular importance. The operator was included because of his deep interest in the functionality of the conversion. The constructor placed a significantly higher emphasis on the FEED, a result that could be expected because of the impact of the FEED, which directly affect the ability of the constructor to manage the conversion project. This issue needs to be pursued through further research (5.4). While this difference is noted, the multi-response data has been regarded as the most appropriate category of results from which to draw conclusions.

The results above show that the time to completion critical success factors are common with the budget critical success factors. The budget list includes an extra critical success factor of Finance and Cost Management (CSF6). It was not possible to determine a precise relative order of importance for these critical success factors. It can be concluded that the following five critical success factors were indicated as impacting the highest on both budget and time to completion:

CSF1 - Project Manager;
CSF2 - Project Management Team;
CSF9 - Change/Variation management;
CSF8 - Scope of Work;
CSF4 – Communications.

Finance and Cost Management is an important critical success factor that impact the management of budget overruns. Further, there is an indication that FEED is an important critical success factor affecting both budget and time to completion (4.5.4.4).

From this exploratory research it has been possible to indicate groupings of critical success factors and the internal and external role of these in achieving budget and time to completion. It has been possible to indicate the relative order of importance of some of the internal factors.

The internal critical success factors of Project Manager, Project Management Team, Change/Variation Management, Finance and Cost Management, and Communications have been gathered into one group, the critical success factors identified as having an important impact on budget and time to completion. These factors made up 50-51% of the multi-responses for budget and time to completion. The factors making up the Scope of Work were also grouped. These made up 30-33% of the responses. Noting the importance placed on the FEED by the constructor, the external factors of FEED, Client Input, and Interface Manager were grouped with approximately 18-21% of responses.

Using the conclusions drawn above, the results in Table 5.2 were grouped to provide further information on the relative importance of the critical success factors. The grouping is shown in Table 5.3.

Table 5.3 – Consolidated Results

	Budget			**Time**		
	Multi %	**Oper' %**	**Const %**	**Mult %**	**Oper' %**	**Const' %**
PM & PMT- Change/Variations, Finance/Cost Management, Communications	50	49.8	48.8	50.6	51.5	42.3
Scope of Work- Specifications, Scheduling & Selection Vessel/Yard	31	29.8	32.8	28.8	28.1	31.7
FEED, Client Input,	19.0	21.2	18.4	20.6	20.4	26

Interface Manager						

(Source: Developed for this Research)

The responses to the sub-question 'Other' were very small and the details cannot be determined. However, it is assumed that these would be external influences to the conversion project and the response result has been included with the external factor grouping of FEED, Client Input, and Interface Manager.

The additional critical success factors were not included in Question 2 of the Survey. These external critical success factors were revealed during the focus groups and interviews (4.3.4.10) and can be directly related into the parameters for the scope of the FEED (4.3.4.7).

The focus groups, and interviewees all emphasised the importance of the Project Manager (CSF1) (4.3.4.1) and Project Management Team (CSF2) (4.3.4.2) as the most important of the nine critical success factors. These qualitative responses provide justification for an order of importance for these factors within Group 1. There is no priority order within Group 2 as it consists of one critical success factor, which has three sub-sections, Group 3, which consists of the external critical success factors of Interface Manager (CSF3) (4.3.4.3), Client Input (CSF5) (4.3.4.5), and FEED (CSF7) (4.3.4.7).

Group 4, which consist of the additional external critical success factors of Whole of Life Cost Concept (CSF10), Safety Case Regime (CSF11) and Standardisation (CSF12) (4.3.4.10).

A grouping of all the critical success factors is shown in Table 5.4.

Table 5.4 – Critical Success Factors

	Grouping	Critical success factors
1	Group 1	CSF1, * CSF2*, CSF4, CSF6, CSF9
2	Group 2	CSF8
3	Group 3	CSF5, CSF7, CSF3
4	Group 4	CSF10, CSF11, CSF12

(Source: Developed for this Research)

Note *: These are the two most important critical success factors for the conversion project.

5.2.2.1. Conclusion to RQ2

The importance of the critical success factors to the success of the conversion project have been identified and discussed. While it has not been possible to determine a precise relative order of importance, some conclusions have been drawn for the internal critical success factors. The critical success factors have been grouped separately as the internal factors, the Scope of Work, the ancillaries, and the external factors. The fourth group contains the newly identified additional external critical success factors. The relationships suggested between the critical success factors are set out in Table 5.4.

5.2.2.2. Reflection of Findings on the Literature

The original nine critical success factors as shown in (2.6). After the research it was possible to group the critical success factors into four distinct groups. The critical success factors in Groups 1, 2 and 3 have been reviewed in the literature review in Sections 2.3 and 2.4 and have been discussed in detail.

Change/Variation Management (CSF9) is discussed in 2.3.16. The PMI PMBOK Guide (2008, p 126) incorporates various separate elements of Change/Variation Management in the change management plan but does not include it as a specific item. This research indicates that the Change /Variation Management is a significant and important critical success factor for the success of a conversion project and as such needs to have precise control and administration applied to it, more so than what is indicated with the PMBOK model of project management. The research indicates that the PMI PMBOK model could be improved by including Change/Variation Management as a separate item.

The Group 1 critical success factors of Project Manager (CSF1), Project Management Team (CSF2), Change/Variation Management (CSF9) and Communications (CSF4) hold the highest grouped response percentages of approx 51%. Group 2 covering the critical success factor of Scope of Work (CSF8), which includes the sub sections of Specifications, Selection of Donor Vessel and Conversion Shipyard, covers the next highest response percentage of 31% as discussed in 2.3 and 2.4. The literature review did not identify any previous research indicating the relative importance of the critical success factors in the conversion of oil tankers to FPSOs. This research adds new knowledge to the literature.

The next section provides findings for the third research question.

5.2.3. RQ3 – What are the Key Issues to be addressed in each of the Critical Success Factors to improve their Efficiency?

Integration Management is recognised in the PMBOK model as a means of integrating all internal project management processes consisting of four core functions of Scope, Time, Cost, and Quality Management and four facilitating functions of HR, Communications, Risk, and Procurement Management (2.3.2).

Five of the identified critical success factors are internal to the conversion process, these being Project Manager (CSF1), Project Management Team (CSF2), Communications (CSF4), Finance and Cost Management (CSF6), Change/Variation Management (CSF9).

The core function, Scope of Work (CSF8), defines the extent of the conversion work. In this research, it has been identified as an external factor to the conversion project management process (2.3.5, 4.5.4.15, 4.5.4.16 & 4.5.4.18).

The process of identifying the Scope of Work (CSF8) includes input from the identified critical success factors of FEED (CSF7), Customer Input (CSF5), Whole of Life Concept (CSF10), Safety Case Regime (CSF11), and Standardisation (CSF12). The Scope of Work consists of three sub-sections of specifications, scheduling and the selection of the donor vessel and conversion shipyard. These external factors have to be included in the concept/development and FEED phases of the whole project. The outcomes of the FEED are the basis for the specifications for the conversion project, and then onto the Scope of Work.

The research has shown that the external factors were significant in achieving budget and time to completion. These factors are not directly included in the PMBOK model however, because of their significance, the model should be modified in format to include them or to have provision for their input.

The management of the interfaces existing between the external and internal factors has a direct bearing on budget and time to completion. An Interface Manager (CSF3) is shown to be essential in managing the internal/external interfaces. The client and other stakeholders such as suppliers, constructors, sub-contractors, consultants, and equipment manufacturers for the conversion project have to be managed. This will be through the Interface Manager, in conjunction with the Project Manager, and Project Management Team (5.2.1). The Project Manager and Project Management Team need to be involved from the concept/development and FEED phases of the conversion project.

The internal process of Integration Management within the PMBOK model is discussed in the literature review covering the integration of all existing internal project management processes (2.3.3). The management of the interfaces that exist between the internal and external elements has to be directly associated with the successful application of Integration Management (2.3.4). However, the results of reported conversion projects over the past 15 years have shown that the management of these interfaces has not been well practised (Nooteboom 2004), and therefore, the role of Interface Management has been included in this research as a parent discipline.

This research showed that the FEED and other external factors having a direct bearing on the Scope of Work were significant in achieving budget and time to completion. Therefore, the PMBOK model should be modified to include these (5.2.2) for a conversion project, as mentioned above. Client Input provides the direction to the conversion management for contract deliverables, changes, progress, and budget/time compliance (4.5.4.20).

The Whole of Life Cost Concept is a provision whereby all the costs associated with the whole oil production project are highlighted and all stakeholders are aware of the costs and individual responsibilities (4.6.2). The Safety Case Regime is the criteria designated for the operation of an FPSO applied to the design criteria of the facility (4.6.3). Standardisation is the process of using past FPSO design and operational history and applying this to current and proposed new facilities (4.6.4). Figure 5.3 shows the process of the internal and external critical success factors working in relation to one another and interacting within the project management process for the conversion project.

In the FPSO, conversion industry the research showed there is a need to utilise additional categories to complete the project management structure. These additional categories include the application of the Whole of Life Cost Concept, a Safety Case Regime and Standardisation implementation (4.6) and they will need to use the Interface Manager to co-ordinate the resultant interfaces.

The client, and other external stakeholders such as suppliers, constructors, sub-contractors, consultants, and equipment manufacturers for the conversion project have to be managed, which will be through the Interface Manager, in conjunction with the Project Manager, and Project Management Team (5.2.1).

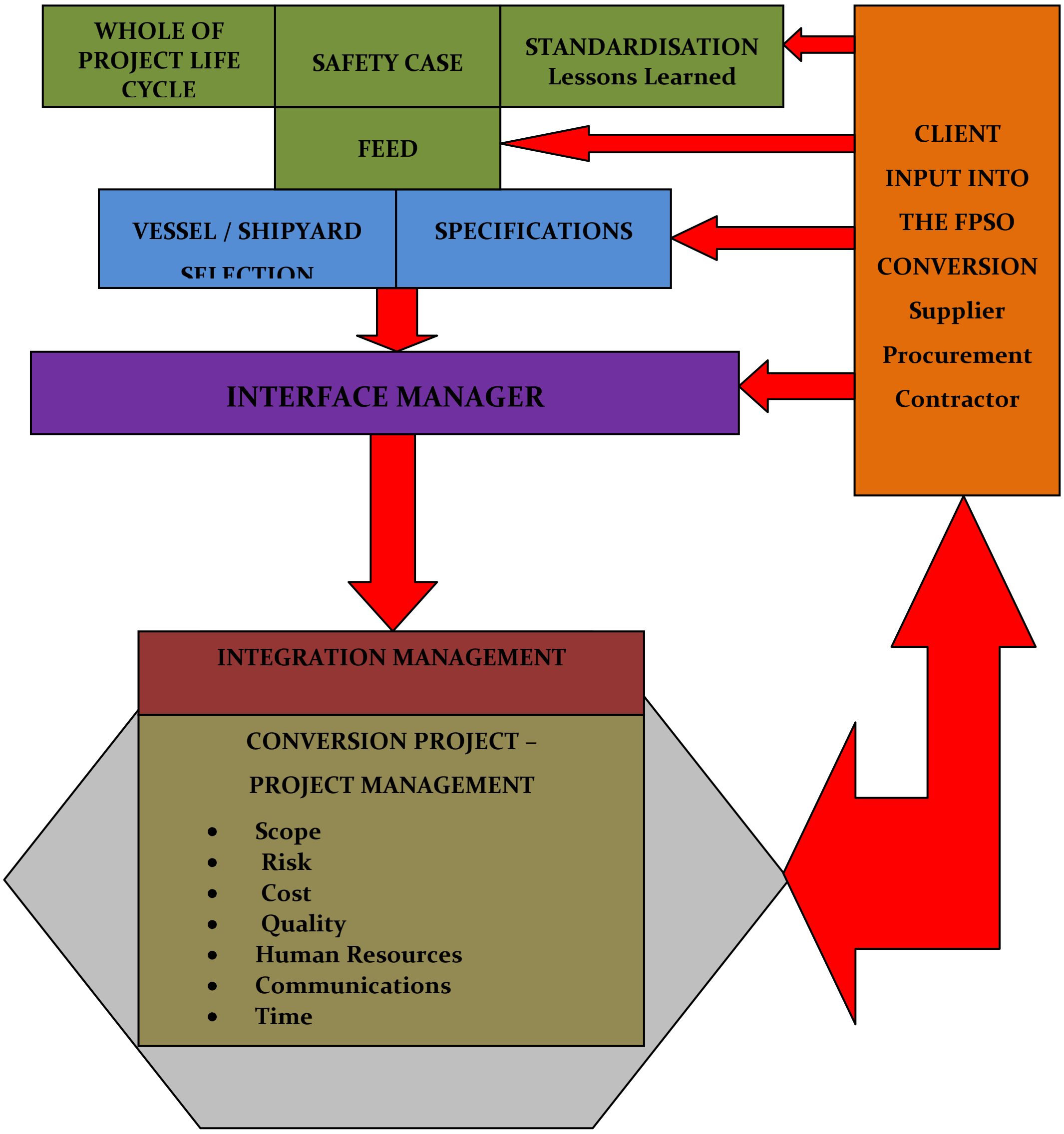
These additional external factors have to begin in the concept/development and FEED phases of the whole project. The outcomes of the FEED are the basis for the specifications for the conversion project, and then shape the Scope of Work.
It is for the Project Manager and the Project Management Team together to be involved from the concept/development and the FEED phases of the conversion project; however, Table 4.19 indicates that this is not normally the situation.

The Interface Manager allows for a smoother flow of communications and manages the interests of external stakeholders associated with the conversion project. To complete these functions for the external stakeholders, the Interface Manager has to be a part of the project management team (5.2.3.4).

5.2.3.1. Proposed Project Management Process for an FPSO Conversion

The research discussed above leads to a revised project management model. This incorporates the external factors associated with a conversion project. The external factors of Whole of Life Cost Concept (CSF10), Safety Case Regime (CSF11), Standardisation (CSF12), are linked into the FEED (CSF7) phase of the whole project. Figure 5.4 is a diagrammatical view of this model.

Figure 5.4 - Project Management Model for an FPSO Conversion



(Source: Developed for this Research)

5.2.3.2. *Conclusion to RQ3*

This research question has indicated that the external factors (Table 5.1) are particularly important. These external factors manifest themselves in the development/concept stage of a project and are particularly relevant to the FEED and Scope of Work for a conversion project (Table 5.3). The PMBOK model can be improved by the addition of these external factors because of their importance in providing input into preventing budget and time overruns. The use of the Interface Manager to co-ordinate the activities of the external and internal critical success factors into the revised project management processes plan was perceived to be of high importance to a successful conversion.

5.2.3.3. Reflection of Findings on the Literature

The literature review indicated that the PMBOK model is focused on the internal processes for management of a complex project. The external factors are acknowledged as important but are taken as given. The research demonstrated that these external factors, and the Interface Management between the internal and external factors, are important for successful completion of the conversion of oil tankers to FPSOs. The literature review indicated that there was no research into the relative importance of the internal and external factors in the management of complex projects.

The research results demonstrate that although the PMBOK model of project management can be applied to a conversion project in its present format (PMI PMBOK Guide 2008). The newly ascertained additional external factors of Whole of Life Cost Concept (CSF10), Safety Case Regime (CSF11), Standardisation (CSF12), have to be managed through the Interface Manager. The internal process of Integration Management (2.3.4) is set up to control the remaining nine elements of project management and it will need the involvement of the Interface Manager (2.4.2) to work in conjunction with the Integration Management process (2.3.4).

The next section provides findings for the fourth research question.

5.2.4. RQ4 – What are the Recommendations and/or Guidelines for Stakeholders to enable them to manage Projects successfully in Terms of Budget and Time to Completion?

5.2.4.1. Conditions for Successful Critical Success Factors

Table 5.5 provides a summary of the conditions for successful implementation of the critical success factors (4.3.4) and these are described for each critical success factor.

Table 5.5 - Conditions Recommended for Success of Critical Success Factors

Critical Success Factors	Conditions for Success
CSF1- Project Manager [PM] (Internal)	• PM appointment timing should be made as early as possible in the project timeline, • PM should have detailed up-to-date qualifications and experience in Project Management processes, • PM should control the FEED process and required outcomes and the various people attending the FEED, • PM should have references of past experience in a similar type of project, • Persons making PM appointment have to understand the role in question, • PM role should be a structured position and may or can consist of more than one person, • PM should control the Finance and Cost Management although through a Finance and Cost Manager as part of the PMT, • PM should select the PMT, • PM should be on strong character to withstand the onslaught of various stakeholders projecting their individual points of view, • PM should be involved in the selection of Donor vessel and Conversion Shipyard.
	• PMT should be selected by the PM, • PMT should be sufficient in size and skills to cover all required disciplines in the Project Scope of Work, • PMT has to be independent, • PMT has to be structured & experienced in the type of project, • A budget has to be made to cover the formation of the PMT,

CSF2- Project Management Team [PMT] (Internal)	• PMT members should attend the FEED as required, • PMT should be selected as soon as possible after the PM appointment; generally, appointments made too late, PMT should be involved in selection of Donor vessel and Conversion shipyard.
CSF3- Interface Manager [IM] (External)	• IM should be appointed for the conversion project, • IM should be a senior member of the PMT, • IM should manage all external matters to contract, manage the project communications in conjunction with PM, • IM should handle all external stakeholders and commitments associated with the project. • IM should manage Culture management for the stakeholders, • IM should be actively involved in the conversion project Communications, • IM should be actively involved in the setting up of Document Control and the process for maintaining Project communications control.
CSF4- Comm's (Internal)	• PM & IM should manage project communication, • Internal Conversion Project communications should be controlled within the PMT, • IM should have a strong involvement of control of all Communications for the project, • Communications should be controlled in a detailed structured manner, • Communications could involve access to lessons learned from past projects. • Communications will include the communications requirements of all the project stakeholders, and the technologies or methods used to transfer this information.
CSF5- Customer Input (External)	• Client should have access however it has to be through a structured and controlled process, • Client should be involved in the FEED process but not control the actual outcomes and process of completion, • Client should set the contract parameters for the deliverables of the conversion project,
	• Finance is for the whole of life for the project and should be assessed accordingly, • Finance & Cost Manager appointment should be as early as possible and continue after the completion of conversion project,

CSF6 -Finance and Cost Management (Internal)	• Finance & Cost Manager has to be involved in Procurement, • Finance and Cost Management practices should be robust and statistically structured. • Budget for the conversion will take 90% of the whole project costs and importance needs to be assigned accordingly, • PM should be strong enough in character to manage the PMT and organise the conversion budget, • Budget has to mirror the Specifications and Scope of Work in detail. • Bill of Materials should be established first, • Estimates of all proposed conversion work should be completed in line with Scope of Work.
CSF7- Front End Engineering and Design (FEED) (External)	• More attention should be paid to the FEED by all stakeholders to the conversion, • FEED needs to conducted early in the whole project, • FEED outcomes need to be the basis for the specifications of the project, • Who should control the FEED and outcomes? • FEED should have standardisation input. • FEED needs to access the "Lessons learned" data, • FEED outcomes should consider the type of project, • Stakeholders and direct participants in the FEED process have to have sufficient authority to make decisions on project Specifications etc, • FEED output is for the specifications for the whole project and not just for a commercial verification of existing well data.
CSF8-	• Scope of Work has three sub sections. They are Specifications, Scheduling, and the Selection of the donor Vessel and conversion Shipyard, • Specifications should be agreed and settled by all parties prior to signing the Contract, • Project manager and Project management team should be involved in the process of Scope of Work, Specification, Invitation to Bid, Tenders, Evaluations and Contract formation, • Invitation To Bid [ITB] has to be written in clear terms to avoid ambiguous circumstances arising in the future, • Specifications should be detailed enough to limit the selection scope of equipment supply, servicing, maintenance and spares, • Contract terms and conditions need to be so precise that with reference to the Scope of work and the specifications, would make the need and ability for change or variation could be

Scope of Work (External)	minimised, • There should be a degree of Standardisation in Specifications, • Constructors should make presentations after ITB submissions, • Constructors need professional negotiators to be successful.
CSF9- Change/ Variation Management (Internal)	• The originally identified nine critical success factors were discussed in varying degrees applicable to the conversion project with the outcomes summarised in Table 4.4. • Change/Variation process should be controlled by the PM, • Contract Terms & Conditions have to structured so as to avoid loop holes and the ability to foreclose changes and variations, • Every effort has to be made in order that the initial contract is as unambiguous as possible, • Change/Variations are time constraints and schedule breakers, • Change/Variations facilitate moving work during conversion from Capital Expenditure [CAPEX] to Operational Expenditure [OPEX], • Whole-of-Life Cost Concept should be considered, • Change/Variation management context should begin at the time of contract signing.
CSF10 – Whole of Life Cost Concept (External)	• A whole of life cost concept should provide a better understanding of costs. All stakeholders should understand the concept and see their financial responsibility for the project and the timing of that responsibility. The whole project costs should be indicated at the beginning of a contract, • Whole of Life Project Risk should have more attention paid to it by all project stakeholders.
CSF11 – Safety Case Regime (External)	• Safety case regime parameters should be adopted in a whole of life project allowing many problems associated with the conversion project to be minimised. This is an additional methodology promoting safer operations. It has commercial application as well. • The safety case regime will promote the application of safety requirements into the design, thus minimising the on-going effects into the operation stage after the conversion project.
	• Stakeholders should look at Standardisation in the Specifications by making better use of the lessons learned data for the industry, • New or updated concepts and designs involving the Specifications should be limited to approximately 20% of the

CSF12 – Standard'tn (External)	whole project design for the conversion project, • FPSO projects should utilise existing design and structure for new facilities and add some new concepts into the design. These new concepts have to have in depth proving to be incorporated into the design process.

(Source: Developed for this Research)

5.2.4.1.1. Project Manager –CSF1

The Project Manager should have appropriate qualifications and direct conversion experience over a reasonable number of projects and a number of years. The appointment of the Project Manager should be made as early as possible in the whole project timeline, and have references of experience in project management of similar types of project. The Project Manager should control the FEED process, and decide who should attend the FEED.

The Project Manager is responsible for the selection the Project Management Team. The person appointing the Project manager has to understand the nature and responsibilities of the role. It is imperative that the Project Manager be accountable for Finance and Cost Management, through a Finance and Cost Manager who is part of the Project Management Team. The incumbent should be of strong enough character to withstand stakeholders projecting their influences on the project. The Project Manager has to be involved in the selection of the donor vessel and the conversion shipyard (4.3.4.1.1).

