



Risk Management Application in an Oil and Gas industry

Done by

Yaser Mohammed Alabbad

Academic number

233000491

Supervised by

Dr Serein Zoureik, Shaban Khalaf , Fayz Jrad , Alfaisal

Abdelhameed , Asma Ababuanzeh , Alaa Ahmed

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Abstract

Oil and gas projects are exposed to significant risks and the reasons can be adoption of complex technology, involvement of different parties, etc. Oil and gas industries are often prone to risks and hazards, but they overcome these problems by following risk management tools and techniques, which leads to the safety of employees and organizations. Based on the facts, our objective in this research report is to assess and identify risk management strategies and procedures and evaluate the efficiency of risk management tools in an oil and gas company in Saudi Arabia. We will conduct the survey between two groups using quantitative and qualitative methods. The number of participants in the survey questionnaire will be one hundred participants from engineers, supervisors, fire and safety officers, human resources managers, and health and safety environment officers. For the semi-structured interview, we will select managers from supply and marine sector, operations specialist, acting health, safety and environment (HSE) manager, and operating station management managers. Then we will analyze the data collected through the survey question using statistical analysis.

Introduction

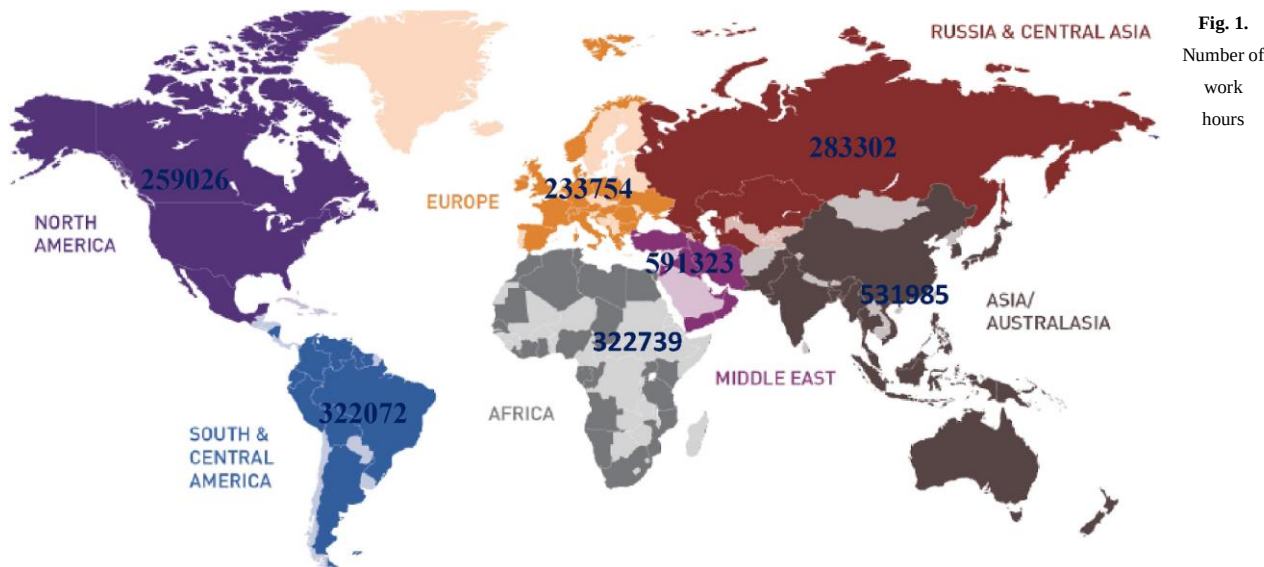
almost all industries contain threat or dangers of their operations, which might also harm people, surroundings or the operations conducted inside the commercial enterprise (Grote, 2012; Abrahamsen et al., 2018). They connect this with the hazard stage of the enterprise. The hazard stage in all industries isn't always the same and the some consist higher degree of risks. The industries with higher dangers are described as the industries whose operations includes a tremendous stage of threat (Fabiano et al., 2017; Abrahamsen et al., 2018) in phrases of main injuries to occur. seeing that dangers purpose the lack of assets, operations sustainability and especially the lives, they need to be taken under manage or controlled effectively to mitigate their effects (Moore, 2013).

