CRITICAL SUCCESS FACTORS FOR PROJECTS IN OIL AND GAS JOINT VENTURES

By

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Specially dedicated to
my beloved wife Merilynn and my dearest son Julian,
who have been my source of motivation.

ABSTRACT

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Daniel Jeyaraj Benjamin

Studies on CSFs for projects in oil and gas JVs are scarce and lack focus. This research focuses on identifying critical success factors (CSFs) that are important for projects in oil and gas joint ventures. Though literature review and industry experts' inputs, 58 CSFs were established as being essential for successful projects in oil and gas joint ventures. These CSFs were categorised into Organisation, Project, Environment and JV factor groups and a CSF model was developed. As these factor groups and CSFs were tested to be positively correlated to project success, these factor groups and CSFs were deemed to facilitate analysis and understanding of CSFs from a macro (factor groups) and micro (individual CSFs) perspective and assist project practitioners to adopt the CSF model for achieving successful project in their respective oil and gas JV organisations. Seven CSFs were found to be commonly in difference of opinion across the respondents. Since these CSFs are equally pertinent for project success, these CSFs needs to be studied further on its implementation and management in the JV organisations.

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APPROVAL SHEET

This dissertation entitled "CRITICAL SUCCESS FACTORS FOR PROJECTS IN OIL AND GAS JOINT VENTURES" was prepared by DANIEL JEYARAJ BENJAMIN and submitted as partial fulfillment of the requirements for the degree of Master of Science in Project Management at Universiti Tunku Abdul Rahman.

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DECLARATION

I Daniel Jeyaraj Benjamin hereby declare that the dissertation is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

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(DANIEL JEYARAJ BENJAMIN)

Date _____

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter presents a summary of the study background on critical success factors for projects in oil and gas joint ventures followed by the problem statement, aim and objectives of this study, summary of research gap from literature review, the questions of this study, research methodology, the significance of this study and brief summary on all the other subsequent chapters.

1.2 Background of the study

Studies attempting to understand the critical success factors (CSF) for projects have always been the subject of interest of practitioners and researchers alike (Abdullah et al. 2010). Although previous studies have been able to outline the factors of project success, there is still a lack of general agreement concerning common factors for all projects as it often varies from author and times, aims of projects, types of industries and the project life cycle itself (Wateridge 1995, Dvir et al. 1998, Fortune and White 2006). Understanding of CSFs for projects in a joint venture is even more specific and sparse area of knowledge. Understanding CSFs for projects and how it affects project success is also uncommon (Belassi and Tukel 1996, Fortune and White 2006).

Joint ventures (JVs) have become popular due to their significance as a strategic option in global competition (Conractor and Lorange 1998, Kumaraswamy, Palaneeswaran and Humpreys 2001, Ozorhon et al. 2008, Ozorhon et al. 2010,

Ozorhon et al. 2011, KPMG 2011, IHS Consulting 2012). In particular JVs has been an emerging trend in the oil and gas industry due to driving forces like capital intensiveness, risk concentration, access to technology, supply chain optimization, market positioning, regulatory requirements and political sensitivities (KPMG 2011, IHS Consulting 2012). Since capital projects in the oil and gas industry constitute a significant amount of each company's spending, special attention must be given to predictability, transparency and reliability, including monitoring and reducing the costs associated with these projects (Ernst & Young 2012).

Due to the popularity of JVs, many studies have been done on CSFs for JV performance. However these studies lack clarity on identifying the relevant CSFs and establishing the importance of CSFs to project success (Reus and Ritchie 2004, Ren, Gray and Kim 2009, Zheng and Larimo 2010). Studies on CSFs for projects in oil and gas JVs are sparse, lack clarity and incomprehensive in determining the CSFs that drives the JV to achieve its project successfully.

In regard of these imperatives mentioned, an attempt to understand the CSFs for projects in JVs of the oil and gas industry and its relation to project success is a well-founded one.

1.3 Problem Statement

Many oil and gas companies form joint ventures to undertake oil and gas projects. Oil and gas industry is a volatile industry. It is often mired with high risk and uncertainties therefore most of the projects in oil and gas industries are done through some form of JV so that oil and gas companies can jointly manage the risks and uncertainties.

It has been noted that at least 65% of oil and gas projects have been failures (Merrow 2011) and these projects have been unsuccessful in achieving its objectives. Since oil and gas projects require huge investment and expected to produce long term sustainable profits, in-depth studies need to be done on factors that will contribute to project success.

As there has been limited studies done on CSFs for projects in oil and gas joint ventures, this study is pertinent, and hopes to provide a baseline for project practitioners to achieve successful projects.

1.4 Aim and Objectives

The aim of this research is to identify critical success factors (CSFs) for managing high risk and complex projects such as oil and gas projects in an intricate organization set up such as joint ventures (JVs) to achieve project success criteria (cost, time, quality, safety, meeting project technical specifications, end-user's

satisfaction and partner companies satisfaction). With the identified CSFs, this research hopes to benefit project management practitioners in managing these projects successfully.

The objectives of this study are outlined below:

i. To establish critical success factors for projects in oil and gas joint venture organisations.
ii. To establish correlation between the identified critical success factors and the critical success factors association with project success.
iii. To determine if there are any differences in perception between the respondents on critical success factors for projects in oil and gas joint venture organisations.

1.5 Research Gap

As mentioned above, although extensive research have been done on critical success factors for projects, there is great lack of consensus among researches as to what are the common factors for successful projects. Conclusion made by many researchers are that there can be no common critical success factors for projects as it is influenced by the author and times, aims of projects, types of industries and the project life cycle itself (Wateridge 1995, Dvir et al. 1998, Fortune and White 2006).

Very few studies have managed to relate CSFs for projects to project success (Rockart 1979, Baker, Murphy and Fisher 1983, Khang and Moe 2008, Pinto and

Slevin 1987**,** Ika, Diallo and Thuillier 2012, Cooke-Davies 2002, Westerveld 2002, Belassi and Tukel 1996, Ika, Diallo and Thuillier 2012, Gray 2001, Hannevik et al. 2013). This has caused lack of clarity and empirical evidence on the relationships and impact of the critical success factors on project success.

Researchers have tried to identify common set of critical success factors for joint venture performance but without much success (Parkhe 1993, Beamish and Killing 1997, Yan and Gray 2001b, Luo 2002b, Zeng and Chen 2003, Dhanaraj and Beamish 2004, Reus and Ritchie 2004, Gong et al. 2005, Ren, Gray and Kim 2009, Zheng and Larimo 2010). As joint venture performance is highly correlated with project success (Ozorhon et al. 2008, Ozorhon et al. 2010, Ozorhon et al. 2011), and joint ventures becoming the future trend for organizations to undertake complex and high risk projects (KPMG 2011, IHS Consulting 2012), identifying the critical success factors will be crucial.

Since oil and gas projects are mostly complex, high risk and capital intensive, it is vital for the organisations to manage these projects consciously (KPMG 2011, Ernst & Young 2012, IHS Consulting 2012). Project management in oil and gas industry has generally developed in the recent years however due to the ever increasing challenges, more clarity is needed on efficient ways of managing these projects. It is hoped that identifying the critical success factors will provide clarity on the focus areas to the project management practitioners to successfully manage the projects.

In summary there are hardly any researches that have studied comprehensively on CSFs that are relevant for project success in oil and gas joint

venture organisation let alone empirically establish the relationship of the CSFs with project success. Therefore it will be important to identify all the relevant critical success factors that are applicable for project success in oil and gas joint venture organizations and empirically relate them to project success.

1.6 Research Questions

In relation to the research gap identified above, this study explores the following research questions:

i. What are the critical success factors that are applicable for projects in oil and gas joint venture organisation?
ii. How do the critical success factors for projects in oil and gas joint ventures correlate with project success?
iii. What are the differences in opinions between the respondents on critical success factors for projects in oil and gas JVs?

1.7 Research Methodology

An on-line administered questionnaire will be developed to test the research questions of this study. Since the main purpose of this study is to analyze the critical success factors for projects in oil and gas joint ventures, the target population would be all the project practitioners in joint ventures of oil and gas companies worldwide.

The survey for this study will be distributed to the senior managers of the joint ventures, project managers and project management executive level staff from oil and gas joint ventures in Malaysia and all other parts of the world. Pilot survey will be conducted on a small sample of respondents to verify the content validity with the assistance of industry experts.

The main survey questionnaire will be sent to a total of 550 respondents with a targeted response rate of 25%. Reliability tests and correlation tests will be carried out to determine the CSFs valid for projects in oil and gas joint ventures and how the CSFs are associated with project success.

1.8 Research Contribution

This study aims to identify CSFs for a specific industry in a defined organisation set up. As pointed out by many previous researchers (Slevin and Pinto 1986, Pinto and Slevin 1989, Belassi and Tukel 1996, Brotherton and Shaw 1996, Zwikael and Globerson 2006), it is only valid that CSFs is studied within a pre-determined parameters i.e. type of industry. Thus study also attempts to relate the CSFs to project success, an attempt which has not been very successful for many other researchers.

By identifying CSFs for projects in oil and gas industry which is managed by joint venture organisation, this study will be important to all project management practitioners who are involved in managing oil and gas projects in a joint venture

organisation set up. These CSFs will be crucial to ensure the project management practitioners focus on the key factors to ensure successful project outcome.

As this study focuses specifically on post-formation stage of JVs, better emphasis is given on CSFs for managing projects in a JV organisation. Factors which are related to pre-formation of JV is not included in this study to maintain the focus area on project management and the CSFs that works for managing projects in JVs.

1.9 Chapter Outline

In the next chapter this study provides introduction to critical success factors, past studies on CSFs for project success by other researchers, review on CSF frameworks and models studied by other researchers. Detail review is done on how CSFs are specific to industry, organisation, project lifecycle and so forth. More review is done on how CSFs are categorised into factor groups for analysis by previous researchers. Chapter 2 also discusses about joint venture organisation and its characteristics (types of JVs, stages in JVs etc.). Definition and CSFs for joint venture performance is also reviewed. Review is also done on emergence of oil and gas joint ventures and why CSFs are important for projects in oil and gas joint ventures. To establish the appropriate measure of project success for this study, project success criteria defined by past studies are also explored. Gap analysis from literature review is discussed prior to concluding Chapter 2.

Chapter 3 discusses about the justification behind the selected research methodology which comprises of discussion on research framework, research model, research strategy, questionnaire development, sampling, data collection method and data analysis method.

Data collection and analysis is discussed in Chapter 4. Descriptive and inferential statistical analysis such as reliability and data distribution are discussed.

Correlation and compare means test results are presented and outcomes for each research question are discussed in chapter 5.

Chapter 6 meanwhile summarises discussions from Chapter 1 to 3. Discussions on findings from data analysis in Chapter 5 are discussed further to determine whether the research objectives were met or not. Contribution of this study to academicians and project practitioners alike is also discussed in this chapter. Limitations of this study and recommendations for future research conclude this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

This chapter presents the literature review in four sections. The first section provides brief introduction to critical success factors (CSFs), critical success factors for projects and review on past studies done by other researchers on CSFs for projects, CSFs frameworks and models.

The second section presents reviews on joint ventures and its characteristics. CSFs for joint venture performance and emergence of oil and gas joint venture organisations are discussed in detail. The importance of CSFs for projects in oil and gas JVs are also discussed here.

The third section of this chapter discusses briefly about project success criteria studied by previous researches so that appropriate measures of project success for this study can be established.

Finally gap analysis from literature review is discussed to conclude this chapter.

2.2 Introduction to critical success factors (CSFs)

The term critical success factors (CSF) was first coined by Daniel (1961). CSFs are defined as elements in an organisation that if implemented adequately and managed successfully will contribute to positive results for the organisation. These elements are the necessities for an organisation to prosper. Lack of CSFs or improper implementation and management will most likely lead to unsatisfactory result for the organisation (Rockart 1979).

As CSFs were implemented through the years, and with increasing number of researches reported, its definition has been further refined to steer project performances. CSFs are also considered as extremely important fundamentals in an organisation which can determine its success or failure (Lim and Mohamed 1999). According to Keck, Leigh and Lollar (1995), CSFs are characteristics, conditions or variables that can contribute significantly to an organisation's business. As CSFs can be also viewed from individuals' responsibilities and attributes perspective, management should give high priority to CSFs because they drive the performance (Jaramillo and Marshall 2004).

This study focusses on CSFs that are applicable to projects. CSFs are applied in a broad spectrum as the backbone of the project and at the same time it is also clearly individualized and project specific (Pinto and Slevin 1989). Whatever manner it is applied, the fact remains that CSFs are critical to the success of a project.

This study will also focus on CSFs that drive JV performance. CSFs for JV performance depend on attributes such as the type of JV and phases which the JV organisation is in (Ren, Gray and Kim 2009, Zheng and Larimo 2010). As projects are executed in operation phase of a JV (Ozorhon et al. 2008) and JV performance is highly associated with project performance (Ozorhon et al. 2008, Ozorhon et al. 2010, Ozorhon et al. 2011), CSFs that contributes to JV performance in operation phase is important to the success of a project.

2.3 CSFs for projects - frameworks and models

The advent of CSFs, although surfaced in the 1960s, was identified objectively only in the 1980s. In 1983, Baker, Murphy and Fisher suggested that perceived performance should be the measure of project success, as opposed to using time, cost and performance (Baker, Murphy and Fisher 1983). A survey conducted by Hughes (1986) concluded that projects fail due to inappropriate basic managerial philosophies, inadequate focus and deficiency of communication goals. Morris and Hough (1987) researched eight large projects and suggested seven dimensions of project success. However it is common recognition that Pinto and Slevin (1987) are the first to attempt to develop a collective set of CSFs related to project success. Their model aptly known as project implementation profile model identified 10 critical success factors namely:

- Project mission
- Top management support

- Project schedule/plan
- Client consultation
- Personnel
- Technical tasks
- Client acceptance
- Monitoring and feedback
- Communication
- Troubleshooting

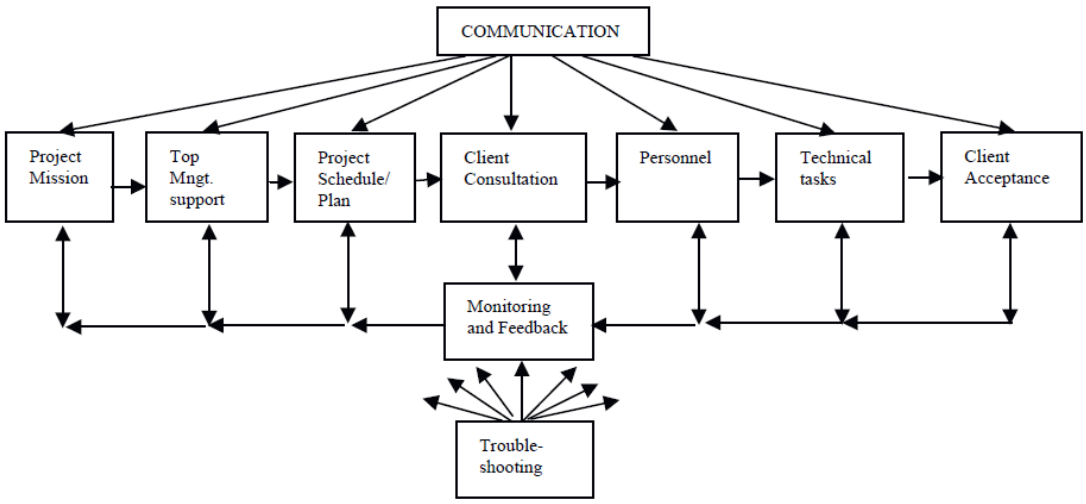


Figure 2.1: Ten key factors of the project implementation profile (PIP)

Source: adopted from Pinto and Slevin (1987)

Pinto and Slevin went on to identify critical success factors and how these factors can be significant to each stage of a research and project life-cycle (Pinto and Slevin 1989). A similar study by Pinto and Prescott (1988) explored the importance of the 10 CSFs and concluded that CSFs have different degree of importance at different phases of the project life cycle. This is further supported by Brotherton and

Shaw (1996) which state that CSFs are dynamic. It was then evident that CSFs were not a static component, but would have relative importance at different stages in the project implementation.

Interrelationships of CSFs are just as important as individual factors. It does not only provide a comprehensive outline of critical success factors for project practitioners, but helps them understand the intra-relationships between the factors in different groups. An example would be top management support is a factor that can be affected by the state of economy, however backed up by effective planning, scheduling and communication, a project manager with competent managerial skills can easily observe cause-effect relationships and prepare accordingly (Fortune and White 2006). Another example quoted by Belassi and Tukel (1996) is that project managers' competence is a critical factor as it can affect project planning, scheduling and communication.

All project CSFs are inter-dependent as no individual CSF alone can be proven to contribute to project success on its own (Belassi and Tukel 1996, Clarke 1999, Khang and Moe 2008). Belassi and Tukel (1996), Clarke (1999) and Khang and Moe (2008) further explain that as well as recognising CSFs for project is important, it is equally imperative that the CSFs should not be considered independent of each other.

CSFs are also industry or organization specific (Zwikael and Globerson 2006). Its weightage is different across various industries (Belassi and Tukel 1996). For example the methodological compatibility, standardization of procedures and

client participation are CSFs that greatly varies from the oil and gas, engineering, construction and service industry. An example of CSFs vital to the service industry would be quality planning and intensive interaction with stakeholders, whereas schedule development and cost planning would rank lower on the priority scale in this industry.

When CSFs are classified and arranged into a framework, its identification becomes more apparent and evident, therefore instead of analyzing individual factors, benefits can be reaped from combined effects from a group of factors. A grouping of such factors helps the project manager identify success factors specific to certain aspects of the project (Belassi and Tukel 1996, Ika, Diallo and Thuillier 2012). A framework could also point out specific factors and situations, and include previously unconsidered factors that were left out as it did not comprise of a framework. This framework then is a tool that groups, classifies and analyses many CSFs, and becomes a diagnostic instrument for the project manager (Slevin and Pinto 1986).

Grouping up success factors into factor groups and analysing its interactions are important in ensuring project success (Belassi and Tukel 1996, Ika, Diallo and Thuillier 2012). In their research, Belassi and Tukel (1996) studied the interaction between several factor groups. The factor groups were categorised into four areas as below:

- Factors related to the project
- Factors related to the project manager and the team members

- Factors related to the organization
- Factors related to the external environment

The four factor groups proposed by Belassi and Tukel (1996) are briefly explained as below.

Factors related to the project

Factors related to the project are one of the essential dimensions of project performance. CSFs pertaining to this category are the size and value of a project, the uniqueness of project activities, the density of a project network, project life cycle and the urgency of a project outcome. Expounding further, the size and value of a project very much influences the project lifespan. Thus the timeline of a project has to be realistic, as penalties are imposed and credibility's lost when deadlines are exceeded, and is deemed as a failure factor. Project density is also an important point to consider, as the allocation of resources, man hours, and budget for overtime and activities competing for the same resources become an issue if the project is overloaded. The urgency of a project dateline needs to be in line with all of the above, and as a general rule, projects need to be implemented as soon as possible to avoid exceeding datelines and budgets.

Factors related to the project manager and the team members

Factors related to the project manager and team members mainly pertain to the human factor, namely because it channels social and communication skills of not just the managers and team members, but more importantly also that of the client. A project manager should have the ability to delegate, coordinate, negotiate and be

perceptive. Needless to say, throughout the planning, execution and termination stage of a project, the project manager's commitment and competence is critical. The competence of the team members is a critical factor during the implementation of the project. Their technical background, trouble shooting skills and commitment are eminent CSFs. And regarding the clients, open channels of reprieve and constructive criticism from the client should influence the managers and team members' direction of work, as this would result in acceptance on the clients' part, and contribute to project success.

Factors related to the organisation

Factors related to the organization are those pertaining to the hierarchy of the project. It is a well-known fact that top management governs the functional managers, who in turn supports the project manager. The bigger scale the project and company is, the more intricate the matrix of organizational hierarchy and full support from each category is vital for project success. An example of CSFs in play here would be negotiating skills, positional power, top management support, project organization structure and project champion. In short, full support from each level is necessary for completion and success of a project.

Factors related to the external environment

External factors also play a role in a projects success or failure. Undesirable factors would have to be taken into consideration, for example political activities and environmental factors play an important role. Factors related to the external environment are quite varied, and the term external environment is not just defined as the physical environment, but the political, economic and social factors, even the

public attitude and client, should the client be from outside the organization. All these could affect the project performance positively or negatively, and at pertinent stages, for example the planning or implementation stage. Some factors are important all round that it affects the project at all stages, factors such as weather condition, political governance and social environment. Although rarely viewed as a factor but lingering in the background of all projects is the issue of competitors. They play an important role in the availability of resources and client market – also in marketing a project to a particular client. Therefore although this is the last component of factors mentioned, it is still nonetheless vital. By identifying factors that are particularly important to a project, project practitioners would have a clearer understanding as to aspects that are critical to project success.

2.4 CSFs for projects – summary of CSFs

A good number of studies have examined CSFs for projects (Pinto and Slevin 1989, Pinto and Slevin 1987, Baker, Murphy and Fisher 1983, Cleland and King 1983, Morris and Hough 1987, Keck, Leig and Lollar 1995, Belassi and Tukel 1996, Brotherton and Shaw 1996, Dvir et al. 1998, Pinto and Prescott 1988, Clarke 1999, Gray 2001, Cooke-Davies 2002, Westerveld 2002, Jaramillo and Marshall 2004, Fortune and White 2006, Zwikael and Globerson 2006, Khang and Moe 2008, Abdullah et al. 2010, Ika, Diallo and Thuillier 2012, and many more). Most of these studies mentioned here are considered notable studies in the subject of CSFs for projects as it is published in top tiered project management journals.