5.2.4.1.2. Project Management Team – CSF2

The Project Management Team should be selected by the Project Manager and should be done as soon as practical after the appointment of the Project Manager. The Project Management Team should be of a sufficient size, in number, and with the necessary skills to cover all the anticipated and known disciplines in the project scope of work. The team must be able to work independently, however the team has to be structured, and experienced in the type of conversion project. It is necessary to establish a budget for the operation of the project management team. The team members should attend to the FEED process, as required. The Project Management Team should also be involved in the selection of the donor vessel and the conversion shipyard, referenced with their individual relevant experience and discipline (4.3.4.2.1).

5.2.4.1.3. Interface Manager – CSF3

The Interface Manager should be appointed for the conversion project. The Interface Manager should be a senior member of the Project Management Team, and should manage all external matters to contract, such as, handling the internal and external stakeholders and their associated problems. This becomes apparent throughout a project, e.g., the liaison between suppliers, clients, contractors, equipment suppliers and manufacturers, statutory authorities, governments, media, and managing the project communications in conjunction with Project Manager. The Interface Manager has to manage cultural issues for the stakeholders for the conversion project, and should be actively involved in the setting up of document control and the process for maintaining project communications control (Table 4.3.4.3.1).

5.2.4.1.4. Communications – CSF4

The Project Manager and Interface Manager should manage communications for the conversion project, with the majority control for internal project communications being controlled within the Project Management Team. The Interface Manager requires a strong control involvement in all communications, and to handle the various stakeholders in the conversion project.

The control of communications should in a structured and detailed manner include information technology (IT) and archiving. This can involve access to Lessons Learned from past projects, as reference and knowledge (4.3.4.4.1).

5.2.4.1.5. Client Input – CSF5

The client must have access to the conversion project; however, it should be through a structured and controlled process of formal communication channels (4.3.4.5). The client sets the contract parameters for the contract deliverables for the conversion project, and should be involved in the FEED process. This is not in a controlling mode but for the actual outcomes and process of completion. This responsibility for control lies with the Project Manager (4.3.4.5.1).

5.2.4.1.6. Finance and Cost Management – CSF6

Finance and Cost Management is an overall function for the whole-of-life of the project and should be assessed accordingly. The Finance and Cost Manager should be appointed as early as possible at the beginning of the whole project and should continue well after the completion of the conversion project. The Finance & Cost Manager must be involved in procurement and should have robust and statistically structured accounting practices experience (4.3.4.6).

The budget for the conversion may well take up to 90% of the whole project costs and the importance of assignment needs to be with the Finance and Cost Manager. The position calls for a person of strong character to manage and organise the conversion budget. The budget has to mirror the Scope of Work and specifications, and a detailed bill of materials has to be established first. Finance and Cost Management should be directly involved in all estimates of all proposed conversion work in line with Scope of Work (4.3.4.6.1).

5.2.4.1.7. Front End Engineering and Design (FEED) – CSF7

The FEED is conducted at the beginning of the whole project. The Project Manager should control the FEED process, including who attends and when, the FEED outputs, and has to have sufficient authority to make decision on the project specifications. The FEED should involve Standardisation input and direct access to any appropriate lessons learned data (4.3.4.7).

The FEED output should be the basis of the specifications for the conversion project and not just the commercial verification of existing well data (4.3.4.7.1).

5.2.4.1.8. Scope of Work – CSF8

The Project Manager and Project Management Team should be involved in the Scope of Work and all of the sub-sections (4.5.4.19, Table 4.16). The conversion project specifications should be agreed to by all parties before the invitation to bid (ITB), tender evaluations and contract formation, and signing.

The contract terms and conditions need to be precise with direct reference to the Scope of Work and the specifications (4.3.4.8.1). Constructors should use professional negotiators to make presentations during the invitation to bid submissions to be successful. The [ITB] should be written in clear unambiguous terms, the specifications sufficiently detailed for the selection scope of equipment, servicing, maintenance and spares to avoid confusion arising in the future. This process allows the Scope of Work to be based on the specifications.

5.2.4.1.9. Change/Variation Management – CSF9

The Project Manager should control the change/variation process. However to be successful, this process has to involve all the applicable stakeholders involved in the conversion project, with a direct interest in that particular change or variation (4.3.4.9). To minimise changes and/or variations, the contract terms & conditions have to be structured to avoid loopholes and/or the ability for Change/Variations occurring (4.5.4.18).

Poor control of change/variations will allow for the moving of work during conversion from capital expenditure [CAPEX] format which is directly linked to the conversion project to operational expenditure [OPEX], which means completion after the conversion where the budget and or time to completion are in jeopardy (4.3.4.9.1).

5.2.4.1.10. Whole of Life Cost Concept – CSF10

The Whole of Life Cost Concept ascertains all the costs for the whole project, reverts them to net present value at the beginning of a contract (4.3.4.10.1). This will provide a better understanding of the cost projections. All stakeholders should understand the concept and their financial responsibility within the project and the timing of that responsibility (Appendix 1).

5.2.4.1.11. Safety Case Regime - CSF11

Safety Case Regime parameters should be managed in conjunction with the whole of life project. This allows for many on-going design problems associated with the conversion project to be minimised. The safety case regime should address the standards, guidelines, limitations, controls, statutory requirements, and overall parameters for the design, conversion, operations, workforce, emergency procedures, control mechanisms, auditing, and inspection methodologies, thus minimising any on-going affects into the operation stage for the project (4.3.4.10.1, Appendix 5).

5.2.4.1.12. Standardisation – CSF12

Conversion project stakeholders should look at standardisation in the specifications by making better use of the Lessons Learned data for the industry,
New or updated concepts and designs involving the specifications for FPSO projects should be generally limited to 20% of the whole project design for the conversion project. New concepts in design and equipment selection should have in-depth validation before consideration in order to be incorporated into the design process (4.3.4.10.1, Appendix 6).

5.2.4.1.13. Actual vs. Recommended Conditions for Success

The interviews and survey responses provided data of actual practices to provide a comparison of actual vs. recommended practice. Departure from these recommended conditions for success might provide explanations as to why there are overruns in budget and time to completion for conversion projects. Table 5.6

sets out a comparison of recommended conditions for success and actual conditions.

The term 'Partially Met' in the table and throughout the discussion means that some respondents reported that, from their experience, the condition had been met.

Table 5.6 - Recommended Conditions for Success v Actual

Critical Success Factors	Conditions for Success	Status
CSF1- Project Manager [PM]	• PM appointment timing should be made as early as possible in the project timeline, • PM should have detailed up-to-date qualifications and experience in Project Management processes, • PM should control the FEED process and required outcomes and the various people attending the FEED, • PM should have references of past experience in a similar type of project, • Persons making PM appointment have to understand the role in question, • PM should control the Finance and Cost Management although through a Finance and Cost Manager as part of the PMT, • PM should select the PMT, • PM should possess sufficient internal fortitude to withstand the onslaught of various stakeholders projecting their individual points of view, • PM should be involved in the selection of Donor vessel and Conversion Shipyard.	• Partially Met ▪ **Met** • Partially Met • Partially Met ▪ Partially Met • **Met** • Partially Met • Met • Partially Met
	• PMT should be selected by the PM, • PMT should be sufficient in size and skills to cover all required disciplines in the Project Scope of Work, • PMT has to be independent, • PMT has to be structured & experienced in the type of project,	• Partially Met • Partially Met • **Met** • **Met**

CSF2- Project Management Team [PMT]	• A budget has to be made to cover the formation of the PMT, • PMT members should attend the FEED as required, • PMT should be selected as soon as possible after the PM appointment; generally, appointments made too late, • PMT should be involved in selection of Donor vessel and Conversion shipyard.	• Partially Met • Not Met • Partially Met • Not Met
CSF3- Interface Manager [IM]	• IM should be appointed for the conversion project, • IM should be a senior member of the PMT, • IM should manage all external matters to contract, manage the project communications in conjunction with PM, • IM should handle all external stakeholders and commitments associated with the project. • IM should manage Culture management for the stakeholders, • IM should be actively involved in the conversion project Communications, • IM should be actively involved in the setting up of Document Control and the process for maintaining Project communications control.	• Partially Met • Partially Met • **Met** • **Met** • **Met** • Partially Met • Not Met
CSF4- Comm's	• PM & IM should manage project communication, • Internal Conversion Project communications should be controlled within the PMT, • IM should have a strong involvement of control of all Communications for the project, • Communications should be controlled in a structured and detailed manner, • Communications could involve access to lessons learned from past projects. • Communications will include the communications requirements of all the project stakeholders, and the technologies or methods used to transfer this information.	• Partially Met • Partially Met • **Met** • Partially Met • Partially Met • **Met**
CSF5- Customer Input	• Client should have access however it has to be through a structured and controlled process, • Client should be involved in the FEED process but not control the actual outcomes and process of completion, • Client should set the contract parameters for the deliverables of the conversion project,	• Partially Met • Partially Met • **Met**
	• Finance is for the whole-of-life of the project and	• Not Met

CSF6 -Finance and Cost Management	should be assessed accordingly, • Finance & Cost Manager appointment should be as early as possible and continue after the completion of conversion project, • Finance & Cost Manager has to have a direct financial control involvement in procurement process throughout the conversion, • Finance and Cost Management practices should be robust and statistically structured. • Budget for the conversion will take 90% of the whole project costs and importance needs to be assigned accordingly, • PM should be strong enough in character to manage the PMT and organise the conversion budget, • Budget has to mirror the Specifications and Scope of Work in detail. • Bill of Materials should be established first, • Estimates of all proposed conversion work should be completed in line with Scope of Work.	• Not Met • **Met** • Partially Met • **Met** • Partially Met • Partially Met • Partially Met • Partially Met
CSF7- Front End Engineering and Design (FEED)	• More attention should be paid to the FEED by all stakeholders to the conversion, • FEED needs to conducted early in the whole project, • FEED outcomes need to be the basis for the specifications of the project, • The control and outcomes for the FEED should be with the PM? • FEED should have standardisation input. • FEED needs to access the "Lessons learned" data, • FEED outcomes should consider the type of project, • People in the FEED have to have sufficient authority to make decision on project Specifications etc, • FEED output is for the specifications for the whole project and not just for a commercial verification of existing well data.	• Not Met • Partially Met • Partially Met • Partially Met • Partially Met • **Met** • **Met** • Not Met • Partially Met
	• Scope of Work has three sub sections. They are Specifications, Scheduling, and the Selection of the donor Vessel and conversion Shipyard, • Specifications should be agreed and settled by all parties prior to signing the Contract, • Project manager and Project management team should be involved in the process of Scope of Work, Specification, Invitation to Bid, Tenders, Evaluations and Contract formation, • Invitation To Bid [ITB] has to be written in clear	• **Met** • **Met** • Partially Met • Partially Met

CSF8- Scope of Work	terms to avoid ambiguous circumstances arising in the future, • Specifications should be detailed enough to limit the selection scope of equipment supply, servicing, maintenance and spares, • Contract terms and conditions need to be so precise that with reference to the Scope of work and the specifications, would make the need and ability for change or variation to be minimised, • There should be a degree of Standardisation in Specifications, • Constructors should make presentations after ITB submissions, • Constructors need professional negotiators to be successful.	• Partially Met • Partially Met • Partially Met • Not Met • Not Met
CSF9- Change/ Variation Management	• PM should control Change/Variation process, • Contract Terms & Conditions have to structured so as to avoid loop holes and the ability to foreclose changes and variations, • Initial contract has to be unambiguous, • Change/Variations are time constraints and schedule breakers, • Change/Variations facilitate moving work during conversion from Capital Expenditure [CAPEX] to Operational Expenditure [OPEX], • Whole-of-Life Cost Concept should be considered, • Change/Variation management context should begin at the time of contract signing.	• **Met** • Partially Met • Partially Met • **Met** • Partially Met • Partially Met • Partially Met
CSF10 – Whole of Life Cost Concept	• A whole-of-life cost concept should provide a better understanding of costs. • All stakeholders should understand the concept and see their financial responsibility for the project and the timing of that responsibility. • The whole project costs should be indicated at the beginning of a contract, • Whole of Life Project Risk should have more attention paid to it by all project stakeholders.	• Partially Met • Partially Met • **Met** • Partially Met
CSF11 – Safety Case Regime	• Safety case regime parameters should be adopted in a whole of life project allowing many problems associated with the conversion project to be minimised. This is an additional methodology promoting safer operations. It has commercial applications as well. • Safety case regime applies the safety requirements into the design, to minimise the adverse on-going affects into the operation stage of the whole project.	• Partially Met • **Met**

	• Safety Case Regime to provide mandatory standards worldwide.	• Partially Met
CSF12 Standard'tn	• Stakeholders should look at Standardisation in the Specifications by making better use of the lessons learned data for the industry, • New or updated concepts and designs involving the Specifications should be limited to approximately 20% of the whole project design for the conversion project, • FPSO projects should utilise existing design and structure for new facilities and add some new concepts into the design. These new concepts have to have in depth proving to be incorporated into the design process.	• Partially Met • Partially Met • **Met**

(Source: Developed for this Research)

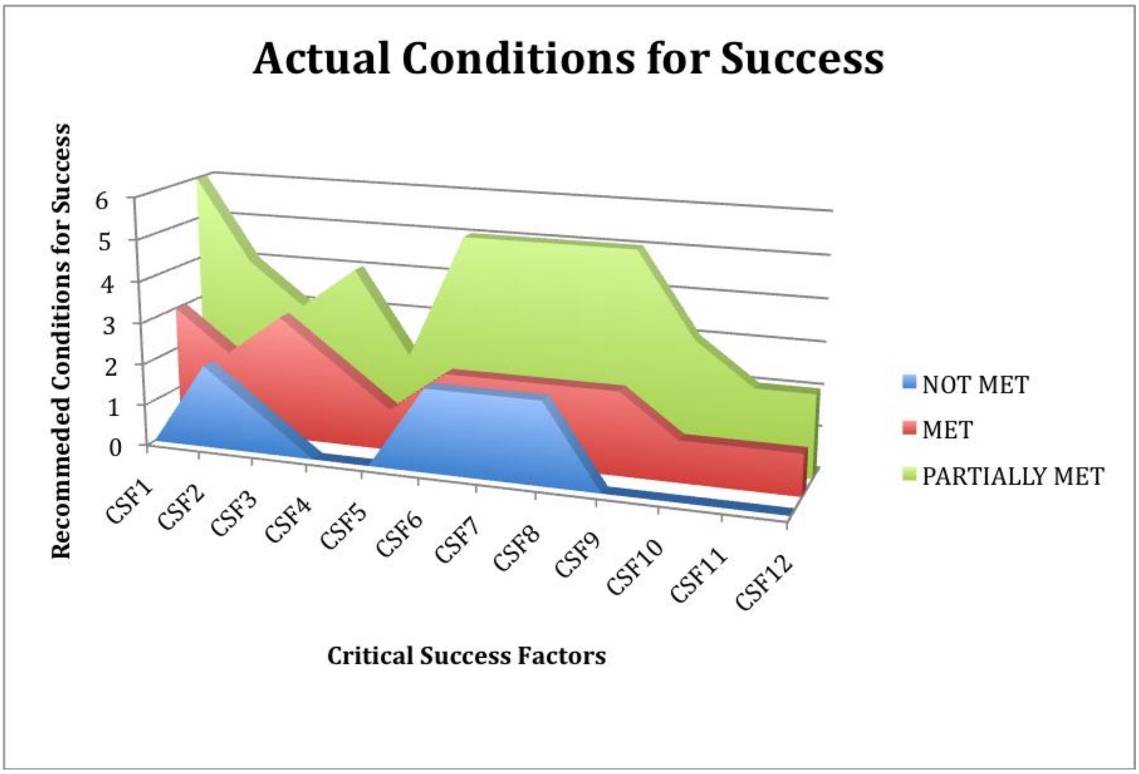
An astounding result was that 4.6% of respondents indicated that the senior management did not care about the schedule. A further 3.7% indicated that a haphazard cost cutting approach was adopted.

The comparison of the recommended conditions for success for each of the critical success factors in the reported actual between; not met, partially met through to met, shows there is considerable difference in these parameters. Based on the results of the partially met recommended conditions for success it can be seen there is considerable improvement to be exercised in the project management process for the conversion industry to get to the recommended best practice.

The next section provides a summary of the results and details the major findings.

Figure 5.5 is a summary of the recommended conditions for success vs. the actual as set out in Table 5.6 as to what is reported through the focus groups and interviews as to what is happening within the industry. This figure demonstrates that there is considerable difference between recommended and actual and this could explain the reasons for budget and time overruns.

Figure 5.5 - Summaries of Recommended Conditions for Success vs. Actual



(Source: Developed for this Research)

5.2.4.2. Conclusion to RQ4

In this section the conditions for success to be adopted to ensure that the twelve critical success factors are managed successfully, and have been identified. The recommendations from this research demonstrate that there is a set of conditions for success (Table 5.5), which should be adopted to ensure that the application of the identified twelve critical success factors are controlled and managed properly. The extent to which these conditions for success have been met, partially met, or not met have been set out in Table 5.6. There is a wide discrepancy between actual performance and required performance of the critical success factors, which could account for budget and time overruns in conversion projects.

5.2.4.3. Reflection of Findings on the Literature

The indicated twelve critical success factors identified through this research have been discussed in the findings for RQ1. The conditions necessary to ensure that these factors are capable of being met and the extent that they being met at present are shown in Table 5.6. The literature review did not indicate any research that investigated this issue related to conversions of oil tankers to FPSOs. Consequently, this research has contributed to the literature.

5.2.4.4. Summary of Results

In this section a summary of the results and major findings pertaining to this research will be shown and discussed. This research has yielded a number of key issues associated with conversion projects, which can account for conversions to be over budget and or late for time to completion.

1. The research has identified external factors that need to be included at the conceptual and design stages of a successful conversion. These factors are:
    a. Whole-of-life cost concept,
    b. Safety case regime; and
    c. Standardisation.
2. External environmental inputs need to be incorporated into the conversion project management processes. These become inputs into the FEED and scope of work processes. The research has indicated the conditions that need to be considered from each of these in the conversion design
3. The PMBOK model, from the perspective of the data results was identified as partially deficient in its treatment of the external environmental factors and the process for their inclusion for major projects such as conversions. A modified conversion project management model based on a PMBOK model is proposed (Figure 5.3). It shows the relationship between the external environmental inputs, the FEED, and scope of work processes, interface management and integration management of the conversion project management process.
4. The critical success factors have been grouped into a model which identifies their perceived role in the project management process (Table 5.4):
    a. A group of critical internal success factors, namely, Project

Manager, Project Management Team, Communications, Finance and Cost Management, and Change/Variation Management have been grouped as Group 1 and are identified in the current project management process. These critical success factors are common to preventing budget and time to completion overruns. Group 2 consists of the external factor of Scope of Work and three sub-sections of specifications, scheduling, and selection of donor vessel and conversion shipyard;

b. Group 3 includes the critical success factors of FEED, Client Input and Interface Manger;

c. Group 4 includes the newly identified additional external factors of Whole of Life Cost Concept, Safety Case Regime, and Standardisation.

5. The appointment of an Interface Manager for the conversion project to manage the interfaces that exist between the external stakeholders and the project management processes for a conversion project.
6. As this research was exploratory, the quantitative results could not give quantitative relative importance of the critical success factors, however the qualitative evidence indicated that the appointment of the Project Manager and the Project Management Team are highest priority internal critical success factors.
7. The research has identified best practice conditions necessary for the critical success factors to be managed successfully.
8. The research has provided evidence to show that the processes being used to manage the internal critical success factors are inconsistent with identified best practice.
9. Conditions for successful application of the critical success factors, which are not being applied, may explain the reasons for past conversions having budget and/or time overruns.

5.3. LIMITATIONS OF THE RESEARCH

When considering the research problem and the research questions, basic limitations were identified (1.6). The literature review indicated further limitations in data available. Additional limitations emerged in designing the primary data collection.

These limitations are discussed below.

1. The limitations encountered have been in the gathering of data due to the non-availability of participants who could be readily accessed. Consequently, the size of the sample has been limited. The industry is undergoing a boom period and employment criteria dictated who was available, and where, and at what time (1.6, 4.5.4)
2. Primary data collection has been carried out referencing Australia and the Asian region of Singapore, Malaysia, Thailand, and Vietnam. There has not been any reference to other global areas of influence such as the North Sea region, South and North America, and the Scandinavian area where each location has substantial growth and new industry.
3. The majority of the survey respondents for the primary data collection came from the constructor / designer / supplier / operator bases within the conversion and associated industries. The selection of the respondents is shown in 3.4.4. Some of these respondents are external suppliers of goods and services to be used within the conversion project. The rationale for all the various views has to be considered taking into consideration the part each respondent is expected to play in the conversion process (1.6).
4. The researcher has not been able to gather any data on the actual Budget and Time overruns for various projects, due to lack of availability of data and individual company security.
5. Because of the exploratory nature of the research, it has not been possible to quantitatively determine the relative importance of the critical success factors (1.6), however it could be done with some non-parametric statistical

testing using the Mann Whitney U Test for example.

6. One of the issues indicated by the focus groups is that the conversion management culture and the leadership and relationships between the Project Manager and the Project Management Team have not been addressed. The research has focused on the conversion project processes and has not addressed these human resource issues (1.6). As the process of interface management becomes more a part of project management, the ability to blame others or the system or to hide errors is reduced. The need to improve management culture may add questions of efficacy, calibre and qualifications of the Project Management Team.
7. The literature provides evidence that more than 60% of all conversions were over budget and/or with a late delivery (2.5.3.2). However, there is very little literature that addresses the reasons in terms of project management relative to the FPSO conversion industry.
8. The inductive and deductive processes of building theory and then conducting testing are dependent upon the availability of prior theory. There is excellent prior theory on project management, per se, however, not on major complex projects in the conversion industry. During this research process the personal experience and involvement of the researcher in the offshore oil and gas industry has provided a definitive and possibly biased basis for problem solving, associated with the conversion industry.
9. The research is qualitative in nature; however, it uses quantitative methods for some assessments. The respondents had varied views on many of the questions and topics and it is possible that some views may have been left out because of the reduction of multiple responses for amalgamating points of view into a summary.
10. Access to specific primary data of individual conversion projects, using case study quantitative methods for analysis as indicated in Section 3.2.3 was found to be difficult in view of corporate intellectual property and corporate security. This would have provided a focus on measuring variables and thus

formulating hypotheses for consideration.

