

**EXAMINING RISK BEHAVIOR AND RISK MANAGEMENT PRACTICES  
IN OIL AND GAS CONSTRUCTION INDUSTRY**

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EXAMINING RISK BEHAVIOR AND RISK MANAGEMENT PRACTICES IN  
OIL AND GAS CONSTRUCTION INDUSTRY

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## DEDICATION

*Alhamdulillah praise to Allah SWT for blessing and giving me the strength to complete  
this project finally.*

*To my beloved husband – Khairulazmi bin Ahmad;*

*To my adorable kids – Afiq, Ardini, Adam and Akmal;*

*To my respectful parents – Ahmad and Hamidah;*

*Family members, in laws and lecturers*

For their endless love, encouragement, sacrifice and support

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## ABSTRACT

The aim of this paper is to examine the risk behaviour and risk management practices among the employees in oil and gas construction industry. Risks are unpredictable events and activities which are known can be avoided and can also give positive or negative impacts to the events or activities. The impacts of these risks may contribute to the project's objectives such as time, quality, cost and safety. Risk behaviour focuses on the role of an individual in the prevention of the risk to be happened. A risky behaviour leads to poor risk management practices and the organization performance as a whole. Risk management has long been associated with the use of market insurance to protect individuals and companies from various losses associated with accidents (Harrington and Neihaus, 2003). In 1990s, the governance of risk management become essential and integrated risk management was introduced. Data were obtained from 150 employees of Malaysia's oil and gas construction's company. The confirmatory factor analysis performed has identified five variables, namely risk behaviour (RB), risk management processes consist of risk identification (RI), risk analysis (RA), risk evaluation (RE) and risk treatment (RT) are good determinant factors of overall risk management practices (ORMP). The results are coherent with the findings by Kletz (1991), Jaffe (2001), Hammond (2002), Navare (2003), Nguyen et al. (2007) and Shama (2009). The findings also unveil the RI and RT does not have significant affect on ORMP.

## ABSTRAK

Tujuan kertas ini adalah untuk mengkaji risiko tingkah laku dan amalan pengurusan risiko di kalangan pekerja di dalam pembinaan industry minyak dan gas. Risiko adalah peristiwa-peristiwa yang tidak menentu dan aktiviti-aktiviti berisiko yang dapat dielakkan dan juga boleh memberi kesan positif atau negatif kepada sesuatu peristiwa atau aktiviti. Kesan risiko-risiko ini boleh menyumbang kepada objektif projek seperti masa, kualiti, kos dan keselamatan. Kelakuan berisiko memberi tumpuan kepada peranan individu dalam pencegahan risiko yang hendak berlaku. Satu perbuatan yang tidak sihat atau berisiko membawa kepada amalan pengurusan risiko dan prestasi yang lemah kepada sesebuah organisasi secara keseluruhannya. Pengurusan risiko telah lama dikaitkan dengan penggunaan pasaran insurans untuk melindungi individu dan syarikat-syarikat dari pelbagai kerugian yang berkaitan dengan kemalangan (Harrington dan Neihaus , 2003). Namun, pada 1990-an, pentadbiran pengurusan risiko menjadi sesuatu yang penting dan pengurusan risiko bersepadu telah diperkenalkan. Data diperolehi daripada 150 pekerja syarikat pembinaan minyak dan gas di Malaysia. Analisis faktor pengesahan telah dilakukan bagi mengenal pasti lima pemboleh ubah, iaitu kelakuan risiko (RB) , proses pengurusan risiko terdiri daripada mengenal pasti risiko (RI), analisis risiko (RA) , penilaian risiko (RE) dan rawatan risiko (RT) adalah faktor penentu yang terbaik bagi amalan pengurusan risiko secara keseluruhannya (ORMP). Keputusan adalah koheren dengan penemuan oleh Kletz (1991), Jaffe (2001), Hammond (2002), Navare (2003), Nguyen et al. (2007) dan Shama (2009). Kajian juga mendapati bahawa RI dan RT tidak mempunyai kesan yang ketara ke atas ORMP .