Risk management (RM) is performed to decide prospective risks or dangers which could arise in a gadget, and to decide the excellent strategies or plans to mitigate the results or prevalence possibility of these dangers (Baladeh et al., 2019). particularly, this control procedure includes two critical steps, which might be assessment and determination. in the assessment, the risks are evaluated in particular in phrases in their opportunity of occurrence and severity. inside the dedication step, the measures to be taken against the dangers are decided and deliberate in element. Dedication of most efficient measures play a totally important component in applying the risk control sports (Abrahamsen et al., 2018). In detail, first, the risks that may occur and damage the gadget need to be determined with super care and no danger ought to be disregarded. Later, to installation the pleasant approach or plan, the measures want to be determined and assessed.at some point of the assessment, a set of diverse criteria are considered i.e. fee and contribution to the enterprise in terms of measure's impact on the discount of the probability and severity of the risks (Baladeh et al.,2019).

Oil and gas industry can be matter as one of the agencies that involves high level of risks. consequently, such industries ought to decide associated risks in a complete and systematic manner (Moore, 2013). There are three streams, that are up-, mid- and downstream, in oil and gasoline industry. Downstream tactics deal with put up-extraction operations and supply to cease users, while, midstream methods do the preliminary operations, storing and delivery to refining facilities. The upstream procedures covers exploring and generating the crude oil or herbal gas (Khan et al.,

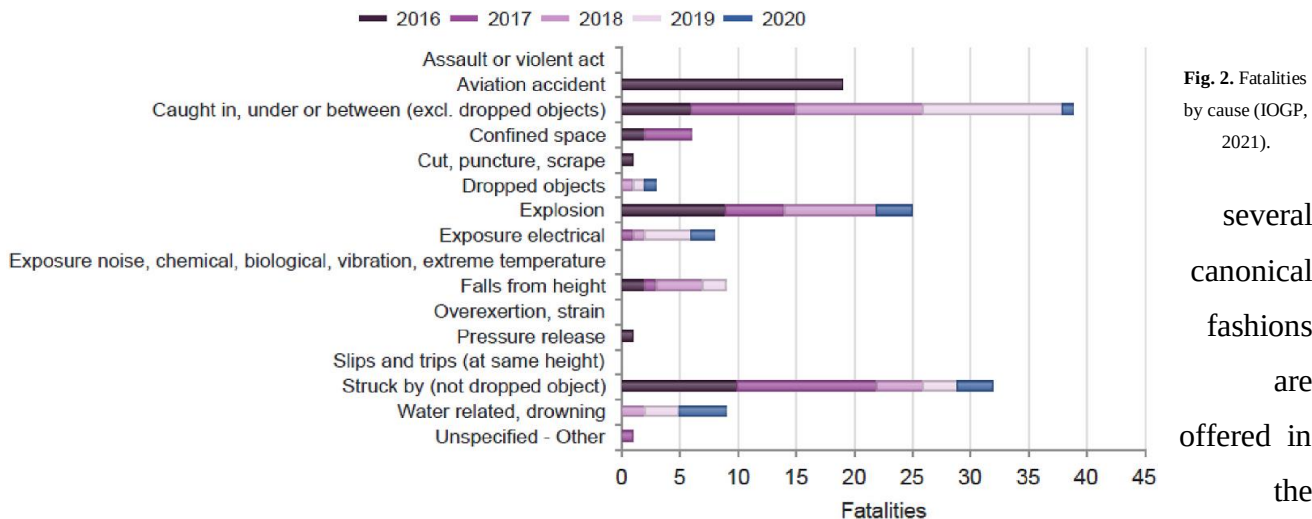
2017).

The global association of Oil and fuel producers reviews every year. The place primarily based mentioned paintings hours (in total 2,544,201 ×a thousand) are proven in Fig. 1 (IOGP, 2021).



(thousands) reported in 2020 (IOGP, 2021).