Among the many researchers as mentioned above, one particular researcher Fortune and White (2006) have conducted extensive review on CSFs proposed by 63 other researchers over the years, and summarised all the CSFs from therein to 27 CSFs. The summarised CSFs by Fortune and White (2006) are as per below.

- Support from senior management
- Clear realistic objectives
- Strong detailed plan/kept up to date
- Good communication/feedback
- User/client involvement
- Skilled/suitably qualified/ sufficient staff/team
- Effective change management
- Competent project manager
- Strong business case/sound basis for project
- Sufficient/well allocated resources
- Good leadership
- Proven/familiar technology
- Realistic schedule
- Risks addressed/assessed/ managed
- Project sponsor/champion
- Effective monitoring/control
- Adequate budget
- Organisational adaptation /culture/structure
- Good performance by suppliers/contractors/consultants

- Planned close down/review/acceptance of possible failure
- Training provision
- Political stability
- Correct choice/past experience of project management methodology/tools
- Environmental influences
- Past experience (learning from)
- Project size/complexity
- Different viewpoints (appreciating)

Previous studies have proven that critical success factors should be comprehensive as it affects projects positively. Disregarding some factors or incomprehensive factors for projects may result in eroding the chances of achieving project successfully (Dvir et al. 1998, Turner 2004). The author has therefore decided to utilise CSFs listed by Fortune and White (2006) for further references for this research as it is deemed as a comprehensive list of CSFs for projects.

2.5 Joint ventures (JVs) in general

Joint venture is a strategic alliance that is formed by two or more firms that contributes equity and resources to a semiautonomous legally separate entity for synergistic benefits (Geringer 1988). Joint ventures have become popular due to their unique opportunity to combine competencies and resources to take on the global competition. Through joint ventures, partner organizations gain opportunity to share costs and risks, to acquire knowledge and technology, to enter new markets and to

gain economies of scale or to rationalize operations (Contractor and Lorange 1988, Kumaraswamy, Palaneeswaran and Humphreys 2001).

Joint ventures are also usually formed to execute project based activities with the underlying motives of JV formation as mentioned earlier such as cost and risk sharing, securing scarce resources, financing, information and attaining knowledge on management. Projects can be also executed through JVs to exert influence in the industry, create competitive strengths and as a strategic tool by the partner companies to create and exploit synergies, transfer of technologies and diversification (Harrigan 1985, IHS Consulting 2012).

International joint ventures meanwhile are separate legal organization whereby its entity is partially held by parent firms from different countries (Shenkar and Zeira 1987). An international joint venture is also defined as a joint venture with at least one partner headquartered outside the country of operation of the joint venture (Geringer and Herbert 1989, Adnan and Morledge 2003b). International JVs are created to conduct business activities in a foreign environment.

Extensive research has been done on various facets of joint ventures particularly on JV strategies, performance and success due to the popularity of joint ventures and the unique characteristics that differentiates JV management from other business organization (Killing 1983, Parkhe 1993, Beamish 1985, Harrigan 1985, Inkpen and Birkenshaw 1994, Gomes-Casseres 1987, Beamish and Killing 1997, Park and Ungson 1997, Beamish 1988, Kogut 1988, Hennart 1988, Tatoglu and Glaister 1998, Elmuti and Kathawala 2001, Fey and Beamish 2001, Luo 2001, Salk

and Shenkar 2001, Yan and Gray 2001b, Boateng and Glaister 2002, Li, Xin and Pillutla 2002, Luo and Shenkar 2002, Luo 2002b, Glaister, Husan and Buckley 2003, Zeng and Chen 2003, Chan et al. 2004, Dhanaraj and Beamish 2004, Sirmon and Lane 2004, Gong et al. 2005, Brouthers and Bamossy 2006, Lu 2006, Nippa, Beechler and Klossek 2007, Ng et al. 2007, Wai-Kit, Lau and Nuaw 2007, Meschi and Riccio 2008, Robson, Katsikeas and Bello 2008, Wilson and Brennan 2008, Ren, Gray and Kim 2009, Deitz et al. 2010, Love, Mistry and Davis 2010, Zheng and Larimo 2010, Liu, Loi and Lam 2011 and many more).

2.6 Characteristics of a JV

2.6.1 Types of JVs

There are two main types of joint ventures namely incorporated and unincorporated joint ventures (Contractor and Lorange 1988). An incorporated joint venture (*IJV*) is a separate business entity whereby each partner firm invests equity in the new JV entity. Each partner firm contributes to the capital and shares the gain and losses according to the percentage equity ownership of each partner firm.

An unincorporated joint venture (*UJV*) meanwhile does not involve capital contribution from the partner firms. A *UJV* partner firms do not always contribute capital but other to share resources such as technical expertise and services.

Joint venture can also be categorized into project-based JV and traditional JV. Project based JVs have specific characteristics as compared to traditional JVs. The

Table 2.1 below summarises the different characteristics between a project-based JV and a traditional JV.

Table 2.1: Comparison of project-based JVs with traditional JVs

Area of comparison	**Project-based JVs**	**Traditional JVs**
Life span	Finite	Indefinite
Nature	Dissolving after project completion	On-going
Strategy planning	Short term orientation	Long-term orientation
Time to rectify default	Within contract period	On-going process
Decision making	Relatively fast	Relatively slow
Management style	Task oriented	Business-oriented
Partner relationship	Short-term orientation	Long-term orientation
Information flow requirement	Must be quick	On-going process
Product/service improvement	Defined by contract	On-going process
Control	Hierarchy	Team work
Primary objective	Completion of project on time	Business objectives
Potential benefits	Possible win-lose situation	Win-win situation

Source: adopted from Lynch (1993)

A joint operating company (JOC) is similar to a JV whereby it executes projects on behalf of the partner companies. However JOCs are also setup to operate the assets upon completion. Therefore JOC's usually have longer lifespan than project-based JVs due to the commitment to also operate the assets till the expiry of

the joint operating agreement. JOC are sometimes considered as hybrid between project-based JV and traditional JV.

In summary, most of the JVs can be categorised as:

- Incorporated JV v Unincorporated JV
- Traditional JV v project-based JV
- Local JV v International JV
- Joint Venture v Joint Operating Company (JOC)

As this research is uniquely focussed on project delivery in a JV organisation, CSFs from project based JVs and traditional JVs are equally considered before shortlisting the relevant CSFs that will be applicable to this research. This is done so to illustrate that CSFs for JVs are indeed important and related to the CSFs for projects to ensure successful project delivery.

2.6.2 Stages in JVs

Joint ventures have also been categorised into different stages such as JV formation stage JV, operation stage and JV local environment with the respective CSFs established according to the different stages (Keith, Rumy and Peter 2003, Mohamad 2003, Zheng and Larimo 2010).

CSFs for JV formation stage emphasises on factors for JV establishment. The success factors in this stage usually reflect on motivation of entry, organisation size, criteria for partner selection, ownership structure and many more that are relevant to the formation of a JV organisation.

The focus on project related activities lies within the JV operation stage (Keith, Rumy and Peter 2003, Mohamad 2003, Zheng and Larimo 2010). Project execution and project management is usually carried out after the JV organisation has been established. CSFs such as commitment by partner companies, trust, control, cooperation, conflict, conflict resolution are among the many CSFs that are prevalent in this stage.

As this research focusses on successful project delivery, only CSFs that are relevant to the JV operation stage (also known as post-formation stage) will be studied. This standpoint is consistent with Ren, Gray and Kim (2009) who have established that CSFs from JV formation stage does not affect the performance. See Table 2.2 for the CSFs in operation stage that will be studied in this research.

2.7 Joint Venture Performance

2.7.1 Definition of JV performance

Many studies have tried to establish what constitutes as JV performance without much consensus (Boateng and Glaister 2002, Killing 1983, Beamish 1988, Parkhe 1993, Inkpen and Birkenshaw 1994, Kogut 1988, Elmuti and Kathawala 2001, Yan and Gray 2001b, Boateng and Glaister 2002, Luo 2002b, Zeng and Chen 2003, Chan et al. 2004, Dhanaraj and Beamish 2004, Sirmon and Lane 2004, Gong et al. 2005, Lu 2006, Ren, Gray and Kim 2009, Mistry and Davis 2009, Zheng and Larimo 2010). Measuring JV performance has always been a complex task because of the many facets of the JV.

Some researchers have proposed survival of the JV as performance measure (Dhanaraj and Beamish 2004). Other researchers have suggested JV's financial output as a performance measure (Choi and Beamish 2004, Zhang et al. 2007, Luo 2008).

Many researchers have also construed overall satisfaction as a performance measure from their respective researches (Demirbag and Mirza 2000, Boateng and Glaister 2002, Kwon 2008, Nakos and Brouthers 2008).

Achievement of JV's goals also seems to be a popular method of establishing a JV's performance (Brouthers and Bamossy 2006, Luo 2008). Transfer of knowledge from partner companies to the JV which results in learning which has also been measured by some researchers as an indicator of JV performance (Tsang 2002, Dhanaraj and Beamish 2004).

Some scholars measured JV as a separate entity meanwhile others used the partner companies perspective to measure performance. Partner companies' perspective on JV performance is usually very subjective and may vary (Ren, Gray and Kim 2009) as each partner may have different criteria to assess performance.

Kagioglou and Aouad (2001) and Chan et al. (2004) suggested that JV performance can be measured either by project or company performance. Ozorhon et al. (2008), Ozorhon et al. (2010) and Ozorhon et al. (2011) have established that a JV's performance can be measured by its project's performance. Ozorhon et al. (2008), Ozorhon et al. (2010) and Ozorhon et al. (2011) further explain that JV

performance is highly associated with project performance. Project performance can be defined as how well the project objectives are met. According Ozorhon et al. (2008) further, part of operational success for a JV is contributed by project success.

Most of oil and gas JVs are formed to execute projects therefore CSFs for JV performance will be studied in detail to meet the objectives of this research.

2.7.2 CSFs for JV performance

There are many studies that have been conducted on factors that influence JV performance. Table 2.2 below is a summary of the literature reviews conducted by the author on CSFs that can influence JV performance. Only the CSFs for JVs in post formation / operation stage have been included here.

Table 2.2: CSFs for JV performance from literature review

Critical success factor	Literature
Commitment	Glaister and Buckely (1998), Demirbag and Mirza (2000), Elmuti and Kathawala (2001), Chan et al. (2004), Nippa, Beechler and Klossek (2007), Kwon (2008), Nakos and Brouthers (2008), Ren, Gray and Kim (2009), Love, Mistry and Davis (2009), Zheng and Larimo (2010).
Bargaining power	Yan and Gray (2001b), Ren, Gray and Kim (2009), Zheng and Larimo (2010).
Control	Steensma and Lyles (2000), Yan and Gray (2001b), Nippa, Beechler and Klossek (2007), Ren, Gray and Kim (2009), Zheng and Larimo (2010).
Trust	Luo (2001), Chan et al. (2004), Brouthers and Bamossy

	(2006), Ng et al. (2007), Wai-Kit, Lau and Nuaw (2007), Fang et al. (2008), Robson, Katsikeas and Bello (2008), Wilson and Brennan (2008), Mistry and Davis (2009), Ren, Gray and Kim (2009), Deitz et al. (2010), Love, Mistry and Davis (2010), Zheng and Larimo (2010).
Justice	Greenberg (1987), Luo (2007a), Ren, Gray and Kim (2009), Zheng and Larimo (2010).
Conflict	Jehn (1995), Demirbag and Mirza (2000), Steensma and Lyles (2000), Jehn and Mannix (2001), Yan and Gray (2001b), Dirks and Parks (2003), Nippa, Beechler and Klossek (2007), Ren, Gray and Kim (2009), Zheng and Larimo (2010).
Cooperation	Demirbag and Mirza (2000), Glaister, Husan and Buckley (2003), Luo and Park, (2004), Zhan and Luo (2008), Ren, Gray and Kim (2009), Zheng and Larimo (2010).
Culture	Park and Ungson (1997), Fey and Beamish (2001), Luo (2001), Salk and Shenkar (2001), Luo and Shenkar (2002), Glaister, Husan and Buckley (2003), Sirmon and Lane (2004), Brouthers and Bamossy (2006), Lu (2006), Nippa, Beechler and Klossek (2007), Meschi and Riccio (2008), Ren, Gray and Kim (2009).
Goal congruity	Kogut (1988), Elmuti and Kathawala (2001), Nippa, Beechler and Klossek (2007), Mistry and Davis (2009), Ren, Gray and Kim (2009), Love, Mistry and Davis (2010).
Support from top management	Chan et al. (2004), Mistry and Davis (2009), Love, Mistry and Davis (2010).
Communication	Elmuti and Kathawala (2001), Glaister, Husan and Buckley (2003), Mistry and Davis (2009), Ren, Gray and Kim (2009), Love, Mistry and Davis (2010).
Competent management team	Elmuti and Kathawala (2001).

Organisational identification	Shenkar and Zeira (1987), Li, Xin and Pillutla (2002), Liu, Loi and Lam (2011).

Commitment

Commitment refers to the partner companies' willingness to extend effort on behalf of the JV. Researchers have studied on commitment and how it affects the performance of the JV. Most of the researchers have agreed that commitment positively affects JV performance (Glaister and Buckely 1998, Demirbag and Mirza 2000, Elmuti and Kathawala 2001, Chan et al. 2004, Nippa, Beechler and Klossek 2007, Kwon 2008, Nakos and Brouthers 2008, Ren, Gray and Kim 2009, Love, Mistry and Davis 2010, Zheng and Larimo 2010). According to the researchers further, commitment can be contributed by psychological and behavioural commitment. Physical commitment can be demonstrated by the willingness by the partner companies to commit resources to the JV. Behavioural commitment refers to partner companies' attitude of overseeing effort and attention to the JV which is related to the JV's financial goals.

Bargaining power

Bargaining power depends on partner companies' resource contribution to the JV. This is usually based on the strategic importance of the JV to each partner company. Partner companies with more resources in the JV tend to have more bargaining power on the JV (Yan and Gray 2001b, Ren, Gray and Kim 2009, Zheng and Larimo 2010). The more a partner company strategically values the JV, the more likely it will contribute resources to it. The partner company with more 'power' over a JV tends to achieve its desired strategic objectives.

Control

Control refers to how much decision power that the partner companies have to influence the JV to achieve its objectives. Shared control by the partner companies was proven to positively influence JV performance (Steensma and Lyles 2000, Yan and Gray 2001b, Nippa, Beechler and Klossek 2007, Ren, Gray and Kim 2009, Zheng and Larimo 2010). Management of a JV will be usually by a board of directors which makes decisions on matters beyond the purview of JV management committee that makes day-to-day decisions pertaining to the business of the JV. The level of influence on the JV will depend on how much control a partner company has which is determined by the equity ownership.

Trust

Trust is positively related to JV performance (Luo 2001, Chan et al. 2004, Brouthers and Bamossy 2006, Ng et al. 2007, Wai-Kit, Lau and Nuaw 2007, Fang et al. 2008, Robson, Katsikeas and Bello 2008, Wilson and Brennan 2008, Mistry and Davis 2009, Ren, Gray and Kim 2009, Deitz et al. 2010, Love, Mistry and Davis 2010, Zheng and Larimo 2010). Trust in this context refers to a party which relies on other party's action in a situation which involves risk and uncertainty. Trust has positive impact on JV performance because trust can facilitate mutual understanding and allows mutual benefit.

Justice

Organisational justice can be broadly categorised into distributive justice, procedural justice and interactional justice (Greenberg 1987). Distributive justice refers to perception of fairness in decision outcomes such as salary. Distributive justice refers

to perceived fairness on procedures used to make decisions and interactional justice refers to perceived fairness of how decisions are made by the management. All these three categories have been found to positively related to JV performance (Luo 2007a, Ren, Gray and Kim 2009, Zheng and Larimo 2010).

Conflict

In general, conflict is negatively linked to a JV's performance (Demirbag and Mirza 2000, Steensma and Lyles 2000, Yan and Gray 2001b, Dirks and Parks 2003, Nippa, Beechler and Klossek 2007, Ren, Gray and Kim 2009, Zheng and Larimo 2010). However conflict can be categorised into task related conflict and relationship conflict. Task conflict denotes differing viewpoint pertaining a task meanwhile relationship conflict refers to emotional or personality clashes (Dirks and Parks 2003). Some researchers however have noted that mild or occasional task conflict is positively linked to performance (Jehn 1995) and may improve decision making process (Jehn and Mannix 2001).

Cooperation

Good cooperation is a positive indicator of JV performance (Demirbag and Mirza 2000, Luo and Park 2004, Zhan and Luo 2008). Cooperation between partner companies, between partner companies and JV, between partner companies and host government, between JV and host government can greatly influence the JV's performance (Glaister, Husan and Buckley 2003, Ren, Gray and Kim 2009, Zheng and Larimo 2010).

Culture

Culture has been researched by Lu (2006) as one of the most important CSFs for JV performance especially for International JVs. Culture can be broadly categorised into organisational culture, national culture and cultural sensitivity. Organisational culture refers to organisational practices and operations. Organisational culture is multidimensional as it refers to decision-making practices, communication flow, human resources plans and so forth (Fey and Beamish 2001). Differences in organisational culture can affect JV performance. National culture meanwhile refers to collective values and norms that are communal to the community (Sirmon and Lane 2004). National culture contribution to JV performance is mixed as certain aspect can lead to misunderstanding meanwhile other aspects can enhance the management of the JV (Park and Ungson 1997, Luo 2001, Salk and Shenkar 2001, Luo and Shenkar 2002, Brouthers and Bamossy 2006, Lu 2006, Meschi and Riccio 2008). Cultural sensitivity among partner companies, JV and its employees is important as it can also enhance trust which can lead to higher JV performance (Glaister, Husan and Buckley 2003, Brouthers and Bamossy 2006, Nippa, Beechler and Klossek 2007, Ren, Gray and Kim 2009).

Goal congruity

Although goal congruities among the partner companies are more important during the setup of the JV, continuous goal compatibility is equally important towards achieving positive JV performance (Kogut 1988, Elmuti and Kathawala 2001, Nippa, Beechler and Klossek 2007, Mistry and Davis 2009, Ren, Gray and Kim 2009, Love, Mistry and Davis 2010.

Support from top management

Top management support is always fundamental for managing a JV (Chan et al. 2004, Mistry and Davis 2009, Love, Mistry and Davis 2010). Senior management team usually develops the strategy and business direction therefore support from top management is absolutely necessary to manage the activities in a JV. Top management support is also needed for acquiring resources and to continuously guide the JV team to achieve the JV's objectives.

Communication

Communication is an important predictor for performance of a JV (Elmuti and Kathawala 2001, Glaister, Husan and Buckley 2003, Mistry and Davis 2009, Ren, Gray and Kim 2009, Love, Mistry and Davis 2010). Lack of communication may result in lack of trust and ambiguity. Effective communication improves transparency and build up trust, both which is positive contributor to JV performance.

Competent management team

Studies have shown that many JVs fail due to poor management. In fact many JVs are proven to fail during the implementation/operation stage as compared to planning/pre-formation stage. Due to the complex and multidimensional attributes of a JV, a strong and competent management team is necessary to guide the JV team to achieve the objectives and ensure its performance (Elmuti and Kathawala 2001).

Organisational identification

Employees in a JV make up from various sources thus contributing to a large pool of conflicting organisational identity (Shenkar and Zeira 1987, Li, Xin and Pillutla 2002,

Liu, Loi and Lam 2011). The conflict is even greater among employees who are seconded from the partner companies as each partner company has its own organisation culture and identity. It is made more complex to the secondees as they are constantly representing two organisations i.e. as a parent company's representative and also a JV organisation's employee. This may cause difficulty in working together as different organisational identification may result in factionalism and lead to role conflict. Amalgamation of the two different identities is important to the success of the JV (Shenkar and Zeira 1987, Li, Xin and Pillutla 2002, Liu, Loi and Lam 2011).

2.8 JV in oil and gas industry – an emerging trend

The international oil and gas industry is one of the most imperative markets in the world (Katsioloudes and Isichenko 2007). Oil and gas projects are usually high risk and high capital intensive. Oil and gas projects are also spread across diverse geographical and socioeconomic environments.

An emerging trend on the oil and gas industry is the advent of international joint venture (Johnson and Scholes 1999). According to KPMG (2011) and IHS Consulting (2012), joint ventures are becoming the preferred option for oil and gas companies globally. See Figure 2.2 for JVs in oil and gas industry in year 2012.

Due to oil and gas business which has grown highly complex, many oil and gas companies prefer to form alliances with others to manage the risks collectively.

JV has also emerged as a popular form of entity due to the emergence of unconventional oil and gas (i.e. shale, oil sands, coal bed methane etc.) as there seems to be many risks and uncertainty around this type of frontier development.