11. During the research process, it was found that results varied between stakeholders (4.5.4.3). The sample size was insufficient to draw reasonable conclusions about the views of the different groups of stakeholders, however future research could include a more in depth statistical analysis.
12. The whole of life cost concept, the safety case regime, and standardisation have been identified however the individual applications into the FEED and concept/development phases of a whole project have not been examined (Table 5.6).
13. The design of the Survey was presented as an informal document to overcome a general attitude of respondents to dispose of the document after receiving a formal survey procedure to be completed. In terms of pure academic forms this survey could have been improved with more succinct:
    - Detailed instructions,
    - Formatted categorise and no overlaps for answers,
    - An appreciation as to perceived leading questions.

    The resultant data did however contribute to the goal of obtaining the nature of critical success factors for the conversion of oil tankers to FPSOs.

5.4. SUGGESTIONS FOR FUTURE RESEARCH

This study has identified a number of further research topics that would provide evidence to support this exploratory research and expand the understanding of the issues involved in effective project management for the FPSO conversion industry. These are presented as follows.

1. A further research project would be to investigate why there is a difference between actual practice and best practice as discussed during the Focus groups (4.3.4). This would include the impact of the donor vessel size, oilfield size, capital available for the whole project, and the type of organization contemplating this venture.
2. Further research could be undertaken to confirm these exploratory

research findings, and expand the findings of this research to include larger sample sizes of suppliers, equipment manufacturers, contractors, constructors, designers, engineers, and consultants involved directly with the conversion industry.

3. Descriptive research could use quantitative methods for analysis as indicated in (3.2.3). This would provide a focus on measuring variables and thus formulating hypotheses for consideration. The use of mathematical analysis will lead to insights into the resultant statistical data.
4. The views of a sample taken from other parts of the world, where conversions take place, such as North and South America, the North Sea, and the Middle East, could lead to verification of the present research or identify further critical success factors.
5. The availability of data for case studies could provide greater insight into various conversion projects around the world. Access to actual conversion project reports would provide detailed data involving progress, the stakeholders, financial results, scheduling, and outcomes for the conversion project.
6. Further research can be undertaken in the areas of understanding and expanding on the knowledge of the culture of Project Management and the involvement of the Project Manager and the Project Management Team. Culture needs to assess individual cultures between different races of stakeholders as well as the assessment of the processes of developing and managing the appropriate culture for the conversion project. Research into this field could be based on a qualitative approach to the data; however, it could provide valuable results for the application of project management to conversion projects.
7. As the evolution of the Interface Management discipline becomes more prevalent, there emerges a corresponding reduction in the ability to blame others or the system and hide errors. Changes to the efficacy,

calibre, and qualifications of the Project Management Team may be necessary. This would provide an avenue for further investigation using human resources analysis of the Project Management Team criteria.

8. Further research into the formulation, utilisation, application, and management of the Whole of Life Cost Concept into the processes of establishing the overall cost analysis of any conversion project. The financial management of any project will provide data for successful conversions.
9. Research into the application of the safety case regime to the conversion project could add to improvement in performance of the conversion project. Integration of this regime into the FEED process could be an important addition to this research leading to better outcomes from the FEED, and in turn forming the basis for better establishing the Specifications of the conversion and ultimately the correct Scope of Work.
10. The standardisation process is an area for future research including its application into the concept/development and the FEED phases of the whole project for the offshore oil and gas industry.
11. A study is recommended to determine the effectiveness of the FEED process in the concept/development phase of an offshore project, in terms of cost, time to completion, design, and specifications accuracy.

This set of recommendations provides potential research programs to extend the findings of this study. In each case, the proposed research would be able to build on the results and conclusions of this study.

5.5. CHAPTER CONCLUSIONS

Chapter 2 identified nine critical success factors and the focus groups discussed, referenced, and responded to these. The focus groups have also identified additional critical success factors that warranted further investigation.

- Research Question 1 has identified a revised list of twelve critical success factors associated with the conversion project management.
- Research Question 2 has identified and established three groups for the critical success factors. These groups have also been categorised to be external and internal factors associated with the conversion project.
- Research Question 3 has identified a revised project management model incorporating external factors to improve current project management methodologies for FPSO conversion projects. These external critical success factors have existed to date, but have not been recognised, as being important, for the overall success of the conversion project.
- Research Question 4 has identified recommendations to be adopted to ensure that the identified 12 critical success factors are managed successfully. There is considerable difference between current and recommended best practice, which could account for the budget and time to completion overruns experienced in conversions.

It was considered that the results were valid because of the process of triangulation used in the data collection.

This exploratory research has developed a base from which further research can be developed into associated topics and has identified new external relationships for conversion projects and how these can be included into the existing philosophies, of the project management processes.

This study has provided evidence that the current available parameters of project management are not being efficiently applied to the conversion of Oil Tankers to

FPSOs. By utilising the fundamentals of the project management processes in a more robust and practical way a substantial amount of the problems associated with a conversion would disappear and or be solved early on in the project. The involvement of the external critical success factors early in the development stages of the whole project will add to the efficiency of project management of the conversion

This study has addressed the research problem and has contributed to existing knowledge in the project management of conversion of Oil Tankers to FPSOs. It has demonstrated the need for more research in this area.

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APPENDICES

APPENDIX 1 - FOCUS GROUPS

1.1. FOCUS GROUPS

The focus groups were conducted to obtain first hand direct information from people who were or are actively involved in the conversion of oil tankers to FPSOs and that these focus groups where:

a) Responses to a specific question for each critical success factor plus a question on additional factors were asked for. The intention was to confirm the importance and to ascertain key reasons to ensure that the critical success factor could be achieved;
b) The responses were recorded in a summary format without quotations;
c) The responses from the two focus groups were combined to give the summary of the focus group output; and
d) The data, as set out below, was incorporated in the Thesis, (Chapter4, Section 4.3.4). An audio transcript was taken to allow any summary item to be checked if necessary.

1.1.1. Participants

All the participants asked at the Annual Conference in Singapore Sept 2010 accepted the offer to be involved (3.4.2.4).

Group 1 was:

Focus Group Member	Participant No.
FPSO Owner / Operator	P1
Industry Consultant	P2
Conversion Constructor	P3
Operator	P4
Materials Supplier	P5
Project Manager	P6
FPSO / FSO operator	P7
Consultant - Safety	P8

Group 2 was:

Focus Group Members	Participant No.
Operator	P9
Conversion Constructor	P10
Project Manager	P11
Consultant	P12
Constructor	P13
Consultant	P14
Project Manager	P15

1.1.2. Focus Group Dialogues with Participants

The following dialogue is what was presented to each focus group at the commencement of the proceedings. It was to set the format for which these focus groups were to be conducted, the agenda and goals.

a) Introduction to the Focus Group Participants

"*Gentlemen, thank you for coming to this focus group and participating.*

This whole process is to be confidential and anonymous however if any of you have any objections to being named in the thesis, can you please inform me.

This focus group will have an audio recording so that I can designate and analyse the input.

As I have mentioned this focus group is part of the research being conducted into the conversion of oil tankers to FPSOs. I have an obligation to explain to each and every person that you are under no obligation to be here and you are free to leave if you wish. As mentioned all the information given today is confidential and will remain anonymous. I have a letter (Appendix 7), which you may sign if you wish to do so. I assume you are all here voluntarily and you wish to be part of this research.

Confidentiality is most important and if you do not wish to be identified then that is not a problem.

You may or may not actually know the other people here, however, if not I will introduce each of you to the group.

It is very gratifying that each of you have taken the time to attend and to assist me in my research.

As you know many conversion projects in the offshore oil and gas industry have been completed over the past 30 years, however I am very interested in why so many projects have been completed over budget and/or late in completion.

There are probably numerous reasons as to why as far as each of you are concerned and in reference to a particular project.

What I am trying to ascertain; Are there any common reasons, and in general terms people could say it is all relates to the Toos!

Too early, too late, Too hot, too cold, Too hard, too easy, Too difficult, Too many people, too poor input, and planning, Etc, etc ....

I have been researching the project management and associated activities for the conversion project to understand what is being done and what is not being done and ultimately to find a panacea, which can be used to guide organisations to better deliveries.

Can we begin by these introductions?

Gentlemen, this person is ......

His position is [position title] with [organisation name]

Thank you for attending.

No two projects are ever the same. There will always be something different.

Managing a project should be similar in application but are they ever?

The people involved will probably never be the same.

Is this a problem with this?

What happens if you have in house qualified people?

Does organisational structure play a part?

Can we go to the questions and see what the input is?

What do you consider the critical success factors for the conversion of an oil tanker to and FPSO?

The literature review I have conducted to date has indicated there are nine major critical success factors for the efficient conversion of an oil tanker to an FPSO:

- *Project Manager,*
- *Project Management Team,*
- *Interface Manager,*
- *Communications,*
- *Customer Input,*
- *Finance & Cost Management,*
- *Front End Engineering and Design (FEED),*
- *Scope of Work, and*
- *Change/Variation Management.*

A question I will put to you is; What do you consider the reason to be as to why more than 60% of all conversions are either over budget or late? (Eriksen 2009)

What do you consider would be necessary to stop this happening?

Can we go through the indicated factors for discussion?

Are there any, which should not be here?

What should or could be added?

Have you ever used an Interface Manager in the Project?

What is your understanding as to an Interface Manager?

Do you think it is worthwhile to have an Interface Manager?

How much involvement has Finance and Cost Management in the process of project management of the conversion?

Should there be more involvement? From whom and when?

What do you know about FEED?

Who should attend?

When should it be held?

Who is responsible for the outcomes?

Have you ever been involved with the actual contract formation and specifications?

Have you ever had input involving Lessons Learned for projects?

Have you been involved with an investigation?

What happened to the information?

Was it ever used?

If not, why not?"

(b) Concluding Remarks

"We have been discussing these questions for one hour and there have been some interesting outcomes.

I have to analyse all this input and have this presented in such a fashion that it can be validated statistically.

I want to take this opportunity to thank each and every one of you for participating as it has provided me with some direct input from people in the industry.

Reporting will be in the form of a thesis, which will be presented to the University early next year for examination and acceptance.

Data is to be anonymous and confidential. It is to be used to analytically assess what people like yourselves have said in relation to this topic and to compare it to the literature available now.
Everyone is entitled to know what this data and research is for and will they have access to the results. The answer is "YES". I will provide each of you with a copy of the outcomes to this research.
All participants are free to offer and provide any additional information about projects they have been working on or any other data they feel is pertinent to this research.
I have your contact details, you have mine, and should you think there is something else to add it will be greatly appreciated.
Thank you once again for the frank information."

1.1.3. Presentation of Focus Group Results

The researcher has elected to use a summary technique rather than make direct quotes, based on the time available to the participants. The necessity to get the participants involved in discussing the indicated critical success factors coming from the literature in both a positive and negative perspective was considered to be most important and also to see if there were perceptions of additional factors to those already known.

In this research the questions to be considered in the focus group discussion were well defined, being directed to obtaining views on the nine critical success factors. Consequently it was possible for the researcher to summarise the responses of the participants in note form as the discussion proceeded. This process was particularly useful because there was clear consensus or disagreement by a number of participants to a particular issue. The audio recording was used as a backup for reference where there was confusion in the notes. While the use of quotations can be helpful where the objective of the focus groups is to obtain wide ranging input, this was not the case in this research.

The summary is set out below.

Q1: How important is the right selection for the PM?

[P1], indicated that the right PM is the project maker.

[P1], [P10], [P12] and [P13] - appointment has to occur as early as possible in the whole project and preferably at the end of the initial design stage.

[P2], [P4] and [P6] - PM had to have a history of projects completed and his ability would precede his arrival. His CV is his calling card.

[P8] - experience criteria for the PM has to include knowledge of the most up-to-date industry perspectives. Adherence to the basic principles of planning, scheduling, and contract management is necessary and the backed up with appropriate qualifications.

[P9], [P11] and [P14] - the criteria for the PM appointment based on successfully recognised experience from conversion projects and the successful PM should bring an understudy.

[P11] and [P15] - senior management of many organisations do not have firsthand knowledge of the requirements of the responsibilities of the PM. Selection of an experienced, strong willed and capable manager for the role of PM is vital to the success of the conversion. Successful PM has to have a strong character, show a superior knowledge of the principles of project management.

[P6] has walked away from the role prior to commencement due to constraints being imposed.

[P2], [P6], [P8], [P11], [P13] and [P14] -the PM has to control the FEED process.

[P13] - the Project Manager should control the people attending the FEED.

[P15] - this concept had not previously been put forward. However, has merit, as it would enable a scrutiny of the actual overall project management process.

[P1], [P3], [P6], and [P7] - the PM should control of Finance and Cost during/ after the conversion project. Through appointment of a qualified project Finance and Cost Manager and who a senior member of the PMT.

[P10], [P12] and [P13] - the Project Manager is currently selected by the client or some external party associated with the actual conversion project.

[P15] - who would make the actual selection and based on what criteria.

[P1], [P4], [P7] and [P9] - the Project Manager should be involved in the process for the selection of a donor vessel for the conversion project and deciding on the proposed shipyard for the conversion.

[P6] - as a constructor to different organisations, difficult to follow a set pattern for project management as most organisations have their own policies, procedures, and methodologies.

Q2: Who should select the Project Management Team and when?

Unanimous view that the PM should select the PMT. Team needed to be large enough in size, experienced in all the disciplines for the management of the conversion and includes a team member capable of managing each jurisdiction and discipline being used.

[P6] - the PMT selection enabled the PM to have a team of people that can be trusted, demonstrated skills, can work as a team, understand the responsibilities for project conversions, and have the necessary experience.

[P1], [P7] and [P11] - the PMT appointed asap after the appointment of the PM.

[P7] - the PM and the PMT independent from all other stakeholders allowed to manage the contract and delivery of the FPSO. PM and the PMT appointed too late in the whole project time scale. Presented with the already completed specifications, selection of vessel and yard, and a signed contract with a constructor. Told to make it work. Unanimously agreed that this practice is counterproductive, would be one of the major reasons for being over budget and time to completion.

Client has in the past appointed the Pm, PMT and selected the conversion constructor. Changed lately to reflect current practices where owner of the facility carrying out the conversion makes the PM

[P1], [P6] and [P15] - the PMT should attend the FEED process.

[P7] and [P11] - a specific budget allocated to the process for the formation of the PMT.

Q3: Has an Interface Manager been involved in your Projects?

[P5], [P14] and [P15] - having an Interface Manager as part of the PMT allowed a smoother flow of organised communications. When changes/variations management, delays in production or supply, completion of negotiations and general dealing with matters affecting many of the parties who are not directly involved in the day to day conversion project operations, the Interface Manager can provide expert advice.

[P6] - the role of Interface Manager should be independent.

[P14] and [P15], - the Interface Manager should be the deputy to the Project Manager and part of PMT.

There is greater chance of a conversion project being delivered on time and on budget using an Interface Manager. Added cost for Interface Manager is minimal.

[P11] - the Interface Manager attended to the interests of mainly the external parties associated with conversion contract.

[P2] - the Interface Manager, experience, involved in structured document control and communications system. Enabled all the communications and recording of data to be controlled.

Participant [P12] - also assisted in referencing documents and library services.

Q4: How important is Communications

[P2], [P3], [P7] - communications is one of the major tools for the project management process. controlled by PM. Formal control systems should be introduced, referenced / the data distributed as required.

[P9] and [P15] - communications should be a structured and have a rigid controlled referencing system for all incoming and outgoing correspondence, drawings, e-mails, contract communications, change/variation documents and internal and external reporting.

[P14] - have a strongly controlled document regulatory system to enable referencing, systematic control, archiving, and formation of library facilities both in hard copy and in electronic forms.

[P6] and [P15] - a complete and detailed controlled communications process allowed for a precise approach to the transfer of information amongst all the involved parties.
[P1], [P9] and [P15] - the Interface Manager was dealing with all external matters, but also influencing, the actual conversion contract, he/she should have the responsibility for all communications and be regulated through the Document Controller for the project under the control of the PM. Result in strict communications referencing, leading to format controls on all inputs and outputs for the project. Those who have to know are told and those who do not need to know are not.

Q5: How much Client Input has there been and has it always been good?
[P1] and [P7] - the conversion is delivered to the client. The client would most likely contract with the owner on completion of the conversion contract. However, this is a separate contracting agreement, commonly called a time charter, and not to be confused with the conversion contract.
[P8] and [P14} - client endeavour to influence the progress of the conversion but ultimately it all comes back to the contract and the terms and conditions. The client needs to be involved in the FEED.
[P2], [P4], [P8], [P14], [P15] and [P16] - the client was to be the owner of the FPSO and specifications of the conversion contract have to be controlled. Successful completion of this part of the whole of life project could influence the outcome of the ongoing contracts for the FPSO operation, governed by the CAPEX provisions. Customer kept informed of the progress of the conversion, of any delays, problems, and outcomes. Some involvement in the conversion process. The communications should be through the formal communication channels.

Q6: How important is Finance and Cost Management?
[P12] - the PM control the cost accounting during the conversion and a direct reporting responsibility back to the financier of the project.

[P9] and [P11] - the financing of the project was for a whole of life provision with generally 90% to 92% allotted to the conversion and the remainder for the OPEX for the duration of the operating period. The OPEX period was backed up with a daily Operations and Maintenance (O&M) operating fee levied at the establishment of the time charter for the FPSO operations.

All agreed the budget and time scheduling be directly geared to the specifications and the scope of work. Useless setting a budget if the schedule is not achievable against the scope of work.

[P1], [P3], [P4], [P6] and [P8] agreed management of project accounting and the inter-relationship with financing of the whole project need constant attention throughout, not only the conversion, but the whole of life of the project.

[P11] - the Finance and Cost Manager is one of the most difficult to fulfill,

start before the project commences there will be a need to travel back to the Estimator for detailed discussion on the projections made and the proposed purchasing commitments made.

Good strategy for estimators, through the PM, look at setting initial purchasing commitments generally in principle only, warn the supplier and give notice of an intended purchase. Provide the ability to have a streamlined approach to equipment and material supply.

Participant [P6] - original estimate documents used to assess the viability of the project have to be passed onto the PMT to ensure that there is rigid compliance to what was indicated in the beginning of the project.

[P6] - vital for the PM to have an accounting function as part of the PMT working closely with the schedulers and planners to administer the spending cost.

[P3] and [P5] - in many instances they have been supplied with a budgeted cost of equipment, supplies, etc., which is not achievable or will have to be severely restricted because the initial budget was developed too early / out of date

[P1], [P4], [P6], [P7] and [P8] - management of the whole PMT impacts so much on the costs and accounting for the project that it is necessary for the entire project team to regularly report, through a formal timed schedule, all activities commenced, current, completed, and planned for the next reporting period.

Allows the Project Manager to assess the status of progress and to compare the scope of work, specifications, and conversion progress and place them into a financial progress analysis.

[P1], [P4], [P6], [P7], [P9], [P11] and [P15] - knowledge that from day one of the contract being signed, all costs have to be known, tabulated and recorded against the SOW, specifications and contract documents. The SOW has to contain a bill of materials and this would detail what has to be purchased and when in the schedule.

[P15] in the time charter, the FPSO owner would charge the client; a daily rate to lease the FPSO and that 99% of these funds went to pay for the initial financing loan.

Estimates of all proposed conversion work should be completed in line with SOW.

Q7: How does Front End Engineering and Design [FEED] fit in?

Unanimous that the FEED in conversion projects is one that needed the most attention.

[P9] - the FEED was done very early in the development of the project and the outcomes were used for contract bid assessment. Rare for anyone from the operations side of the FPSO to be involved in any decision-making.

[P11] - the FEED to have relevance to the actual project the operations and project management personnel need to be involved to obtain an appropriate outcome, which is useful during the conversion contract.

[P1], [P2], [P4], [P6], [P7] and [P8] - FEED or the lack of it and the resulting consequences. Clients were generally taking control of FEED with little or no input or representation from operations personnel for clarification and or comment.

[P15] - vast majority of conversion projects there was little or no FEED conducted. What was developed was limited to the proposed operational functionality of the FPSO with commercial input from the safety, environmental, statutory, and engineering concepts in association with the geological data from the well reports.

Output from a client controlled FEED, is a report on the functionality of the FPSO with only basic input from safety, environmental, statutory and engineering personnel.

[P11], [P12], [P14] and [P15] - SOW for the FEED needs to be concise and detailed and the control and output should be formally stated.

FEED must assess all the risks associated with the project and this should cover the risks associated under the 'whole-of-life' cost concept.

[P6], [P8] and [P12] - FEED process should be governed by the Safety case regime.

It was agreed that if the following conditions were met, the output would most likely be the setting of accurate specifications detailing the SOW, allow an accurate proposed time schedule for completion. At the beginning of the planning stage of the conversion project leading to the construction phase.

FEED should:

- Be conducted as early as possible in the project;
- Have a concise budget assigned to a Scope of Work;
- Have participants with the authority to make decisions and capable of analysing the engineering data; and
- Have access to all well data, with involvement of all related and stakeholder parties.

[P1] and [P2] - the specifications and parameters of the project are being discussed there should be effort made to try not to reinvent the wheel, and to analyse the previous operational history of FPSOs.

30 years of conversion and operational history for FPSO operations in the world implies that there will have been a similar facility developed prior to the current

project and the lessons learned from that project should be incorporated into the current proposal.
A conversion similar to the current proposal should be selected and maximum of 20% of the project should be changed, rather than redesigning the whole project from scratch.

Q8: When is Scope of Work done and how important?
[P3], [P5] and [P7] - the SOW allowed for a better understanding of the requirements for equipment selection for the project, whether this was for supply through Client Input or independent supplier. Agreed that the specifications for equipment should include a provision for service contracts and the supply of spare parts for the duration of the project. Allows suppliers - best possible pricing for the whole of life costing for the project. Cater for the requirements of minimal CAPEX for the conversion as well as providing a provision for budgeting in relation to the OPEX requirements for operational contracts.
[P11] and [P15] - SOW have to be relevant to the project as this was the basis for the issuing of the ITB to constructors. Many cases specifications are ambiguous in nature both for the intended constructor and the tenderer.
[P1] - the specifications is the basis for all that will follow in the conversion, as the SOW. Engineers need to understand what they are designing, what operating environment is, what operational period is, and what oil characteristics from the wells.
[P12] - issuing of the ITB and the attached specifications was to give a basis for constructors and tenderers to get together and arrive at a satisfactory agreement.
The bid and assessment stage of the process [P2] - the ITB has to be as clear and concise as possible to avoid ambiguity / clarification.
[P3] - specifications on ITB have been written to engender a high degree of ambiguous language, which causes confusion not only for the constructor but also in the interpretation of the bids at a later phase.

[P9] - project specifications come from the FEED together with the input given to the project provisions by the client.