Lovell (2022) determines the principle motive of injuries as; explosions and fires, slips and falls, struck-through/stuck-in/caught-among injuries, working heavy equipment, transportation injuries, exposure to toxic chemicals, heavy lifting of materials, running in confined spaces, temperature extremes, employee fatigue from long hours, electrocution, lack of planning and prevention. in addition, IOGP (2021) suggested every year-based fatality by using reason as in Fig. 2. As may be absolutely visible from Fig. 2, explosion, which normally is observed by fireplace, is one of the highest reason of fatalities in oil and gas industry.



literature for reading the accidents in distinctive industries. as an example, as traditional strategies; Fault Tree analysis, event Tree evaluation, FMEA, cause-result analysis, Rasmussen's models and so on., and as cutting-edge techniques; Why-because evaluation, gadget chance identification Prevention

and Prediction method, Dynamic chance evaluation method, Cognitive Reliability and errors evaluation technique and so forth. are a number of the fashions offered in the literature (Al-Shanini et al., 2014). Some determine the motive of accidents to arise even as others examine or count on the effect of coincidence if they arrive real. to give example; Attwood et al. (2006) foresee the price of occupational injuries in oil and gas enterprise via reliability concept. Kujath et al. (2010) and Rathnayaka et al. (2011) prioritize measures to prevent accidents. Rathnayaka et al. (2011) forecast injuries via fault timber, event timber and statistics. highly, this observe does not only combines properly recognized strategies to both determine the reasons of accidents and develop techniques to prevent them however additionally gives a brand-new hazard evaluation method, which may be very clean to use and collect outcomes, to be applied to any enterprise. due to the significance of the fire and explosion inside the oil and gasoline industry,

Research Problem

Many agencies with excessive task budget and less monitoring normally suffer economically and should pay the cost of negligence. Agencies need to face loss of fee, and bad impressions because of lacunas like miss communications, loss of governance and lacking facts as stated via Fauver and Naranjo (2010). Oil and gasoline industries often tend to risks and hazards, however they conquer these troubles with the aid of following equipment and techniques of danger control, which effects in employees and protection organizations. All this proof is a result of small negligence and incorrect tracking through management. As a result it is essential to contain numerous precautionary measures and risk management techniques for the oil and gasoline industry.

importance of study

During the control of tasks, dealing with threat is the maximum critical concept because unexpected risks can immediately affect all project members' advantages. This paper might be helpful in figuring out and classifying all the hazard elements based entirely on extraordinary danger assets, in unique intention of this pater is to provide the outline of risks applicable to oil and gasoline corporate initiatives and evaluation of measures and effectiveness of the chance control strategies applied.

This have a look at includes figuring out the practices of handling risk in the oil and gasoline businesses. The principal place of interest of this have a look at is to locate out the primary hazard factors confronted all through initiatives, and special hazard control and tools adopted to control the risks. This takes a look at additionally specializes in the behavioral characteristics of mission managers and employees involved in initiatives in oil and gasoline enterprises

Purpose of study

The intention of this examine is to discover how chance management may be applied in oil and gas corporations. As EY. Suda, Rahman, Rani, & Chen (2014). (2015) noted of their Studies, numerous surveys states that, severa oil and fuel companies are unsuccessful in Accomplishing the goal because of time table, satisfactory and finances in line to this project hazard Control can proved to be an essential to become aware of all dangers that hampers agency overall performance. Project threat management is keen to pick out evaluation, monitoring and controlling unexpected dangers.

Research objectives

- ☐ To identify risk management strategies and their application for projects in an oil and gas company.
- ☐ To identify the procedures of implementation of risk management strategies and to measure the efficiency of risk management tools applied in company.
- ☐ To provide the practical feedback based on the result and findings.

Research questions

What are the major risks and issues that influence the projects in oil and gas industries?

- ☐ What are those standard guidelines and procedures applied during risk management in oil and gas project site?
- ☐ How effective are the current risk management tools and strategies in identifying and managing risks?
- ☐ What is employee's extent of involvement in project risk management strategy?
- ☐ What safety precaution and pre-planning of risk management are applied to ensure human and environment safety?

Literature Review

Introduction

As Herkenhoff (2014) stated in his paper, the oil and gas enterprise significantly. affect All elements of other groups and financial system of all countries. All international locations are suffering from any fluctuation in oil and fuel industry because they're either manufacturer and /or client of oil and fuel or each of the oil and gas industry is strategically most essential to the world economic system. The fact is every USA's economy is actively tormented by the oil and fuel industry, in one way or another as mentioned by way of Schwab (2016).

Many researchers stated that although a various alternative come to be energy supply but still Oil and gasoline will continue to be most critical sources of electricity for upcoming decades as per the File by BP & England, (2016). For sources and task implementation their oil and gasoline companies rely on a range of specialized experts in applicable fields. Kingdom Organizations in the Middle East are in control of the fundamental part of the entire worldwide oil reserves as in step with record with the aid of the Petroleum.co.uk, (2015).