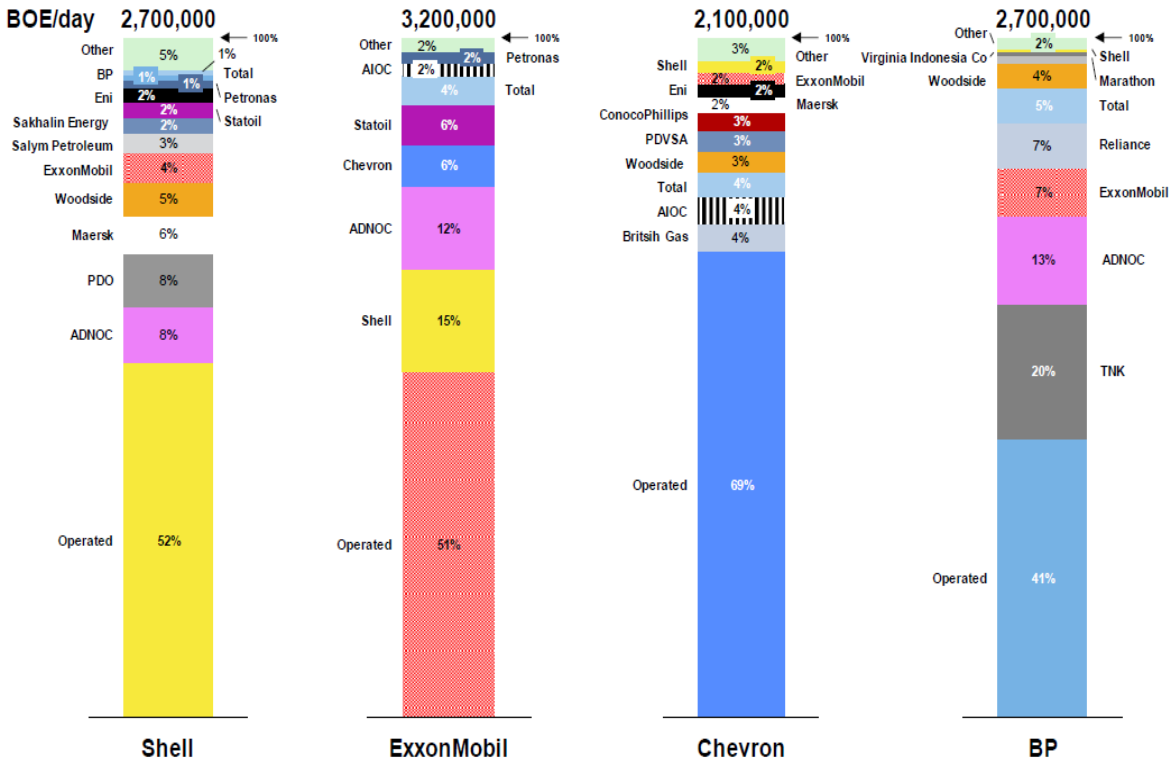


Figure 2.2: Excerpt of JVs in oil and gas industry for year 2012

Source: IHS Consulting 2012

Oil and gas development deals with many risks and uncertainties such as reservoir profile, oil and gas pricing volatility, escalating capital and operating expenditures, geopolitical unrest and technological challenges. The risks and uncertainties have been growing by the years due to growing demand thus requiring oil and gas organisations to commit huge investment to embark on its projects. These projects also require multiple interfaces and complex engineering accomplishments

(Badiru and Osisanya 2013). Coupled with market price volatility and growing environmental and political concerns, capital investments for oil and gas projects have become astronomically high. Oil and gas companies spending outlook for 2014 is forecasted to be about US 723 billion on upstream activities alone (exploration and production), which is an increase by 6% more as compared to year 2013 (Barclays 2013).

Most of the recent oil and gas projects have been failures as at least 65% of mega oil and gas projects have failed to achieve the project objectives successfully (Merrow 2011). Many reasons have been cited by researchers as main contributors to project failure however poor project delivery continue to persist over the years.

Very few studies have attempted to identify what are the factors that can contribute to success for projects in oil and gas industry (Halman and Braks 1999, Asrilhant, Dyson and Meadows 2005, Katsioloudes and Isichenko 2007, Eweje, Turner and Muller 2012, Salazar-Armayo et al. 2012, Obawole 2012, Badiru and Osisanya 2013, Hannevik et al. 2013). The focus of these studies are varied on diverse topics such oil and gas international joint ventures, oil and gas projects, project management in oil and gas industry and so forth. Katsioloudes and Isichenko (2007) proposed 31 CSFs in their study however the study was focussed on general success of IJV in all phases of the IJV. The study also did not emphasis on CSFs related to projects in IJVs. Therefore there was no empirical evidence suggesting the relationships of the CSFs with project success. Obawole (2012) meanwhile has conducted study based on 20 years of data of major oil and gas projects in Nigeria. Obawole (2012) proposes a model for project practitioners but the model is deemed

to be incomprehensive and does not encapsulate all the factors especially JV performance factors that can impact project success. None of the researches had comprehensively studied the critical success factors that are necessary for successful projects in oil and gas joint ventures let alone conclusively establish the relationship of the factors with project success.

With escalating investments and almost negligible improvement on project delivery and significant project failures, emphasis must be given to studies on factors that will contribute to successful project delivery in oil and gas industry.

2.8.1 Motives for forming oil and gas joint ventures

According to IHS Consulting (2012) the key drivers that encourage oil and gas companies to form joint ventures are:

- Sharing of capitals and risks

  Many projects in oil and gas companies can be labelled as ‘mega’ as these projects easily exceed the cost of US 1 billion due to increasing complexity in finding, developing and producing oil and gas. Price tags like this will dampen even the super-major oil companies to fund on its own. The risk attached to oil and gas projects varies so much that no oil and gas company will be willing to finance and undertake projects on its own as the exposure will be too great to bear. This will be even more applicable for capital constrained companies.

- Access to markets

  Gaining access especially to foreign and international market is a popular reason why joint ventures are formed. Regulatory requirement sometimes compliments this as some countries will require foreign company to include local company participation to enter the market in a particular country.

- Access to technology and resources

  New technology may be required to develop complex and frontier developments. Therefore partnering with companies that may have leading advantage in the particular technology may improvise the chances of successful project delivery. Access to resources will enable the partner companies to access new assets, reserves and manpower that may have the technological know-how and capability to develop the project.

- Supply chain optimization

  Through joint venture, supply chains may be optimised. This is particularly true for downstream oil and gas business whereby optimised supply chain especially across different geographical locations may increase profit.

- Market positioning and optimization

  By combining assets and resources, a JV may become a market leader thus commanding better cost efficiency across the industry's value chain.

2.8.2 Types of oil and gas JVs

JVs in oil and gas industry can be broadly categorised into three categories i.e. full asset JV, full business JV and marketing alliance (Ernst & Young 2011). See Figure 2.3 for graphic representation of types of JV in oil and gas industry.

Full asset JV refers to JV that has been established for existing assets or to develop assets. These types of JVs are common in the upstream (exploration, development and production), midstream (pipelines, LNGs) and downstream (refining). This type of JV is the most common in the oil and gas industry.

Full business JV refers to mostly downstream, chemicals and midstream businesses. It also often includes oil field services companies in the upstream sector.

Marketing alliance meanwhile refers to joint marketing of fuel products and retail products in convenience stores.

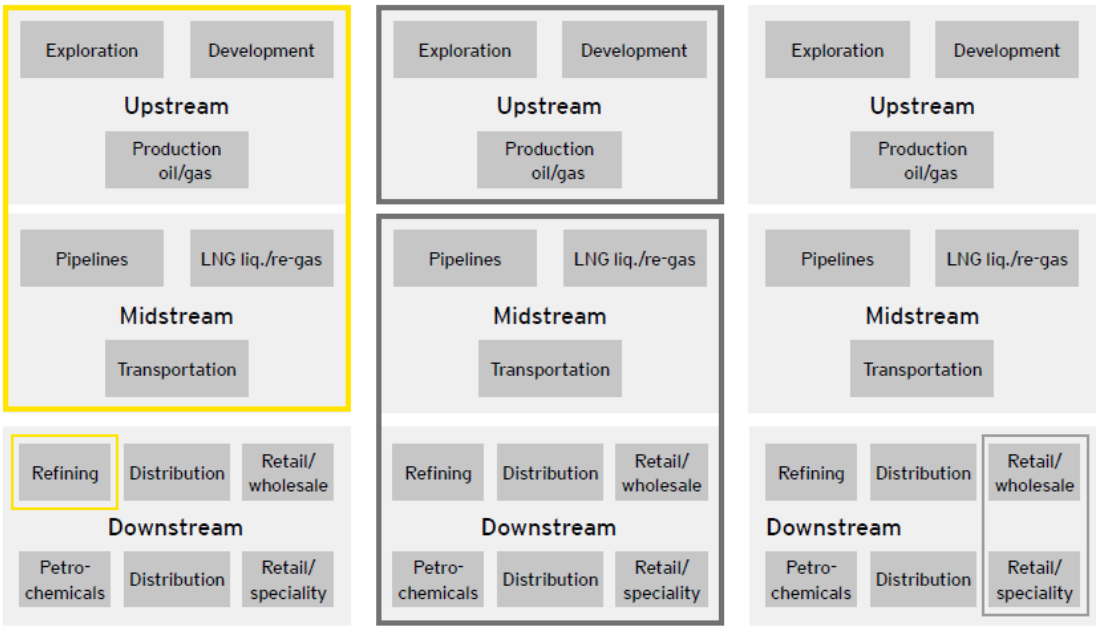


Figure 2.3: Types of JV in oil and gas industry

Note:

1 = Full asset JV

2 = Full business JV

3 = Marketing alliance

Source: adopted from Ernst & Young 2011

This research hopes to cover all the types of oil and gas JV i.e. full asset JV, full business JV and marketing alliance.

2.9 Measures of project success

Cost, time and quality (The Iron Triangle) have been long associated with measuring project success (Atkinson 1999, Fortune and White 2002). Many researches (Munns and Bjeirmi 1996, De Wit 1988, Pinto and Slevin 1988, Atkinson 1999, Baccarini

1999, Lim and Mohamed 1999, Chan, Scott and Lam 2002, Milosevic and Patanakul 2005, Muller and Turner 2007, Ogunlana and Toor 2010, Al-Tmeemy, Abdul-Rahman and Harun 2011 and many more) have since suggested additional success criteria to measure success of a project.

Lim and Mohamed (1999), Chan, Scott and Lam (2002) and Ogunlana and Toor (2010) have introduced safety as another success criterion which is very relevant as oil and gas industry emphasises heavily on safety performance.

De Wit (1988), Baccarini (1999), Chan, Scott and Lam (2002) and Ogunlana and Toor (2010) have suggested client satisfaction and achieving technical specifications in their research.

Munns and Bjeirmi (1996), Atkinson (1999), Baccarini (1999), Milosevic and Patanakul (2005), Ogunlana and Toor (2010), Al-Tmeemy, Abdul-Rahman and Harun (2011) and Shao, Muller and Turner (2012) have added achieving stakeholders' satisfaction as another success criterion.

Milosevic and Patanakul (2005), Zwikael and Globerson (2006), Muller and Turner (2007), Al-Tmeemy, Abdul-Rahman and Harun (2011) and Shao, Muller and Turner (2012) have included end-user satisfaction as one of the project success criteria.

Based on the literature review on the researches mentioned above seven project success criteria were established for this study. The seven success criteria are

achieving project budget, time, quality, safety, and project technical specifications. Also included are achieving end-users and partner companies' satisfaction.

Few studies have managed to relate CSFs for projects to project success (Rockart 1979, Baker, Murphy and Fisher 1983, Khang and Moe 2008, Pinto and Slevin 1987**,** Ika, Diallo and Thuillier 2012, Cooke-Davies 2002, Westerveld 2002, Belassi and Tukel 1996, Ika, Diallo and Thuillier 2012, Gray 2001, Hannevik et al. 2013). These researchers have empirically established that CSFs studied are positively related to project success. This study also hopes to empirically establish the relationships between the CSFs and project success.

2.10 Gap analysis from literature review

2.10.1 CSFs for projects

In spite of the twenty seven CSFs identified from 63 publications (as discussed in section 2.4), Fortune and White (2006) concludes that there is no commonly agreed CSFs among project practitioners or researchers for projects as it often varies from author and times, aims of projects, types of industries and the project life cycle itself. Other researchers (Wateridge 1995, Dvir et al. 1998) also agree that there is lack of agreement of opinion among researchers on the factors that influence project success.

Also in spite of various CSFs established, the failure rates for projects are still very high (Kerzner 2009, Zwikael and Globerson 2006). This phenomenon could be due to the fact that CSFs are too general and are not discrete enough to better support

the project practitioners (Zwikael and Globerson 2006). Therefore it can be agreed that studies for CSFs need to be as specific as possible so that it will be beneficial for project practitioners.

Only few researches done on CSFs for projects have managed to empirically establish the link between the CSFs to project success (Rockart 1979, Baker, Murphy and Fisher 1983, Pinto and Slevin 1987**,** Belassi and Tukel 1996, Dvir et al. 1998, Gray 2001, Cooke-Davies 2002, Westerveld 2002, Khang and Moe 2008, Ika, Diallo and Thuillier 2012, Hannevik et al. 2013).

2.10.2 CSFs for JV performance

Despite the popularity of JVs, many studies have found that JVs have very low success rate of survival (Gomes-Casseres 1987, Beamish 1988, Hennart 1988). Among the main reasons why JV organisations fail are due to difficulties in managing them, frustration with the JVs poor performance and early dissolution of the JVs (Killing 1983, Harrigan 1985, Beamish 1985, Gomes-Casseres 1987, Beamish 1988, Kogut 1988, Parkhe 1993).

JVs in particular pose great challenge in managing due to the fact that each partner organisations could be either competitors or collaborators in the industry. Also each partner organisation will inevitably bring in each organisation's unique process and procedures, goals and objectives, attitudes and values into the JV organisation which makes the integrated management of JVs more challenging (Killing 1983, Tatoglu and Glaister and Buckley 1998).

Also JVs have been difficult to manage because there has been influx of CSFs on JV performance (Reus and Ritchie 2004) that have contributed to confusion and lack of clarity on what are the factors that drives a JV to success. According to Parkhe (1993), there is no proper understanding of the fundamental concepts of JV operation. Many models have been proposed by various researches on the performance of JVs however there is no synergy and consistency among the models (Yan and Gray 2001b, Luo 2002b, Zeng and Chen 2003, Dhanaraj and Beamish 2004, Gong et al. 2005).

According to Beamish and Killing (1997), many researches on JVs focused mostly on formation of the JVs, JV partner relationships and the evaluation of JV performance with JV performance focusing on long term performance comprising general success criteria such as survival, financial output (ROI, market share), overall satisfaction, goal achievement and learning (Ren, Gray and Kim 2009).

Many previous studies also generally developed CSFs for the whole of JV lifecycle rather than specifying them by the JV's relevant stages i.e. formation stage, operation stage and termination stage (Zheng and Larimo 2010).

The author did not come across any literatures that have researched specifically relating to critical success factors for projects in JVs that established the relationship between the CSFs and project success. A large number of the researches failed to address concepts and models that are dominant to success of projects.

2.10.3 CSFs for projects in oil and gas joint ventures

Very limited literature on CSFs for projects in oil and gas JVs could be found (Halman and Braks 1999, Asrilhant, Dyson and Meadows 2005, Katsioloudes and Isichenko 2007, Eweje, Turner and Muller 2012, Salazar-Armayo et al. 2012, Obawole 2012, Badiru and Osisanya 2013, Hannevik et al. 2013). The few researches done were not comprehensive neither the findings conclusively summarise how the CSFs affect the project success in an oil and gas JV organisation.

2.11 Summary of chapter

There are many CSFs proposed by previous researchers and very few that establishes CSFs to project success as discussed earlier. There is also lack of consensus on CSFs that influences project success. Furthermore, it is evident from the literature review that CSFs and its importance can vary according to authors and times, aims of projects, types of industries and the project life cycle itself.

Researchers have proposed many elaborate models for measuring performance of JVs. Extensive research on joint venture has been conducted but with incomprehensive results (Ren, Gray and Kim 2009). Researchers acknowledge the fact that there cannot be one perfect model to measure JV performance for the different industries, focus groups and phases of the JVs. The many models proposed may have benefitted specific focus groups and industries at a specific phase of the JVs. The majority of models also concentrate on long-term performance of the JVs.

The many models proposed may create confusion and difficulties in adopting a suitable model for others.

There has been very limited research done on identifying critical success factors for projects in an oil and gas JV organisation. The researches have been sparse and also failed to establish the relationship between the CSFs to success of projects in JV organisations. Identifying relevant critical success factors for projects in oil and gas JVs are important, which is the main aim of this research.

This research focusses to establish a set of critical success factors that will be relevant and useful for the project management practitioners in oil and gas JV projects for managing the projects to achieve the fundamental project success which are cost, schedule quality, safety, achieving technical specifications, achieving end-user's satisfaction and achieving partner companies' satisfaction.

CHAPTER 3

METHODOLOGY

3.1 Overview

In this chapter, the author discusses the research methodology premise, rationale behind the selected research methodology including the framework, model, strategy, questionnaire development, sampling selection, data collection and data analysis method.

The research methodology is based on the premise that:

- All the CSFs described are inter-dependent to achieve project success (Belassi and Tukel 1996, Angela 1999, Fortune and White 2006, Khang and Moe 2008).
- Grouping of CSFs into factor groups and studying the correlation provides clearer results on how the factor groups are related to project success (Belassi and Tukel 1996, Ika, Diallo and Thuillier 2012).
- Joint Venture's performance is highly associated with the project performance (Ozorhon et al. 2008, Ozorhon et al. 2010, Ozorhon et al. 2011).

This research will:

- Group all the identified CSFs and project success and try to establish the relationship among the groups.

- Attempt to establish relationships between CSFs within each factor groups and with project success.

3.2 Research Framework

This research began with reviewing of critical success factors for projects. The findings from the literature review discovered that there are no generally agreed CSFs as it varied from authors and times, aims of projects, types of industries and the project life cycle itself. (Wateridge 1995, Dvir et al. 1998, Fortune and White 2006,). Also very limited researches that have managed to empirically establish the link between CSFs for projects with project success (Rockart 1979, Baker, Murphy and Fisher 1983, Pinto and Slevin 1987**,** Belassi and Tukel 1996, Dvir et al. 1998, Gray 2001, Cooke-Davies 2002, Westerveld 2002, Khang and Moe 2008, Ika, Diallo and Thuillier 2012, Hannevik et al. 2013).

Since more projects in oil and gas industry are being done through some form of joint venture or joint operating company, this research was needed to establish the CSFs that will relate to project success in oil and gas joint ventures. The research framework is as illustrated in Figure 3.1 below.

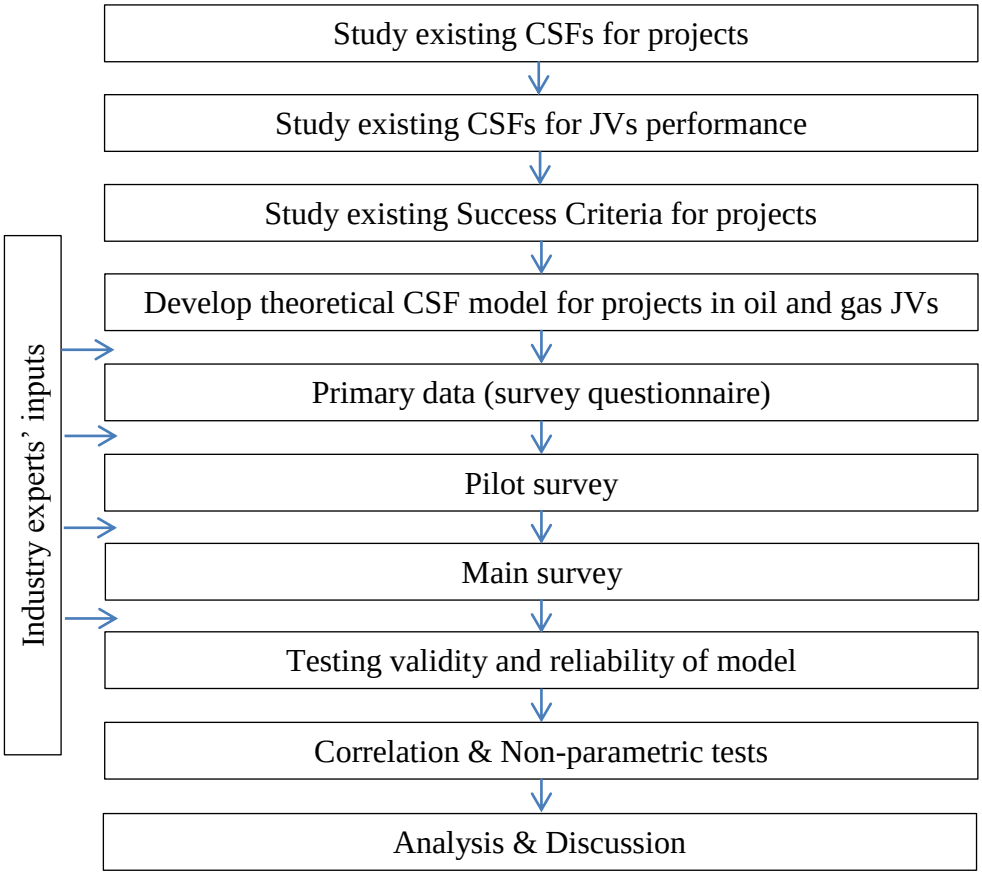


Figure 3.1: Research Framework

After reviewing all CSFs proposed by researchers in the literature review, a draft list of CSFs for projects was developed. Most of the CSFs for projects were adopted from CSFs as compiled by Fortune and White (2006) as it was deemed to be comprehensive and covered most CSFs on projects as compared to other researchers.