[P12] - expertise of the assessing team was often less than could be desired and experience / understatement. One-sided arguments giving constructor the benefit of the doubt for the contract and in more than one case the bid was accepted as presented.

[P3] and [P9] unrealistic schedules stemming from and being based on wrong parameters. Schedules may not be geared to the SOW for the conversion; rather they are set by commercial and contractual terms & conditions set generally by the external influences associated with the conversion contract.

[P1], [P3] and [P10] - if contract terms and conditions covered all applicable aspects of the SOW, specifications were sufficiently detailed in explanation and requirements, the chances of any changes or variations occurring is minimised.

[P6] and [P8] - the data from Lessons Learned has to be taken into consideration when starting a new project. . Changes for the better in technology, the mixtures of processes needed have been engineered, constructed, and operated successfully in the past. Need to research these libraries of data to avoid the tendency of reinvent the wheel, a philosophy generally adopted in new projects.

Most participants agreed the bid and assessment to be conducted with a standard scope to avoid ambiguous results. The bids assessment by the same personnel to avoid complex opinions and points of view and a structured assessment process of scoring needs to be used.

[P3] and [P5] - the constructors have the opportunity to make a presentation of their individual bid. Tendering group opportunity to clarify any contentious points of the bid and to ask questions in regard to equipment selection, timing, conversion processes.

[P1], [P3] and [P7] - the bid assessment has to consider the criteria for the selection of the donor vessel and the selection of the conversion yard.

[P14] and [P12] have worked on more than one project and the commercial negotiating skills of the constructor during the bid assessment period took a very experienced PM and Contract Administrator to control this period and to arrive at a consensus and agreement. The constructor had the advantage during the contract conversion; e.g., the PM agreeing to the constructor supplying an alternative selection of equipment as being an equivalent to the specifications. The project manager has to be firm and concise, stipulate what is required, and not to accept additional factors without sufficient technical backup and proof of equipment capabilities.

Q9: How were Change/Variation Management handled?

[P6] - the PM controls Change/Variation. Linked to the contract T&Cs, which the PM is responsible. No problem in delegating this. The PM maintain control. The change management process has to involve all people within the PMT as well as external stakeholders.

[P3] - stakeholders have to understand the contract and T&Cs. Contracts have to be administered correctly and otherwise the constructor will take advantage of poor contract administration and change/variations. Ambiguous tendering and bid process allows for loopholes in contract terminology. The process canvassed in Q8 has to be concise and as accurate as possible.

Participants [P6], [P11] and [P15] change/variation process is the most difficult to manage. The change or variation goes to the core of the specifications, engineering and production process for the project. Avoidance is the best option unless there is some fundamental problem that has merit to be changed.

[P15] - the contract been administered robustly from the beginning, the ability to have changes would be diminished.

[P2] - change/variation management is the most time consuming and difficult provision to manage within the process of project management.

Agreed that change/variation management would be a critical success factor. Also identified is the recent issue, of Whole of Life cost Concept, as having a significant impact on the success of a conversion. This factor is discussed in Q10, below.

[P8] - why the WLCC should be seriously considered from the beginning of the project and also stressed the importance of the safety case regime.
[P4] - variations or changes are deliberately delayed to a later date thus allowing the CAPEX to remain the same. The responsibility can then be transferred to the OPEX provisions for the operating period.

Q10: Do you consider there are any Additional Factors?
The floor was opened to the participants for input as to any other criteria that should be considered for conversion projects apart from the nine areas that were being discussed.
[P8], [P12] and [P14] indicated that the development of the WLCC for conversion projects has to be considered, as without this functionality there will always be a scenario of; 'he said you said' in regard to responsibilities.
[P1] quoted; 'that the whole of life concept is an integral part of turning a client's business related functional requirements into a physical asset providing whole life value for that client. The whole of life costing includes the investment of a certain amount of money at today's level, which will be repaid with higher value sometime in the future'.
A method of project economic evaluation in which all costs arising, and benefits accrued from development, installations, operations and maintenance, and ultimately demob and disposal of project hardware are considered as important to the whole project financial status.
[P1] added that the object of the WLCC analysis together with the technical, environmental, social, and other evaluations is to provide the project decision makers with sufficient information on which to base a proper financial judgment.
[P2} - solution with the lowest WLC is automatically the one with the highest initial cost. However this is not always the case.
[P1], [P2], [P4], [P6-P9], [P12], [P14], and [P15] - the safety case regime from the beginning of the project is beneficial to the selection of all the critical equipment, assets, and operating processes. The safety case regime provides a set of

guidelines and conditions for the control of all facets of the FPSO, from development to departure at the end. It is a different approach to managing an offshore facility as it governs all the processes for the whole project. All stakeholders are aware of the criteria for control of safety for the facility from the development, the FEED, the conversion workforce and onto the operations and maintenance phase and ending with the demobilisation of all equipment at the end of the field.

[P1], [P8], [P12] and [P14] - standardisation of FPSO projects and incorporation of past Lessons Learned was important.

[P4] and [P7]. Standardisation of the conversion industry is related to the SOW, and the specifications. Instead of designing a complete new facility, there is a propensity to look at the Lessons Learned of previous conversion projects and their incorporation into the design of a new conversion as far as possible. Suggested that previous Lessons Learned would assist but new idea and design should be limited to 20% in the conversion project.

[P2], [P6], [P9] and [P14] - the specifications of previous conversion projects, would suit current conversion projects apart from adding some modernisation in these specifications. Setting specifications utilising standardisation in the selection of particular brands of equipment, including the organisation of maintenance, service, and spare parts regimes. This would limit to the selection of suitable various equipment.

[P2], [P6], [P8] and [P12] - identification, and assessment of risk throughout the whole production project needs greater attention to ensure 302organized and diligent project management. The initial risk assessment and analysis needs to updated and progressed throughout the whole of life project and the conversion is only one section of the whole production project.

- xxxxx -

APPENDIX 2 - INTERVIEW FORMAT

2.1. INTRODUCTION

The interviews were conducted either in the interviewee's office or at the Annual Conference held in Singapore. The conference holds the Business and Technical Streams for active involvement of conference attendees. The researcher's eligibility to attend this conference enabled direct approach to interested persons willing to participate in an interview. A direct approach was made by the researcher to various members for their permission to partake in an interview. The broadest coverage of participants for the conversion industry was sort to enable direct input into the proposed questions for this research. Each interviewee was asked if they wanted to see the summary of the questions, however all declined but have requested a copy of the finalised thesis on the subject.

Each interviewee was informed at the beginning of the interview of their rights and obligations during the interview and all participated at their own volition and agreement.

The interview was commenced as follows:

> *"Thank you for allowing me the time and for you to participate in this interview.* *Thank you for giving up your time to assist me in advancing my research into this project management area of our industry.*
>
> *I would just like to say that you are under no obligation to answer any or all of the questions put to you and you can terminate this Interview at any time.*
> *Any information provided will of course remain anonymous and confidential and at no time will your identity or the identity of your organisation be mentioned or directly linked to the outcomes of this research."*

2.1.1. Interview Participants

Table 2.1 - Interviewees

	Interviewee	Participant Number
1	Senior Consultant	Interviewee 1 [A1]
2	Senior Corporate General Manager	Interviewee 2 [A2]
3	Senior Offshore Manager	Interviewee 3 [A3]
4	Senior Commissioning Engineer	Interviewee 4 [A4]
5	Senior HSE Manager	Interviewee 5 [A5]

2.1.2. Interview Format

The following dialogue sets out the format adopted for conducting face to face interviews with selected senior managers of organisations involved in the conversion of oil tankers to FPSOs. The interviews are to obtain some candid data pertaining to the performance of conversions that the interviewees were involved in. the data from the interviews is to be used to establish a format for conducting a survey among various organisations involved in conversions and to provide a back up to the data obtained through separately held focus groups.

a) *"I would like to conduct this one on one interview with you to talk about your involvement in the conversion of Oil Tankers to FPSOs.*

I have found in my research to date that more than 60% of all conversions over the past years have been over budget and or late. I find it strange with the enormous amount of information concerning Lessons Learned project management, strategic management of organisations that this has been allowed to perpetuate over the years. There are more than 80 more projects in some stage of development and are these going to go the same way.

Can we begin?

1. *How many conversion projects have you been involved with?*

2. *What in your words were the reasons for a project to come in on budget and on time?*
3. *How much experience did the Project Manager have?*
4. *Who do you see as the person primarily responsible for Project Risk?*
5. *How do you feel Risk was managed on any particular project?*
6. *Was there any Risk Assessment carried out?*
7. *Who should appoint the Project Manager and the PMT?*
8. *Was there ever an Interface Manager appointed in your projects?*
9. *How did you go about actually working as a Project Manager?*
10. *When it was found that the project was falling behind what was done to re-schedule or what was the additional plan to get the project back to schedule?*
11. *How did you find Finance fitting into the PMT as a discipline?*

a. *Project finance*

b. *How was cost accounting reported back to fiancé?*

c. *Who was responsible for finance in the project?*

12. *How was Cost accounting reported during the project?*
13. *If the project was falling behind what was the senior management response?*
14. *When should the FEED be carried out, who was represented at the FEED, who was responsible for the FEED outputs and who should be involved?*
15. *Who formulated the project specifications? Is it done from the FEED?*
16. *Was the time schedule reasonable to achieve a successful project?*
17. *In the project with your involvement who managed change/variation management?*

a. *Is it the Project Manager's role – to assign responsibility?*

18. *How much say did the client have in the project progress?*
19. *Who do you feel should be responsible for project communications?*
20. *What happened if the Project Manager of PMT were replaced or left?*

a. *Do you feel there should be a Dep. PM?*

21. *How were lessons learned handled in your organisation?"*

The following dialogue was the concluding remarks, put to each interviewee as a small thank you and appreciation for their individual support for this research.

> *"Well thank you very much for your input; it has been a wonderful insight into your involvement in conversions. As I have indicated this information will be analysed and will be recorded into a report, being the thesis for my Doctorate, and that will be available to all those who wish to have feedback.*
>
> *The objective is to make some recommendations in the form of specific criteria or guidelines for improvement so we can start to get an industry consensus into this. Once again thank you very much and should you wish to add anything please do so by confidential email, letter, fax or reference."*

2.1.3. Interview Questions Results

The data from each interview was analysed by listening to each interview and points made for each question asked. On completion all the separate points were categorised and a summary of like answers has been made.

Interviewee [A1] had experience over six conversions, four offshore projects, and one new build with estimated project costs of USD3b in value. Interviewee [A2] had experience over three conversions with estimated project costs of USD1.2b. Interviewee [A3] had experience over four conversions and one new build with estimated project costs of USD1.95b. Interviewee [A4] had been actively involved in three conversions, two new builds, and six offshore installations with estimated project costs of USD2.45b. Interviewee [A5] has been involved in three FPSO conversions and two offshore construction projects with estimated project costs of USD1.42b.

Interviewees [A1] and [A4} mentioned that the Scope of Work has to incorporate the specifications, and that the design outcome did reflect what was actually going to be built. Interviewees [A2] and [A3] indicated they were not involved in the setting of the Scope of Work and came to the projects after this phase.

Interviewee [A5] indicated that good design philosophies come from a thorough FEED.

Interviewees [A1] and [A2] reiterated that the experience and qualifications of the Project Manager governed the project outcome. Interviewees [A3] and [A4] indicated that if the schedule was reasonable relative to the Scope of Work then there was a reasonable chance of success and provided the Project Management Team was allowed to do its job.

Interviewee [A5] indicated that some Project Managers had little FPSO experience and came from a range of backgrounds, from exploration to drilling. Those without specific experience of FPSOs and the respective interface issues tended to struggle for success. There was no understanding of the demands and requirements of this type of project.

The Senior General Manager, Interviewee [A2] was high enough up the corporate ladder and was responsible. This was verified by Interviewee [A2].

Interviewee [A3] mentioned that the risk identification and assessment should be done during the development stage and continued through the whole of life for the project; further the CEO of the organisation should sign off on the risk management plan. Interviewees [A1], [A2], [A3] and [A4] stated that the handling of risk management was governed by corporate power and the size of the organisation managing the risk. Large organisations do it well and smaller organisations tend to take more risk and use less people.

Interviewee [A5] indicated that nominally the Project Manager would be responsible for the entire conversion project, however often this was delegated to the project services manager/contracts manager. Their understanding of project risk was limited to commercial aspects and was not wide-ranging, to the extent of risk management principles (ISO 31000, 2009). The risk register was typically only updated two or three times in a two to three year project.

Interviewee [A1] was appointed at the corporate levels, whereas in the case of Interviewees [A2] and [A3] the constructor management made the appointments based on the complexity of the project and participant availability.

Interviewees [A1] and [A3] went on to say that the role of Project Manager is actually a discipline and in all cases there was a structured team filling this role, due to the complexity of the project.

Interviewee [A4] indicated the Project Manager for several projects appointed him; however, in several cases the appointment came from a corporate level.

Interviewee [A5] mentioned the Project Manager appointment depended on who was running the project. If the oil company was running the design project themselves, then the oil company's project group appointed the Project Manager and the Project Management Team. If an FPSO constructor was running the design project, then they appointed the Project Manager and Project Management Team.

All Interviewees indicated that there was an Interface Manager or Coordinator appointed to a project and was a part of the senior section of the Project Management Team. In most cases the Interface manager doubled as the Deputy Project Manager. Interviewee [A5] said that there was only one project where a specific role for Interface Coordinator was appointed.

When the project was falling behind schedule Interviewee [A1] indicated that the method of getting the project back onto schedule depended on the contractual requirements and corporate relationships. Many joint venture organisations require a, no surprises, approach to reporting of budget anomalies and normally budget/schedule reviews had to indicate a, lead and lag condition to actions taken and proposed changes and alterations. A detailed analysis of schedule and Scope of Work had to be maintained for smaller projects over designated set periods and small increments of improvement were administered.

Interviewee [A2] was involved in this process except for major delays, which necessitated a contract review with the client and a decision to be made at corporate level.

Interviewees [A3] and [A4] indicated that at the end of each month a detailed budget/ schedule analysis was reported with proposed changes to scope of work, thus reducing the lag to bring the project back to the schedule. Much of the reduced Scope of Work was earmarked for completion after delivery to site, so the CAPEX would remain the same and the OPEX would be handed the responsibility.

Interviewee [A1] demonstrated that the finance reporting responsibility was through the Project Manager. Interviewees [A2] and [A3] stated that the cost accounting process throughout the project was less than impressive on more than one project, so much so that an external accounting firm had to be employed to manage the cost accounting and report as to the current status and projections based on the scope of work. This led to a reduction in the Project Management Team morale and work ethic, which in turn lead to terminations and then resignations. This then led to delays in schedules, budget, and delivery.

Interviewee [A4] mentioned that his involvement in the conversion project had been after the commencement of the project, however, it is generally seen that the format for the completion of the conversion is hindered due to the initial poor scope of work, equipment selection, specifications and project management.

Interviewee [A5] showed that responsibility for Finance and Cost Management varied. Some projects had a specific project services manager/contracts manager who fulfilled that role, with several calling this role, that of the Deputy Project Manager, whereas other projects left that to the Project Manager and the Engineering Manager.

All Interviewees explained that had the experienced Project Manager and a well coordinated Project Management Team been appointed initially then these types of problems would be minimised. All Interviewees indicated that senior management would unfortunately take the role of project budget or time delays, and adopt, a slash and burn, approach. This did not assist the project progress; in fact it was demonstrated that in many cases it was non-productive.
Interviewee [A1] explained that it took an exceptionally experienced Project Manager to be able to handle this corporate approach and if handled correctly the first time it tended to negate any further brash approaches.

Interviewee [A5] indicated that when the project started to fall behind in some projects, the Project Manager and Engineering Manager simply decreed to the discipline leads that they had to guillotine work. In other projects, a more systematic approach was taken with the Project Manager/Engineering Manager working with the discipline leads to determine where schedule savings could be made.

Interviewee [A3] has adopted the approach that it is better to let the responsible person carry out the work but have a backup plan in operation to circumvent any awkward situations. Interviewee [A2] had the opportunity to fight; fire with fire, by demonstrating that a more conciliatory approach including the provision of reasons for the occurrence and a methodology to recoup the situation to the benefit of all parties generally resulted in a better outcome.

Interviewee [A4] being appointed late in the project had the benefit of hind sight to comment on project progress, however, it was stated that a documentary record of the project progress had to be maintained by individual members of the Project Management Team to ensure that project reporting was conducted in a clear and proper fashion.

Interviewee [A1] was adamant that not many organisations actually carry out a proper FEED. The FEED needs to be conducted as early as possible in the project and it is necessary to have experienced project and operations personnel; these people must have some sort of authority to commit. In large well run organisations the Project Manager has actually determined a FEED budget and if the project initiators say that a FEED was not necessary then the budget, which had previously been approved, would surface and be utilised.

Interviewee [A2] indicated that in all of his projects a FEED was conducted very early in the process. However, it was more geared toward the commercial aspects related to the data from the wells. Interviewee [A3] stated that the FEED was carried out at the time of contract bid stage and used the specifications formed by the Project Management Team to verify the outcomes of the FEED.

Interviewee [A5] expounded that, in some projects, there was a clearly defined FEED phase, run by the oil company. For some of these projects, this involved a third party engineering constructor who put together the specification and bid documents that was used for the request for quotation [RFQ] for the FPSO constructors. In two projects, the FEED phase was run as a design competition between two FPSO constructors prior to final award of contract. In other projects, there was no real FEED phase, just an initial design phase for the FPSO constructor, which was supposed to serve as a FEED, but actually failed.

All Interviewees indicated that the time schedules of the projects initially seemed reasonable. However, after a very short period it was found that the Scope of Work could not be completed within the time schedule.

Interviewees [A1], [A4] and [A5] indicated Change/Variation Management is the most difficult area to manage as it covers the contract terms and conditions and the engineering feasibility.

Interviewees [A1], [A3] and [A5] indicated that the Project Manager was responsible for this discipline. In many cases it was delegated to the Engineering Manager who would liaise with the Accountant, the relevant Project Management Team members and the Interface Manager as found appropriate.

Interviewees [A1] and [A3] stated that the selection of the donor vessel for the conversion had not been assessed against the design specifications and contract requirements. The Scope of Work assigned to the donor vessel was not sufficiently detailed to ensure complete satisfaction of the outcome of the project. All Interviewees said the selection of the donor vessel and the proposed conversion shipyard are the external parameters that can make or break the proposed conversion contract. There is generally scant regard paid to the detail of these items in relation to the conversion project either for the conversion or in respect of the whole-of-life capabilities of the project. Interviewee [A1] elaborated that the selection of the donor vessel was one of the major contributors to the success of the project based on the whole life cost analysis.

Interviewee [A2] indicated that many constructors and conversion project owners had a range of donor vessels available and a choice was made against the client well data and the proposed production outputs for the facility.

Interviewees [A1] and [A3] made the point that the selection of the proposed shipyard for the conversion was generally based on where the project can be completed in the time required for the work to be done. Additional involvement in the process would be to conduct an independent survey on the shipyard operational capabilities, the existing workload, the current workforce, previous work history in this field, material availability, location and capability of delivering the project at the time required.

The ideal selection process would have to be based on;

- Correct specifications based on the proposed location environmental conditions;
- Locating a donor vessel for the right price and age to satisfy the whole of life projections for the project;
- In-depth independent third party naval architect and marine engineering analysis by classification surveyors, structural engineers, shipyard conversion experts, and operational oil and gas consultants. These investigations would provide detailed assessments of risk analysis, structural parameters, classification based on stability and structural hull movement analysis, corrosion assessment, pumping and piping conditions, and power requirements;
- The condition of the donor vessel and a proposal for a maintenance plan for the time the vessel would be undergoing conversion; and
- A proposed time of delivery to a specific conversion shipyard.

All interviewees agreed that the project communications cover spoken and written forms. Ultimately, the Project Manager is responsible. However, it would generally be delegated to the Document Controller and in later cases in conjunction with the Interface manager.

Interviewee [A1] stated that part of his role was to establish a systematic referencing methodology for document correspondence inward and outward, a sequenced numbering system for e-mail traffic, and a recognised procedures and drawing numbering system. Information transfer was diligently and thoroughly controlled. Interviewee [A2] explained the virtues of the large oil company and the controls on correspondence related to company business and penalties for abuse of the system. The Project Manager would delegate this role to a Document Controller as a member of the Project Management Team.

Interviewee [A3] followed a standard corporate referencing system and the distribution of data was controlled to those who actually had to know the information. Interviewee [A5] said a successful project would have good vertical communications, both ways; however, this depends so heavily on the individual characters involved in the Project Management Team.

Interviewee [A1] was the only Interviewee who had to replace someone in the Project Management Team or had someone leave the project. He stated that it caused a problem because the Project Management Team was comfortable with the existing Project Manager. After the departure the schedule was affected somewhat until the replacement was capable of controlling the group. The replacement came from an external source, which caused some discontent amongst the existing Project Management Team. This was soon overcome and the project actually ended up finishing ahead of schedule and in line with the original specifications.

Interviewee [A5] talked about a project, where a succession of Engineering Managers came and went, with at least one change in Project Manager. All of these individuals were from a marine background and had no appreciation of FPSO conversion industry interface issues. The project lurched from disaster to disaster and never recovered. Interviewee [A5] stated that in some cases, the replacement of personnel proved to be of great benefit to the project.

Interviewees [A1] and [A5] indicated that Lessons Learned is a concept that although used by many organisations, is not totally and effectively utilised. An investigation is conducted at the end of each project and a person is assigned to report on this. The report is then either pushed into the archives and generally rarely accessed or is used at the beginning of the next project, as a reference tool.
Interviewees [A1], [A2] and [A4] had experience with Lessons Learned investigations at the end of each project and these organisations archived the data in a centralised library. The entire company history could be accessed. The Lessons Learned were a part of the development of all subsequent projects and could be referenced back.

Interviewee [A3] indicated that although the Lessons Learned process was conducted it was very rare that past projects were referenced at the beginning of the next project.

The face to face Interviews raised more questions than were originally proposed especially in the areas of the Project Manager role and responsibilities, the risk management process within Project Management, the project accounting process, the Change/Variation Management role and the data for and from the FEED.

Although the data from the interviews was invaluable, it demonstrated that by conducting a survey amongst personnel actually and actively involved in conversion projects a broader access to data could be usefully obtained This gathering net should be extended to cover clients, customers, classification societies, suppliers, consultants, constructors, owners, financiers and operators.
The responses from the Interviewees indicated that further data gathering should be undertaken, as the opinions and facts portrayed in the interviews indicated that opinions varied considerably.