Risk

N. Thuyet and S. Ogunlana (2007) stated in his paper that risk factor in procedure of Development commonly triggered time and value complexities. Many responsibilities in assignment have been exceeding the spending restriction; These problems are extra commonplace now days.

Threat can be characterized as a hassle which could reason terrible good fortune in success of fulfillment. Hazard control can be said as key business manner, where by managerial crew needs to assess the reliability of dreams and hazard management strategies on the subject of improvement and achievement of organization as according to J.C. Clarke, and S. Varma (1999).

Potential Risks in Oil and Gas industry

Following are the imperative dangers for functioning of oil and fuel agencies: -

1. In every task there are a few inner dangers consisting of financial, funding, assets, human resources, control, innovations, records, manufacturing operational, technical, technological, liquidity etc. funding danger can be bobbing up because of low criminal of enchantment of investment tasks. belongings risks are contemplated via low stage of liquidity, solvency and commercial enterprise sports etc...
2. intense hazard lime political strain, criminal problems, socio-demographic, ecological, market troubles, exchange, repayment, geological, climate, globalization are also recognized in step with Khvostina et.al, (2019).
3. The records danger may also rise up because of gap in statistics device amongst business enterprise.
4. Geological risks can be observed to have an effect on oil and gasoline extraction method and may be bring about lack of confidence approximately the productiveness of deposits.
5. Globalization dangers can reason the give up of not best specific organizations but also the entire industry or any other organization. If oil and gasoline sports are not controlled and regulated well, it could motive a giant lack of surroundings, grow to be risky to lifestyles and assets as stated by using Achaw, Osei-Wusu, and Boateng. (2012).

further to those issues oil and fuel enterprise regularly faces the danger of gasoline leakage and regularly brings out the social conflicts and casualties as Ambarsari, DC et al. (2009) noted in his

paper. those failures are not viable to avoid but they are able to arise at any time, through thinking about the capacity risks the control measures can be implemented in step with Voogd Henk. (2004.)

those risks may be categorized in three principal classes:

1. natural dangers: those forms of risks rise up due to trade in climatic and geographical aspects.
2. The technological dangers can motive loss of life, assets harm, socio-economic disturbance, and environmental degradation.
3. Environmental degradation may be deteriorating critical herbal resources, or poor alteration in ecosystems. The environmental deterioration can purpose through influential sports of human, every so often combined with herbal failures.

Risk emergent properties at oil and gas industry

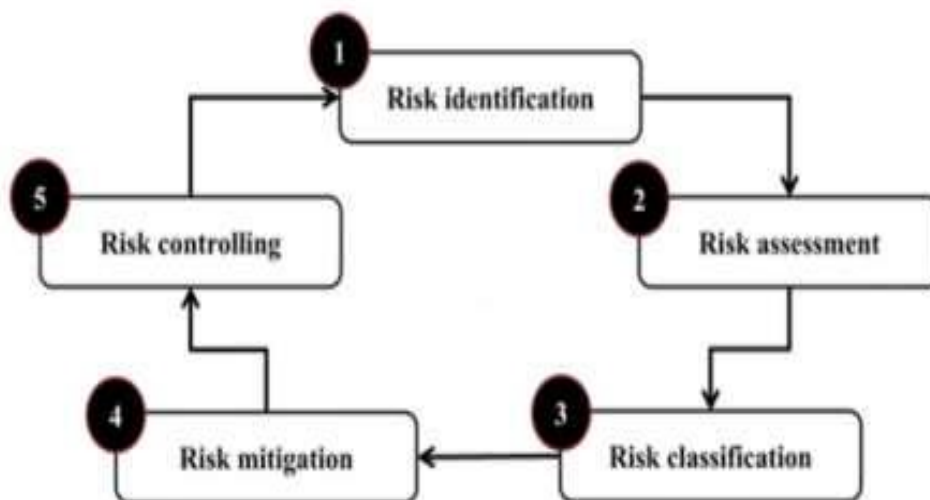
in keeping with the authors Babenko.V.et.al. (2018) and Ivashuk. yu. P. (2016), concept of emergence is a end result of reflection of a situation when strategic interaction of an man or woman gives standard tremendous effect. Oil and fuel agencies ought to face loss or disaster for enterprise entities, because of any unmarried recognized risk. tracking of terrible events have to expect the dangers because of the emergent residences of chance. If threat emergent properties are involved throughout danger analysis, it enables to become aware of both destiny hazards and upcoming new opportunities inside the organization development. for example, to reduce the threat of environmental pollution and degradation, it's miles important to undertake global environmental satisfactory requirements. this will control felony and environmental risks as stated by way of Khvostina Inesa et.al (2019).