CSFs from Fortune and White (2006) were further detailed in accordance of literature review and industry experts' opinion so that the detailed CSFs will provide more clarity on the subject matter. The detail CSFs for projects as listed in Table 3.1 below will be used as questionnaire items and further reference as CSFs for this study

Table 3.1: Detail CSFs for projects

Critical Success Factors (Fortune and White 2006)	**Detail critical success factors (Questionnaire items)**	**ID**
Support from senior management	Support from JV senior management	FAC01
Clear realistic objectives	Clear project objectives	FAC02
Strong business case/sound basis for project	Strong business case for project	FAC03
Sufficient/well allocated resources	Sufficient resources	FAC04
Risks addressed/assessed/ managed	Project risk management processes and procedures in place	FAC05
	Active project risks management	FAC06
Project sponsor/champion	Existence of project sponsor/champion	FAC07
Training provision	Adequate training provision for staff	FAC08
Strong detailed plan/kept up to date	An agreed project plan in place	FAC10
	Project plan is updated regularly	FAC11
	Project plan performance monitored regularly	FAC12
Good communication/feedback	Established lines of communication between the project manager and the team	FAC13
	Good and constant communication / feedback between the JV top management and the team	FAC14
User/client involvement	End users participation	FAC15

	End users requirement incorporated appropriately	FAC16
Skilled/suitably qualified/ sufficient staff/team	Project team members adequately skilled for their job functions	FAC19
	Project team members have relevant experience	FAC20
Effective change management	Change management established and practiced	FAC21
Competent project manager	Competent project manager	FAC22
Proven/familiar technology	Usage of familiar technologies for the project	FAC23
Realistic schedule	Realistic project schedule	FAC24
Effective monitoring/control	Effective project performance monitoring and control (cost/schedule/quality/HSE)	FAC26
Adequate budget	Adequate budget for the project	FAC27
Good performance by suppliers/contractors/consultants	Competent consultants / contractors / suppliers	FAC28
Correct choice/past experience of project management methodology/tools	Suitable project management methodology and tools in place	FAC29
Past experience (learning from)	Adopt lessons learned from other projects	FAC30
Project size/complexity	Good integration to manage project complexities	FAC31
Environmental influences	Adoption of new technologies for project	FAC33
	Political stability in host country	FAC34

	Prudent management of competitor's threat	FAC35
	Proactive management of internal and external key stakeholders	FAC36
	Availability of competent service providers (consultants/contractors/suppliers)	FAC37
	Conducive economic climate	FAC38

Next literature review was conducted on CSFs for joint venture performance. As JV performance contributed to project performance (Ozorhon et al. 2008, Ozorhon et al. 2010, Ozorhon et al. 2011), this research shortlisted CSFs commonly cited by all researchers related to JV performance. Only CSFs related to post-formation phase of the JV were considered as it was important not to include pre-formation CSFs which were not relevant to the objectives of this research. The CSFs for JV performance identified through literature review (as listed in Table 2.2) were further detailed in accordance of literature review and industry experts' opinion so that the detailed CSFs will provide more clarity on the subject matter. The detail CSFs for JV performance listed in Table 3.2 below will be used as questionnaire items and further reference as CSFs for this study.

Table 3.2: Detail CSFs for JV performance

CSF (Lit. review)	**Detail critical success factors (Questionnaire items)**	**ID**
Commitment	Partner companies commitment to provide competent resources	FAC40
Bargaining power	Sharing of expertise by partner companies with the JV	FAC56
Control	Joint decision making process by partners in regards to routine JV project decisions	FAC56
Trust	Trust among partner organisation	FAC43
	Trust among partner organisation and the JV	FAC44
	Trust between JV team members	FAC45
	Trust between the JV and host government	FAC46
Justice	Fair remuneration for JV employees	FAC51
	Transparent decision making process in the JV	FAC52
	Participation of JV employees in the decision making process	FAC53
Conflict	Low/moderate disagreement between the JV and	FAC47

	partner organisation	
	Conflict-free relationship between JV and partner companies	FAC48
Cooperation	Good cooperation/alignment between partners and the JV management	FAC49
	Good cooperation/alignment between JV partners and host government	FAC50
Culture	Adaptation of project team members to JV organisation culture	FAC59
	Adaptation of the JV to the host country culture	FAC60
Goal congruity	Goals and objectives congruity between the JV partner companies	FAC39
Support from top management	Adequate support for the JV from partner companies	FAC41
Communication	Established lines of communication between the JV and partner organisation	FAC42
Competent management team	Competent JV senior management team to manage the JV	FAC58
Organisational identification	Organisational identification to the JV by secondees from partner companies	FAC61

The next literature review was done on projects in oil and gas industry specifically in a JV organisation. There are very limited studies done on oil and gas JVs (Halman and Braks 1999, Asrilhant, Dyson and Meadows 2005, Katsioloudes and Isichenko 2007, Eweje, Turner and Muller 2012, Salazar-Armayo et al. 2012, Obawole 2012, Badiru and Osisanya 2013, Hannevik et al. 2013). And no studies have tested on CSFs for projects in oil and gas joint ventures and also linking the CSFs to project success.

The project success criteria which were selected are the most popular and traditional measures of performance for project success which is meeting project budget, schedule, quality, safety, achieving project technical specifications, end-user's satisfaction and partner companies satisfaction. The selected project success criteria are also listed in Table 3.3 below.

Table 3.3: Project success criteria for questionnaire development

ID	Project success criteria (Questionnaire items)
SUC01	Meeting project budget
SUC02	Meeting project schedule
SUC03	Meeting project quality requirements
SUC04	Meeting project technical specifications
SUC05	Achieving end-users' satisfaction
SUC06	Achieving project HSE targets
SUC07	Achieving partner companies satisfaction

A model was then created to investigate the objectives of this study. The model was developed in combination from literature review and inputs from industry experts.

The list of all the CSFs for projects, JV performance and project success criteria was compiled. Each of the CSFs and project success criteria were then developed into an item in the questionnaire. The questionnaire was then reviewed with two industry experts (senior managers in the author's organisation). Each item on the questionnaire were scrutinised on its relevancy on the research objectives. Few items (CSFs) from literature review were dropped as it was deemed repetitive

and ambiguous. As per the feedback from the industry experts, several additional items (CSFs) were added on as per Table 3.4 below. These CSFs along with the detail CSFs from Table 3.1, Table 3.2 and success criteria from Table 3.3 will be used as references for this study.

Table 3.4: Additional CSFs based on industry experts' feedback

ID	Critical Success Factors (Questionnaire items)
FAC09	Clear and agreed processes and procedures
FAC17	Technical specifications for the project agreed up front
FAC18	Realistic contracting strategy for the project
FAC25	Utilisation of cost and schedule benchmarking information
FAC32	Project reporting requirements to partner companies and other key stakeholders are well met
FAC54	Partner companies second competent employees into the project
FAC57	Adequate limits of authority (LOA) for JV to make financial commitments related to the project
FAC62	An agreed project decision gate system in place

To test the content validity of the questionnaire, a pilot survey was conducted. A sample of 20 respondents was chosen from the author's organisation and the survey questionnaire sent to them. The response from the respondents was tested for reliability and changes which are necessary were made in consultation with the industry experts.

The main survey questionnaire was sent out to the targeted respondents. Respondents were given enough time-frame to respond to the survey. Email reminders were sent out to the respondents to improve the response rate.

Results were collected and sanity checks done on the data for completeness. Incomplete responses were dropped from further analysis. Appropriate tests like reliability analysis and correlation analysis were conducted in SPSS software to find out whether the tests output meets the research questions and the test findings were then discussed.

Reliability tests were run on the CSFs and project success. Content validity were established though literature review and industry experts inputs. The results from content validity provided the answers for Research Question 1. Correlation tests were carried out on factor groups, success group, CSFs and success criteria. Results from the correlation tests provided feedback for Research Question 2. Non-parametric tests such as Wilcoxon-Mann-Whitney tests (U-test) and Kruskal-Wallis tests were carried out on factor groups, success group, CSFs and success criteria to analyse Research Question 3. Figure 3.2 below summarises the flow of test analysis for the research questions.

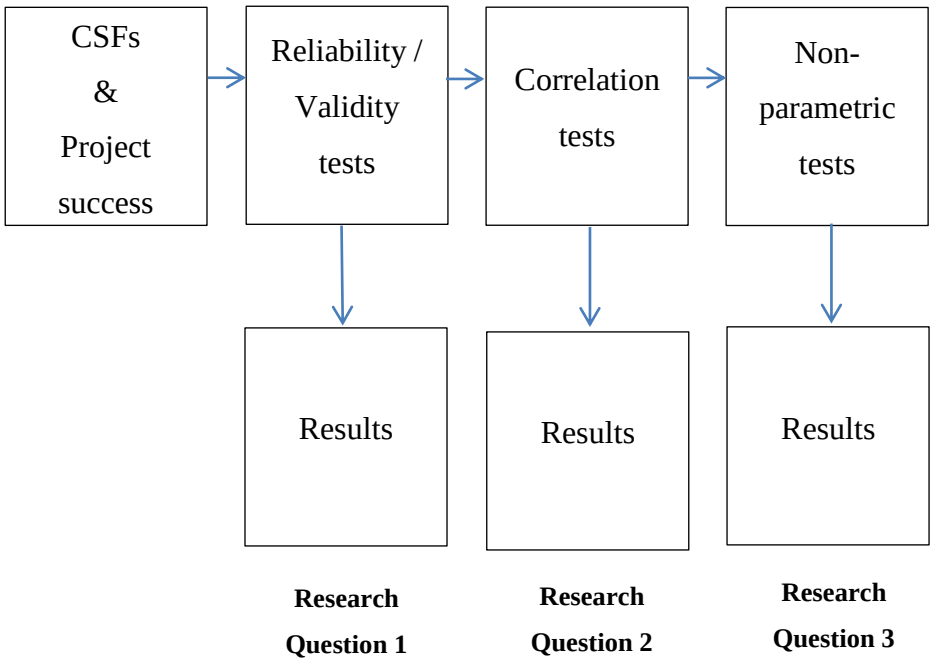


Figure 3.2: Flow of test analysis for research questions

3.3 Research model

The objective of the literature review was to develop a research model and to prepare the survey questionnaire. Figure 3.3 briefly illustrates the process flow of literature review and industry experts' inputs to develop the research model.

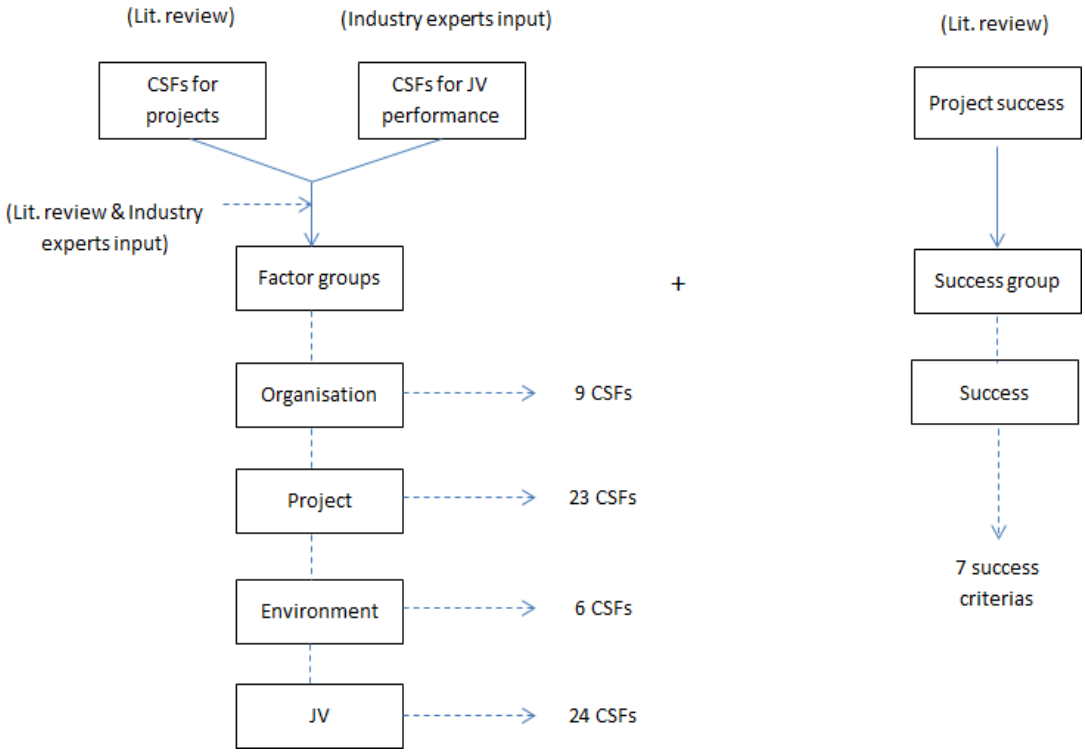


Figure 3.3: Process flow to develop the research model

Based on the literature review, a list of critical success factors and project success criteria was compiled. This list was reviewed with the industry experts for content validity. Through the literature review and industry experts' inputs, a catalogue of 62 critical success factors and 7 project success criteria as listed in Table 3.1, Table 3.2, Table 3.3 and Table 3.4 were compiled (as shown in Table 3.5 below).

Table 3.5: Critical success factors (CSFs) for questionnaire development

ID	Critical Success Factors
FAC01	Support from JV senior management
FAC02	Clear project objectives
FAC03	Strong business case for project
FAC04	Sufficient resources
FAC05	Project risk management processes and procedures in place

FAC06	Active project risks management
FAC07	Existence of project sponsor/champion
FAC08	Adequate training provision for staff
FAC09	Clear and agreed processes and procedures
FAC10	An agreed project plan in place
FAC11	Project plan is updated regularly
FAC12	Project plan performance monitored regularly
FAC13	Established lines of communication between the project manager and the team
FAC14	Good and constant communication / feedback between the JV top management and the team
FAC15	End users participation
FAC16	End users requirement incorporated appropriately
FAC17	Technical specifications for the project agreed up front
FAC18	Realistic contracting strategy for the project
FAC19	Project team members adequately skilled for their job functions
FAC20	Project team members have relevant experience
FAC21	Change management established and practiced
FAC22	Competent project manager
FAC23	Usage of familiar technologies for the project
FAC24	Realistic project schedule
FAC25	Utilisation of cost and schedule benchmarking information
FAC26	Effective project performance monitoring and control (cost/schedule/quality/HSE)
FAC27	Adequate budget for the project
FAC28	Competent consultants / contractors / suppliers
FAC29	Suitable project management methodology and tools in place
FAC30	Adopt lessons learned from other projects
FAC31	Good integration to manage project complexities
FAC32	Project reporting requirements to partners and other key stakeholders are well met
FAC33	Adoption of new technologies for project

FAC34	Political stability in host country
FAC35	Prudent management of competitor's threat
FAC36	Proactive management of internal & external key stakeholders
FAC37	Availability of competent service providers (consultants/contractors/suppliers)
FAC38	Conducive economic climate
FAC39	Goals and objectives congruity between the JV partner companies
FAC40	Partner companies commitment to provide competent resources
FAC41	Adequate support for the JV from partner companies
FAC42	Established lines of communication between the JV and partner organisation
FAC43	Trust among partner organisation
FAC44	Trust among partner organisation and the JV
FAC45	Trust between JV team members
FAC46	Trust between the JV and host government
FAC47	Low/moderate disagreement between the JV and partner organisation
FAC48	Conflict-free relationship between JV and partner companies
FAC49	Good cooperation/alignment between partners and the JV management
FAC50	Good cooperation/alignment between JV partners and host government
FAC51	Fair remuneration for JV employees
FAC52	Transparent decision making process in the JV
FAC53	Participation of JV employees in the decision making process
FAC54	Partner companies second competent employees into the project
FAC55	Sharing of expertise by partner companies with the JV
FAC56	Joint decision making process by partners in regards to routine JV project decisions
FAC57	Adequate limits of authority (LOA) for JV to make financial commitments related to the project
FAC58	Competent JV senior management team to manage the JV

FAC59	Adaptation of project team members to JV organisation culture
FAC60	Adaptation of the JV to the host country culture
FAC61	Organisational identification to the JV by secondees from partner companies
FAC62	An agreed project decision gate system in place
SUC01	Meeting project budget
SUC02	Meeting project schedule
SUC03	Meeting project quality requirements
SUC04	Meeting project technical specifications
SUC05	Achieving end-users' satisfaction
SUC06	Achieving project HSE targets
SUC07	Achieving partner companies satisfaction

3.3.1 Grouping of CSFs and project success to factor groups and project success group

To facilitate the data analysis later, these critical success factors were categorised into several factor groups. As in accordance with the literature review, the grouping of factors was done so that the cause-effect relationships between the factor groups could be easier to be observed (Belassi and Tukel 1996, Ika, Diallo and Thuillier 2012).

Belassi and Tukel (1996) also suggested that grouping of CSFs into factor groups and studying the correlation provides clearer results on how the factor groups are related to project success. This will help the project practitioners and management team to adopt the model and focus on the factor groups and its factors that are critical for their projects from a macro (factor group) and micro (individual CSFs) perspective. This model would also enable project practitioners and other

relevant stakeholders to identify if project success is more related to certain factor group as compared to the others.

The categorisation and naming of these factor groups were done in consultation with industry experts and based on other researches. For this research, the author has categorised the 62 CSFs into 4 factor groups and the 7 success criteria into 1 group. The CSFs were categorised into groups which were named as Organisation, Project, Environment and JV. Meanwhile the project success criteria were simply named as Success.

3.3.1.1 Organisation factor group

Support from top management is widely accepted as one of the top critical factor to achieve a successful project. And existence of a project champion who is usually from the management team also acts as a catalyst to support the project from inception through to completion. Clear project objectives are important so that the project manager and its team will have a clear mandate to execute the project. Project objectives are usually determined by the top management in an organisation. Project objectives are usually driven by the project's business case. Existence of agreed process and procedures in the organisation enables the project to be conducted consistent with the organisation's assurance process that will act as a roadmap to ensure the project is managed in the best possible way as envisioned by the organisation. One definite process that is prevalent in an organisation that manages its projects successfully will have to be the risk management process. Risks must be identified and managed proactively and continuously to encounter any threat that can

affect the chances of achieving a successful project. By proactive management of risks, opportunities which can add value to the project objectives can also be identified. Resources are also controlled from an organisational level whereby top management makes decision on the advice of the project manager to assign manpower to the project team. Training plan and development plan for the resources is also important to ensure the employees are competent to execute the project. Training is often managed by the functional manager in the organisation and the budget for the training and overall project is approved by the top management.

3.3.1.2 Project factor group

Project related factors are important critical success factors to a successful project completion. A competent project manager must be put in charge to manage a project as the project manager is an important member of the project to direct and lead the team to a successful project delivery. Communication between the project manager and the team must be open and continuous. This will enable the team and project manager to exchange information for the betterment of the project. Good communication must also be established between top management and the team. Transparent communication between the stakeholders is proven to be successful in managing projects. Therefore sufficient communication i.e. via project reporting to partner companies and other key stakeholders are important to ensure adequate support for the project is maintained. Along with the project manager, project team members must also be competent and suitably qualified for their respective job functions in the project. Having sufficient relevant experience also provides advantage to carry out the tasks effectively. To execute a project, an agreed and

realistic project plan must be established. This plan must be updated and consulted regularly to identify the potential slippages and bottlenecks to the project. Besides project plan, having adequate budget for the project is important as enough funds must be made available to the project manager and the team to manage the project. Project plan and budget must be developed with reference to benchmarking information as deemed appropriate. Benchmarking is important as to develop a robust project plan and budget for the project. Along with benchmarking requirement for the project, suitable project management methodologies and tools are important to manage a project consistent with the industry's best practices for managing projects. Project performance monitoring and control must be established to monitor project KPIs especially those related to cost, schedule, quality and safety. Performance monitoring and control will help the project team identify potential trends that can affect the project objectives. Projects are always prone to changes therefore change management must be practised by the project team to minimise impact to the project objectives due to changes. One way of minimising changes to the project scope is by agreeing the technical specifications of the project up front. Also by using familiar technology, the project could most likely freeze the technical specification up front therefore optimising on the project schedule and cost. Lessons learned from other projects can be useful to avoid the same pitfall or to capitalise on the good lessons learned for the current project. As most of the scope of the project is done actively by the external consultants, contractors and suppliers, securing competent consultants, contractors and suppliers contributes very much to a successful project. Prior to selecting these service providers (consultants/ contractors/suppliers), a robust overall contracting strategy is important so that the scope of work could be categorised into appropriate packages and remuneration

method based on competency of these service providers. End-user's input and participation in a project is important. End-users are the 'customer' of a project when the project becomes an asset. End-user's in oil and gas projects especially upstream projects are the Operations personnel. Their requirements need to be appropriately incorporated into the project as Operations personnel will have to operate and maintain the asset for many years. Neglecting end-users during project phase could be costly as issues related to changes, reliability and maintainability of the asset may emerge. Effective management of complexity of all the aspects related to the project including project size, value and uniqueness needs good integration of all the components (stakeholders, processes, procedures etc.) so that all these components react positively in ensuring a successful project.