The Interviewees agreed that the indentified critical success factors are important to the conversion project and have an importance to having a successful conversion project.

The following is a summary of the key issues that emerged from the discussion:

- Interviewees had good overall experience in the industry;
- The Scope of Work, design and specifications had to be suitable for the conversion;
- Project Manager experience and ability governed the success of the Project;
- Project Manager position can be a structured one;
- Interface Manager should always be appointed to the project;

- Risk should be a corporate discipline and applied to the whole production project, however the risk management within the conversion project would be handled by the existing PMBOK model project management process;
- Senior management expected a no surprises approach to managing the project and communications as to budget and time overruns. However if a problem was raised then a solution was expected to be presented;
- Blaming people only caused further problems;
- Cost management on conversion projects has always been a problem;
- FEED is important to the specifications and in many cases the FEED was only geared to commercial issues;
- Time schedules were reasonable;
- Change/Variation Management needs strict control to be successful;
- Selection of the donor vessel and conversion shipyard is imperative to the overall success of the whole of life project;
- Document control and communications must be rigid and structured; and
- Lessons Learned data needs to be accessed as part of every project.

2.1.4. Tabulation of Interview Results in a Quantitative Form

The interviews were conducted using open-ended questions and a qualitative response was provided to all questions. The researcher has analysed the qualitative results and made comparisons across the five interviews. The aim is to ascertain the existence of any like-minded results. The results are shown in a quantitative display in Table A2.1 below.

Table A2.1 – Interview Summary

	Interview Questions	Responses	
1	What was your involvement / experience in conversion projects?	Nil	
		One	1
		3-5	1
		>5	3
2	How was the Scope of Work established?	Based on Specifications.	3
		Not involved	2
3	What did you see as the Success of the Conversion Project?	Qualifications & Experience	2
		Schedule v Scope of Work	3
4	Who managed the Risk for the Conversion Project?	GM	2
		CEO	1
		Corporate Responsibility	4
5	Appointment of Project Manager [PM]?	Corporate	5
6	Should there be an Interface Manager [IM]?	Senior Member of PMT	5
7	What happened when project falling behind?	Depends on Contract Terms and Conditions and a review	1
		Corporate level	1
		Revised Scope of Work	2
		Revised Scope of Work, Sch. and transfer from Capital Expenditure [CAPEX] to Operations Expenditure [OPEX]	3
		Full Review. Who to	4

		blame.!!	
8	Who was responsible for Finance/Cost Management for the Conversion Project?	Project Manager	4
		Not appropriate and caused problems.	3
		Finance Mgr	1
		Corporate	1
9	Have you been involved with the FEED process?	Yes	3
		No	2
10	When was the FEED done?	Field Develop.	3
		Time of Contract	1
		Only for Well data verification for corp.	1
		Never done	1
11	Was Schedule suitable for Scope of Work?	Initially OK	4
		Initially OK but after one month found to be unrealistic	4
12	Who was primarily responsible for Change/Variation management?	Internally - PM	1
		Externally - IM	1
		PM totally	4
		PM & PMT	2
13	When was Donor Vessel selected and by Whom?	Owner	3
		Constructor	2
		Against Specs	4
		Where located & Condition	1
14	Who selected Shipyard?	Client	1
		Owner	4

		PM & PMT	1
15	Who controlled Communications for the Conversion Project?	Lge Co & well structured	2
		Owner/ controller middle structure	2
16	What happened when someone left?	Replace Internally	3
		Replace Externally	1
		Not replaced	2
17	Were Lessons Learned discussed?	Yes	3
		No	2
18	Did it make any difference to the Project?	Yes	1
		No	4

(Source: Developed for this Research)

2.1.5. Summary

The data from the interviews has provided a basis for the design of the survey.

The initial outcome from the interviews was to obtain in-depth information about how senior management portrayed their involvement in a conversion project. It was envisaged that senior management would take a big picture approach and allow those responsible for the project to get on and complete the tasks.

It was found that, through the questions and responses that the senior management had become involved in detailed project management by;

- Attempting to influence the Scope of Work from Client Input;
- Budget over-runs required rectification input;
- Lack of engineering definition in the specifications;
- Client pressure for early delivery;
- Feedback on competency of project management staff; and
- Arbitration of contract disputes with external partners.

The responses to the questions put to the Interviewees indicated that further useful data could be obtained from personnel working within the conversion contract project via a survey. The outcome of this data gathering was to broaden the scope of questions and to allow for verification of the indicated nine critical success factors for successful conversion projects.

In this section the input from the participants in the face-to-face interviews has been discussed and the process has been set out including the outcomes. The responses have been initially presented in a qualitative manner and then using comparisons with respective responses, a quantitative summary, Table 4.6, has been prepared highlighting the similarities and differences in the responses from the interviewees. The initial responses from the interviews have provided the basic scope to have additional questions tested over a wider sample of the conversion industry population. Several of the questions have been expanded to cover a broader application to the industry. The results of the interviews have provided the researcher with a verification of the types of questions to be asked in the survey.

APPENDIX 3 – SURVEY

3.1. SURVEY

3.1.1. Introduction

The survey consists of 26 questions aimed at the people who have been and are actively involved in conversions of Oil Tankers to FPSOs in various function and discipline formats. The background is to obtain informative responses from the people directly involved in this industry. People should be involved and come from the fields of operators, constructors, owners, equipment manufacturers, consultants, classification society representatives, clients, financiers, designers and suppliers, relative to the offshore oil and gas industry.

Some of the respondents were contacted through the Annual Conference held in Singapore. The conference holds the Business and Technical Streams for active involvement of conference attendees. The researcher's eligibility to attend this conference enabled direct approach to interested persons willing to participate in an interview. A direct approach was made by the researcher to various members for their consent to be involved in the survey. The broadest coverage of participants for the conversion industry was sort to enable direct input into the proposed questions for this research. Each potential respondent was asked if they wanted to see the summary of the questions, however all declined but have requested a copy of the finalised thesis on the subject.

The precise number of projects a respondent was involved in was not directly relevant to the research. An investigation of the precise degree of experience of a person would be a separate research project in itself. The respondents were given to make their own selection as to whether they considered the activities they were involved in were several or many. The purpose of the question was to ascertain the validity of the overall survey responses.

Each respondent was informed at the beginning of the survey of their rights and obligations during the survey and all participated at their own volition and agreement. It was not necessary to obtain formal written approval to be in the survey as, by filling in the survey the respondents have given tacit approval of their involvement.

3.1.2. Survey Format

3.1.2.1. Survey Respondent Instructions

The instructions given to each respondent were forwarded to each of the respondents in the following format consisting of an instruction letter and the survey form attached. This was emailed to each respondent.

"Dear xxxxxxxx,

Thank you for taking the time to assist me in my research into the conversion industry by completing this attached survey. It should not take more than 20 minutes to complete and your input will provide me with some raw data answers.

The survey consists of 26 questions.

I need you to place a "X" or indicate a number as seen as appropriate in a box for each question.

There are many questions such as Question 2, which allow you to make multiple responses in different areas for the same question. I ask you to make these selections based on your own involvement and experiences.

Should you have any questions or you need advice please do not hesitate to contact me.

As part of my research ethics commitments, I have to inform you that you are under no obligation to fill in this Survey, however if you return the completed document it will be considered you have given your permission for the information to be used as described.

It would be appreciated if you could return this as soon as possible to the email address shown.

Yours Sincerely,

Ross Mierendorff"

CONVERSION OF OIL TANKERS TO FPSOs SURVEY.

6. **Can you relate your experiences in the management of conversion of oil tankers to FPSOs?**

PROJECTS INVOLVED IN	NO.	
None		1
One		2
Several		3
Many		4

Experiences:

1a

	'X'	
Client to a conversion project		1
Designer a Conversion project		2
Constructor a Conversion project		3
Supplier to a Conversion project		4
Operator of an FPSO		5
Classification Rep		6
Shipyard		7
Other		8

2. **What, in your words, were the main reasons for the budget and time overruns?**

	POTENTIAL REASONS	BUDGET	TIME
		'X'	'X'
1	design, specifications, contract		
2	Cost accounting problems		
3	SOW, scheduling		
4	Project Mgr, Proj Mng't team or Project Management		
5	Interface management		
6	Selection of vessel and or shipyard		
7	Changes and variations		
8	Client involvement in decision making		
9	Communications format, control, documentary		
10	FEED and involvement		
11	Other, show details below if lack of space		

3. **What experience did the Project Manager have on similar projects?**

	PROJECTS		Number	
1	Nil	0		1
2	Basic level:	1 - 3		2
3	Intermediate Experience	3 - 5		3
4	Experienced Professional	>5		4

4. **Who was primarily responsible for managing Project risk?**

	'X'	
Project Manager		1
Interface Manager		2
Accountant / finance		3
Client / Client Representative		4
Risk Manager		5
Document Controller		6
CEO		7
Engineering Mgr		8
other		9

a. **How often was the Risk Register updated?**

How often	**Respons e**	
never		1
daily		2
weekly		3
monthly		4

5. **When was the Project Manager and the Project Management Team appointed?**

		PROJECT MGR	PROJ MNG'T TEAM
		'X'	'X'
1	**Beginning of field development**		
2	**FEED**		
3	**Contract / Specification forming**		
4	**Selection of contractor/ Yard**		
5	**Beginning of Conversion**		

6. **Was there an Interface Manager appointed or any type of Interface Co-Ordinator and what was his role?**

	'X'	
Yes		1
No		2

7. **Who primarily handled conflicts, negotiations and disputes resolutions for the project?**

	'X'	
Project Manager		1
Interface Manager		2
Accountant / Finance		3
Client / Client Representative		4
Risk Manager		5
Document Controller		6
CEO		7
Engineering Mgr		8
other		9

8. **When it was found that the project was falling behind what was done to re-schedule or alternative plan to get the project back to schedule?**

		'X'
1	**Nothing**	
2	**Someone was found to blame**	
3	**Project was re scheduled.**	
4	**Project SOW was altered to ensure delivery and budget were on time.**	
5	**Finance asked for more money to finish on schedule**	
6	**Revision carried out on schedule and SOW and short cuts were ordered.**	
7	**Revision carried out on the project in relation to resources, cost, schedule, client, delivery**	
8	**Revision carried out on the project in relation to all**	

	positions and every effort was protracted to ensure delivery was on time and to meet the budget	

9. Who did Finance report to in the Project Management Team and or others involved in the project management?

	'X'	
Project Manager		1
Interface Manager		2
Accountant / Finance		3
Client / Client Representative		4
Risk Manager		5
Document Controller		6
CEO		7
Engineering Mgr		8
other		9

10. Who was primarily responsible for Finance?

	'X'	
Project Manager		1
Interface Manager		2
Accountant / Finance Manager		3
Client / Client Representative		4
Risk Manager		5
Document Controller		6
CEO		7
Engineering Mgr		8

other		9

11. How did budgetary meetings cope with held project performance and project progress and how reported?

	'X'	
Never		1
Very rarely		2
All departments reported but nothing done		3
Scheduler told to revise the schedule in line with the budget		4
Accountant told to cut the budget		5
Project Mgr told to cut the SOW		6
Client informed of a change or variation to budget and delivery time		7
Budget forecasts to be revised in line with proposed delivery date and all options discussed at the following meeting usually held that day		8

12. How was project progress reported?

	'X'	
Never		1
Occassionally		2
Regularly		3
At every Meeting		4
Constant updating carried out dynamically in the project reporting		5

13. **What was the attitude of senior management when it was found the project was falling behind?**

	'X'	
Could not careless		1
Blame the Project Mgr		2
Blame the Project Mgr and PM team		3
Haphazard cost cutting ordered		4
An enquiry held to find out why		5
An enquiry held to find out how to recover		6
SOW, schedule, budget analysed to find out a recovery plan		7
More resources added to PMT		8
Analysis conducted to see how to reduce work load in view of contract		9

14. **When was the FEED carried out, who involved, who controlled?**

	FEED		WHO INVOLVED		WHO PRIMARILY CONTROLLED
		'X'		'X'	'X'
1	Not done		Project Manager		
2	Field Development		Interface Manager		
3	Contract signing		Accountant / finance		
4	Conversion start		Client / Client Representative		
5	Delivery		Risk Manager		
6			Document Controller		
7			CEO		
8			Proj Mngt Team		
9			Engineeering Mgr		
10			Operator		
11			other		

15. Who primarily formatted the specifications for the project?

	'X'	
Project Manager		1
Interface Manager		2
Accountant / Finance		3
Client / Client Representative		4
Risk Manager		5
Document Controller		6
CEO		7
Engineering Mgr		8
other		9

16. Who primarily set the time schedule parameters for the project?

	'X'	
Project Manager		1
Interface Manager		2
Accountant / Finance		3
Client / Client Representative		4
Risk Manager		5
Document Controller		6
CEO		7
Engineering Mgr		8
other		9

17. Was the time schedule reasonable to achieve a successful project?

Schedule	'X'	
Not done		1
Unrealistic		2
Achievable		3
Plenty of time		4

18. When was this point primarily made?

	'X'	
Never		1
After one week		2
After one month		3
When schedule had blown out of all relativity		4
When Project Mgr was made aware of it		5
When no other excuse could be found		6

19. How were "lessons learned" primarily handled in your organization?

	'X'	
Lessons learned never undertaken.		1
Lessons learned investigation carried out and a process to consult commenced and someone made responsible.		2
Lessons learned investigation carried out and a process to consult commenced but process not carried through.		3
Lessons learned mentioned at beginning of contract only,		4
Lessons learned mentioned at beginning of contract and then at the end.		5
Lessons learned investigation carried out and a process to consult commenced and someone made responsible and mentioned throughout the project duration.		6

20. Who primarily managed change / variations?

	'X'	
Project Manager		1
Interface Manager		2
Accountant / Finance		3
Client / Client Representative		4
Risk Manager		5
Document Controller		6
CEO		7
Engineering Mgr		8
other		9

21. What project management processes were used to manage changes and maintain schedule?

	Method	No.	
1	Communicating with all involved		1
2	Project risk assessment		2
3	Cost		3
4	Schedule and time effects		4
5	Contract documents and specifications		5
6	Quality		6
7	Rework proposal		7
8	Material, Labour impacts		8

22. How much say did the client have into the project progress?

INVOLVEMENT	'X'	
Nil		1
Minimal		2
Some		3

Constant		4

23. How was communications set up in the project management?

INVOLVEMENT	'X'	
Nil		1
Basic		2
Structured		3
Detailed		4

24. Who was primarily responsible for Communications?

	'X'	
Project Manager		1
Interface Manager		2
Accountant / Finance		3
Client / Client Representative		4
Risk Manager		5
Document Controller		6
CEO		7
Engineering Mgr		8
other		9

25. **How were documents and document control primarily maintained through-out the project?**

		'X'
1	**Not controlled**	
2	**Basic sequence numbering**	
3	**Individual ref numbers issued to Proj. Mng't Team**	
4	**Drawing / Variations only**	
5	**Contract docs only**	
6	**Contract docs and drawings**	
7	**Input and Outgoing written comms numbered**	
8	**Detailed referencing for all communications including e mails in and out**	

26. **What happened if the Project Manager or one or more of the Project management team were replaced or left?**

	'X'	
Never replaced		1
Replaced with someone from outside the project		2
Replaced with someone from inside the project		3
Work passed to Second in Charge		4
Client took over		5
Operator took over		6

3.1.2.2. Data Results Spreadsheet No 1.

Analysis of survey data can range from simple interpretation to use of an exacting computer software programs. In this research A list of questions was given to respondents in the form of an informal survey (Table 4.7) and 52 responses from 100 participants asked to complete the survey were received. Two were discarded as they contained errors leaving 50 for analysis. The format for the survey is shown in Appendix 3 Frequency analysis allowed for tabular and graphical presentation of results.

The number of required responses for many questions was deliberately not specified as there was a need to draw on the individual experiences of the different classifications of people. This approach allowed for the results in different responses and giving different response numbers by each recipient.

It was necessary to examine the affect of different response numbers to a question on the results for each relevant question. There are no previous references in the literature on how to deal with this and so the method chosen was to:

- Reduce the number of responses to focus on the ones which gave the majority, (highest frequency responses).

The procedure was adopted throughout this research to determine if there was any difference to the results and whether the actual data returned could be used for the purpose of identifying results. In all cases it was found that the date could be used.

The analysis of the Question data has been carried out in three parts, as follows:

4. Analysis of the experiences of the people responding to the Survey to ensure that appropriate persons responded;
5. Prioritising multi-responses, where these have been provided, to identify their relative importance. This is particularly relevant to answer research question 2; and
6. Interpreting the data including description of responses, tables and bar

charts of frequencies to validate the critical success factors to enable a response to the research questions to be ascertained.

3.1.2.3. Data Analysis Methodology

Analysing the data received during the survey has been carried out using an Excel format. The data files are shown in Appendix 6.

Some of the questions had multiple response options.

For example Q2 and Q2a of the survey asked: What were the main reasons for the budget and time overruns? Question 2 responses were for the budget and Question 2a responses were for the time overruns. There were eleven available answers to each question.

Many respondents indicated more than one selection. Including all responses in the analysis of the results would distort the results in favour of respondents who gave multiple responses. To correct for this the following process was followed:

- Firstly, all responses were tabulated and summed (Line 55, Appendix 6). The summed results were then expressed as a percentage of the total responses (Line 64, Appendix 6).
- Secondly, the items were prioritised in order of the frequency scores and a number chosen to equal at least two thirds of total responses. Each respondent's data was then reviewed and limited to this number. In this reduction process preference was given to the identified highest frequency items. In almost all cases this process was sufficient to rationalise the responses. The final prioritised results are shown (Line 131 Appendix 6).
- Thirdly, the results were again summed and new prioritised frequencies obtained. These were compared with the original frequencies to ensure that there were no major changes to the original frequencies. The prioritized frequencies were used as the outcome data for the question.
- Fourthly, a similar process was used for each of the multi-response questions with the number of items chosen varying for each question to

ensure that the number chosen represented at least two-thirds of all responses.

This process has been used for questions Q1b, Q2, Q2a, Q4, Q7, Q8, Q9, Q10, Q11, Q13, Q14a, Q14c, Q15, Q16, Q20, Q21, Q24, Q25, and Q26.

Questions Q1a, Q3, Q4a, Q5, Q6, Q12, Q14, Q17, Q18, Q19, Q22, and Q23 asked for a specific answer between the number response range of one to five. The frequencies were determined by adding the results for each specific answer and converted to percentages.
For example in question Q3, the question put was; "What experience did the project manager have on similar projects?" the choices were from 1 to 4, Nil, Basic, Intermediate and Experienced Professional. The answers are shown in cells B62 to B65 in Appendix 6 and shown as a percentage. The results for all questions are shown in Section 4.5.4.5.

3.1.2.4. Data Results Spreadsheet No.2.

The data from Spreadsheet No. 1 was used to generate a number of graphs and tables as shown in Spreadsheet No. 2. These graphs portray the results of the Spreadsheet No.1 and are shown in Chapter 4, Sections 4.5.4.3 through to 4.5.4.24 inclusive (Appendix 6).

APPENDIX 4 – MANN - WHITNEY TESTING

4.1. INTRODUCTION

Mann–Whitney 'U' Tests were conducted to ascertain whether there were significant differences between the Budget and Time results and between the multi-responses and the Operator and Constructor results.

4.2. MANN-WHITNEY U-TEST RANKING RESULTS

The Mann-Whitney U-Test is a non-parametric test to determine whether there any significant differences between two independent populations (Gosling J 1995).

The null hypothesis to be tested is:

H_0: no significant difference between rankings of the importance of the critical success factors between: a) Budget and Time; b) Multi-responses and Operator responses, and c) Multi-responses and Constructor responses.

Against:

H_a: significant differences between the rankings of Budget and Time; and/or

H_a: significant differences between multi-responses and Operator responses; and/or

H_a: significant differences between multi-responses and Constructor responses.

The data is set out in the Table below (Ref. Table 5.2 of the thesis)

Frequency data, Budget and Time, Multi, Operator & Constructor (Ref. Table 5.2)

	Budget			Time		
	Multi	**Operator**	**Const'r**	**Multi**	**Operator**	**Const'r**
Scope of Work	11	9.7	12	20	20	19
Specs	11	13	12	6.2	6.3	9.5
Vessel/Yard	8.8	7.1	8.8	2.6	1.8	3.2
PM/PMT	14	13	15	16	19	14
Change Mgt	14	14	13	19	17	14
Finance/Cost	12	14	12	4.6	4.5	4.8
Comms	10	8.8	8.8	11	11	9.5
FEED	8.3	7.1	12	7.7	6.3	14
Client	3.4	5.3	2.9	4.6	4.5	4.8
Interface Mgr	4.4	5.3	4.4	5.7	7.1	6.3
Other	2.5	3.5		2.6	3.6	

(Ref. Table 5.2)

The sample sizes are respectively: Multi-responses 50, Operator 24, Constructor 12. Hence, the sampling distribution may be considered to be approximately normal.

The U-statistic is calculated from the larger of the U-statistics calculated from the sample data,

where x and y are the two rankings to be compared:

$U_x = n_x n_y + 0.5(n_x(n_x+1)) - s_x$

Where s_x is the sum of the ranks of all x values and s_y is the sum of the ranks of all y values.

The test statistic is calculated from:

$Z=(U-\mu_U)/\delta_U$

Where:

$\mu_U=0.5 n_x n_y$ and

$\delta_U=\mathrm{Sqrt}(n_x n_y(n_x+n_y+1)/12)$

At the 0.05 significance level for a two-tailed test the critical value is Mod(1.96).

The results are set out in the table below.

RANKINGS TO BE TESTED	TEST DATA	TEST STATISTIC CV = 1.96	RESULT
Budget vs Time	Multi-responses	-1.182	No significant difference
Multi-responses vs Constructor	Budget	0.394	No significant difference
Multi-responses vs Constructor	Time	0.197	No significant difference
Multi-responses vs Operator	Budget	0.066	No significant difference
Multi-responses vs Operator	Time	0.197	No significant difference

(Ref: Gosling Jenny. Introductory Statistics. Pascal Press 1995.)

4.3. TEST RESULTS

There was no significant differences between any of the results as shown in Section 4.5.4.5. However, the multi-response results for Time were clearly different to those for Budget. These differences are very important for the understanding of the research problem and have been addressed in the Thesis. Similarly, the Constructor places greater emphasis on the FEED as a critical success factor than the Operator or the aggregate of all responses (multi-responses). Again, this is a very important finding from the research and has been addressed in the thesis.