Management of Projects in oil and Gas Industry

The Panel BS6079 11996 because the education, observation and control of all elements of a undertaking as well as the incentive of all of those connected with it, in keeping with the British standard for project, to achieve the undertaking desires in a well timed way at described price, performance and execution. control has to manipulate both expectancies as properly as reviews in the barriers and talents of its companions. Managerial accomplishment is an uncertain, distinctive and diverse subject and its showing is estimated.

Risk Management Concept

Many businesses identified the perception in addition to the significance of chance management in initiatives as stated by using Cooper et al., (2005). This method cannot be separated from guy duties and functions in challenge control, but it's far fundamental towards the larger undertaking dealing with process as stated by way of Cooper et al., (2005) and PMI, (2013). mission chance control has a sturdy basis in development of software evaluation and evaluate strategies (PERT) during the 1950s' with awareness on coping with ambiguity inside the period of the undertaking in keeping with Taroun, (2014). distinct disciplines like economy, management strategic management, and venture management observe the idea of threat and threat control however all disciplines view the idea in another way. Reviewed literature by Ehsan (2013) also states that, there's no best and standardized definition of those phrases available. Besner and Hobbs (2012), described challenge danger management is an organized practice to successfully manipulate venture risks. in addition to this pupils and expert bodies define the concept with moderate differences within the stage of information, as, risk management technique is a five-step process: threat identification, risk assessment, danger category, chance mitigation and risk controlling;



Benefits of project risk management in oil and Gas Industry

The Oil and gas enterprise tactics are oriented as consistent with the demand of global strength as properly as specific tasks undertaken are the spine of those companies. consequently, the key aim of danger control practices is shortening the time required for chance identity, assignment clean threat assessment system, strategizing movements and in the end presenting file at the identified chance. in addition, PMI (2004) said that, danger management practices no longer most effective perceive and reduce product's danger tiers but also consist of making plans of risk management it's tracking and manipulate technique.

Risk Management Process

Risk Identification Project

The risk identity project is number one exercise of hazard control. at some point of the early segment of undertaking, this level performs an important role of identification, classification and assessment of importance of mission dangers as noted within the paper via Aven et al., (2007).

After right documentation, category the danger is diagnosed in the statistics. The control must speak to all of the team participants and ought to provide an explanation for the potential effects of threat as mentioned with the aid of PMI (2013).

Risk assessment

Study and observation of sequence of events taking place around the 'risk' is important for establishment of risk assessment. This sequence of events can be the cause of risk occurrence and consequences. According to Cagliano et al., (2015) these three events can be converted into phases of risk management process, involving planning, identification, analysis, monitoring, response and control of the risk. Zwikaël & Ahn, (2011) stated in their paper that many projects have to face failures because their risk assessment team unable to understand and identify possible sources of project risk, especially in Middle East and North Africa (MENA) region assessment teams inability to accurately score the risk for various projects is observed as mentioned by Srivastava & Gupta, (2010).

Project Risk Response

In this process, creating a risk response plan is also necessary task. Developing a risk response plan can include defining thresholds and activates, emergency strategies and justification schemes etc. Risk response matrix can also be applied to determine the risk response plans and actions. The mutual risk response policies recognized are: avoid, transfer, reduce and accept.

Risk Control

Controlling risk factors is another important part of the project risk management practice. This activity is done continuously over the project life cycle. Project risk control involves the reassessment of all possible project risks and finding more effective risk management plan of risk response action as mentioned by Benta et al., (2011).

Selecting an effective project risk management tool or technique

Selection of perfect risk management tools and techniques is an important task in ensuring the success of project. Selection of risk management tools and techniques can be varying according to project, because specific projects can differ in their nature, location, size and complexity as per Cagliano et al., (2015), to ensure the performance of different kind of projects in different working environments tools and techniques can be selected as per Liu, Meng, & Fellows, (2015).