3.3.1.3 Environment factor group

The factors in this group are usually external factors but can affect the project positively or negatively. Economic and political climate is crucial for allowing a project to be conducted especially in a country foreign to an organisation. Political leaders are powerful external stakeholders as their decisions can affect a project positively or negatively. Timely approvals of permits relevant for project execution by host government are important for completion of project on time. Good reputation with local stakeholders such as NGOs is also important as not to disrupt the project in any manner. Availability of competent service providers (consultants/contractors/suppliers) is important to safeguard project schedule and cost. As many other organisations will be competing with the limited resources, securing and maintaining these resources are equally important. Conducive economic

climate is important as it will help ease the risk of inflation for the project cost and possibly the schedule as well.

3.3.1.4 JV factor group

In addition to CSFs for JV factor group from Table 3.2, several CSFs from industry experts' input as listed in Table 3.4 are also relevant for JV factor group. These additional CSFs are partner companies second competent employees into the project (FAC54), adequate Limits of Authority (LOA) for JV to make financial commitments related to the project (FAC57) and an agreed project decision gate system in place (FAC62).

3.3.1.5 Project Success group

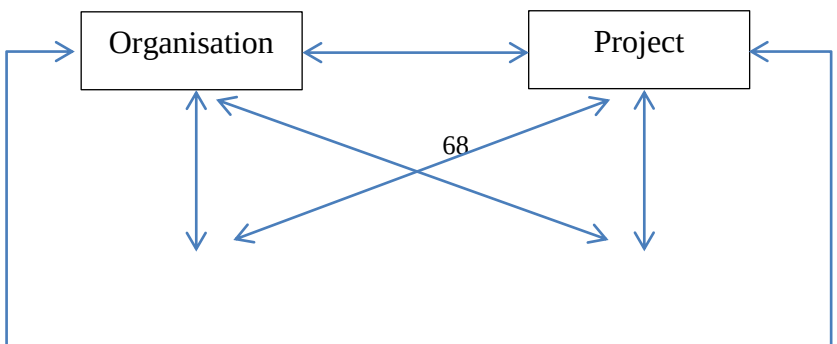
A list of project success criteria was developed through literature review and industry experts' inputs (Table 3.3) as means to assess the content validity. A total of seven project success criteria that was deemed relevant were accepted for questionnaire development. These project success criteria were categorised and named as Success. Success group and the success criteria therein are important to assess the relationship between the factor groups, CSFs and Success and success criteria.

3.3.2 Correlation between factor groups and with project success group

As tested by Belassi and Tukel (1996) on positive correlation between factor groups, the author also decided to study if the correlation between Organisation, Project and Environment and JV factor groups are positive and strong.

Few researchers have managed to establish the contribution of factor groups to the success of a project (Belassi and Tukel 1996), although some have established the relationship between individual CSFs to project success (Rockart 1979, Keck, Leig and Lollar 1995, Baker, Murphy and Fisher 1983, Ika, Diallo and Thuillier 2012, Hannevik et al. 2013, Gray 2001, Khang and Moe 2008, Pinto and Slevin 1987, Cooke-Davies 2002, Westerveld 2002). This study also attempts to empirically establish the relationship between factor groups and project success.

Based on the grouping of CSFs into Project, Organisation, Environment and JV factor groups and project success criteria into Success group, the proposed model as per Figure 3.4 was developed. This model is based on the premises that there are positive association between Organisation, Project, Environment and JV factor groups and each of these factor groups are positively related to Success thus playing a role in determining the success of a project in a joint venture organisation. This research will therefore attempt to establish the relationship between Project, Organisation, Environment and JV factor groups, and between the factor groups and project success (Success).



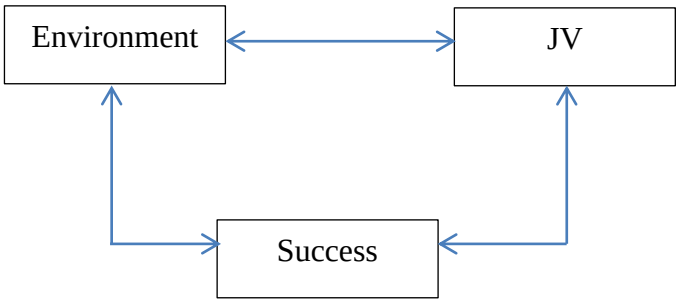


Figure 3.4: CSF model for projects in oil and gas joint ventures

3.4 Research Strategy

The research strategy adopted by this research is quantitative strategy. Quantitative research is based on research questions and/or hypothesis and considered very 'objective' in nature. Quantitative data are tangible and reliable (Bryman 1998). The research questions/hypothesis is tested based on a number of variables and measured with statistical procedures to determine whether the research question/hypothesis is true (Naoum 2007).

Creswell (2003) suggests that quantitative method is applicable when the researcher wants to test or verifies theories or concepts, identify variables to study, relates variables questions or hypotheses, uses unbiased approaches and employs statistical process and procedures to analyse the data.

Quantitative method is also the better choice especially when the subject or topic is well known (Rattray and Jones 2007). Since CSFs are well researched topic by other researchers therefore it is deemed acceptable to use quantitative method for

this research. It is hoped that quantitative methodology used in this research is able to generate hard and reliable data and provide facts to test and confirm the relationship between the research questions and the research objectives.

3.5 Sampling

3.5.1 Sampling method

This research's sampling method is random sampling based on probability sampling method. Probability sampling is preferred as subjectivity and biasness of the sample and the responses can be eliminated.

The target population should be based on the research objectives. The target population for this research are joint ventures managers, project managers and project management executive level staff from projects in oil and gas joint ventures from Malaysia and worldwide. This population will encompass from as many countries as possible to enable a large sample size.

3.5.2 Sampling size

Appropriate sampling size determines a reasonable conclusion and generalisation of the target population. For probability strategies, it will be beneficial to have sample size as large as possible so that the margin of error for generalising the target population can be kept to a minimum (Saunders, Lewis and Thornhill 2007). According to Stutely (2003) it is recommended to have a minimum of 30 statistical

analyses for a meaningful sampling distribution analysis. The author targeted to receive a minimum of 150 valid responses for the questionnaires so that the analysis conducted can be meaningful.

3.6 Data collection method

Data collection method helps collect information in a systematic manner that will ultimately contribute to the objectives of the study. Data collection has to be done in a systematic manner because if the data is collected unsystematically it may lead to inaccurate data analysis and invalid results. This study's data collection method is based on both primary and secondary data. This will help the researcher generate results and compare the results with the literature review.

3.6.1 Primary Data

For this research, the author utilised online survey questionnaire as a primary data collection method. Online survey was chosen because it is relatively cheaper, reaches out to a wide target population and provides a faster response time (Llieva, Baron and Healey 2002, Naoum 2007). This method is also advantageous in reaching out to geographically dispersed respondents. A survey questionnaire is critical for probability sampling as it enables the researcher to make interpretations from the sample to meet the objectives of the research (Saunders, Lewis and Thornhill 2007)

The self-completion questionnaire was designed with the intention to quantitatively test the critical success factors for projects in oil and gas joint ventures. Through self-completing questionnaire, all the respondents will be able to answer the questions themselves (Bryman and Bell 2003).

The author decided to use SurveyMonkey to administer the survey. Invitations were sent out via emails to the respondents with a hyperlink that will direct to the survey in SurveyMonkey website when clicked. Thereafter, the respondents were guided through a series of webpages to answer all the questions. The survey was open online for the respondents to answer for 15 days. This duration was based on the experiences of the average time taken by the respondents to reply by other researches that used online questionnaire surveys (Llieva, Baron and Healey 2002).

The author, having the virtue of working in an oil and gas project in a joint operating company, sent personal survey invitation emails to 200 colleagues and friends who are working on projects in oil and gas joint ventures and joint operating companies particularly the author's own organisation. Additional 350 invitations were sent out to oil and gas project practitioners who are listed working in joint ventures and joint operating companies around the globe through the author's parent company, which happens to be one of the leading oil and gas companies in the world. In addition, referrals from survey participants also helped broaden the sampling size. The cover note in the author's email to the respondents explained the purpose of the survey. As the survey questions did not require the respondents to divulge and personal details such as name and the name of organisation, respondents were

assured of their anonymity. After the first 15 days, reminders were sent out through emails as follow ups to improve the response rate.

A sample of 20 respondents was chosen from the author's organisation and the survey questionnaire sent to them as pilot survey. 16 responses were obtained and were checked for completeness of data. Minor adjustments on the questions were done based on feedback from respondents. It is important to note that when amending the questionnaire, the original underlying questions should not be compromised.

3.6.2 Questionnaire development

A questionnaire was developed to facilitate systematic data collection from the respondents. The questionnaire was designed based on extensive literature reviews from relevant textbooks, professional journals, conference papers, research reports, information from the Internet and also inputs from industry experts. The survey was constructed so that the respondents can rate their agreement on importance of the critical success factors and its impact to project success.

The proposed questionnaire was divided into 6 sections. In the first section respondents were requested to provide information on their demographic profile i.e. age, country of origin, job title, working experience and so forth.

The second section of the questionnaire requested the respondents to provide information regarding their current work organisation. In this section respondents were requested to feedback whether they are currently working for a joint venture or

joint operating company. Then more details regarding the organisation were requested i.e. if it was incorporated or unincorporated, location of the joint venture, whether the respondents was directly hired to the organisation or seconded from the partner organisation and so forth. Sample of the survey questionnaire are found in Appendix E. The respondents attributes in the first and second section was important as it was used for data analysis particularly to determine whether there was any difference in opinion in the responses between the different attributes. In total, 15 attributes related to the respondents (demographic profile and organisation background) were designed into the questionnaire.

The remaining sections in the questionnaire (Section 3, 4 and 5) requested the respondents to rate their agreement on the importance of each critical success factors for project success. Section 6 meanwhile invited the respondents to rate the importance of the project success criteria as influenced by the CSFs from previous sections.

To ensure consistency of responses, a generic question was provided in Section 3, 4 and 5. The generic question was worded as follows **"The statements below indicate possible critical success factors for projects in oil and gas joint ventures. Please indicate your response for the statements"**. This question was then followed by the 62 critical success factors and respondents were required to rate their responses according to the responses on the Likert scale. As for Section 6, the question was as follows **"The following statements below indicate the measures of project success. Please indicate your response for the statements".**

The rating scale that was used was a five-point Likert scale whereby 1 represented “Strongly Disagree” and 5 represented “Strongly Agree” as shown in Table 3.6 below.

Table 3.6: Likert Scale

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Likert scales are designed to measure fixed choice responses such as attitudes or opinions. The ordinal scale above measures the levels of disagreement to agreement. A Likert scale assumes that the scale is linear therefore the responses can be measured. Importance of CSFs can be determined through this Likert scale although it cannot be determined whether the value between the 5 point scales is equally distributed.

Section 3, 4 and 5 formed the factor groups and Section 6 formed the project success group. All the questions in Section 3, 4, 5 and 6 were designed as close-ended questions as they are deemed to be more efficient for data collection, processing and analysis. All the statements were positively worded to ensure consistency.

For the purpose of simplicity and ease of respondents to answer the questionnaire, the items were developed according to each CSFs and project success criteria. As most of the survey data were collected from experienced executives and

managers, it was construed that the responses provided were mainly based on experience of the respondents.

Since the survey was designed as self-administered, the results heavily depended on the respondent's state of mind. As such, the responses were most likely subjected to biasness. It is important to note that when responding to a CSFs or project success, the respondents could be responding based on their own perception of success factors/project success rather than any 'objective' measures of *actual* success factors/project success (Asrilhant, Dyson and Meadows 2005). Some researchers (West and Schwenk 1996, Starbuck and Mezias 1996) argue that almost all surveys are perception based. There have been numerous studies that have contributed by using perception based questionnaires.

Since there was concern on the proper use of perception based data, some measures were put in place to reduce biasness. Industry experts' opinions were used and emphasis was put on reliability on the questionnaire designed. Cronbachs' Alpha of 0.95 was targeted to be achieved. The approach of setting 0.95 for reliability for perception based data has been accepted by many researchers (Rodan and Gallunic 2004, Miller, Wilson and Hickson 2004). Other measures such as designing the questions related to success criteria on a separate page at the end of the survey were also implemented. This required the respondents to browse through the entire survey pages to complete it.

3.6.2.1 Validity

It is important to demonstrate the validity of the questionnaires. Validity refers to whether a questionnaire is measuring what it is supposed to measure (Nunnally and Bernstein 1999). The different type of validity suggested being necessary for any research namely:

- Content validity (face validity): Content validity refers to how a test measures an intended content area and how well the content area have been categorised for the tests. There are few possible ways to achieve content validity i.e. through literature review, inputs from industry experts and feedback from pilot survey.

- Construct validity: Construct validity refers to whether the concepts and theoretical assumptions are measured correctly as desired by the researcher.

The content validity (face validity) has been addressed in this research through literature review. Also industry expert's opinions were obtained on the proposed concepts of the questionnaire. Feedbacks from pilot survey were also incorporated to make minor adjustment to the description of the questionnaire in consultation with the industry experts.

According to Narver and Slater (1990), construct validity is established when the correlations among variables is consistent with the predicted theory. The author has examined construct validity with simple correlation based on the pilot survey data. All the factor groups were computed to be positive and strongly correlated.

3.6.2.2 Reliability

Reliability refers to ability of a measurement method is without bias and able to produce the same result over and over again. Reliability is different from validity as reliability means measuring something consistently (Nunnally and Bernstein 1999). For this study, reliability tests will be conducted on all the questionnaire items to establish the consistency of the questionnaire items.

3.6.3 Secondary data

This study refers to extensive literature reviews from relevant textbooks, professional journals, conference papers, research reports and information from the Internet and also inputs from industry experts as secondary data. Secondary data provides a comprehensive viewpoint of the subject in this research and to enable the preparation of the questionnaire.

3.7 Data analysis method

Statistical Package for Social Science (SPSS) version 22 software will be used to analyse the data collected from the questionnaire. Reliability analysis, normality tests, correlation analysis and tests to compare means between the different groups of attributes will be conducted through SPSS.

3.7.1 Statistical Means

The main factor groups (Organisation, Project, Environment and JV) and success group (Success) will be summarised by taking statistical mean of their underlying CSFs and project successes. The factor groups will be then used for the reliability, correlation and to compare means tests. All these tests will also be repeated for the individual CSFs and project success.

3.7.2 Reliability test

Internal consistency reliability indicates how well the items in the survey correlate to one another. The internal consistency reliability is referred to as Cronbach's Alpha and it ranges between zero to one. According to Nunnally and Bernstein (1999), the rule of thumb for commonly accepted scores is those which are above 0.70. For the research data, the reliability tests will be conducted for each of the factor groups and project success group. It is also common practice to report the Cronbach's Alpha based on categories of items in a questionnaire rather than the entire questionnaire (Rattray and Jones 2007).

3.7.3 Normality test

Prior to running any other tests, normality tests will be run to determine the normality of the data distribution. One method of testing the data normality is through Shapiro-Wilk W test. For this test, if the null hypothesis H_0 is accepted, then the data is normally distributed. This is valid if *p* value is greater than 0.05. However if *p* value is lesser than 0.05, then H_0 will be rejected and alternative hypothesis H_a will be assumed. This means that the data distribution is not normal.

3.7.4 Correlation test

Correlation analysis will be done to assess the association between the factor groups, between factor groups and success group, between factor groups and project success, between individual CSFs in the factor groups and between individual CSFs and project success. The strength of correlation is indicated on a scale from -1 to +1 whereby the latter signifies the strong positive correlation meanwhile the former a strong negative correlation. As a rule of thumb, values ranging from 0.1 to 0.4 will be classified as weak positive correlation and values above 0.5 will be regarded as strong positive correlation (Cohen 1988).

3.7.5 Compare means test

Relevant tests to compare the means between groups of respondents attributes will be used to analyse the data. One of the agreements reached by all the other researchers is that there cannot be common CSFs for projects as it usually differs according to the author, type of project, industry, time and so forth. Therefore this test is important to determine if there are differences in opinions between the various attributes of the respondents and if there are any common CSFs that the respondents have differences in opinion with.

3.7.5.1 Test Groups

Compare mean tests will be carried out on the individual CSFs. The respondents attributes will be categorised into 12 different groups namely JV v JOC, Incorporated Joint Venture v Unincorporated Joint Venture, employee type (direct v secondee), age group, major shareholder partner company's employee, oil and gas working experience, job level, country of origin, joint venture location, international joint venture v local joint venture, industry sector (upstream v both) and number of projects experienced in joint venture organisations. These groups were labelled as test group 1, 2, 3, 4, 5 and so forth until group 12. The summary of the test groups are as in the Table 3.7 below.

Table 3.7: Test Groups

Test Group	Attributes
1	Previous projects experience in JV/JOC
2	Incorporated Joint Venture (*IJV*) v Unincorporated Joint Venture (*UJV*)
3	Sector: Upstream v Both (upstream & downstream)
4	Joint Venture (JV) v Joint Operating Company (JOC)
5	JV location (country)
6	Parent company: Major shareholder?
7	Respondents country of origin
8	Employee type (Direct v Secondee)
9	Respondents age group
10	International JV v non-international JV
11	Respondents experience in oil & gas industry
12	Respondents job level

CHAPTER 4

RESULTS

4.1 Overview

The objective of this chapter is to present the outcome of pilot survey, data cleaning and screening prior to data analysis to remove incomplete main survey data that was returned and detail description of main survey respondents demographics. Results of reliability analysis and tests results on data distribution are also explained.

4.2 Pilot survey

A pilot survey was carried out to ensure the clarity and relevance of the questionnaire. The pilot survey questionnaires were sent to 20 respondents located in the author's organisation for fast and complete feedback. Responses were received for all the 20 surveys that were sent out. Based on the feedback received, several critical success factors and details requested on respondents demographic were mildly reworded to remove any ambiguities and discrepancies.

4.3 Response rate

For the main survey, 550 questionnaires were sent out and 135 questionnaires were returned. Out of the 135, 19 responses were incomplete. Therefore only 116 (21.1%) of the responses were deemed useful.

The response rate is considered high and this was achievable due to the author's employment with a leading multinational oil and gas company. Also since the author has been seconded to a joint operating company for the last 4 years, and due to personal contacts, this has helped in getting a satisfactory response rate. However the survey has to be kept open for 1 month from the initial plan of 15 days. This was due to poor initial response and reminders had to be sent out after the first 15 days. The reminders boosted the response rate but the overall responses were below the expectation as the target of 150 responses was not met.

4.4 Data cleaning and screening

Survey data were examined for accuracy of data entry and missing values prior to data analysis. Only 116 responses were used for data analysis although 135 responses were received due to incomplete data. The missing values were related to responses to the critical section of the survey i.e. Section 3, 4 and 5 of the survey and respondents who are not currently working in a JV or do not possess prior working experience in a JV organisation. The missing information was essential to the survey

therefore the 19 incomplete responses were dropped from data analysis. Consequently only 116 responses were used for the analysis.

4.5 Respondents attribute

Attributes of the survey respondents are described in this section.

Table 4.1: Respondents attributes

Attributes	No	%
Age group		
24 and under	2	2%
25 to 29	2	2%
30 to 34	15	13%
35 to 39	24	21%
40 to 44	16	14%
45 to 49	29	25%
50 and above	28	24%
Country of origin		
Angola	1	1%
Australia	9	8%
Brunei	1	1%
Canada	1	1%
India	3	3%
Indonesia	4	3%
Italy	1	1%
Malaysia	54	47%
Netherlands	1	1%
Nigeria	6	5%
Russia	5	4%

Singapore	1	1%
South Africa	3	3%
United Kingdom	14	12%
United States of America	11	9%
Uruguay	1	1%
Job function		
Business /Finance / Commercial	1	1%
Construction/ Installation	15	13%
Downstream Operations Management	1	1%
Drilling	2	2%
Electrical	2	2%
Estimator/ Cost Engineer	10	9%
Information Management (IM)	3	3%
Health, Safety and Environment (HSE)	5	4%
Engineering	5	4%
Contracts/Legal	1	1%
Internal Audit	1	1%
JV Management	1	1%
Interface Management	1	1%
Production Management	1	1%
Project Controls	27	23%
Project Management	20	17%
Quality Assurance/Quality Control (QA/QC)	14	12%
Supply Chain/ Procurement	2	2%
Process (Chemical)	3	3%
Others	1	1%
Overall working experience		
0-4 years	2	2%
5-9 years	46	40%
10-19 years	38	33%
20+ years	30	26%

Working experience (in oil & gas industry)	7	6%
0-4 years	41	35%
5-9 years	40	34%
10-19 years	28	24%
20+ years		
Position		
Graduate	2	2%
Intermediate	10	9%
Senior	28	24%
Lead / Principal	28	24%
Manager	27	23%
Senior Manager	20	17%
CEO / Director / VP	1	1%
Previous projects experience in JV/JOC		
0	8	7%
1-3	45	39%
4-6	24	21%
7-9	19	16%
10 and more	20	17%
Currently working in a :		
Joint Venture (JV)	40	34%
Joint Operating Company (JOC)	76	66%
Type of JV/JOC		
Incorporated	81	70%
Unincorporated	35	30%
No of partner companies in the JV/JOC		
2	10	9%
3	80	69%
more than 3	26	22%
Type of employee		
Direct	73	63%
Seconded from partner company	43	37%

Secondees only: From partner company with major share?		
N/A	60	52%
Yes	25	22%
No	31	27%
JV location		
Australia	12	10%
Brunei	1	1%
Canada	1	1%
Indonesia	2	2%
Ireland	1	1%
Kazakhstan	6	5%
Malaysia	61	53%
Nigeria	5	4%
Russia	7	6%
United Kingdom	8	7%
United States of America	8	7%
Azerbaijan	4	3%
International JV/JOC:		
Yes	111	96%
No	5	4%
Sector		
Upstream	80	69%
Both (upstream & downstream)	36	31%

This questionnaire has been completed by one respondent working as a CEO/Director/Vice President and 88% of respondents who are in a senior position and above. Majority of the respondents have 5-9 years of experience in oil and gas industry (35%) followed by 10-19 years (34%). The respondents with 20 plus years make up of 24% of the total number of respondents. Respondents with 0-4 years' experience meanwhile makes up a small part of the total respondents (6%). This

demographic profile is assuring to the author that the data received can be considered credible as it is backed up by experienced respondents from the related industry. It can be inferred that respondents have adequate experience in oil and gas industry to and capable to provide answers to the questionnaire.