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## LIST OF ABBREVIATIONS

RB	-	Risk Behaviour
RI	-	Risk Identification
RA	-	Risk Analysis
RE	-	Risk Evaluation
RT	-	Risk Treatment
RMP	-	Risk Management Processes
ORMP	-	Overall Risk Management Practices
BI	-	Behavioural Intention
UTM	-	Universiti Teknologi Malaysia
UK	-	United Kingdom
SPSS	-	Statistical Package for Social Science
PCA	-	Principal Component Analysis
EFA	-	Exploratory Factor Analysis
CFA	-	Confirmatory Factor Analysis
VIF	-	Variance-inflation factor
Std. Deviation	-	Standard Deviation
%.	-	Percentage
$\beta$	-	Standardized beta coefficient
X	-	Mean value of the group of scores or the mean
$\Sigma$	-	Total scores
N	-	Size of the sample

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## **CHAPTER 1**

### **INTRODUCTION TO THE RESEARCH**

#### **1.1 Introduction**

Risks are unpredictable events and activities which are known can be avoided and can also give positive or negative impacts to the events or activities. The impacts of these risks may contribute to the project's objectives such as time, quality, cost and safety. Previous study, risk are more related to the financial management, however in the new era the needs of risk is extended to other industry such as construction, human resource, safety and others.

Risk and uncertainty are inherent in all construction projects, regardless of its size (Abdul Rahman et. al, 2007). Construction risk is generally perceived as events that influence project objectives of cost, time and quality. While, the construction in oil and gas industry is unique and is particularly complex due to the need for the management of numerous internal and external interfaces, the magnitude and scale of the project, regional constraints, technology stretch and also sensitivity to market conditions (Schroeder and Jackson, 2007).

Risk management can be applied to any organization, any areas and levels, at any time, as well as to specific functions, project and activities. Risk management basically is the core aspect for every organization whereas to manage and minimize the risk as it cannot be eliminated. As such, risk management simply meant predicting the unpredictable where it includes assessment to avoid any vulnerability from occurring and it diminished the potential harm in the future. The main subject of risk management is as an enabler to assist the organisation to keep out from trouble as well as to make the business better.

The risk management process is the start to the key feature of risk management. As the context, objectives and procedure have been established in the risk management, the series of process that need to be done. Edna, (2010) concluded that the aim of risk management practices in a business environment is to avoid the high impact risks that will damage the business and threaten its continued existence.

Risk behaviour means knowing how dangerous the risk situation is in which the person find in him/herself (Institute for Road Safety Research, 2010). It focuses on the role of an individual in the prevention of the risk to be happened. A risky behaviour leads to poor risk management practices and the organization performance as a whole.

This study focuses on the risk management practices in the oil and gas construction projects. It discuss about to examine the risk behaviour and risk management practices. Besides that, it also focuses on the risk management processes which are the common steps in risk management principles.

## 1.2 Background of the Study

Risk management has long been associated with the use of market insurance to protect individuals and companies from various losses associated with accidents (Harrington and Neihaus, 2003). It has begun its study after the World War II and the modern risk management was origin from 1955 to 1964 (Crockford, 1982; Harrington and Neihaus, 2003; Williams and Heins, 1995). In parallel the content of pure risk management was evolved to include corporate financial risk, technological risk model and operational risk model.

In 1960s, the development of contingent planning activities and various risk prevention or self-protection activities and self-insurance instrument took place. The use of derivations as instruments to manage insurable and uninsurable risk began in the 1970s and developed very quickly in 1980s (Dionne, 2013). From there companies began to consider financial market and risk portfolios. In 1990s, the governance of risk management become essential and integrated risk management was introduced.

However, Dionne, 2013, she argued all these regulations, rules and risk management methods did not suffice to prevent the financial crisis in 2007; it is not necessarily the regulations of the risk, but rather their application and enforcement. It is known that the stakeholders in various organizations or markets that regularly expose to the regulations and rules, and then self-protection activities has also become an important. This is because self-protection activities affects the probabilities of losses or cost before they arises (Dionne, 2013).

Risk management practices are a process that will assist the construction management to achieve its objectives in a manner consistent with environmental factors, law, public safety and human safety (Edna, 2010). The oil and gas industry all over the world is a high risk industry due to the nature that has a very high risk

factor and has high workplace fatalities and injuries (Mearns and Yule, 2009, and Kane, 2010). Construction industries is subjected to more risks due to the unique features of construction activities, such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures (Smith, 2003). While, the construction industry of oil and gas has a poor reputation of managing risk, with many major projects failing to meet datelines and targets (Schieg, 2006).

In Malaysia, generally the impact of risks in construction industries is several times more severe than in Western construction industries. This is because, in Malaysia, systematic risk management is not well implemented in most existing construction companies (Lee & Azlan, 2012). Roshana and Akintoye (2005) stated that due to insufficient knowledge, the risk management is still rhetorical in Malaysian construction industry and their awareness on benefits and importance of risk management is relatively low. Nevertheless, formal risk management is still be implemented by companies with highly good reputation, stable financial status and involved in massive construction projects.