Phase of the risk management process

Hillson & MurrayWebster, (2007) in their paper stated that risk management process is practically based on the sequence of events; those are responsible for risk emergence these events can be a cause of risk, occurrence of risk and consequences responsible for risk . Risk management involves identification, planning, analysis, monitoring, responses, and control of risk as mentioned by Cagliano et al., (2015).

Challenges in developing effective project risk management practices

As Nocco & Stulz, (2006) said in their paper that although, task threat control practices might also appearance easy and impressive I principle, almost difficult for implementation. One greater difficulty in Implementation of task hazard management method is, business enterprise can't put all duties on an employee at unique ranges of organization. Goh and Abdul-Rahman (2013) located that lack of knowledge in personnel or among different events about the overall blessings of project risk control can lead to failure in reaching organization goals. Dandage et al. (2017) conducted a detailed literature overview and identified 10 important challenges and barriers that can be proved a proscripting factor in development and alertness of a hit assignment management, including:

1. Resistance to change: this is most common barrier for implementation of effective= project risk management because usually employees are resistant for new concept.

2. Lack of clear risk definition: as discussed previously, there is no clear definition of term 'risk', because of these employees remain unclear about the implementation of concept;
3. Limited top management support: many studies believe that without support of top management or without proper leadership, organization unable to get goal-oriented direction and strategic vision.
4. Limited availability of resources: According to Hwang, Zhao, and Toh (2014) like funds, technologies and work force are some of the important resources that can contribute to the success of implementation of project risk management strategy.
5. Lack of cooperation between top management and employees: this is an important criterion to bring the positive change, because proper relationships in top management and employees can create a favorable environment for developing effective project risk management.
6. Lack of formal training: For effective project risk management practices training are important determinant as per Papadaki et al., (2014), because untrained people can become a limiting factor in implementation and effective use of risk management practices as mentioned by Dandage et al., (2017).
7. Increased cost risk management: risk management strategies if not implemented successfully it can disturb the economic budget of project and drive cash flow to negative balance.
8. Avoidance of talking about risk: As per Bhoola et al., (2014) avoidance of talking about risk within an organization usually positive things are discussed among tea, but they often avoid talking about shortcomings and draw backs. This can create miscommunication between employees and top management.
9. Cross-functional conflicts: team members of a project usually belong to different functional departments within a company, this situation can create functional conflicts among team members.
10. Cultural differences: Harner (2010) clearly highlighted the importance of solid relationship between management practices and corporate culture.

Performance of Projects in Oil and Gas Industries

There is a complexity and difficulty in both technology and management of oil and gas industries, due to this oil and gas projects are considered to be the most challenging of all industries as per Akinremi et al., (2015). However, Briel et al. (2013) proposed that in addition to experience, project managers should follow coherent reference framework and that should be based on constant monitoring and reviewing of all official project stages from starting to finish the project. Finally, it can be stated that developing management strategies in relation to time, cost and quality is all that necessary for an efficient management in all oil and gas sector, this will ultimately enforce the

requirement of knowledge to reduce upcoming possible project failure events. Project failure can be minimized by careful assessment of risk factors and this is one of highly effective project risk management strategy as mentioned by Al Subaih, (2015). However, importance of risk management is all known but still some oil and gas industry projects are facing failure due to lack of proper implementation of risk management strategies.

Summary

cause of the look at turned into to conduct a comprehensive evaluation on importance and powerful practices of hazard control in the oil and gas industry. This assessment offers the obstacles to the effectiveness of such practices to enhance challenge performance. eventually, the researchers provide an real photo of oil and fuel enterprise with the data like negative performance, over budgeting, delaying, loss of right tools and skilled work pressure and these all barriers having their roots in loss of implementation of mission chance control practices. several researches and theories are to be had on chance control as mentioned above which suggests nice relation between hazard control procedure and Oil and gasoline industries. threat management method has been widely implemented by means of several oil and fuel industries around the world and also in kingdom of Saudi Arabia. Threat control and mitigation are tough problems which wishes proper planning and software to manipulate chance and chance factors in an organization. moreover, there are several techniques carried out to control and manipulate risk through the utility of particular gear and measures as stated in danger control tools and strategies .For this have a look at the cited tools and techniques will be applied as part of the findings to determine whether or not the management in the company are privy to the equipment and strategies, and which many of the cited are implemented to govern and control danger.