It is also important to note that almost all of the respondents have worked in a JV/JOC organisation before and/or currently working in a JV/JOC. This is a good indicator on the credibility of the data collected as the feedback will reflect the input from the targeted samples that have experience working on projects in oil and gas JV or JOC organisation. Most of the respondents come from incorporated JV organisation as compared to unincorporated joint venture organisation. 81 (70%) respondents are currently involved in incorporated joint venture as compared to 30% (35) who are working in unincorporated joint venture.

Majority of the respondents are from Malaysia (47%) as shown in Table 10 above. This is followed by respondents from U.K. and U.S.A. respectively. It is interesting to note that the survey respondents hail from six out of seven continents in the world. And as expected, most of the respondents' organisations are located in Malaysia (53%). This is followed by Australia (10%). Other respondents are dispersed around various countries in the world.

Majority of the respondents are working in project controls (23%), followed by project management (17%), construction (13%), QA/QC (12%) and the rest. These proportions of respondents signify that respondents have the right skills set and experience required to answer this survey questionnaire. As 93% of respondents

have previous projects experience in a JV/JOC, it can be inferred that most of the responses are experienced based rather than perception based.

69% of the respondents are from the upstream sector of the oil and gas industry; therefore it can be safely assumed that most of the responses reflect the view on upstream part of the industry. Also almost all of the respondents are from international joint venture (IJV) therefore the views of the responses incorporates views from an IJV's perspective.

As survey invitations was sent out only to respondents operator organisations only, it is assumed that all the respondents for the survey questionnaires comprised of project practitioners from oil and gas operator organisations only thus reflecting the views from oil and gas operator companies.

4.6 Internal consistency reliability

Reliability tests were conducted on the factor groups (Organisational, Project, Environment and Joint Venture) and project success group (Success).

Based on reliability assessment most of the factor groups and success group were highly reliable ($\alpha > 0.7$) except for Environment which the Cronbach's Alpha scored below the 0.7 threshold.

Reliability test were then carried out on the individual CSFs within Environment factor group. Combinations of CSFs were tested for reliability analysis.

Out of the 6 CSFs in Environment, only 2 CSFs (FAC33 and FAC37) were able to compute Cronbach's Alpha of 0.725, which was above the acceptable score of 0.70. Four CSFs from Environment factor group (FAC34, FAC35, FAC36 and FAC38) were then excluded from all the future tests and reference in this study.

Cronbach's Alpha was computed again on the 4 factor groups and success group and the results are as stated in the Table 4.2 below.

Table 4.2: Internal reliability test

Group	Cronbach's Alpha	N of Items
Organisation	0.835	9
Project	0.922	23
Environment	0.725	2
JV	0.922	24
Success	0.789	7

4.7 Data distribution

The survey respondents' data was tested for the normality of distribution. Since the sample size was 116, the Shapiro-Wilk W test was carried out on the data. The result of the data distribution is shown in Appendix A.

Since the test results show that p is < 0.05, therefore the null hypothesis H_0 is rejected. The data from the survey is not normally distributed and the appropriate tests that can be carried out on the data are the non-parametric tests.

CHAPTER 5

DISCUSSION

5.1 Overview

This chapter discusses the detail analysis of the data that has been collected through the main survey questionnaire. The data analysis is done to determine how the various test results correspond to the research questions. Results of reliability analysis, construct validity and content validity are explained to validate research question 1. Correlation tests provide answers for research question 2 and compare means test provides explanation for research question 3.

5.2 Research questions

5.2.1 Research question 1: What are the critical success factors that are applicable for oil and gas projects in a joint venture organisation?

As stated in Table 4.2, the reliability test shows that all the factor groups and project success group have Cronbach's Alpha of more than 0.70 and therefore deeming them reliable. It is commonly accepted to report the Cronbach's Alpha based on categories of items from a questionnaire rather than the entire questionnaire (Rattray and Jones 2007). Therefore the reliability assessment done on the factor groups and project

success group rather than the entire questionnaire items were deemed appropriate to establish the validity of the items.

Furthermore, pilot survey was carried out prior to issuing out the main survey to the targeted respondents. The internal reliability factor, α was more than 0.70 demonstrating that the items in the factor groups and project success group were measuring the same domain.

These results were as expected by the author as the factor groups, CSFs, success group and project success criteria were shortlisted and categorised after conducting extensive study on previous literature on CSFs and project success criteria. CSFs and project success criteria on projects established by other researchers were considered and factors for JV performance were added on to the developed list. In addition to that, industry experts opinion were sought to validate the list of CSFs and project success criteria that was initially developed. Industry experts opinion was needed to check the relevancy (content/face validity) of the CSFs and project success criteria related to projects in oil and gas joint ventures. The factor groups and success group were then developed to categorise the CSFs and project success criteria as appropriate in concurrence with the industry experts opinion.

The author also examined construct validity with simple correlation test based on the pilot survey data. All the factor groups and project success group were computed to be positive and strongly correlated. This result provided construct validity for the research model that was studied. The details of the correlation test are discussed in the next section.

5.2.2 Research question 2: How do the critical success factors for oil and gas projects in joint ventures correlate with project success?

5.2.2.1 Correlation between factor groups and project success group

Correlation tests were conducted to assess how the various factor groups and success group associate with each other. SPSS software was used to test the groups to determine the strength of the correlation and also determine if the groups are statistically significant. Table 5.1 below shows the test results.

Table 5.1: Correlation between Organisation, Project, Environment, JV and Success groups

	Organisation	Project	Environment	JV	Success
Organisation	1.000				
Project	.860**	1.000			
Environment	.367**	.478**	1.000		
JV	.758**	.784**	.409**	1.000	
Success	.598**	.635**	.221*	.507**	1.000

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

Based on the table above, most of the groups are positively and significantly correlated. Organisation, Project, JV and Success are correlated significantly at $p < 0.01$ and Environmental at $p < 0.05$.

It can be observed that Organisation has strong positive correlation which is statistically significant with Project ($r = 0.860$, $p = 0.00$), followed by JV ($r = 0.758$, $p = 0.00$). Environment has medium to high positive correlation which is statistically significant with Organisation ($r = 0.367$, $p = 0.00$).

Project meanwhile has strong positive correlation which is statistically significant with JV ($r = 0.784$, $p = 0.00$), but is medium to highly correlated and statistically significant with Environment ($r = 0.478$, $p = 0.00$).

Environment is mildly correlated with the JV and statistically significant ($r = 0.409$ and $p = 0.00$).

The results demonstrates that correlation between Organisation and Project is the strongest ($r= 0.860$, $p = 0.00$) followed by Project and JV ($r = 0.784$, $p = 0.00$), Organisation and JV ($r= 0.758$, $p = 0.00$) and the rest of the groups.

The factor groups were then tested on the correlation against project success group. All the factor groups show medium to strong positive correlation with the project success group. Project had the strongest correlation ($r = 0.63$, $p= 0.00$) followed by Organisation ($r = 0.598$, $p = 0.00$), JV ($r = 0.507$, $p = 0.00$) and lastly Environment ($r = 0.221$, $p = 0.05$).

These results are mostly in line with the literature review whereby grouping of CSFs into factor groups and studying the correlation provides clearer results on how the factor groups are related to project success (Belassi and Tukel 1996, Ika, Diallo and Thuillier 2012).

Results from Table 5.1 are reflected in the research model (Figure 5.1) and it shows that the factor groups are interrelated and logically interconnected. Positive correlation from the tests results for all the factor groups can be concluded that

increase in value for one factor group is associated with increase in value for other factor group. Test results also establish the relationships between Organisation, Project, JV and Environment (factor groups) with Success (project success group).

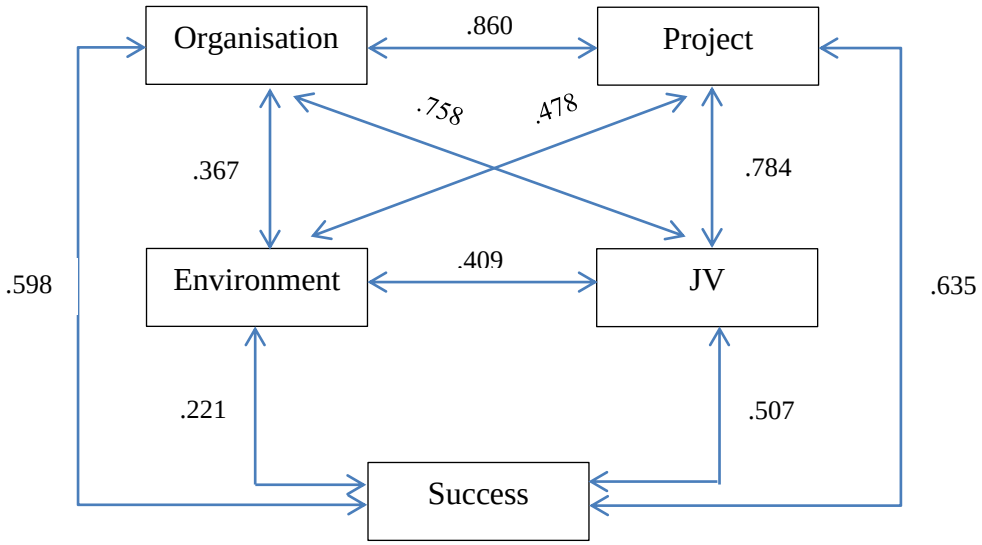


Figure 5.1: Correlation results for CSF model for projects in oil and gas joint ventures

This analysis also demonstrates that the factor groups are inseparable and should not be looked at in isolation from each other. Project factor group is deemed to be the most strongly related with the success of a project followed by Organisation, JV and Environment factor groups. In other words, CSFs related to project have stronger influence on project success as compared to organisation, joint venture and external environment related CSFs. It can also be established that Organisation and Project factor groups are most strongly related followed by relationship between JV and Project and between JV and Organisation. Also Project factor group has the

strongest relationship with project success followed by Organisation, JV and Environment factor group.

Based on the literature review, there were various studies undertaken by researchers to establish various CSFs within different parameters i.e. industry, time, categories and so forth. Very few researchers have managed to establish relationships between CSFs and project success criteria albeit through different models, variables, industries, phases and many more (Pinto and Slevin 1987, Belassi and Tukel 1996, Gray 2001, Cooke-Davies 2002, Westerveld 2002, Khang and Moe 2008, Ika, Diallo and Thuillier 2012, Hannevik et al. 2013). However for this research, an all-inclusive critical success factors were studied for projects in oil and gas joint ventures in operation phase through grouping of the critical success factors into four factor groups and tested against project success group. Through this test results it was concluded that all the factor groups that was studied are positively and moderate to strongly associate with project success group.

Strong correlation between the factor groups may suggest that the factor groups are similar or might overlap with each other thereby suggesting that factor analysis can be conducted to reduce the number of factors represented by each factor group. However it should be noted that the factors are mixture of qualitative and quantitative and combining them will reduce the clarity on the associations between these factors.

5.2.2.2 Correlation between Organisation, Project, Environment and JV factor groups with project success criteria

The research model was subjected to further correlation tests to determine the relationships between the factor groups and individual project success criteria. The results are shown in Table 5.2.

There were no changes to the correlation coefficient between the factor groups in comparison to correlation results between factor groups in Table 5.1. The correlation coefficient between factor groups and project success criteria (budget, schedule, quality, technical specifications, end-users satisfaction, HSE and partner companies' satisfaction) however were found to vary. Most of the factor groups and project success criteria were found to have between mild to strong positive correlation which were statistically significant. Environment factor group yielded positive correlation coefficients that were not statistically significant with several project success criteria (budget, quality, end-user satisfaction and partner companies' satisfaction).

In comparison of all statistically significant correlation coefficients between each factor group with individual project success criteria, Organisation, Project and Environment factor groups were found to have stronger positive correlation to meeting project technical specifications. It can be deemed that from this study, factors related to organisation, project and external environment have stronger relationship with meeting project technical specification as compared to other project success criteria.

JV factor group meanwhile was found to have stronger positive correlation to achieving partner companies' satisfaction. It can be summarised from this finding that factors related to JV influences achieving partner companies satisfaction.

Table 5.2: Correlation between Organisation, Project, Environment, JV factor groups with project success criteria

	Organisation	Project	Environment	JV	Success						
					Budget	Time	Quality	Technical specifications	End-user satisfaction	HSE	Partner companies satisfaction
Organisation	1.000										
Project	.860**	1.000									
Environment	.367**	.478**	1.000								
JV	.758**	.784**	.409**	1.000							
Success (Budget)	.380**	.428**	.119	.197*	1.000						
Success (Time)	.381**	.442**	.190*	.300**	-	1.000					
Success (Quality)	.475**	.481**	.062	.367**	-	-	1.000				
Success (Technical specifications)	.549**	.533**	.217*	.392**	-	-	-	1.000			
Success (End-user satisfaction)	.332**	.370**	.077	.407**	-	-	-	-	1.000		
Success (HSE)	.481**	.493**	.214*	.338**	-	-	-	-	-	1.000	
Success (Partner companies satisfaction)	.407**	.364**	.156	.457**	-	-	-	-	-	-	1.000

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

5.2.2.3 Correlation between critical success factors with project success criteria

Critical success factors in each factor group were further tested to determine the correlation among them. This test was done to determine if the critical success factors are positively correlated.

Information in Appendix B demonstrates the correlation between the CSFs in Organisation factor group. There are medium to strong positive correlations for all the 9 critical success factors with majority of CSFs being statistically significant ($p < 0.01$). Out of 36 correlations in Organisation, 34 correlations were proven to be positive and significant. This demonstrates that CSFs in Organisation are highly associated with each other and cannot be treated in isolation.

As for correlation between CSFs in Project factor group, the result shows that there was medium to strong positive correlations and majority of the CSFs being statistically significant ($p < 0.01$). Out of total 253 correlations computed in Project factor group, 226 correlations were positive and statistically significant. This demonstrates that the CSFs in Project are highly associated with each other and cannot be treated in isolation.

Table 5.3 demonstrates the correlations between the CSFs in Environment factor group. The results show that there are strong positive correlations for the CSFs and is statistically significant ($p < 0.01$). This demonstrates that CSFs in Environment are highly associated with each other and cannot be treated in isolation.

Table 5.3: Correlation for CSFs in Environment factor group

	FAC33	FAC37
FAC33	1.000	
FAC37	.528**	1.000

**. Correlation is significant at the 0.01 level (2-tailed)

For correlation tests between the 24 CSFs in JV factor group, the results show that most of the CSFs have medium to strong positive correlation and majority of CSFs being statistically significant ($p < 0.01$). Out of 276 correlations, 207 correlations were positive and statistically significant. This demonstrates that CSFs in JV are highly associated with each other and cannot be treated in isolation.

For correlation tests between the 58 CSFs and 7 project success criteria, out of the 2346 correlations, results show that most of the CSFs have medium to strong positive correlation, with majority of CSFs being statistically significant between $p < 0.01$ and $p < 0.05$. Out of 2346 correlations, 1871 correlations were positive and statistically significant. This demonstrates that the CSFs are highly associated with project success criteria.

The findings above prove that all the CSFs are inseparable and should not be looked at in isolation from each other. This result has also proved that all the CSFs studied have significant correlation with project success.

5.2.3 Research question 3: What are the differences in opinions between the respondents on critical success factors for projects in oil and gas JVs?

In order to test if there are any significant differences in the responses within the different attributes of the respondents, Wilcoxon-Mann-Whitney test (U-test) and Kruskal Wallis test were carried out on the CSFs based on 12 test groups.

5.2.3.1 Difference in opinions on CSFs

Wilcoxon-Mann-Whitney test (U-test) and Kruskal Wallis test were run on all the 12 test groups against the CSFs. The flow of test analysis to assess differences in means on the CSFs among the various Test Groups are summarised in Figure 5.2 below.

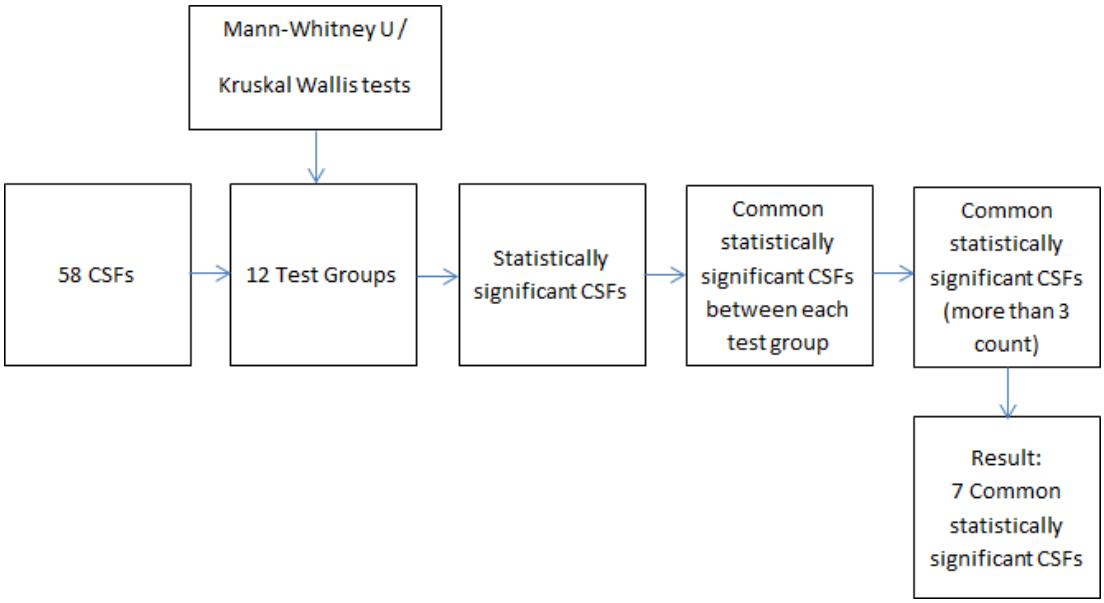


Figure 5.2: Flow of test analysis on CSFs for various Test Groups

The test results show that when CSFs are tested against different attributes of the respondents, there are some CSFs which are statistically significant in all the test groups. Information in Appendix C shows the CSFs which the differences in means are statistically significant from the tests conducted on the different attributes of the respondents.

It is observed that each test group has its unique statistically significant CSF. The unique CSF for each test groups shows that respondents from different test groups seem to have difference in opinion on the importance of CSFs.

It is also observed that there are statistically significant CSFs which are common among the test groups. For example, between Test Group 1 and Test Group 2, the common CSFs and project success are FAC07, FAC14, FAC17, FAC25 and FAC57. Likewise when Test Group 1 and Test Group 6 were compared, the common factor is FAC14. Meanwhile between Test Group 2 and Test Group 3, the common CSFs were FAC25, FAC46 and FAC51.

The frequency count represents the number of times a statistically significant factor is recorded across the test groups. This also suggests that the commonality of the factor across the test groups is represented by the higher frequency count. The frequency of each of the common factors across all the test groups was counted. For example, it was counted that frequency for factor FAC01 was 2 across all the test groups (Test Group 6 and Test Group 8). Meanwhile frequency for factor FAC05 was 2 across all the test groups (Test Group 8 and Test Group 10).

After counting the frequency of the statistically significant factors across all the test groups, the factors were then listed from the highest count to the lowest count. The highest count is 6 while the lowest count is 1. Factors such as FAC14 (Good and constant communication / feedback between the JV top management and team) and FAC25 (Utilisation of cost and schedule benchmarking information) recorded 6 counts denotes that these two factors were found to be common within 6 test groups.

The next most common statistically significant factor with frequency count of 5 is FAC48 (Conflict-free relationship between JV and partner companies). This is followed by factors with 4 counts comprising FAC45 (Trust between JV team members), FAC54 (Partner companies second competent employees into the project), FAC57 (Adequate limits of authority (LOA) for JV to make financial commitments) and FAC59 (Adaptation of project team members to JV organisation culture).

These results suggest that respondents with different attributes seem to have significant differences in opinion about the CSFs. These results also discover that while different test groups yielded a set of CSFs that were statistically significant, yet there were commonalities of the CSFs across the various test groups. When the CSFs are tested against all the attributes, a trend of statistically significant CSFs which appears commonly across the test groups was identified. The commonality of the CSFs across the test groups signifies that these are the CSFs that most of the respondents commonly have differences in opinion on the importance to project success.