APPENDIX 5 - SAFETY CASE REGIME

5.1. SAFETY CASE REGIME

5.1.1. Introduction

The safety case regime ideally encompasses all the activities associated with what is designed, supplied, procured, constructed, merged, installed, commissiıd, operated, managed, maintained, replaced, corroded/eroded, altered, bettered, and finally decommissioned and removed for the whole of life cycle for the project. It also has to encompass the risk assessment, operating methodology, the human protection and human control of the operations, the fire and explosion protection, emergency and evacuation process, the electrical design and installation, the process methodology and the facility management system.

5.1.2. History

A recommendation stemming from Lord Cullen's Inquiry into the Piper Alpha offshore explosion of 1988 was that there needs to be a change in responsibility brought about by a shift in the emphasis in prescriptive regulations, whereby specific requirements on duty holders were replaced by goal-setting regulations. The Cullen report, scathing in its assessment of the state of safety in the industry, suggested that reconstruction of the offshore regulatory regime and the responsibility for regulating safety be transferred to a discrete division within the English HSE (Whyte 1997).

One of the main requirements of the new regime for the offshore industry was the introduction of a safety case system in which each installation is required to demonstrate that all major hazards are adequately controlled and that a suitable management system is in place for the facility. Today the challenge for the global offshore industry and for HSE authorities is to manage the actual integrity of an ageing infrastructure while improving health and safety for the offshore workforce (HSE–UK 1991).

The HSE laws apply to the operators, owners, employers, licensees, contractors, suppliers, directors, and employees (HSE–UK 2010). The HSE-UK department set about formulating a set of guidelines to be published by the Department of Energy, for new international standards and these guidelines are available as individual reports in the Offshore Technology series from the HSE - UK. The onus is on the duty holder to assess what is relevant to their facility. The ISO have documents relating to structural integrity assessments for offshore facilities and these are tabled in appropriate documents in the BS EN ISO 19900, 19901-2 & 3, Series 2001 – 2004, (HSE-UK 2010).

5.1.3. The UK Safety Case

Companies which were planning to operate in UK waters were obliged to contact the appropriate HSE – UK authorities' office at the earliest possible stage. The law protects health, safety, and welfare of all personnel on offshore installations. UK health and safety law follows what is called, a goal-setting approach. Instead, of prescribing a checklist of things that have to be done, Duty holders have to;

- Systematically identify all the hazards;
- Assess the risks and consequences of hazards being summarised; and
- Put in place suitable procedures and measures to control the risks.

The goal-setting law allows duty holders to choose the most appropriate methods or equipment available to meet the legal requirements. A duty holder is defined as those who create and/or have the greatest control of the risks associated with any particular activity. Those who create the risks at the workplace are responsible for controlling them.

The law and associated regulations mainly place these duties on employers. In the offshore oil and gas industry, this will include the installation owners, operators, and contractors. Employees have duties under the Act and so every1 has a part to play to ensure the HSE conditions are met. In the four sets of offshore-sector regulations mentioned below, the responsibility is mainly placed on the primary duty holder or holders, i.e., the operators of production installations and owners of non-production installations. They are deemed to be in overall control of the installation and must co-ordinate the health and safety activities of all the companies and personnel present in that place.

The Offshore Installations (Safety Case) Regulations 2005 (SCR05) – in the UK require all offshore installations to have a safety case accepted in writing by HSE before they start operating in UK waters. Parts of any installation identified as being critical for the safety of the installation must be verified as suitable for the role, by independent and competent people.

Preparation of a safety case is not a difficult task. It requires the operators/owners to simply describe the proposed management systems and show a systematic and structured approach to managing the major hazards on the installation. However, in doing so it provides valuable insights into operation of the installation.

A safety case is the means by which a duty holder shows that;

- Their management system is adequate to ensure compliance;
- Their management system ensures the satisfactory management of contractors and sub- contractors;
- Established adequate arrangements have been made for audit and the making of reports;
- All hazards with the potential to cause a major accident have been identified and evaluated; and
- All major accident risks have been evaluated and measures have been, or will be, taken to control those risks to ensure that relevant statutory provisions for compliance (HSE-UK, 2010).

5.1.4. Safety Case Concepts

In Australia, the primary aim of the offshore safety case legislation is to reduce and minimize the risks to the health and safety of the workforce on offshore facilities and or in any connected activities. The Occupational Health and Safety law applying to the offshore petroleum facilities in Commonwealth of Australia waters includes Schedule 3 applicable to the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGSA) and the Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 (OPGGS(S)). The OPGGS(S) regulations require the operator of each offshore facility to prepare a safety case to be submitted to NOPSA for approval. All activities on the offshore facility must be conducted in accordance with that safety case.

The control measures must facilitate risk reduction through appropriate performance standards and by implementing a safety management system to support and maintain them. The safety case must give transparent evidence or supporting arguments indicating that risks are reduced to a level, which is as low as reasonably practicable [ALARP]. The operator owns the safety case and it is the regulator's role to assess, inspect, and audit for compliance (NOPSA 2010).

The Australian / New Zealand Standard on Risk Management AS/NZS 4360:2004 gives a framework for establishing the context for Risk Management and then for identifying, analysing, evaluating, treating, monitoring and communicating that risk. The requirements under the offshore legislation of OPGGS(S), reflects the current thinking on Risk Management and application of the key elements of Risk Management.

There are a number of principles for an effective and well-crafted safety case:

- The level of detail has to be relative to the extent and complexity of potential risks of the installation/process/system;
- The safety case has to have a coherent structure: with a logical flow to the process to create strong links to the causes and consequences of any major accident events, associated risks, the strategies and measures needed to manage the risks, and hence the performance required from specific measures so as to reduce risk levels to ALARP;

- The regulations are quite clear, in that the operators are to supply descriptions of elements in the safety case, as opposed to copies of the documents themselves.

The safety case should outline the reasoning or the background thinking used in the development of the element of the safety case in question, and then explain how it is connected to other related elements. A well structured and coherent safety case will allow the operator to demonstrate to others that there is a clear understanding of all the factors influencing risk and that the controls, indicated, are critical to managing the risk on that facility (NOPSA 2010). The common misunderstanding that risks being 'tolerable' and being 'ALARP' mean the same thing and this is not the case. The establishment that risks are tolerable through an application of good practice, professional judgment, experience and where necessary is supported by referencing appropriate risk assessment techniques.

There is no single correct way to demonstrate compliance with the statutory provisions, however, it is expected that for each major accident hazard identified for the installation, the compliance would contain elements of the following process:

- Identification and of a range of potential measures for further risk reduction;
- Systematic analysis of each of the identified measures;
- Evaluation of the reasonable practicability of the identified measures;
- The implementation of the identified reasonably practicable measures;
- Recording of the process and results, and summarised in the safety case.

The safety case has to show that the process of ensuring risks are controlled to ensure regulatory compliance has been an iterative 1 in which it has been necessary to go through the process a number of times throughout the whole of life of the project (HSE-UK 2006).

5.1.5. Identification of Hazards

Safety issues on marine construction needs to be made aware to all stakeholders, oil company, engineering consultant, installation contractor, and other parties. A first thing with safety issues is about the hazards identification. Wong (2002) defines hazard as anything that has a potential to cause harm. Hazards have close relationship with risk, which is the chance, that someone will be harmed by the hazard (Wong 2002). Hazards could happen to humans, and hazards come from machines and processes, emissions, radiations and others. To identify and assess the risk it is necessary to consider the risk at the very beginning.

Electrical energy dangers could occur in view of due of live components, insulation problems, fault condition, or residual stored energy. All electricity sources have to be well engineered and properly maintained and controlled during installation phase, as well as during operation stage of production and the construction of many parts on the topsides. Humans can make mistakes. The risk of human error has to be reduced by doing everything possible. The formalisation of all work practices and the provision of engineering controls has to reduce the risk of human error to the ALARP (Jaring 2009).

Equipments, tools, machines, raw materials, structural parts, and the limitation of space of platform, working and transportation barges can cause hazards by create an entrapment for the worker working in the region. The situation involving fire, gas release or explosion can give risk to this danger (Wong 2002). The worker could not escape to safer place when these situations are happening. Careful thoughts during the design and FEED phases need to be conducted by the qualified engineers and all stakeholders in order to arrange a proper layout for positioning of all machinery, process parts and pipe work which will eventuate during installation and or operation phases on board the facility.

Fire, is a common major hazard, which can happen in all areas of life, and can occur in marine condition. Fire hazard can be present due to the presence of three components, which are heat, fuel, and oxygen; therefore, fire has to be prevented by separating or insulating each of the relevant components.

Weather conditions affecting marine installations and sometimes due to bad weather, the workers on board will have to leave their incomplete works. Without proper communication, there is a threat that different workers will not understand the latest jobs condition left by others. This condition leads to a potential hazard.

An example of a contract requirement of the safety case formation is detailed as follows;
It is a requirement of this HSE Management system (EHS MS) that a hazard and risk assessment is integrated into all stages of the project lifecycle, including project definition, selection, implementation and operation. The project phase 1 has been subject to hazard and risk assessment through internal and external processes and this will continue throughout the life of the project. The Safety case will include formal Safety Assessments (FSAs) and Hazard Identification/Hazardous Operations (HAZID/ HAZOP) studies of risk such as explosion, fire, dropped objects, ship collision and gas releases. The outcomes of these studies have to integrated into the design through Safety Critical Elements (SCEs), which will be monitored against Performance Standards during the field life (ERM, 2009). This demonstrates the depth and breadth the safety case details must go and the range of fields it will cover during the whole of lifecycle for the field. As shown it demonstrates the detail the project needs to go to, to be compliant and assessed by the third party assessor.

The ideal time to commence the safety case is at the beginning of the FEED or Pre Feed for the field development. The safety case has to explain how inherent safety design concepts have been applied to all design decisions. This principle is relevant to all stages of the installation's life cycle. The inherent safe design requires a hazard management strategy to commence at the very earliest stages of the design.

The strategy will have to incorporate and reference;

- The platform vs. subsea development, whether attended vs. unattended, floating facility vs. fixed, single vs. multiple structures in the field and whether there is to be pre-drilling of wells;
- The installation location and orientation;
- Decision on the substitution of hazardous processes by less hazardous ones;
- The segregation of hazards;
- The reduction in complexity of the process;
- Reduction of subsurface uncertainty by conducting more detailed seismic surveys;
- The riser location and routing on the facility;
- Any allowances for human factors, such as a fail-safe, and or an error-tolerant designs;
- Construction materials selection;
- Corrosion, erosion and stress concentration in design for the facility; and
- The design that will facilitate inspection and maintenance for the whole of life concept (HSE-UK 2006).

The increasing advent of the use of the safety case regime for the control and management of the whole project concept provides a viable additional to the existing concepts of conversion of Oil Tankers to FPSOs. Identification of the safety case regime, in accordance with a set of parameters stipulated under statutory Acts and requirements set by industry regulatory authorities, indicates that further investigation of this concept is warranted. The safety case regime requires that all the critical equipment, new assets, and associated operating processes have to be supplied and operated for the whole of life project, which also includes the decommissioning process.

APPENDIX 6– STANDARDISATION

6.1. STANDARDISATION

6.1.1. Introduction

If the Unit, to be adopted, is a FPSO, then two options are possible: a tanker conversion or a new built hull. The type of Unit to be adopted for the field exploitation depends mainly on a technical-economic analysis. Alternatives are evaluated and considered, such as the type of hull;

- converted vessel into a FPSO,
- FPSO with new hull or a converted tanker.

According to the economic-financial return for each option and taken into account the possibilities now, such as the availability of vessels for conversion. The chosen alternative will be the one that presents the best results and the survey and inspection campaigns are in general critical tasks to be achieved, in the asset integrity management system of an FPSO Biasotto, Rouhan 2004).

In general, the technical teams prefer customised projects for production units. It means that the unit must be a tailor made project, built specifically for each field. However, in some situations, this is not the best alternative to be followed. In this way, the premises of repeatability and similarity are an optimised and very attractive decision that will result in a highest financial gain.

6.1.2. Standardisation Concept

The development plan of an oil production field starts during the conception phase. During this phase, the type of the Unit to be installed and the construction schedule are defined. All the advantages obtained from the similarity and repeatability between projects shows how the contribution to reduce delivery times is made. Other aspects are integrating teams between the Operation and Construction & Assembling [OC&A], a focus on health safety and environment [HSE] during the construction, and assembling the safety case regime.

6.1.3. The Process of Standardisation

Respondents have made the comments that in response to the survey the fact that there should be a degree of standardisation made in the specifications and Scope of Work for the conversion project. Standardisation should be in the form of; at the time of designing or establishing the Scope of Work for the conversion then the addition of new processing, procedures, equipment involved in the conversion should be limited to approximately 20%, rather than trying to redesign the entire facility. Preferential engineering has often lead to runaway costs or to systems which are poor in terms of operability and maintainability (Hardie, Knowles 2000). There has been thirty years of converting tankers to be FPSOs and a large percentage of these have been individual conversions with little comparison to previous conversions completed. This plethora of available information needs to be referred to, to achieve a better flow of the conversion process.

APPENDIX 7 – EXCEL WORKSHEETS FOR DATA ANALYSIS RESULTS

7.1. WORKSHEETS

7.1.1. Introduction

These spreadsheets cover the analysis process for the data gathered during the survey. The responses from each of the twenty six questions is collated and compared. It is to achieve designated results using totals, averages, and percentages for the results. The results obtained have been incorporated into tables or set out into graphs to demonstrate perceptions and/or points of view.

7.1.2. Analysis of Data

Spreadsheet No 1 is the collation and gathering of all the results from the survey questions. Many of the questions have the facility for multiple responses and each response has a tally. A total of responses per question have been made and a percentage is then calculated for each of the responses against that total tally. Many of the questions with multiple responses have been prioritised. The highest two responses per question have been sort to see if these differ in any way from the original multiple responses to provide a more definite answer to the data priority.

7.1.3. Data Analysis Spreadsheet No. 1

Analysing the data received during the survey used an Excel format. An extract of the data file is in Table 6.1. Many of the questions had multiple response options. The processes adopted for the suitable presentation of the results obtained from this data using table and graphical forms.

For e.g.; Q2 and Q2a of the Survey asked: What were the main reasons for the budget and time overruns? There were 11 multiple answers and many respondents indicated more than one selection. Question 2 responses were for the budget and Question 2a responses were for the time overruns. The tabulated results are in Table 6.1.

Line 55 shows the summation of the individual responses. The total number of multiple responses is 204 as shown in cell K61. The tabulations are expressed as a percentage of this total in Line 62. These results are shown in Table 7.1.
This format issued for questions Q1b, Q2, Q2a, Q4, Q7, Q8, Q9, Q10, Q11, Q13, Q14a, Q14c, Q15, Q16, Q20, Q21, Q24, Q25 and Q26.

Table 7.1 - Data Analysis Spreadsheet.

Y QUESTION RESPONSES

	A	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
1																							
2	Response No	Q2											Q2a										
3		1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11
4	1	1	2		4				8						3	4			7				
53	50	1		3				7				11			3	4			7				11
54																							
55	Tallies	22	25	23	29	9	18	28	7	21	17	5	12	9	39	32	11	5	36	9	21	15	5
56																							
57																							
58																							
59																							
60																							
61	Sum	204											194										
62	%	11	12	11	14	4.4	8.8	14	3.4	10	8.3	2.5	6.2	4.6	20	16	5.7	2.6	19	4.6	11	7.7	2.6

The remainder of the survey data results from the data spreadsheet have been analysed as follows.

For questions Q1a, Q3, Q4a, Q5, Q6, Q12, Q14, Q17, Q18, Q19, Q22 and Q23 the responses were either single of double responses per respondent. The range of responses was between the numbers of 1 to 5. The data responses are shown on lines 55 to 59 in Table 6.2 There were 50 respondents to the survey from 100 enquiries and the responses from the respondents are shown on line 61. The percentages for the number of respondents are shown in lines 62 to 66.

For example in question Q1a, the question put was; **Can you relate your experiences in the management of conversion of Oil Tankers to FPSOs?**
The choice in responses was from 1 to 4, None, One, Several and Many. The response is shown in cells B62 to B65 as a percentage.

Table 7.2 Data Analysis Spreadsheet.

	A	B	AQ	AR	AS	AT
1						
2	Response No	Q1a	Q4A	Q5		Q6
3				1	2	
4	1	3	3	2	3	1
55	Tallies	0	10	22	1	35
56		10	0	17	9	14
57		27	29	8	14	0
58		13	9	2	8	0
59				0	17	
60						
61	Sum	50	48	49	49	49
62	%	0	21	45	2	71
63	%	20	0	35	18	29
64	%	54	60	16	29	0
65	%	26	19	4.1	16	0
66		0	0		35	0

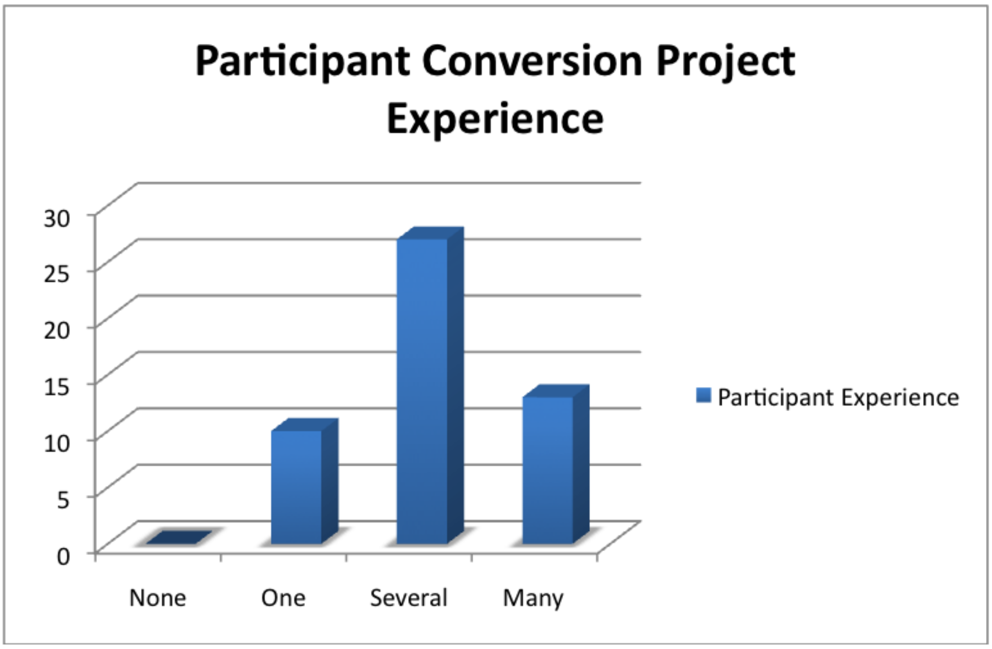
7.1.4. Data Analysis Spreadsheet No.2

The charts shown in chapter 4 used the data gathered in spreadsheet Table 6.1 and 6.2. To achieve these charts the following process was adopted.

For e.g.; In Q1a above the pparticipants came from those working in the offshore oil and gas industry and who have been working directly in the actual conversion of tankers to FPSOs.

Of the 50 responses, received 54% of cases have had experience in several conversions, 26% of cases have been involved in many and in 20% of cases have only had experience with only one conversion (Figure 4.2). These results are shown in table form above in Table 6.2, line B62 to B66. Extrapolating these results using chart-forming process with Excel, Figure 7.3 is made.

Figure 7.3 - Participant's Conversion Project Experience



(Source: Developed for this Research)

APPENDIX 8 – CONSENT FORMS

8.1. CONSENT FORMS

8.1.1. Introduction

The researcher has a set of guidelines to assist in setting up and maintaining consent from participants becoming involved in the research process. A person's decision to participate in research is to be voluntary, and based on sufficient information and adequate understanding of both the proposed research and the implications of participation in it (SCU 2009). There has to be adequate understanding of the purpose, methods, demands, risks and potential benefits of the research.

8.1.2. Consent Form

Consent can be in a written form from the participant. It can also be implied or verbal. Implied could be when a participant submitted back to the researcher a completed questionnaire or verbally through oral contact. In these situations, written consent is unnecessary.

A copy a generic consent form or letter is attached in this appendix.

Chief Executive Officer
ABC Corporation
PO Box xxxxxx
XXXXXXXXXX

Attention: Mr ……………..

Consent for Research

Dear Sir / Madam,

My name is ***Ross Mierendorff*** and I am conducting research as part of my Doctorate of Business Administration at Southern Cross University, Tweed Heads Campus, Queensland Australia This research has been approved by Southern Cross University, Graduate College of Management and has been approved by the Human Research Ethics Committee at Southern Cross University.

My research project is titled:

CRITICAL SUCCESS FACTORS FOR THE ECONOMICAL CONVERSION OF OIL TANKERS TO FPSOs

I am endeavouring to involve as many people as possible who are actively working in or associated with the offshore oil and gas industry in this region and to seek their involvement in my research. I am looking for people who are currently or who have been involved in conversions to highlight the problems that have incurred;

- Who they consider should be responsible for projects,
- What betterments are necessary to make a conversion successful,
- How the project experience can be made easier, better and more productive.

I would like to explore the situation as to who should be involved in a project of this sort and at what stage and for how long.
I would also like to explore what are the hindrances to such a project and how these could be changed to achieve a better result.

I intend to invite all people working in the industry who have been associated with a project of this sort to become involved.

The research to date has taken the form of conducting a literature review project management, risk management and interface management related to the offshore oil and gas industry and becoming familiar with some experts in different fields associated with similar projects.

This literature review has highlighted some interesting factors, which, I consider, need further investigation and research to ascertain their relevance to project management and project risk management.

As mentioned I wish to source data from those people actively involved in the industry and/or in a conversion. If in a conversion then I need to access all those involved to ascertain if they were present for the whole project or only part of the time.
I need to explore whether it makes a difference when people are involved at different stages of a project?

I intend to conduct face-to-face interviews with key people within involved organisations.
I intend to provide a questionnaire to other sections of the industry to conduct an anonymous survey regarding the research project.
I also intend to conduct a “focus group” with some key people from different organisations so a firsthand discussion can provide opinions.
These opinions may be based on fact, fiction or perception.

I intend to conduct qualitative and quantitative analysis on the data from the interviews, questionnaires, surveys and focus groups in order to find if there is any relationship between the data from those involved in the industry and the literature review information.

The objectives are to find the critical success factors for an economical conversion to see if the factors:

- Are currently known,
- Are being administered properly,
- Receive enough attention,
- Include external factors affecting project performance.

The outcome of the research is to develop, through this exploratory research, a formulae or criteria, which can be used to improve project management and risk management processes for conversion projects.