Research Methodology

For this study we have we will used two different research approaches. One being the qualitative method through which semi- structured interviews will be conducted with management of different departments whereas the other method is the Quantitative method, where the employees will be included in a survey

Research Sampling

Two groups we will targeted from an oil and gas company in the Kingdom of Saudia Arabia. The first group for the Quantitative method comprises of managers whereas the second group the participants of the survey, questionnaire we will distribute among all the employees in the department through survey links. Both groups we will be assessed using qualitative as well as quantitative method respectively to analyses their knowledge, perspective, and skills involved in Risk management.

The Survey questionnaire we will design using 20 questions (Appendix 2). The questionnaire we will be structured based on Likert's 5-point scale which ranged from the scale of 1 – 5, with 1 = strongly disagree, 2= disagree, 3= Neutral, 4 = agree and 5 = strongly agree. The questions we will design to evaluate the understanding and knowledge of the employees such as engineers, specialists, officers, etc. based on the risk management strategies applied in the company. The questionnaire comprises of tools which analyses the awareness, and readiness of risk management in the work environment.

Sample size

The study that we will conduct to reach the project goal. Sample from the population participating in this study will be selected on the basis of non-probability sampling road. The population concerned will consist of 4 sections which included departments such as As well as staff for scanning. For the semi-structured interview, we will select 10 managers almost. Interview questions we will organize based on the research question and

The aim of the study is to serve the purpose of analyzing risk management practices in Oil and Gas Company and the various risk management tools applied by the company To monitor and control risks.

The survey questionnaire that we will distribute to employees through the survey link to 100 employees, and then we will calculate the response rate. There may be several factors associated

with low response from employees, one of which is Vacations, in addition to the unwillingness of some to participate voluntarily.

Questionnaire

1-Objective Setting

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Q1.The Project management have a strategic plan for risk management					
Q2.The Project management team follow a policy set out for management of risk in project					
Q3.The department has a clear objective and approach towards the risk levels					

2-INTERNAL FACTORS

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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Q1. The management use specific risk management tools to control and manage risk					
Q2. Management consider and calculate risk management during the initial project planning and is part of the oversight agenda					
Q3. The management use specific risk management tools to control and manage risk					

3-Information Communication

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Q1. Employees are aware of the risk management policy					

Q2. Employees have access to all the rules and regulations dealing with risk management					
Q3. Employees are Informed about the strategies to control and manage risk					
Q4. Employees are trained regularly to manage, control and report risk					
Q5. The management clearly state The responsibilities and accountability for identification of risk					
Q6. Management and representative es at all stages perform self – assessment of their performance					

4-Monitoring

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Q1. Employees are trained to overview the potential risks and how to spot them,					

procedures for reporting potential problems					
Q2. Management and representative monitor the project for risk daily.					
Q3. Performance measure are used in monitoring results of risk management					
Q4. A set of events (internal & external) which could impact the achievement of the objectives is available with clear guidelines					

Reference

- Aven, T., Vinnem, J. E., & Wiencke, H. S. (2007). A decision framework for risk management, with application to the offshore oil and gas industry. *Reliability Engineering & System Safety*, 92(4), 433-448. <https://doi.org/10.1016/j.ress.2005.12.009>
- Abrahamsen, E.B., Moharamzadeh, A., Abrahamsen, H.B., Asche, F., Heide, B., Milazzo, M.F., 2018. Are too many safety measures crowding each other out? *Reliab. Eng. Syst. Saf.* 174, 108–113.
- Al-Shanini, A., Ahmad, A., Khan, F., 2014. Accident modelling and analysis in process industries. *J. Loss Prev. Process. Ind.* 32, 319–334.
- Al-Shehri, D.A., 2019. Oil and gas wells: enhanced wellbore casing integrity management through corrosion rate prediction using an augmented intelligent approach. *Sustainability* 11 (3), 818.
- Attwood, D., Khan, F., Veitch, B., 2006. Occupational accident models—where have we been and where are we going? *J. Loss Prev. Process. Ind.* 19 (6), 664–682.
- Baladeh, A.E., Cheraghi, M., Khakzad, N., 2019. A multi-objective model to optimal selection of safety measures in oil and gas facilities. *Process Saf. Environ. Protect.* 125, 71–82.
- Bhoola, V. H. S. & M. D. (2014). An Assessment of risk response strategies practiced in software projects. *Australasian Journal of Information Systems*, p. 18(3). <https://doi.org/10.3127/ajis.v18i3.923>
- Cagliano, A. C. G. S. & R. C., (2015). Choosing project risk management techniques. A theoretical framework. *Journal of Risk Research*, pp. 18(2), 232-248. <https://doi.org/10.1080/13669877.2014.896398>