Currently, the challenging point in the construction of oil and gas platform is to examine whether there is an existence of risk management practices and is it highly practice by its employee in the company. Recent trend in assessing risk management practices indicated that, there is a need to focus on human behaviour or at individual level whether human are capable of being flexible in handling risks. According to Phua (2012), individual-level construct are seldom taken into consideration in construction management related to risk and project performance.

Although the awareness is there, it is the people which are internal and external in that organisation are think, act, behave and apply the risk management in all activities that they do. This awareness does not automatically give result for a safe behaviour. As example, Heinrich (1959), in his study, he relate to the physical

cause of accidents were related to human failure as most of the on-the-job injuries are appeared from the results of unsafe acts by the employee.

Such studies may contribute towards minimizing the risk and improving employee's risk attitude for effective management of risk in construction industry of oil and gas platform. Although, technological and procedures have made the world a better place, researches have noted that some risky interventions still failed to achieve its objectives due the neglect of the people.

In conjunction with successful implementation of risk management practices, the researchers have concluded that it needs to include into the culture of an organisation that the beliefs, practices, and behaviours of employees with regard to risk need to be examined in this construction industry of oil and gas platform. Risk behaviour in risk management culture is relevant because the exchange of information is crucial (Julianne, 2013), and it is important fields for investigation.

However, the extent to which the employee of follow the series of risk management processes conceives from risk management principles is still limited in the literature. Each employee is belongs to different department and different responsibility, this will also have different beliefs and perception in the behaviour with regards to the risk management practices. The concept of behaviour is based on the principle of reciprocity that is employee tend to reciprocate a high quality relationship with supervisor by engaging in behaviours valuable in the organisation (S. Didla et al., 2009). This concept relates to employees at different groups of department such as operation and non-operational team or managerial and non-managerial level may have different behaviours and perceptions towards the risk.

Therefore, in order to understand the behaviour of the employee with regards to the risk management practices in the construction of oil and gas platform, the



study of employees' risk behaviour becomes a central of study in risk management practices.

### **1.2.1 Company background**

The company was established in 1973 is the leasing offshore and marine service provider focussing primarily on the oil and gas sector in Malaysia. It offers a wide spectrum of offshore construction, offshore conversion and marine repair services. With their fabrication yards along the coasts, Company A is capable of undertaking the full range of construction and engineering services from detailed engineering design and procurement to construction, installation, hook-up and commissioning in fabricating the oil and gas platform/topside, jackets and well head. The company is targeted to be High Performing Organisation by 2014, whereby there are many risks that need to be addressed by all parties' involved in order achieving the set targets by 2014.

In handling such mega projects, they have been dealt with many obstacles to achieve until these milestones. Hence, Company A needs to provide essentials services to its customer with commitment to deliver on time, within budget with good quality and in any environment they are ready to place their services. However, in construction site the risk exposure is relatively high, despite that much effort has been put in place by the Company A. With the numbers of the internal and external stakeholders that involved in every project, it is vulnerable for Company A to expose with risks be it positive or negative impact.

Thus, assessment of risk level associated with the behaviour of the employees and the risk management processes for Company is essential to examine which is a process of estimating the magnitude of overall risk management practices. This yield

will be an assessment for Company A to be more competitive and gains its clients' trust in the market.

### **1.3 Problem Statement**

A growing number of companies have recently begun to use risk management in their project management as a key strategy for remaining competitive, increasing the possibility of value creation in their business (Weijermars, 2009; Wagner and Armstrong, 2010). Studies have shown that there is a relatively low implementation of formal risk management practice, and few of them managed to produce quantitative data that could pinpoint the exact spot areas of problems (Lyons and Skitmore, 2004). It is proven by Norazian *et al* (2008) that risk management is implemented by companies in the operation of construction activities, although the number of identifiable and effective risk management framework practitioner in Malaysia is only a small scale. While, Tah and Carr (2001), pointed out that the construction industry consistently suffers from poor performance due to the lack of a formalised risk management procedure.

Postali and Picchetti (2006), emphasize that the irreversibility of exploration and production (E&P) of oil and gas projects as a critical additional element, that is, due to the long life cycle of these projects and the specificity of resources involved may impact future implications of decisions. This statement is relevant because of poor risk management results extra cost generated through project delays, penalties, excess of materials used, labour, resource reallocations and rescheduling.