The CSFs with frequency of count 4 and above as listed in Appendix D comprises 70% of total count of the commonly significant CSFs across the test groups and CSFs which recorded frequencies of count 4 and above will be discussed briefly of its importance to project success.

i. Good and constant communication / feedback between the JV top management and the team (FAC14)

Communications seems to be one of the most overlooked aspects of many large organisations. Many studies have pointed out that lack of communications being one of the biggest causes for failure of projects. In large organisations where things change rapidly, it is important to keep the communication alive so that changes are communicated efficiently between the management and employees (Chan et al. 2004). Thus large and complex corporations such as joint ventures require more proactive communication between the management and the team.

Constant communication and feedback is essential to project success (Sridharan 1997). According to Cooke-Davis (2002), communications is like a central node for a complex organisation. Opinions, discussions and decisions are crafted through effective communications. Effective communication enables to generate ideas, manage uncertainties and identifying problems sooner. Constant communication encourages team work, enhances motivation and warrants participation of all the relevant parties. In the end, it is envisaged that with good communication the project will be more likely to meet project success.

As this study points out that there are differences in opinion on the importance of communication and feedback between the JV management and team, JV organisation must devise plans and step up efforts to encourage communication between management and the team.

There are several ways how communication can be improved especially in a large organisation. Open communication can be encouraged so that organisational barriers are eliminated and employees have the assurance that the managers are readily available for engagement and feedback.

Frequent updating of changes and status of the project and matters related to joint venture needs to be disseminated to the employees so that employees are kept abreast of the project and joint venture's direction. This may be especially more important to direct employees of the JV organisation who may be anxious on the sustainability of their employment which is often directly related to the sustainability of the joint venture organisation.

Opportunities and channels must be established whereby employees can formally and informally channel their opinions to the management team. Some organisations conduct survey for their employees on regular basis whereby feedbacks from the employees are gathered, key findings discussed and necessary improvement measures implemented.

ii. FAC25 (Utilisation of cost and schedule benchmarking information)

Benchmarking is defined as a process whereby business performance, processes and activities are compared with others in the industry. Information that is normally benchmarked for projects includes project schedule and project cost (McDowell 2009, Shell EPA 2011)

Benchmarking is conducted due to various benefits to the project and the organisation as a whole. Some of the benefits from benchmarking include increasing accuracy of cost and schedule estimates, improve efficiency in obtaining and using past historical project data and to improve the quality of decision for the project funding approval.

Benchmarking can be done internally and also externally by 3rd party organisations. External benchmarking is useful as independent views can be offered by third parties who provide additional credibility to the benchmarking of the schedule and cost. Based on the value drivers for the organisations, internal or external benchmarking procedures and processes can be established.

iii. FAC48 (Conflict-free relationship between JV and partner companies).

According to Demirbag and Mirza (2000), relationship conflicts are found to be negatively linked to performance of the joint venture. Relationship conflict refers to clashes in personality or negative personal characteristics contributed by anger, frustration and many more. Relationship conflicts can occur due to many reasons.

According to the literature, mistrust and lack of cultural sensitivity are among main reasons why relationship conflicts can occur. When a relationship conflict occurs, opinions, discussions and decisions can be influenced by emotions. This may eventually lead to decisions from opinions that were not well conceived.

Research shows that resolutions of conflicts are expensive affair for the JV to manage and non-resolution of relationship conflicts will ultimately lead to lower performance due to managers or employees losing motivation in their work. Therefore the joint venture will need to establish appropriate policies that can negate or minimise relationship conflicts.

iv. FAC45 (Trust between JV team members)

From the literature review it has been proven that trust leads to better performance of the JV as trust aids mutual understanding (Luo 2001, Chan et al. 2004, Brouthers and Bamossy 2006, Ng et al. 2007, Wai-Kit, Lau and Nuaw 2007, Robson, Katsikeas and Bello 2008, Wilson and Brennan 2008, Mistry and Davis 2009, Ren, Gray and Kim 2009, Deitz et al. 2010, Love, Mistry and Davis 2010, Zheng and Larimo 2010). Previous researches have also proven that trust increases the JV performance through increasing the commitment of the team members.

In a typical joint venture organisation, the team members may come from various sources, mainly seconded from the partner companies and also employees who are directly hired by the joint venture organisation.

All the team members in the JV organisation are responsible to contribute with the intention of achieving the common project objectives of the joint venture. The seconded employees often have to take on the burden of wearing both hats, one as a representative of the partner company and the other as a member of the joint venture organisation. As a representative of the partner company, the secondees must represent the interest of the partner company entrusted on them. At the same time, to ensure the project success, the secondees must become colleagues and form strong working relationships with the secondees from other partner companies and also the direct hire employees. It is the secondees' balancing of expectations of the parent companies together with joint venture expectations creates a gap of trust among the various group of employees in the JV.

v. FAC54 (Partner companies second competent employees into the project)

It has been widely accepted and recognised that it is people who deliver projects rather than processes and procedures (Cooke-Davies 2002). People form the backbone of the ecosystem in an organisation that in return performs the procedures to deliver projects. Therefore as widely recorded in many previous researches, having competent team members is very crucial.

In a joint venture organisation, based on the shareholder's agreement, the partner companies usually have the right to designate personnel for particular positions. Although this is mostly common for key positions in the JV organisation, other positions can also be gazetted by the partner companies. It is of utmost

imperative that partner companies second competent employees into the project so that competent employees perform productively and efficiently to deliver the project.

vi. FAC57 (Adequate limits of authority (LOA) for JV to make financial commitments)

For projects in joint venture organisations, the joint venture working level management team needs to be granted appropriate limits to commit for expenditures. Prior to making commitment or incurring any expenses, the JV management team will need to obtain Authorization for Expenditure (AFE) from the partner companies' representative board (commonly known as Management Committee).

According to the Joint Operating Agreement (JOA) from one of the JOC in Malaysia, the maximum spending limit by the JV without needing the approval of Management Committee is RM 1 million. Any commitment or expenditure above this limit will need an AFE approval. Based on the feedback from the experienced professionals from the industry, the RM 1 million ceiling is perceived to be on the low side and not adequate given the scale of the project and the amount of total approved budget.

The consequences of having a low ceiling capped for commitment and expenditure will curb flexibility of the JV to execute works that is necessary for the project within the optimum time. The time taken for AFE preparation, circulation and approval by all the partner companies could consequence in loss of opportunities, schedule delay or cost impact to the project.

Therefore it is proposed that in-depth analysis be done while setting up the Joint Operating Agreement (JOA), prior to setting the threshold level for JV's limits of authority.

vii. FAC59 (Adaptation of project team members to JV organisation culture)

According to Lu (2006) and Sirmon and Lane (2004), culture has been widely accepted to be one of the key drivers of joint venture performance. Culture can be categorised into national culture and organisational culture.

Most organisations have its culture or system. Organisational culture or system can be process or results oriented, decision making processes, flow of information, human resource policies and many more.

When different organisational culture is brought in to the JV by the respective team members, the differences may result in conflict (Fey and Beamish 2001). Different organisational culture may also result in mistrust among employees (Park and Ungson 1997). Due to employees with dissimilar organisational culture, the JV organisation may have to spend more time and effort in establishing a workable culture, which in turn may result in cost and time impact to the project. Therefore joint venture organisation needs to establish organisational procedures or policies that set as baseline for all the employees in the joint venture.

5.3 Summary of chapter

Based on the literature review, inputs from industry experts and the tests that were conducted on the respondent's data, the status of the research questions can be summarised as such:

- Research question 1

All the critical success factors that were studied in this research through the survey questionnaire were deemed to be valid as supported by literature review, industry experts inputs and survey questionnaire respondents' replies. Content validity was demonstrated through inputs from industry experts and by reliability tests which the Cronbach's Alpha score was beyond 0.70. Also since the correlation tests for factor groups, success group, CSFs and project success criteria were positive, therefore it can be inferred that all the CSFs studied are valid and applicable for successful projects in oil and gas joint ventures.

- Research question 2

Most of the success factor groups (Organisation, Project and JV) have strong and positive correlation with each other with the exception of Environment factor group which was positive and moderately correlated. When the individual factor groups and success group were tested, strong positive correlation was computed. This result indicates that the CSF model was valid in establishing the factor groups that relates to project success in oil and gas joint ventures.

The tests between factor groups and project success criteria yielded results indicating Organisation, Project and Environment factor groups have stronger correlation to meeting project technical specifications. JV factor group meanwhile was found to have stronger correlation to achieving partner companies' satisfaction.

Upon further examination on the critical success factors and project success, most of the CSFs were positive and strongly correlated with each other and with project success criteria. These results indicate that the critical success factors and project success criteria studied in this research are positively and strongly correlated. These CSFs are deemed to be important for the success of projects in oil and gas joint ventures.

- Research question 3

There are differences in opinion on the critical success factors based on the tests computed on different attributes of the respondents. The common factors that were statistically significant across the various test groups were identified. The factors that were reported 4 times and more across the test groups were shortlisted and discussed. These factors are good and constant communication and feedback between JV top management and the team, utilisation of cost and schedule benchmarking information, conflict-free relationships between JV and partner companies, trust between JV team members, partner companies second competent employees into the project, adequate limits of authority (LOA) for JV to make financial commitments, adaptation of project team members to JV organisation culture.

From the literature review and input from industry experts, all the CSFs were determined to be important to ensure projects delivered successfully. However as there seem to be differences in opinion about the importance of several CSFs. Project practitioners and relevant stakeholders must be made aware of the importance of the seven factors that is listed above and necessary steps must be taken by oil and gas joint venture organisation so that all the key stakeholders especially the joint venture members and partner organisation members embrace the importance of these factors as these factors are important for the success of their project.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Overview

In this research the lack of consensus on critical success factors for projects and shortage of empirical evidence relating the CSFs to project success particularly in oil and gas joint ventures were reviewed. The literature review was presented giving an insight and direction to an understanding in helping develop a conceptual model for testing. The proposed model was aimed at testing the correlation of Organisation, Project, Environment and JV factor groups with project success therefore if this model could serve as a baseline for project practitioners in the oil and gas JV organisation.

Noting the lack of previous comprehensive studies on CSFs pertinent for project success and limited studies demonstrating empirical evidence on the relationship between critical success factors and project success, the 58 CSFs studied in this research were established through extensive literature review and industry experts' inputs and deemed as pertinent for successful project delivery in oil and gas JV organisations. The 58 CSFs were categorised into Organisation, Project, JV and Environment factor groups to serve as a reference model for project practitioners in oil and gas joint venture organisations.

The factor groups (Organisation, Project, JV and Environment) were found to be positively correlated with each other and with project success group (Success). This finding validated the research model whereby Organisation, Project, JV and Environment factor groups are intimately related to each other and with project success. As these factor groups are interdependent of each other, these factor groups must co-exist to ensure project success.

Relationship between factor groups and project success criteria were tested. Organisation, Project and Environment factor groups have stronger correlation to meeting project technical specifications and JV factor group meanwhile was found to have stronger correlation to achieving partner companies' satisfaction.

Most of the individual CSFs were also positively and strongly correlated with each other and with project success criteria. These results indicate that the critical success factors proposed in this study has influence on project success criteria therefore proving that the CSFs are important for project success.

As all the factor groups and CSFs were positively correlated with project success, it can be concluded that all the factor groups and CSFs studied are valid and can contribute to project success in oil and gas joint ventures.

There were differences in opinion on the critical success factors by the respondents. Seven common factors that were statistically significant across the various test groups were identified. Project practitioners from oil and gas joint venture organisations are recommended to take note of these seven common factors

and ensure appropriate measures are implemented and managed to increase the likelihoods of achieving successful projects.

6.2 Discussion of research findings

6.2.1 Research objective 1: To establish critical success factors for projects in oil and gas joint ventures

All the CSFs for this study were validated through extensive literature review particularly on previous studies relating to CSFs for project success. Industry experts opinion were also sought to validate the CSFs identified in this study.

CSFs suggested by other researches on JV performance were also carefully considered and only commonly cited CSFs related to JV's operation phase were selected. In addition to literature review, industry experts were also engaged to validate the CSFs that were shortlisted. Additional CSFs that were deemed relevant by the industry experts were also added to the CSF list.

Similar approach was taken to study the CSFs for projects in oil and gas industry particularly in joint venture organisations. Through literature review and industry experts opinion, CSFs that were deemed relevant to the objective of this study were considered.

58 CSFs were established and categorised to Organisation, Project, Environment and JV factor groups for a better understanding on characteristics of

each CSF and its relationship to project success. The establishment of factor groups and CSFs within each factor groups were anticipated to help project practitioners' focus on the CSFs from macro (factor groups) and micro (CSFs) perspective. Through this categorisation it was determined that CSFs for projects in oil and gas joint ventures can be scrutinised from an organisation, project, external environment and JV point of view. The model established in this study (Figure 3.4) can be adopted by project practitioners and researchers alike to understand how Organisation, Project, Environment and JV factor groups are relevant for project success.

CSFs in Organisation factor group as proposed in this study is important to ensure all the required fundamentals are in place so that the organisation is supportive of achieving a successful project. A summary of CSFs related to Organisation factor group is listed below.

- Support from JV senior management
- Clear project objectives
- Strong business case for project
- Sufficient resources
- Project risk management processes and procedures in place
- Active project risks management
- Existence of project sponsor/champion
- Adequate training provision for staff
- Clear and agreed processes and procedures

CSFs in Project factor group as proposed in this study are important to ensure that the project has all the required fundamentals in place to ensure that it can be successful. A summary of CSFs related to Project factor group is listed below.

- An agreed project plan in place
- Project plan is updated regularly
- Project plan performance monitored regularly
- Established lines of communication between the project manager and the team
- Good and constant communication / feedback between the JV top management and the team
- End users participation
- End users requirement incorporated appropriately
- Technical specifications for the project agreed up front
- Realistic contracting strategy for the project
- Project team members adequately skilled for their job functions
- Project team members have relevant experience
- Change management established and practiced
- Competent project manager
- Usage of familiar technologies for the project
- Realistic project schedule
- Utilisation of cost and schedule benchmarking information
- Effective project performance monitoring and control (cost/schedule/quality/HSE)
- Adequate budget for the project
- Competent consultants / contractors / suppliers

- Suitable project management methodology and tools in place
- Adopt lessons learned from other projects
- Good integration to manage project complexities
- Project reporting requirements to partners and other key stakeholders are well met

CSFs in Environment factor group as proposed in this study important to ensure all the required fundamentals are in place to ensure that external environment is conducive to achieving a successful project. A summary of CSFs related to Environment factor group is listed below.

- Adoption of new technologies for project
- Availability of competent service providers (consultants/contractors/suppliers)

CSFs in JV factor group such as commitment, bargaining power, trust, control, justice, conflict, cooperation, culture, goal congruity, support from top management, communication, coordination, competent JV management team and organisational identification are pertinent to ensure a project in the JV organisation can be executed successfully to achieve pre-determined project objectives. A summary of CSFs related to JV factor group is listed below.

- Goals and objectives congruity between the JV partner companies
- Partner companies commitment to provide competent resources
- Adequate support for the JV from partner companies

- Established lines of communication between the JV and partner organisation
- Trust among partner organisation
- Trust among partner organisation and the JV
- Trust between JV team members
- Trust between the JV and host government
- Low/moderate disagreement between the JV and partner organisation
- Conflict-free relationship between JV and partner companies
- Good cooperation/alignment between partners and the JV management
- Good cooperation/alignment between JV partners and host government
- Fair remuneration for JV employees
- Transparent decision making process in the JV
- Participation of JV employees in the decision making process
- Partner companies second competent employees into the project
- Sharing of expertise by partner companies with the JV
- Joint decision making process by partners in regards to routine JV project decisions
- Adequate limits of authority (LOA) for the to make financial commitments related to the project
- Competent JV senior management team to manage the JV
- Adaptation of project team members to JV organisation culture
- Adaptation of the JV to the host country culture
- Organisational identification to the JV by secondees from partner companies
- An agreed project decision gate system in place

It can be concluded through literature review, industry experts' inputs and statistical tests run on feedback from the survey respondents that CSFs proposed in this study are pertinent for project success in oil and gas joint ventures.

Noting previous incomprehensive studies and the lack of clarity on the CSFs relevant for projects especially in oil and gas joint ventures which are pertinent to project success, including the lack of empirical evidence on the relationship between the success factors and project success, this study established:

i. 58 critical success factors (CSFs) for successful project delivery in oil and gas JV organisations.

   These CSFs were deemed comprehensive as to provide wide-ranging insights on the elements that must exist and practiced in oil and gas joint venture organisations to ensure project success. These CSFs encompasses elements related to organisation, project, environment and joint venture.

ii. Organisation, Project, Environment and JV factor groups form the 58 CSFs to create a CSF model and serve as a reference for project practitioners in oil and gas joint venture organisations.

   The model established in this study (Figure 3.4) can be adopted by project practitioners and researchers alike to understand how Organisation, Project, Environment and JV factor groups are pertinent for project success. Through this categorisation it was determined that CSFs for projects in oil and gas joint

ventures can be scrutinised from an organisation, project, external environment and JV point of view. The establishment of factor groups and the CSFs within each factor groups are also expected to help project practitioners' focus on the CSFs from macro (factor groups) and micro (CSFs) perspective.

Respondents from this research comprised of project practitioners from oil and gas operator organisations only. Therefore it can be concluded that the CSFs, CSF factor groups and CSF model reflects the views formed by oil and gas operator companies.

6.2.2 Research objective 2: To establish correlation between the identified critical success factors and the CSFs association with project success

As depicted by the research model, Organisation, Project, Environment and JV factor groups are strongly correlated to each other. This proves that Organisation, Project, Environment and JV factor groups cannot exist independently and forms an intimate ecosystem to achieve projects successfully. Almost all the CSFs within each factor group are also closely related to each other. This proves that all the CSFs are interrelated in a wide web of network and each CSF must be present so that a project can be well executed to achieve its objectives successfully.

From this study it is also proven that Organisation, Project, Environment and JV factor groups are strongly and positively correlated with project success group (Success). Having empirically established the relationship between the factor groups

and project success group, this means that Organisation, Project, Environment and JV factor groups are pertinent to achieving project success.

This study also discovered that Organisation, Project and Environment factor groups have stronger association to this particular project success criterion: meeting project technical specifications. Therefore the CSFs related to organisation, project and external environment has stronger influence with meeting project technical specifications. JV factor group meanwhile have stronger association to this particular project success criterion: achieving partner companies' satisfaction. Factors related to JV factor group influences project performance and have close relationship with achieving partner companies satisfaction. Therefore the CSFs related to JV must be managed well so that partner companies satisfaction can be better achieved.

Individual CSFs within each factor groups are also strongly correlated to project success criteria. This finding reveals that the CSFs that were studied have close relationship with project success.

Oil and gas joint venture organisation that intends to execute project and achieve satisfying results should embrace the proposed model as the model represents factor groups containing critical success factors that are important and significant to achieving successful project outcome. JV organisations in oil and gas industry can certainly benefit from the proposed model as it reflects macro (factor groups) and micro (CSFs) viewpoints and all-inclusive of the necessary fundamentals that must be put into place to ensure a successful project delivery.

6.2.3 Research objective 3: To determine if there are any differences in perception between the respondents on critical success factors for projects in oil and gas joint venture organisations

Through literature review, industry experts opinion and results from the survey tests show that although all the CSFs were deemed important for project success in oil and gas JV organisation, there were differences in opinions from the respondents on the importance of the CSFs. The CSFs that were found commonly in difference of opinion across the various respondents test groups were:

i) Good and constant communication and feedback between JV top management and the team

ii) Utilisation of cost and schedule benchmarking information

iii) Conflict-free relationships between JV and partner companies

iv) Trust between JV team members

v) Partner companies second competent employees into the project

vi) Adequate limits of authority (LOA) for JV to make financial commitments

vii) Adaptation of project team members to JV organisation culture

All the CSFs in this study were found to be important for successful project delivery in oil and gas joint ventures as discussed in previous sections. Key stakeholders are recommended to take note of these seven CSFs, and oil and gas JV

organisations need to ensure appropriate measures especially related to these seven CSFs are implemented and managed so that likelihood of achieving successful projects can be increased.

6.3 Contributions of the study

The contribution of this study can be defined into two categories. The first category will be on contribution to CSFs testing methodology. The second category will be on contribution to CSFs application to the domain of study.

6.3.1 CSFs testing methodology

Very limited researchers have realised the potential of studying CSFs through categorising them into factor groups. This study has joined the unique few existing studies on categorising CSFs into factor groups that could facilitate analysis and understanding of CSFs from a macro (factor groups) and micro (individual CSFs) perspective. Through CSF factor groups, CSF model can be established and relationship between factor groups and with project success could be easily observed. This would assist project practitioners and management of an organisation to adopt the model with ease and provide the flexibility to focus on CSFs from macro and micro perspective.

6.3.2 CSFs application to the domain of study

This study can be considered the first of its kind to study the CSFs relevant to achieving successful projects in oil and gas joint ventures particularly during the joint venture's operation phase.

The CSFs that were identified in this study sets as baseline for project practitioners and relevant stakeholders in oil and gas joint venture organisation on the fundamentals that are required for achieving project success.

This research has managed to define new factor groups (Organisation, Project, Environment and JV) which comprehensively cover all aspects to achieve successful projects in oil and gas joint venture organisation, and successfully associate the factor groups and CSFs in this study with project success. Therefore CSFs for projects in oil and gas joint ventures can be assessed from CSFs related to organisation, project, external environment and joint venture.