Dandage, R. V. M. S. S. R. S. B. & B. V. (2017). Analysis of interactions among barriers in project risk management. *Journal of Industrial Engineering International*, pp. 1- 17.
<https://doi.org/10.1007/s40092-017-0215-9>

Fabiano, B., Vianello, C., Reverberi, A.P., Lunghi, E., Maschio, G., 2017. A perspective on Seveso accident based on cause-consequences analysis by three different methods. *J. Loss Prev. Process. Ind.* 49, 18–35.

Hillson, D. & M.-W. R. (2007). *Understanding and managing risk attitude..* Aldershot: Gower Publishing, Ltd.

Harner, M. M. (2010). Barriers to effective risk management. *Seton Hall Law Review.*, pp. 40(4), 1323-1365.

Grote, G., 2012. Safety management in different high-risk domains—all the same? *Saf. Sci.* 50 (10), 1983–1992.

IOGP, 2021. IOGP Safety Performance Indicators-2020 Data. May 2021. <https://www.iogp.org/>.
February 4, 2022.

Khan, W.Z., Aalsalem, M.Y., Khan, M.K., Hossain, M.S., Atiquzzaman, M., 2017, February. A reliable Internet of Things based architecture for oil and gas industry. In: 2017 19th International Conference on Advanced Communication Technology (ICACT). IEEE, pp. 705–710.

Kujath, M.F., Amyotte, P.R., Khan, F.I., 2010. A conceptual offshore oil and gas process accident model. *J. Loss Prev. Process. Ind.* 23 (2), 323–330.

Lovell, 2022. <https://www.lovell-law.net/blog/personal-injury/oil-and-gas-accident-statistics/>.
Last accessed: February 4, 2022.

Moore, D.A., 2013. Security risk assessment methodology for the petroleum and petrochemical industries. *J. Loss Prev. Process. Ind.* 26 (6), 1685–1689.

Nocco, B. W. & S. R. M. (2006). Enterprise risk management: Theory and practice. *Journal of Applied Corporate Finance*, pp. 18(4), 8-20. <https://doi.org/10.1111/j.1745-6622.2006.00106.x>

Rathnayaka, S., Khan, F., Amyotte, P., 2011. SHIPP methodology: predictive accident modeling approach. Part I: methodology and model description. *Process Saf. Environ. Protect.* 89 (3), 151–164.

Fauver, L. a. N. A. (2012). Derivative usage and firm value: the influence of agency costs and monitoring problems. *Journal of Corporate Finance*, pp. 719-735. <https://doi.org/10.1016/j.jcorpfin.2010.09.001>

Suda, K. A., Rani, N. S. A., Rahman, H. A., & Chen, W. (2015). A review on risks and project risks management: oil and gas industry. *International Journal of Scientific Engineering*, 6(8), 938-943.

Herkenhoff, L. (2014). A Profile of the Oil and Gas Industry: Resources, Market Forces, Geopolitics, and Technology. Expert Press Industry Profiles Collection.

Schwab, K. (2016). Available at: http://www3.weforum.org/docs/GCR20162017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf

Thuyet, N. V. e. a. (2007). Risk management in oil and gas construction projects in Vietnam. *International Journal of Energy Sector Management*. pp. 1(2):175-194. <https://doi.org/10.1108/17506220710761582>

Khvostina, I. e. (2017). Manifestation of emergent properties in risk assessment of oil and gas companies. s.l., s.n.

PMI. (2013). A Guide to the Project Management Body of Knowledge (PMBOK Guide).

Newtown Square, Pennsylvania: Project Management Institute.

Papadaki, M. G. A. R. J. K. R. T. A. & B. M. (2014). Essential factors that increase the effectiveness of project/programme risk management. *Procedia-Social and Behavioral Sciences*, pp. 119, 921-930. <https://doi.org/10.1016/j.sbspro.2014.03.103>

Zwikael, & A. M. (2011). The effectiveness of risk management: an analysis of project risk planning across industries and countries. *Risk analysis*, pp. 31(1), 25–37. <https://doi.org/10.1111/j.1539-6924.2010.01470.x>