I have a responsibility to the participants to ensure that they are fully aware of the purpose of the research and that any information given will be anonymous and or confidential. Privacy and confidentiality will be protected

There is a provision for counselling or other services to participants adversely affected by the research although this should not occur in this very "low" risk research.

If you have concerns about the **ethical conduct** of this research or the researchers, the following procedure should occur. Write to the following:

The Ethics Complaints Officer
Southern Cross University
PO Box 157
Lismore NSW 2480
Email: ethics.lismore@scu.edu.au

All information is confidential and will be handled as soon as possible.

Participants in this research will be required to donate a small part of their time to complete the questionnaire survey. They will be asked to leave the completed questionnaire with a representative for me to collect. There is no place on the questionnaire for details of the participant to be recorded. Participants are free to contact me personally at anytime to volunteer information.

Face to face interviews will be arranged so as to not to inconvenience the interviewee. The interview will take approximately 20 minutes and the interviewee is not obliged to answer any questions he / she feels they do not wish to answer. The interview can be terminated at anytime if so desired. The identity of any recorded information will remain confidential.

Focus groups will take approx 1 – 2 hrs. People will be free to be involved, however attendance will not be recorded and confidentiality will be maintained.

On completion of the research, feedback will be provided to all organisations involved through the presentation of the thesis. The results may be published in a peer-reviewed journal and presented at conferences, but only group data will be reported. There will not be any mention of participating organisations, people in particular organisations, quotes from participants etc.

Information received in the form of the questionnaires and surveys will be retained by the Southern Cross University for the gazetted period of seven [7] years and then destroyed.

Involvement in focus groups, interviews or completion of the questionnaire survey will imply consent by the participant.

Enquiries:

Participants can make further enquiries about the research by contacting the Researcher and or Supervisor at the following contact details.

Mr Ross Mierendorff

33 Coburg Street East, Cleveland, Qld 4163, Australia
Tel: +61 3286.5531
Mob: +61 419 635 319, +6012 202 1845
E mail: rmierend@bigpond.net.au

Dr Barry Ritchie

Tel: +617 55372137
Mob: +61405372137
E mail: britchi1@bigpond.net.au

If participants wish to receive results of this research, they can leave their contact details on the consent form, which is to be returned to the researcher.

Yours Sincerely

…………………………

Ross Mierendorff

Title of research project:

CRITICAL SUCCESS FACTORS FOR THE ECONOMICAL CONVERSION OF OIL TANKERS TO FPSOs

Name of researcher: ROSS MIERENDORFF

Name of Supervisor: PROF BARRY RITCHIE

(*Contact details of the researcher and the supervisor are contained in the information sheet about this research)*

Tick the box that applies, sign and date and give to the researcher

I agree to take part in the Southern Cross University research project specified above.

Yes ☐ No ☐

I have been provided with information at my level of comprehension about the purpose, methods, demands, risks, inconveniences and possible outcomes of this research, including any likelihood and form of publication of results.

Yes ☐ No ☐

*I agree to be interviewed by the researcher Yes ☐ No ☐

*I agree to allow the interview to be *audio-taped and/or *video-taped

Yes ☐ No ☐

*I agree to make myself available for further interview if required

Yes ☐ No ☐

*I agree to complete questionnaires asking me about ???
(insert general topic) Yes ☐ No ☐

I understand that my participation is voluntary Yes ☐ No ☐

I understand that I can choose not to participate in part or all of this research at any time, without negative consequence to me

Yes ☐ No ☐

I understand that any information that may identify me, will be de-identified at the time of analysis of any data. Therefore, any information that I have provided cannot be linked to me (*Privacy Act 1988 Cth*)

Yes ☐ No ☐

I understand that all information gathered in this research is confidential. It will be kept securely and confidentially for 7 years at the University

Yes ☐ No ☐

I am aware that I can contact the supervisor or researcher at any time with any queries Yes ☐ No ☐

I understand that the ethical aspects of this research have been approved by the SCU Human Research Ethics Committee Yes ☐ No ☐

If I have concerns about the ethical conduct of this research,
I understand that I can contact the SCU Ethics Complaints Officer
Yes ☐ No ☐

Participants name:

Participant's signature:

Date:

☐ Please tick this box and provide your email address or mail address (confidential) below if you wish to receive a summary of the results:

Email:

Mailing address:

APPENDIX 9 – ETHICS APPROVAL

9.1. ETHICS

9.1.1. Introduction

The researcher has a set of guidelines to assist maintaining ethical conduct while doing research. There has to be adequate understanding of the purpose, methods, demands, risks and potential benefits of the research (SCU 2009). The key ethical issues associated with this research project are the rights and obligations of those involved, the privacy, and informed consent, as found applicable. Addressing the ethical issues is important to ensure to avoid breaches of legal and community standards in relation to the ethical conduct. The nature of this research, is dealing with non-personal issues of a technical nature with participants experienced in the technical field of the offshore oil and gas industry, and the number of ethical issues to be addressed is relatively small, but nevertheless still important to address.

9.1.2. Ethics Application

The application for ethics approval was submitted to the Human Research Ethics-Committee through the Southern Cross University. The format for the application has to follow the application guidelines set by the university.

A copy of the application for ethics approval is attached in this appendix.

9.1.3. Ethics Approval

The application for ethics approval was submitted in May 2010 and approval was given in July 2010. A copy of the approval is attached in this appendix.

Southern Cross UNIVERSITY

A new way to think
A new way to think

Human Research Ethics Committee (HREC)
Human Research Ethics Sub-Committee (HRESC)
(Lismore, Coffs Harbour, Tweed/GC)

LOW and NEGLIGIBLE RISK RESEARCH

Applicant/Researcher's Name: **ROSS MIERENDORFF**

Supervisor's Name (if applicant is a student)**:** **JAMES BARRY RITCHIE**

EXPEDITED REVIEW APPLICATION FORM

INSTRUCTIONS
*(*By crossing the box after each statement, you acknowledge that you have read and understood the instruction)*

1. Before completing this application form, have you read the National Statement on Ethical Conduct in Human Research? (National Statement or NS) www.nhmrc.gov.au *☒

2. All approvals which are expedited and approved by the delegated HREC authority are ratified by the full HREC. If there are any queries from the full HREC, the researchers are obliged to comply with these. *☒

3. Information specific for participants to consent to research. (NS 2.2) Specific information about a research project MUST ALWAYS be provided to participants so that a person's (NS 2.21) decision/consent to participate in research is to be voluntary, and based on sufficient information and adequate understanding of the proposed research and the implications of participation. *☒

This requires an adequate understanding of the purpose, methods, demands, risks and potential benefits of the research.

This information must be presented in ways suitable to the particular research project.

For example, some inclusions might be:

3. The name of the project;

- An introductory paragraph including details of who you are, what you are studying (if applicable) and your position within the University (current status - eg lecturer, Honours student, PhD, Masters)
- An explanation (in plain English) about the subject of your research, its purpose and aims;
- Explanation of what will be required of the participants in this research;
- Any risks, inconveniences, discomforts which participants may experience;
- Details of the estimated time that it will take the participant to complete the research (including the opportunity of taking a break if required);
- Details about the likelihood and form of publication of the research results;
- That participation in the research is voluntary;
- Advice to the participant that he/she may withdraw at any time without any negative consequence to him/her;
- Provision of services to participants adversely affected by the research (if applicable to your research project);
- Details of how the anonymity / or confidentiality of any information provided by participants will be ensured;
- Details of how adequate security will be provided for the research data and that information gathered by the University is kept for 7 years at the University;
- Inclusion of the researcher(s) and supervisor's (if applicable) contact details;
- The ethics approval number – once it has been received;
- Details of the University Complaints policy.

A sample of information sheets and consent form (if applicable) are attached to this form. *☒

4. An ethics application for 'Expedited Review' can be submitted at any time to the ethics office at the Lismore, Coffs Harbour or Tweed/GoldCoast campuses. *☒

5. You must submit two copies of this application, with all the relevant attachments, to the ethics office as follows:-

   (a) One electronic copy;
   (b) One copy with relevant signatures. *☒

6. You must not make contact with any participants or begin the data collection component of your research until you receive an ethics approval number. *☒

7. Contacts for the ethics offices are: *☒

   HREC Administration
   HRESC Administration
   Sue Kelly
   Tel: (02) 6626 9139
   Fax: (02) 6626 9145
   Email: ethics.lismore@scu.edu.au

   HRESC Coffs Harbour
   Email: ethics.coffs@scu.edu.au

   HRESC Tweed Heads/GC
   Sue White
   Tel: (07) 55069303
   Fax: (07) 5506 9202
   Email: ethics.tweed@scu.edu.au

Southern Cross UNIVERSITY

A new way to think

Human Research Ethics Committee (HREC)

Human Research Ethics Sub-Committee (HRESC)

(Lismore, Coffs Harbour, Tweed/GC)

LOW and NEGLIGIBLE RISK RESEARCH

EXPEDITED REVIEW APPLICATION FORM

SECTION 1 – ETHICAL CONSIDERATIONS

1.	Is this a new project?	**YES**
1(a)	If NO, please advise relevant details such as the name of the Ethics Committee, the Ethics Approval Number and the month/year of review:	
2.	Is this a project which has received external ethics approval and now requires Southern Cross University ratification?	**NO**
3.	Is this project currently before another ethics committee? If YES, which committee?	**NO**
4.	The nature of this project is most appropriately described as involving: *(select all boxes which apply)* • Observation ☐ • Questionnaire/s, Survey/s *(please attach a copy)* ☒	

	• Interviews ☒ • QA/Evaluation surveys ☐ • On-line data collection ☐ • Focus groups ☒ • Experiments ☐ • Other (please provide details): ☐	
5.	Is this research Low/Negligible Risk to participants? *(refer to the National Statement on Ethical Conduct in Human Research (NS Section 2) www.nhmrc.gov.au)* *(If your answer is NO, then your research is not suitable for expedited approval.* You must submit the National Ethics Application Form [NEAF], available at www.neaf.gov.au)	**YES**
6.	Reason for Expedited Approval: Please select the reason/s why you consider this application can be given expedited review for approval *(please mark all the relevant boxes – more than one may apply)*: (a) Data obtained is anonymous or will be held confidentially ☒ (b) The research plan is safe and poses low/negligible risk to participants ☒ (c) The research plan is safe and poses no risk to the researcher ☒ (d) The research does not involve the participation of vulnerable groups ☒ (e) Other, (please specify): ☐	
7.	Does the research involve any other institution (*such as a hospital or school*)? If YES: (a) What is the name of the institution? (b) Does the institution require ethical approval from its own ethics committee? N/A (c) If YES, has that approval been obtained? YES	NO

SECTION 2 - ADMINISTRATIVE DETAILS

8. Title of project: CRITICAL SUCCESS FACTOR FOR THE ECONOMICAL CONVERSION OF OIL TANKERS TO FPSOs

9. Estimated commencement date: JANUARY 2010

10. Expected duration of the project (months): EIGHTEEN MONTHS

APPLICANT/S

11. **Principal Researcher/Investigator** (applicant) (Main Researcher/Student/Staff Member)

Name: ROSS MIERENDORFF

Qualification/Status: POST-GRADUATE STUDENT
(*eg: staff member (state position), lecturer*, *postgraduate student, undergraduate student, Honours student*)

Degree being undertaken (if applicable) and School: DOCTORATE OF BUSINESS ADMINISTRATION

Phone No: +61 419635319

Email address at Southern Cross University: r.mierendorff.10@scu.edu.au

Additional Researcher/Investigator
Please list with details of their role in the research, their name, qualification/status, phone number and email address.

NIL

12. **Supervisor/Person Responsible***: (NS 5.1.2) (Not required where the Principal Researcher/Investigator [above] is a staff member of the University) (**This should be a member of the full-time staff of the University; they should be adequately experienced and qualified*).

Name: JAMES BARRY RITCHIE

Position: DBA SUPERVISOR

Qualifications: BMechE(1st Class Hons) (Melb); DipEd(Melb);PhD(Melb)

School/Centre: GRADUATE COLLEGE OF MANAGEMENT SCU

Phone No: 617 55372137

Email address at Southern Cross University: barry.ritchie@scu.edu.au

13. **FUNDING** (NS 5.2.7)

Have you (or your supervisor if applicable) received or applied for external funding or sponsorship for this research? YES ☐ NO ☒

If YES:

(a) What is the name of the funding organisation?

(b) What are the details of the funding or sponsorship (including details of any in-kind contribution)?

(c) Amount of external funding/sponsorship: $

(d) Value of in-kind contribution: $

(e) Other details:

13.1 Are there any conditions or restraints on the research as a result of the funding arrangements (eg. intellectual property, publication of results) (NS 5.2.11) YES ☐ NO ☒

(a) If YES, please state the nature of the conditions and/or restrictions:

SECTION 3 - PROJECT DETAILS

14. **AIM or PURPOSE** of the research: (NS 1.1 – 1.13)
(*Give a concise and simple description, in plain language, of the aims of this project*)
[max. 1500 characters]

The aim of the research is to develop criteria for identifying and managing the critical success factors for successful conversion of Oil Tankers to Floating Production Storage Offloading facilities [FPSOs].
Anecdotal evidence within the oil & gas industry suggests that there are fundamental project management success problems with mega projects such as the conversions of Oil Tankers to FPSOs, as there have been a large percentage of these projects concluded with cost and or time schedule overruns (Nooteboom 2004).
The objectives of the research are:
To identify the critical success factors associated with conversions;
To rate the critical success factors in order of their likely importance;
To identify new techniques that may improve current project management methods;
To provide criteria for project managers to enable them to manage projects successfully in terms of cost and time to complete.

15. **RESEARCH PLAN**

(a) **Methodology** – must include a literature review (NS 1.1) plus details of the processes and instruments (eg. interview or questionnaire) [*max. 4500 characters*]

There are approximately 154 FPSOs and Floating Storage Offloading facility, [FSO] in operation and nearly 80 more destined to be completed within the next five years with approximately 60% as conversion projects.(Royal Belgian Institute of Marine Engineers, 2005) Conversion projects repeatedly are late on delivery and over budget. (Nooteboom 2004, sBM - AGM 2009)
The disciplines of project management and project risk management are well defined and have a plethora of information and well established operational criteria for the monitoring and controlling of projects worldwide. Therefore, the question has to be asked as to why, conversions of Oil Tankers to FPSOs are over budget and late on completion. (Nooteboom 2004, sBM - AGM 2009)
The financial impact of having projects completed over budget and late in delivery is substantial.(Nooteboom 2004) In addition under-costing of installation, which can occur two years after the contract is let, can add significantly to overall costs.
(Horsington, Swire Production Solutions, 2007)

The parent disciplines are Project management and Risk management in the context of the Oil Industry

Over the past few years there has been an alternative and maybe new perspective on project management, that of Interface Management. This new perspective casts a different light on existing approaches to project management. The interface process lessens ambiguity about roles and tasks for the project and can reduce misconceptions and misunderstandings between participants. Decision making time can be minimised and the actual decisions are shown to be clear. The process of closer teamwork is encouraged, and doubling up of required efforts can be lessened (Shirley et al. 2006). The external interface management process is useful to ensure that the project elements are properly coordinated, responsibilities are assigned, problems are identified, conflicts can be resolved, documentation on results are formatted and all the participant's roles are understood (Shirley et al. 2006).

The inter-relationship of Interface Management with the five process stages of Project management is to be investigated and tested.

The proposed Research Design and Methodology is to follow Figure 1 below where exploratory questions, interviews and surveys are to seek information pertaining to this research.

The flowchart, in Figure 2, provides the path proposed, consisting of seven steps.

Step 1 is development of the theoretical model looking at the parent discipline literature and providing some outcomes based on existing knowledge.

Step 2 is creation of the research map as shown in Figure 3.

Step 3 is testing and analysis using interviews and surveys of a sample population.

Step 4 is identification of the success factors.

Step 5 is identification and ordering of the critical success factors including determination of those that are new or not acknowledged.

Step 6 is reviewing the resultant success factors against theory.

Step 7 is creation of the formula or criteria for application of the critical success factors.

Although there is a vast spread of information available for the parent disciplines there is a limited amount of relevant and directly related information available for the immediate discipline. Therefore, the research will be exploratory research (Zigmund 2003). The purpose of exploratory research is to diagnose a particular situation, to screen the alternatives that may be available and to discover any new ideas associated with the subject in question.

Figure 1 – Research Design and Methodology

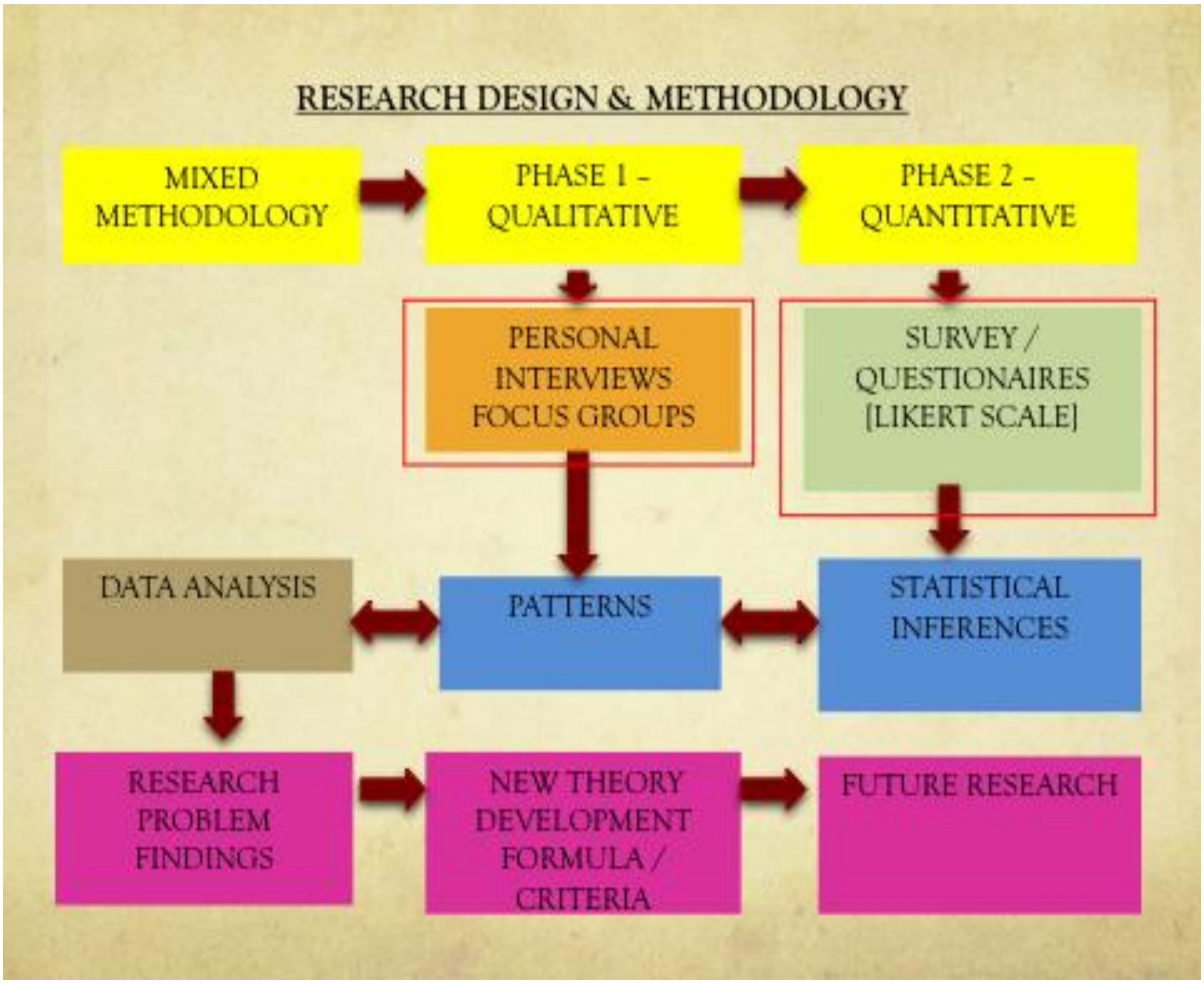
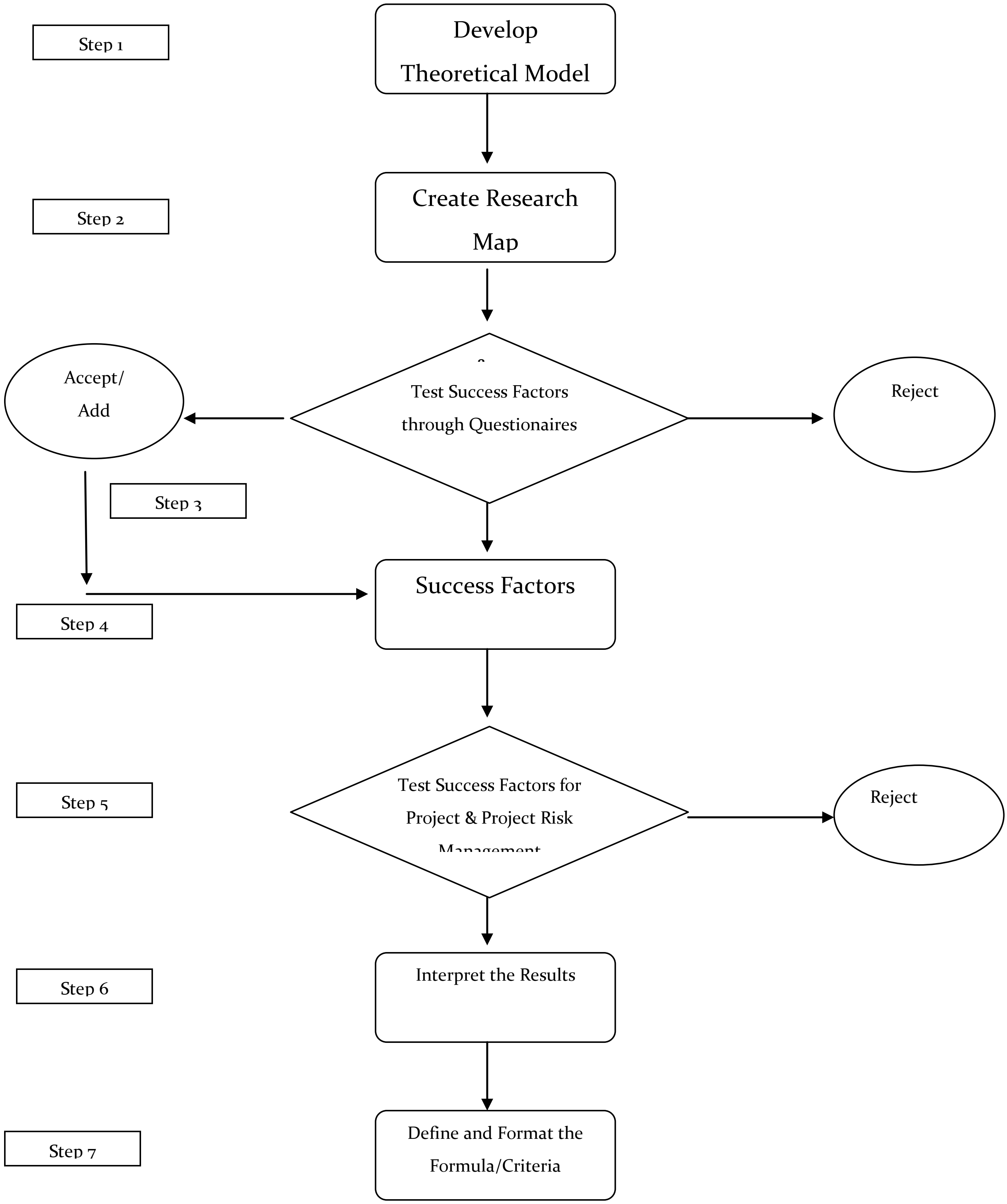


Figure 2– Research Methodology Flowchart



The research map shows where the body of knowledge areas form the initial framework for the source of some of the various considered critical success factors. This framework will allow the researcher to assess the nine elements of project management, in relation to the five process stages of a project and whether, in fact, the critical success factors actually stem from the initial "body of knowledge" of the existing project management framework or stem from other factors such as outside influences.