The factor groups of Organisation, Project, Environment and JV helped define a model for the project practitioners and other stakeholders alike so that appropriate attention from macro (factor groups) and micro (CSFs) view can be given to ensure project success. A combination of macro and micro view will provide flexibility on adopting the model to each organisation, and also facilitate to identify factor groups or CSFs that is related to a particular factor group needs better prominence to achieve successful project outcomes. The model further advocates that all the factor groups including the CSFs must co-exist to ensure project success.

This study is unique as unlike most previous studies, the factor groups and CSFs can be empirically proven to be related to project success. Therefore the model used in this study is proven to be a functional model for all relevant stakeholders. In addition to that, Organisation, Project and Environment factor groups have stronger association with meeting project technical specifications and JV factor group meanwhile have stronger association with achieving partner companies' satisfaction.

This study also discovered that opinions among respondents were different in regards to several CSFs. CSFs such as good and constant communication and feedback between JV top management and the team, utilisation of cost and schedule benchmarking information, conflict-free relationships between JV and partner companies, trust between JV team members, partner companies second competent employees into the project, adequate limits of authority (LOA) for JV to make financial commitments, adaptation of project team members to JV organisation culture were found to be commonly in difference of opinion across the respondents.

This finding is significant as it reflects the opinion of the target samples of this study i.e. project practitioners from oil and gas joint venture organisation. Adequate measures must be taken by oil and gas JV organisations to reinforce the importance of these seven critical success factors and proactively manage them to ensure project success.

6.4 Limitations of current research

As the research instrument for this study depended mostly on self-administered survey, there were always possibilities of perception biasness on the responses by the respondents. There was likelihood that the respondents could have replied to the survey questionnaire based on their own perception of CSFs and project success rather than actual measures of CSFs and project success, or both. Therefore it is suggested that for future studies, respondents are required to respond on the CSFs and project success only based on actual experience from previous projects. This will then help to validate the CSFs, factor groups and CSF model better.

The influence of external environment is pertinent to success of projects. However reliability test for Environment factor group computed α to be lower than 0.70, hence several CSFs had to be discarded from subsequent analysis. As there were no avenues for respondents to provide comments on the survey questionnaires, there was no opportunity to examine the possible reason of this occurrence. Future studies can possibly explore more on external environmental factors and its impact to project success. This could be done by allocating for interviews as additional data collection technique with selected industry experts after the survey questionnaire results have been analysed. This should be done so that feedback can be obtained to validate the importance of external environmental related factors to project success.

6.5 Recommendations for future research

The CSF model in this research can be further tested based on actual experiences of the respondents. This may help to validate and further reinforce the suitability and adoptability of the CSFs, factor groups and CSF model for projects in oil and gas joint venture organisations.

While this study focussed on validity and relationship of the factor groups with project success, additional tests i.e. regression analysis can be conducted to examine the causal relationship between the factor groups and project success. Through regression analysis, there can be more clarity on how the factor groups can impact project success and vice versa.

Future studies should extend its focus on success factors related to external environment and its impact to project success. This will further enhance the validity of the CSF model in this study.

As mentioned in earlier sections, adequate measures can be taken by oil and gas JV organisations to recognise the importance of the seven critical success factors which the respondents had difference in opinions of its importance to project success. Future studies can be focused on how best to implement measures related to the seven CSFs to assist oil and gas joint venture organisations deliver projects successfully. It is recommended that future studies to dive deeper regarding CSFs such as good and constant communication and feedback between JV top management and the team, utilisation of cost and schedule benchmarking

information, conflict-free relationships between JV and partner companies, trust between JV team members, partner companies second competent employees into the project, adequate limits of authority (LOA) for JV to make financial commitments and adaptation of project team members to JV organisation culture. Since these CSFs are equally pertinent for project success in oil and gas joint venture organisation, these CSFs needs to be studied further on its implementation and management in the JV organisations.

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APPENDICES

APPENDIX A:

Survey data distribution

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
FAC01	.272	115	.000	.773	115	.000
FAC02	.285	115	.000	.717	115	.000
FAC03	.310	115	.000	.780	115	.000
FAC04	.231	115	.000	.843	115	.000
FAC05	.364	115	.000	.762	115	.000
FAC06	.329	115	.000	.799	115	.000
FAC07	.297	115	.000	.839	115	.000
FAC08	.293	115	.000	.829	115	.000
FAC09	.341	115	.000	.806	115	.000
FAC10	.241	115	.000	.814	115	.000
FAC11	.346	115	.000	.748	115	.000
FAC12	.285	115	.000	.784	115	.000
FAC13	.340	115	.000	.740	115	.000
FAC14	.281	115	.000	.853	115	.000
FAC15	.292	115	.000	.825	115	.000
FAC16	.307	115	.000	.801	115	.000
FAC17	.305	115	.000	.841	115	.000
FAC18	.290	115	.000	.853	115	.000
FAC19	.242	115	.000	.854	115	.000
FAC20	.288	115	.000	.851	115	.000
FAC21	.373	115	.000	.699	115	.000
FAC22	.299	115	.000	.760	115	.000
FAC23	.337	115	.000	.808	115	.000
FAC24	.323	115	.000	.811	115	.000
FAC25	.290	115	.000	.839	115	.000
FAC26	.367	115	.000	.747	115	.000
FAC27	.265	115	.000	.808	115	.000
FAC28	.200	115	.000	.863	115	.000
FAC29	.318	115	.000	.813	115	.000
FAC30	.325	115	.000	.826	115	.000
FAC31	.281	115	.000	.840	115	.000
FAC32	.262	115	.000	.820	115	.000
FAC33	.324	115	.000	.808	115	.000

FAC37	.279	115	.000	.840	115	.000
FAC39	.384	115	.000	.717	115	.000
FAC40	.310	115	.000	.839	115	.000
FAC41	.346	115	.000	.782	115	.000
FAC42	.398	115	.000	.710	115	.000
FAC43	.276	115	.000	.855	115	.000
FAC44	.248	115	.000	.866	115	.000
FAC45	.259	115	.000	.858	115	.000
FAC46	.246	115	.000	.867	115	.000
FAC47	.308	115	.000	.735	115	.000
FAC48	.233	115	.000	.859	115	.000
FAC49	.363	115	.000	.773	115	.000
FAC50	.284	115	.000	.841	115	.000
FAC51	.304	115	.000	.833	115	.000
FAC52	.204	115	.000	.876	115	.000
FAC53	.220	115	.000	.871	115	.000
FAC54	.285	115	.000	.848	115	.000
FAC55	.292	115	.000	.808	115	.000
FAC56	.266	115	.000	.862	115	.000
FAC57	.294	115	.000	.833	115	.000
FAC58	.315	115	.000	.778	115	.000
FAC59	.425	115	.000	.665	115	.000
FAC60	.389	115	.000	.737	115	.000
FAC61	.251	115	.000	.873	115	.000
FAC62	.280	115	.000	.848	115	.000
SUC01	.283	115	.000	.768	115	.000
SUC02	.207	115	.000	.878	115	.000
SUC03	.298	115	.000	.844	115	.000
SUC04	.333	115	.000	.793	115	.000
SUC05	.312	115	.000	.809	115	.000
SUC06	.423	115	.000	.649	115	.000
SUC07	.365	115	.000	.755	115	.000

a. Lilliefors Significance Correction

APPENDIX B:

Correlation between CSFs in Organisation factor group

	FAC01	FAC02	FAC03	FAC04	FAC05	FAC06	FAC07	FAC08	FAC09
FAC01	1.000								
FAC02	.510**	1.000							
FAC03	.306**	.396**	1.000						
FAC04	.528**	.607**	.334**	1.000					
FAC05	.502**	.365**	.191*	.538**	1.000				
FAC06	.491**	.473**	.294**	.693**	.763**	1.000			
FAC07	.324**	.347**	.139	.334**	.136	.332**	1.000		
FAC08	.326**	.354**	.226*	.298**	.312**	.335**	.434**	1.000	
FAC09	.447**	.424**	.265**	.420**	.297**	.323**	.432**	.508**	1.000

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

APPENDIX C:

Summary of statistically significant factors across the different test groups

Test Groups											
1	2	3	4	5	6	7	8	9	10	11	12
FAC03	FAC07	FAC24	FAC14	FAC14	FAC01	FAC12	FAC01	FAC07	FAC05	FAC23	FAC59
FAC07	FAC08	FAC25	FAC23	FAC25	FAC02	FAC16	FAC05	FAC21	FAC32	FAC57	
FAC14	FAC14	FAC39	FAC25	FAC42	FAC08	FAC24	FAC08	FAC47	FAC39		
FAC16	FAC17	FAC45	FAC48	FAC45	FAC10	FAC25	FAC10	FAC54	FAC42		
FAC17	FAC22	FAC46	FAC49	FAC48	FAC14	FAC45	FAC14	FAC56			
FAC21	FAC25	FAC48	FAC54	FAC49	FAC33	FAC54	FAC33				
FAC25	FAC46	FAC49	FAC57	FAC52	FAC48	FAC59					
FAC28	FAC48	FAC51	FAC61	FAC59							
FAC32	FAC51	FAC59									
FAC43	FAC57										
FAC44											
FAC45											
FAC47											
FAC53											
FAC54											
FAC56											
FAC57											
FAC61											

Note: 1 = Projects in JV/JOC, 2 = UJV v IJV, 3 = Sector: Upstream v both, 4 = JV v JOC, 5 = JV location, 6 = Parent company: Major shareholder?, 7 = Respondents country of origin, 8 = Employee type, 9 = Respondents age group, 10 = International JV?, 11 = Respondents experience in oil & gas industry, 12 = Respondents job level

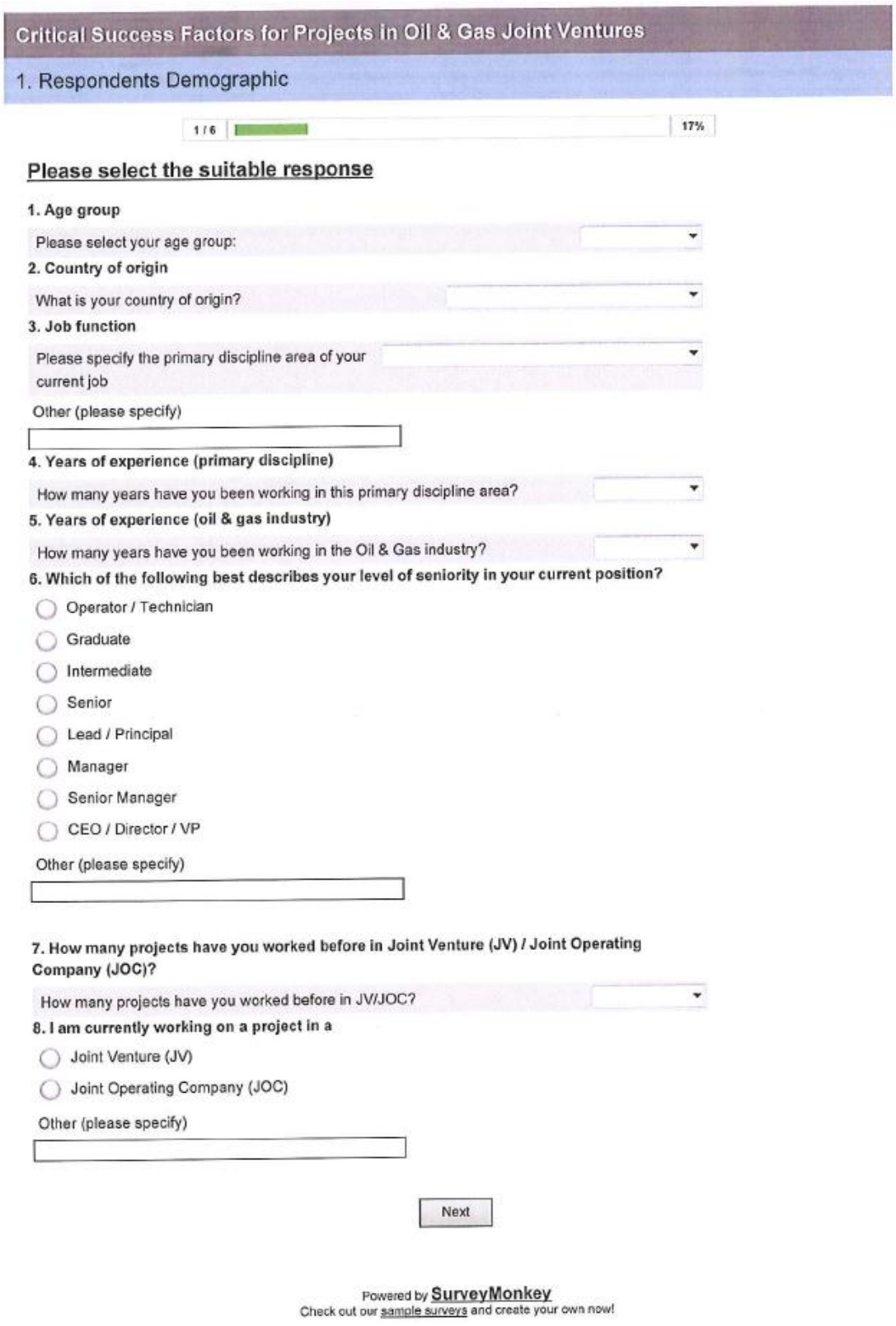
APPENDIX D:

CSFs with high frequency of count across different test groups

CSFs	Description	Count
FAC14	Good and constant communication / feedback between the JV top management and the team	6
FAC25	Utilisation of cost and schedule benchmarking information	6
FAC48	Conflict-free relationship between JV and partner companies	5
FAC45	Trust between JV team members	4
FAC54	Partner companies second competent employees into the project	4
FAC57	Adequate limits of authority (LOA) for JV to make financial commitments	4
FAC59	Adaptation of project team members to the JV organisation culture	4

APPENDIX E:

Survey questionnaire



Critical Success Factors for Projects in Oil & Gas Joint Ventures

1. Respondents Demographic

1 / 6 17%

Please select the suitable response

1. Age group

Please select your age group:

2. Country of origin

What is your country of origin?

3. Job function

Please specify the primary discipline area of your current job

Other (please specify)

4. Years of experience (primary discipline)

How many years have you been working in this primary discipline area?

5. Years of experience (oil & gas industry)

How many years have you been working in the Oil & Gas industry?

6. Which of the following best describes your level of seniority in your current position?

- Operator / Technician
- Graduate
- Intermediate
- Senior
- Lead / Principal
- Manager
- Senior Manager
- CEO / Director / VP

Other (please specify)

7. How many projects have you worked before in Joint Venture (JV) / Joint Operating Company (JOC)?

How many projects have you worked before in JV/JOC?

8. I am currently working on a project in a

- Joint Venture (JV)
- Joint Operating Company (JOC)

Other (please specify)

Next

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APPENDIX E:

Survey questionnaire *(continued)*

Critical Success Factors for Projects in Oil & Gas Joint Ventures

2. Organization background

2 / 6 — 33%

In answering the questions below, herein after JV and JOC will be referred to collectively as JV.

Note: You may skip this page if you are not currently involved in a JV or JOC

9. Is your JV incorporated or unincorporated?

- ◯ Incorporated *(A separate legal entity formed to carry out the JV's business. It owns assets in its own name. Incorporated JVs include limited liability companies and listed companies).*
- ◯ Unincorporated *(A JV set up by contract. It is not a separate legal entity and does not own assets in its own name).*

Other (please specify)

10. How many partner companies are there in the JV?

- ◯ 2
- ◯ 3
- ◯ more than 3

11. Are you a direct employee to the JV, or employee of the partner company seconded into the JV?

- ◯ Direct
- ◯ Seconded from partner company

Other (please specify)

12. For secondees only: Does your parent company hold the majority share in the JV?

- ◯ Yes
- ◯ No

13. In which country is your JV located?

In which country is your JV located?

14. Are any of the JV's parent companies headquartered outside the JV's country of operation?

- ◯ Yes
- ◯ No

15. In which sector of the industry does your JV belongs to?

- ◯ Upstream
- ◯ Downstream
- ◯ Both

Prev Next

APPENDIX E:

Survey questionnaire *(continued)*

Critical Success Factors for Projects in Oil & Gas Joint Ventures

3. Critical Success Factors

3 / 6 — 50%

16. The statements below indicate possible critical success factors for projects in oil and gas joint ventures.

Please indicate your response for the statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Support from JV senior management	○	○	○	○	○
Clear project objectives	○	○	○	○	○
Strong business case for project	○	○	○	○	○
Sufficient resources	○	○	○	○	○
Project risk management processes and procedures in place	○	○	○	○	○
Active project risks management	○	○	○	○	○
Existence of project sponsor/champion	○	○	○	○	○
Adequate training provision for staff	○	○	○	○	○
Clear and agreed processes and procedures	○	○	○	○	○
An agreed project plan in place	○	○	○	○	○
Project plan is updated regularly	○	○	○	○	○
Project plan performance monitored regularly	○	○	○	○	○
Established lines of communication between the project manager and the team	○	○	○	○	○
Good and constant communication / feedback between the JV top management and the team	○	○	○	○	○
End users participation	○	○	○	○	○
End users requirement incorporated appropriately	○	○	○	○	○
Technical specifications for the project agreed up front	○	○	○	○	○
Realistic contracting strategy for the project	○	○	○	○	○
Project team members adequately skilled for their job functions	○	○	○	○	○
Project team members have relevant experience	○	○	○	○	○

Prev Next

APPENDIX E:

Survey questionnaire *(continued)*

Critical Success Factors for Projects in Oil & Gas Joint Ventures

4. Critical Success Factors

4 / 6 — 67%

17. The statements below indicate possible critical success factors for projects in oil and gas joint ventures.

Please indicate your response for the statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Change management established and practiced	○	○	○	○	○
Competent project manager	○	○	○	○	○
Usage of familiar technologies for the project	○	○	○	○	○
Realistic project schedule	○	○	○	○	○
Utilisation of cost & schedule benchmarking information	○	○	○	○	○
Effective project performance monitoring and control (cost/schedule/quality/HSE)	○	○	○	○	○
Adequate budget for the project	○	○	○	○	○
Competent consultants / contractors / suppliers	○	○	○	○	○
Suitable project management methodology and tools in place	○	○	○	○	○
Adopt lessons learned from other projects	○	○	○	○	○
Good integration to manage project complexities	○	○	○	○	○
Project reporting requirements to partners and other key stakeholders are well met	○	○	○	○	○
Adoption of new technologies for project	○	○	○	○	○
Political stability in host country	○	○	○	○	○
Prudent management of competitor's threat	○	○	○	○	○
Proactive management of internal & external key stakeholders	○	○	○	○	○
Availability of competent service providers (consultants/contractors/suppliers)	○	○	○	○	○
Conducive economic climate	○	○	○	○	○

Prev Next

APPENDIX E:

Survey questionnaire *(continued)*

Critical Success Factors for Projects in Oil & Gas Joint Ventures

5. Critical Success Factors

5 / 6 — 83%

18. The statements below indicate possible critical success factors for projects in oil and gas joint ventures.

Please indicate your response for the statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Goals and objectives congruity between the JV partner companies	○	○	○	○	○
Partner companies commitment to provide competent resources	○	○	○	○	○
Adequate support for the JV from partner companies	○	○	○	○	○
Established lines of communication between the JV and partner organisation	○	○	○	○	○
Trust among partner organisation	○	○	○	○	○
Trust among partner organisation and the JV	○	○	○	○	○
Trust between JV team members	○	○	○	○	○
Trust between the JV and host government	○	○	○	○	○
Low/moderate disagreement between the JV and partner organisation	○	○	○	○	○
Conflict-free relationship between JV and partner companies	○	○	○	○	○
Good cooperation/alignment between partners and the JV management	○	○	○	○	○
Good cooperation/alignment between JV partners and host government	○	○	○	○	○
Fair remuneration for JV employees	○	○	○	○	○
Transparent decision making process in the JV	○	○	○	○	○
Participation of JV employees in the decision making process	○	○	○	○	○
Partner companies second competent employees into the project	○	○	○	○	○
Sharing of expertise by partner companies with the JV	○	○	○	○	○
Joint decision making process by partners in regards to routine JV project decisions	○	○	○	○	○
Adequate limits of authority (LOA) for the to make financial commitments related to the project	○	○	○	○	○
Competent JV senior management team to manage the JV	○	○	○	○	○
Adaptation of project team members to JV organisation culture	○	○	○	○	○
Adaptation of the JV to the host country culture	○	○	○	○	○
Organisational identification to the JV by secondees from partner companies	○	○	○	○	○
An agreed project decision gate system in place	○	○	○	○	○

Prev Next

APPENDIX E:

Survey questionnaire *(continued)*

Critical Success Factors for Projects in Oil & Gas Joint Ventures

6. Success Criteria

6 / 6 — 100%

19. The following statements below indicate the measures of project success.

Please indicate your response for the statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Meeting project budget	○	○	○	○	○
Meeting project schedule	○	○	○	○	○
Meeting project quality requirements	○	○	○	○	○
Meeting project technical specifications	○	○	○	○	○
Achieving end-users' satisfaction	○	○	○	○	○
Achieving project HSE targets	○	○	○	○	○
Achieving the partner companies satisfactions	○	○	○	○	○

Prev Done