In general, risks occur in projects and may result either positive or negative outcomes from the project plans. And the negative outcomes generate loss or as a probability of losses in the project or organization (Webb, 1994; Chapman and Ward, 1997; Larson and Kusiak, 1996; Jaafari, 200; Kartam and Kartam, 2001). The application of risk management processes to uncovering the weaknesses in method

use in project management through a structured approach. With the risk management processes the mitigation plans are initiated on time in order to avoid risk, transfer risk, reduce risk likelihood or reduce the risk impact (Ammer et al., 2007).

Risk management processes determines the steps which construction management will follow in order to identify all the issues which can affect their performance and how best to mitigate their impact on project growth and development. Generally, over the years researchers have expanded these series of steps in risk management processes from three to nine series of steps (Bandyopadhyay et al. 1999; Ward and Chapman, 2003; Baloi and Price, 2003). The risk management process as proposed by Malaysia Standard ISO13000:2010 is composed of risk context, risk identifications, risk analysis, risk evaluations, risk treatment, risk communications and consult, and risk monitoring and review. Risk management processes should be practice and asses to ensure they are well organised and handles as an integrated function of project management (Nguyen et al. 2007).

A study by Lee and Azlan (2012), show that the trend of risk management processes that implemented in the construction companies in Malaysia is different between each company. This is due to the different nature and characteristics being set of the project, criteria and objectives itself. The steps of risk management processes are a helpful technique to plan for and cope with the constructions risks and uncertainties (Carbone and Tippett, 2004). Hence, those techniques in the risk management processes should be easily applied, understood and utilised by the project team. Failure to manage these risks will affect the poor project performance as such, early discovery of risk events leading to downstream losses is much more preferable than treating losses when they cannot be prevented (Ayub et. al, 2007, Ahmad et. al, 2007).

Malaysia's government currently is promoting investment from overseas in the oil and gas sector. As an example, Project of Pengerang Integrated Petroleum Complex and marginal field offshore at Peninsular Malaysia for oil and gas construction. This sector has been predicted will be an exciting future for Malaysia's oil and gas industry. Thus, there is limited study to examine the risk management practices in construction of oil and gas platform in Malaysia.

Risk management requires the involvement of stakeholders internally and externally in interactive ways (Kutsch and Hall, 2005; Dey et. al, 2007). To develop a sense of ownership and responsibility for risks and their management, the entire management team must be involved in the risk management process (Project Management Institute, 2008). Subsequent investigation indicated that, a behaviour approach is needed because it is becoming apparent that employee attitude and behaviour govern how they identify the risk at workplace (Specht et. al 2006). In recent years, there has been increasing focus on improving compliance behaviour in terms of following safety rules and regulations (DeJoy et al. 2004). As an example, there are studies investigated with related to the safety shown that human error is leading cause of such accidents. This is also call as people risk. Thus, it is worth to study on how the employees follow the series of step in risk management processes in construction of oil and gas platform industry.

Hardy-Valee (2010), stated that projects often fail because organizations put more emphasis on rational factors of the processes rather than on employees' psychological engagements that is their behaviour and this add enormous cost to the organizations. The needs to determine the effect of risk behaviour by employees on risk management processes is important in order to ensure the overall risk management practices is highly practice in the organization.

The people involved in the project, their behaviour and their perception of risk are key elements with regard to the risk management practices (Kutsch and Hall, 2009; de Bakker et al. 2010). In the context of project management, it indicates that

employees' behaviour towards risk management practices is important as it can enhance the risk management implementation for organisation success. While Hammond, 2002; stated that measuring risk behaviour is important on the risk management practices and explores how they can help organisations to reduce the cost of risk while improving employees' attitude and organisational performance. In addition, in the aspects departmental or managerial level, each person may behave differently base on their roles, definition and understanding of risk management processes. Therefore, it is essential to provide an initial understanding of the behaviour of the employees involve in construction of oil and gas platform, when they follow to the series of risk management processes in their practices.

#### **1.4 Research Questions**

To address the aforementioned problem as discussed in problem statement, the research questions were identified and formulated:

1. Does employee's risk behaviour affect the risk management processes which consist of risk identification, risk analysis, risk evaluation and risk treatment?
2. What is the effect of risk management processes which consist of risk identification, risk analysis, risk evaluation and risk treatment on the overall risk management practices?
3. What is the level of overall risk management practices being implemented in the company?
4. Is there any difference in the overall risk management practices between different groups in the company?