A questionnaire for the research will be developed from the research map for use in a survey of participants using guidelines, including issues of reliability and validity. (McMurray, 2009) The questionnaire cannot be completed until the full Literature Review is completed and the details in the Research Map finalised.

Figure 3 - Research Map

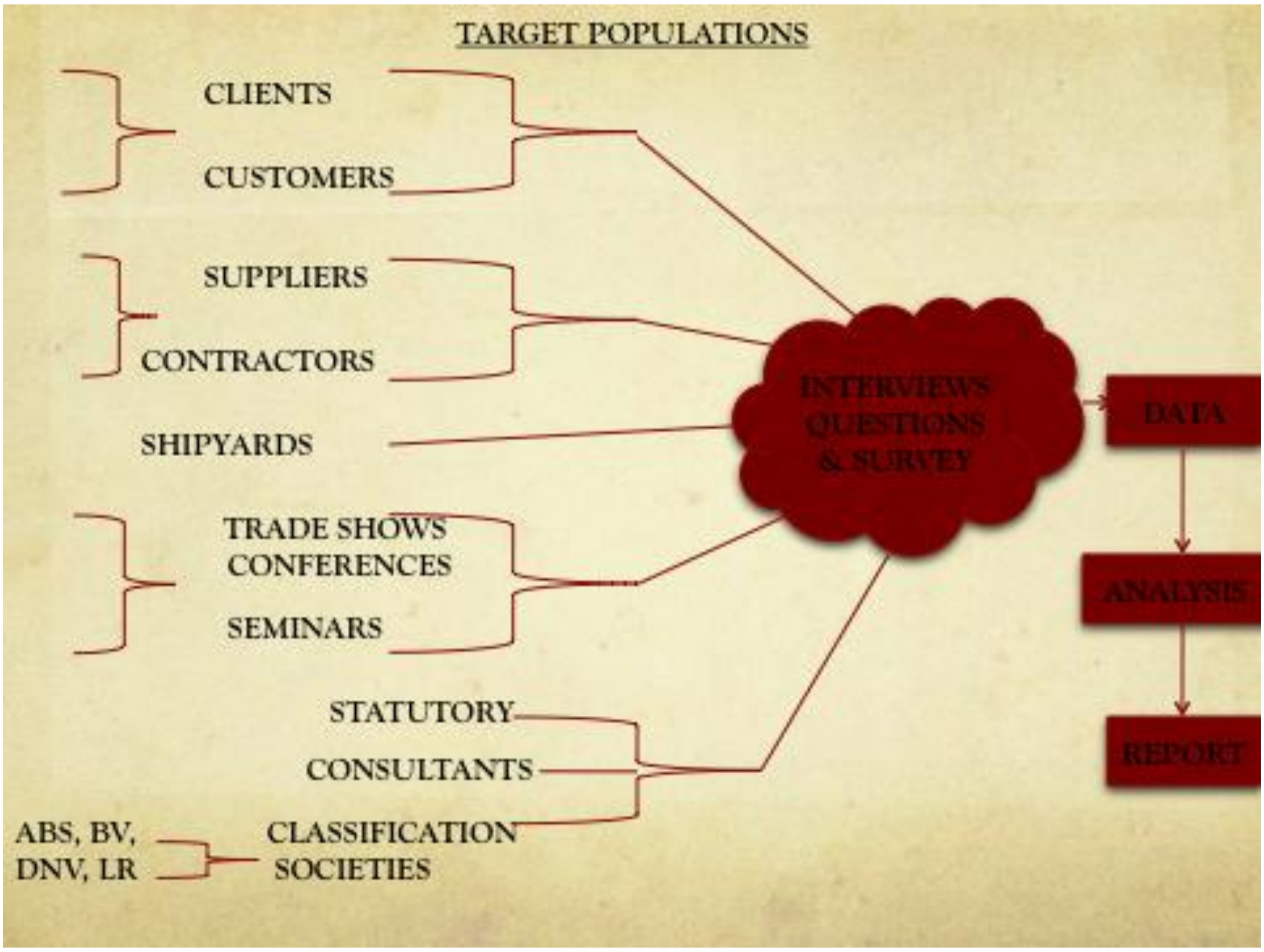
KNOWLEDGE AREAS	INITIATION	PLANNING	EXECUTING	MONITORING & CONTROLLING	CLOS-ING
INTERFACE MANAGEMENT	Define the Philosophy,		Coordinate Response actions to Project Integration Issues, Risk, Contractors, Conflict within Contract		
INTEGRATION MANAGEMENT	Project Management Controls				Docu-Ment
RISK	FEED, Specifications Risk ID, Assessment				Docu-Ment

PROJECT SCOPE	Project Deliverables.	Project Management Plan Select Yard & Vessel Selection Change Management Control	Project Work Plan, Change Management, Scope Contract T&Cs,		Docu-Ment
FINANCE & COST	Financing T&Cs, Estimate Costs, Contract Tender, Compliance & Validation Establish Cost Control System			Budget & Change Management	Docu-ment
PROJECT MT – HR	Acquire, Develop & Manage the PMT				Docu-ment
COMMUNI-CATIONS	Distribute Information				Docu-ment
TIME				Time - project completion & Finish date	Docu-ment
QUALITY				Compliance	Docu-ment

PROCURE-MENT		**Procurement Schedule**	**3rd Party Supplier Management**		**Docu-ment**

(b) **Participants**

The participants intended for this research are to come from those people who are actively involved in the industry at this time. Participants will come from within some of the most influential organisations including developers, clients, contractors, operators, shipyards, financiers, consultants and classification societies.



(b.1)**Recruitment/Source of participants**: Please give details of how the participants are to be recruited/selected.

Include details of how you propose to:

- *Initially select and contact your participants.*
- *How you will obtain their contact details.*
- *Include/attach copies of documentation you intend to use [letter, advertisement/flyer, script for telephone, email, internet, personal or organisation contact])*
- *Provide details of any permission you are required to obtain, or have obtained, from organisations (e.g. university, company, government department) where you are <u>seeking to access staff</u> or other members of that organisation.*
  [max. characters 4500]

To complete a systematic selection process is as follows:

Write a letter to the CEO of each organisation seeking permission to:

A] interview the senior managament on a one to one basis.

B] seek persission to ask the employees to partake in a questionnair and or survey,

C] seek permission for employees both senior management and others to be part of a focus group to discuss aspects of the industry.

D] provide the CEO with an explanation of what the research is about and how confidentiality and anonymity will be maintained,

E] inform the CEO that any information made available through employees would remain anonymous.

F] inform the CEO that permission as been given by the University ethics committee to proceed with this research.

H] inform senior management before interview as to the aspects of the research, the confidentiality and anonymity and they can withdraw from the research at any time if they choose to do so,

I] inform all participants as to the reason for the research and what the information will be used for.

J]Ask the senior management to introduce me to other employees and seek permission for their involvement in answering questionnaires and partaking in the survey,

K] explain the confidentiality and anonymity for the information.

The CEOs of the organisations are known to me and I will be speaking to them individually as I provide them with the relative information when seeking permission in writiing.

Attached are copies of the proposed information sheets, permission letters, University documentation and contact details for Supervisor, University and Researcher.

(b.2 **Intended number of participants**: ⇨ >300

Explain how and why you have chosen this number: ⇨ THIS NUMBER APPEARS TO BE THE MAXIMUM NUMBER OF PERSONS ACTIVELY INVOLVED IN THE MANAGEMENT OF OPERATIONS WITHIN THIS REGION. TO GET ALL

OF THESE PEOPLE WILL NEED A COMPREHENSIVE RANGE OF QUESTIONNAIRES AND SURVEYS.

(b.3) **Age range of participants**: 20 – 70 YEARS OF AGE

(b.4) **Sex of participants**: MALE & FEMALE

(b.5) Will you be using equal numbers of male/female participants. Yes ☐ NO

Please explain why: THE PREDOMINANT GENDER WITHIN THE INDUSTRY IS MALE HOWEVER THAT DOES NOT MEAN THERE WILL BE ANY EXCLUSION OF FEMALES FROM PARTAKING WITHIN THE RESEARCH PROCESS.

(b.6) How will research participants be affected?

(*Please provide answers under the following headings)*:

i. What procedures will participation in this research involve for your participants? THOSE PROPOSED TO BE INVOLVED IN DIRECT FACE TO FACE INTERVIEWS WILL HAVE DIRECT PARTICIPATION.

ii. THOSE BEING ASKED TO PARTAKE IN QUESTIONNAIRES AND SURVEYS WILL BE ASKED TO BE INVOLVED AND TO TAKE THE TIME TO ANSWER THE QUESTIONNAIRES AND SURVEYS.

iii. THOSE BEING ASKED TO BE INVOLVED IN THE FOCUS GROUPS WILL REQUIRE TO BE DIRECTLY INVOLVED THROUGH ATTENDANCE.

iv. What time commitment will the research involve for your participants? INTERVIEWS WILL BE 15 – 20 MINS

v. QUESTIONNAIRES – SURVEYS – 15 MINS

vi. FOCUS GROUPS – ONE [1] - [2] HOURS

vii. What travel (if any) will the research involve for your participants? MINIMAL

viii. Where will the research/data collection take place? WITHIN AUSTRALIA AND SEVERAL ASIAN COUNTRIES OF SINGAPORE, MALAYSIA, THAILAND AND VIETNAM

ix. Please include any additional information you feel is relevant; e.g. will any refreshments be provided to the participants? Will participants be reimbursed for travel costs?

(c) Data analysis (NS 3): The survey will use the Likert rating scale as far as possible to allow quantitative results to be obtained, particularly in determining the relative importance of the success factors. Descriptive answers will be used to supplement the quantitative results to provide a deeper understanding of the rationale underlying the results and to build confidence in the results. As the research is exploratory issues of dependence of variables on each other will not be needed.

(d) Expected Outcomes (NS 1.6-1.9): Outcomes expected include:
A listing of critical success factors prioritised by degree of risk to effective completion of a conversion project;
Identification of those critical success factors that have not been recognised in previous conversions;
Identification of new or modification to existing theory to improve the understanding of Project Management and its application to complex projects.

16. What are the expected **BENEFITS** of this research? (NS 1.6-1.9 and 2.1*)*

(a) To participants: NEW INFORMATION IN REGARD TO PROJECT MANAGEMENT PROCESSES.

(b) To the broader community: UNLESS DIRECTLY INVOLVED OR ASSOCIATED WITH THE INDUSTRY THERE WILL PROBABLY BE VERY LITTLE BENEFIT TO THE BROARDER COMMUNITY. THE PRINCIPLES AND OUTCOMES MAY BE APPLIED IN OTHER INDUSTRIES

(c) To increasing knowledge: INCREASE KNOWLEDGE IN THE DISCIPLINES OF PROJECT MANAGEMENT AND PROJECT RISK AMANGEMENT ASSOCIATED IN THE OIL AND GAS INDUSTRY.

17. **RISK** (NS 2)

Describe the level and nature of the risk to the participants in this research.

NIL

18. **REVIEW PROCESS** (NS 1.2)

Please give a brief description of the process of review and quality assessment for your research proposal. (eg. has your supervisor or an external reviewer assessed the research plan?)

THE ASSIGNED SUPERVISORS FOR THIS RESEARCH PLAN AND METHODOLOGY HAVE ASSESSED THE PROPOSAL.

19. **FEEDBACK**

All participants are entitled to receive the results of research in which they participated. Usually, participants are advised, in the Information Sheet, as to how they can obtain results of research. If there is a consent form, participants can also indicate on it that they would like to receive research results.

How will you advise participants that they can obtain **feedback** on the results of the research once it has been completed?

Please describe: IT IS PROPOSED TO PROVIDE FEEDBACK TO ALL PARTICIPANTS THROUGH THE AVAILABILITY OF THE COMPLETED THESIS.
IT IS ALSO PROPOSED TO PROVIDE FEEDBACK TO EACH OF THE ORGANISATIONS INVOLVED IN THE WAY OF A DIRECT REPORT BASED ON THE THESIS DOCUMENT.

20. **INFORMED CONSENT**(NS 2.2)

Is Informed Consent necessary? *YES – DIRECT TO THE CEO OF EACH ORGANISATION WHERE CONSENT WILL BE ASKED OF THE EMPLOYEES OF ORGANISATIONS PRIOR TO BECOMING INVOLVED IN THE PROCESS. QUESTIONNAIRE AND SURVEY PARTICIPANTS WILL BE FREE TO BE INVOLVED IN THESE QUESTIONNAIRES AND SURVEYS.

How will you obtain the consent of the participants? A DIRECT APPROACH TO THE CEO OF EACH ORGANISATION WITH A FORMAL REQUEST FOR PARTICIPATION AND PERMISSION TO ASK EMPLOYEES.
AN INFOMED CONSENT FORM WILL NEED TO BE SIGNED BY THE RESPONSIBLE PERSON FOR THE ORGANISATION.
A PROFORMA WILL BE SUPPLIED DETAILING WHAT THE RESEARCH IS ABOUT, WHAT THE INFORMATION WILL BE USED FOR, HOW THE INFORMATION WILL BE OBTAINED, HOW THE RESULTANT INFORMATION WILL BE CONTROLLED AND REMAIN CONFIDENTIAL.
ANONIMITY WILL BE MAINTAINED.
THE INFORMATION FOUND WILL ONLY BE USED FOR THE STATED PURPOSE.

21. **Research conducted in OVERSEAS countries** (NS 4.8)

21.1. Are you conducting research in an overseas country? ⇨ *YES

- **If NO**, go to Section 4
- **If YES,** answer questions 21.2, 21.3 and 21.4 below

21.2 Are you familiar with the National Statement Chapter 4.8: ⇨*YES
"**People in Other Countries?**"

21.3. How will local cultural values be acknowledged in the design and conduct of the research whilst maintaining the basic principles of the National Statement? In relation to the National Statement please provide full information below about the local cultural values and how they will be maintained: NO AFFECT

21.4 *Research Conducted Overseas*. There is a separate form which **MUST** be completed if your research is being conducted overseas. It is available at the website.
It has been attached to this application form. ⇨*YES. A FORM WILL BE COMPLETED FOR EACH COUNTRY WHERE THE RESEARCH WILL BE UNDERTAKEN (THE FORM FOR SINGAPORE IS ATTACHED AS AN EXAMPLE).

SECTION 4 - CERTIFICATION

22. The applicant (and, if relevant, the research student's Supervisor), certifies that:

- Information provided in this application is truthful and complete.
- I/we have read the *National Statement on Ethical Conduct in Human Research (National Statement).*www.nhmrc.gov.au
- The research will be conducted in accordance with the National Statement.
- The research will be conducted in accordance with the ethical and research requirements of the institutions involved.
- I/we have consulted any relevant legislation and regulations (such as the *Privacy Act 1988*), and the research will be conducted in accordance with these.
- I/we will immediately report to the HREC anything which might warrant review of the ethical approval of the proposal (NS 5.5.1 – 5.5.10), including:
    - Serious or unexpected adverse effects on participants;
    - Proposed changes in the protocol; and/or
    - Unforseen events that might affect continued ethical acceptability of the project.
- I/we will inform the HREC, giving reasons, if the research project is discontinued before the expected date of completion (NS 5.5.1 – 5.5.10).
- I/we will not continue the research if ethical approval is withdrawn and will comply with any special conditions required by the HREC.
- I/we agree to adhere to the conditions of approval stipulated by the HREC and will co-operate with the HREC's monitoring requirements. At a minimum, annual progress reports and a final report will be provided to the HREC. (NS 5.5.1 – 5.5.10).
- I/we acknowledge that failure to complete all details of the form may lead to delays for which I am/we are therefore responsible.

23. **Full Name of Applicant/Principal Researcher/Investigator** *(Researcher/Student):*

⇨ ROSS MIERENDORFF

Email: rmierend@bigpond.net.au

Telephone: +61732865531, +61419635319, +60122021845

Signature of Applicant/Principal Researcher/ :...

Date: .....

24. **Full Name of Supervisor/Person Responsible:**

Position: DR J BARRY RITCHIE

Email: Barry Ritchie <britchi1@bigpond.net.au>

Telephone: +617 55372137............................

Signature of Supervisor: ....

Date: ....

Note: Your signature above confirms that you have checked all details in this application, including the Information Sheet and Consent Form.

25. **Please Note:**

Ethics approval provides no guarantee of school support or funding for your project. Those must be sought independently through appropriate channels.

Please complete the following checklist to ensure you have correctly finalised the Ethics application form.

CHECKLIST:

Have you read the National Statement on Ethical Conduct in Human Research	YES
Have you attached the Information Sheet	YES
Have you attached a Consent Form	YES
Have you attached a copy of a proposed Questionnaire	NO
Have you answered all the questions?	YES
Do you have ALL the required signatures?	YES
Have you completed two (2) copies of the application? NOTE: One must be in electronic format and is to be forwarded to the appropriate ethics office Original signatures must appear on one copy; this is usually a hard copy and is sent by mail or delivered to the appropriate ethics office. Alternatively, the signature pages can be faxed to the appropriate ethics office.	YES NOTED NOTED
Have you proof-read your application? Have you checked your spelling and grammar?	YES YES
Have you included page numbers at the foot of your application and all attached documents (information sheet, consent form, questionnaires)?	YES

HUMAN RESEARCH ETHICS COMMITTEE (HREC)

NOTIFICATION

To: Professor James Barry Ritchie/Ross Mierendorff
Graduate College of Management
barry.ritchie@scu.edu.au,r.mierendorff.10@scu.edu.au

From: Secretary, Human Research Ethics Committee
Division of Research, R. Block

Date: 19 July 2010

Project: **Critical success factor for the economical conversion of Oil Tankers to FPSOs.**

Approval Number ECN-10-121

The Southern Cross University Human Research Ethics Committee has established, in accordance with the *National Statement on Ethical Conduct in Human Research – Section 5/Processes of Research Governance and Ethical Review*, a procedure for expedited review by a delegated authority.

This application was considered by the HRESC, Tweed Heads/Gold Coast campus and has now been approved. This approval will be ratified by the full HREC at the August HREC meeting. Your research may commence.

The approval is subject to the usual standard conditions of approval. Please ensure that these standard conditions of approval are noted.

<u>Standard Conditions</u> in accordance with the National Statement on Ethical Conduct in Human Research (National Statement) (*NS*).

1. **Monitoring**

NS 5.5.1 – 5.5.10

Responsibility for ensuring that research is reliably monitored lies with the institution under which the research is conducted. Mechanisms for monitoring can include:

(a) reports from researchers;

(b) reports from independent agencies (such as a data and safety monitoring board);

(c) review of adverse event reports;

(d) random inspections of research sites, data, or consent documentation; and

(e) interviews with research participants or other forms of feedback from them.

The following should be noted:

(a) All ethics approvals are valid for **12 months** unless specified otherwise. If research is continuing after 12 months, then the ethics approval MUST be renewed. Complete the Annual Report/Renewal form and send to the Secretary of the HREC.

(b) *NS 5.5.5*
Generally, the researcher/s **<u>provide a report every 12 months</u>** on the progress to date or outcome in the case of completed research specifically including:

- The maintenance and security of the records.
- Compliance with the approved proposal
- Compliance with any conditions of approval.
- Any changes of protocol to the research.

<u>Note: Compliance to the reporting is **mandatory** to the approval of this research.</u>

(c) Specifically, that the researchers <u>report immediately</u> and notify the HREC, in writing, for approval of **any change in protocol.** *NS 5.5.3*

(d) That a report is sent to HREC when the **project has been completed**.

(e) That the researchers report immediately any circumstance that might affect ethical acceptance of the research protocol. *NS 5.5.3*

(f) That the researchers report immediately any serious adverse events/effects on participants. *NS 5.5.3*

2. Research conducted overseas

NS 4.8.1 – 4.8.21

That if research is conducted in a country other than Australia, all research protocols for that country are followed ethically and with appropriate cultural sensitivity.

3. Complaints

NS 5.6.1 – 5.6.7

Institutions may receive complaints about researchers or the conduct of research, or about the conduct of a Human Research Ethics Committee (HREC) or other review body.

Complaints may be made by participants, researchers, staff of institutions, or others. All complaints should be handled promptly and sensitively.

Complaints about the ethical conduct of this research should be addressed in writing to the following:

Ethics Complaints Officer

HREC

Southern Cross University

PO Box 157

Lismore, NSW, 2480

Email: ethics.lismore@scu.edu.au

All complaints are investigated fully and according to due process under the National Statement on Ethical Conduct in Human Research and this University. Any complaint you make will be treated in confidence and you will be informed of the outcome.

All participants in research conducted by Southern Cross University should be advised of the above procedure and be given a copy of the contact details for the Complaints Officer.

They should also be aware of the ethics approval number issued by the Human Research Ethics Committee.

Sue Kelly
HREC Administration
Ph: (02) 6626 9139
E. ethics.lismore@scu.edu.au

Professor Bill Boyd
Chair, HREC
Ph: 02 6620 3650
E. William.boyd@scu.edu.au