## **1.5 Objectives of the study**

The main objectives of this study are to:

1. To examine the effect of employee's risk behaviour on the risk management processes which consist of risk identification, analysis, evaluation and risk treatment.
2. To examine the effect of risk management processes (risk identification, analysis, evaluation and risk treatment) on the overall risk management practices.
3. To determine the level of practice in overall risk management practices implemented in the company.
4. To examine any significant means of practice in the overall risk management practices between different groups in the company.

## **1.6 Scope of the study**

This study is focussing in the context of study in the risk management practices. A wide assessment being done in order to achieve the objectives of this study as stated above. This study is focussed on risk behaviour and risk management practices in the construction industry of oil and gas platform that is locally located in Malaysia. The employees were taken among the employees Company A, where their nature of business is construction of oil and gas platform and marine repair industry. This study is implements to all employees under OBU (Offshore Business Units) only with no constraints on the size of the organization. OBU Division is the division that handle the construction projects for oil and gas platform in Company A. The reason for use of Company A is that the implementation of the risk management

in this industry is more widespread. This study will not cover other oil and gas constructions in this area and other part of Malaysia.

The data collection gathered from 150 employees from OBU Division and the respondents were the manager, executive, engineer, supervisor and assistance level who directly involved with risk management practices. In addition, this study is discuss risk management at a general level by identify the risk behaviour factors that lead to risk management practices performance. This study to include risk management processes of risk management principles and in some respect, the inclusion of risk management in a particular study may allow to generalize the results from such a study.

### **1.7 Significance of study**

The aim of this study is to make a contribution towards the results of risk behaviour of the employees in construction industry particularly in oil and gas platform in the risk management practices. The awareness has been put in place, but whether the employee is behaving positively or negatively this has not been examined in Company A. This result will be able to show the implementation of risk management practices are being practice by the employees in this construction industry of oil and gas platform. This will provide more evidences from the previous studies as well as to gather more information about the experiences in our local industry, Malaysia.

This study provides empirical evidence on how risk behaviour affects the steps of risk management processes in construction industry of oil and gas platform. It should also provide a basis for future studies for development of effective risk management practices that to integrate risk behaviour into risk management practices in oil and gas construction industry. The significant for this study would contribute a great understanding for Company A and the industry as a whole in order to

understand the risk behaviour of the employees towards risk management practices in the company especially the construction industry as a whole.

While exploring the limitation of the current implementation with regard to related issues, this study aims to evaluate the impact towards the risk management practices. By reviewing literature on the hypothesis, this study insight into the relevant determinants of risk behaviour and identified the theoretical frameworks for better understanding. The study contributes what factors of risk behaviour and risk management practice by identifying what factors to look for when implementing the culture of risk management as well as the challenges that may be occurred. The findings of the study can help to promote the implementation of the risk management practices as risk management practises are still new and the implementation of risk management are still low. As the industry is expanding in Malaysia, we need to be well-positioned in terms of expertise and experience in order to being this endeavour.

## **1.8 Limitation of the Research**

There are two main limitations of the research; both are related to sample selection. The research will be conducted at Company A as a single case study. Therefore, result and finding of the study only reflect on the situation of the selected company and might not present the situation of other oil and gas constructions as a whole. The result generalized from this study to other oil and gas constructions should be cautioned.

This study only examines current risk management practices in Company A. It is not intended to develop best practices in risk management in oil and gas construction project. Therefore, current risk practices may not be concluded as the best risk management practices in managing oil and gas construction project.



## **1.9 Organization of the Research**

This thesis consists of five chapters. Chapter 1 explains the introduction, background of the research, problem statements, research questions and scope of the research. Literature study on the risk behaviour, risk management processes and risk management practices will be carried out and summarized in Chapter 2. Chapter 3 explains the research methodology, sampling plan and instruments apply in the research. Discussion on the research result and finding will be done in Chapter 4, follows by review on the significant of research as well as research conclusion in Chapter 5.

### **1.10 Summary**

This assessment needs to be in place because it provides a reasonable assurance that the project's ability to achieve its strategic objectives will not be hindered by unanticipated events or losses, adequate measures are taken to protect people, the environment and assets from harmful consequences of the activities being undertaken as well as balancing different concerns, in particular health, environment, safety and cost.

In construction industry, although there are lots of awareness being in place still the assessment of the practices of risk management, measures to manage unavoidable risk, are critical to reduce effects of risks that can lead to failure to achieve operational requirements and the required quality, non-completion of the project within stipulated time and estimated cost. Thus, risk management practices in the construction industry must be continuously examined/researched (Lee and Azlan, 2012). Refer to the study by Lee and Azlan, (2012), this research will further examine the overall risk management practice for construction industry in oil and gas platform in Malaysia.

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