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RESEARCH ARTICLE

RISK MANAGEMENT APPLICATION IN OIL FIELD EPCC CONSTRUCTION PROJECTS IN SUDAN

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ABSTRACT

Background: This paper, discuss the application of risk management on EPCC construction projects executed in Sudanese oil field and its effect on the projects objectives. **Methodology:** Descriptive study design based on 18 individual interviews face to face covered the study population, the interviews conducted on January, 2018. **Results:** The contractors practice of projects management in general depends on their organization process assess and the organization culture, for the risk management the researcher finds that none of the contractors follows a risk management stander practice, the OEPA and the operators are not satisfied from the contractors process in terms of risk management practice but they didn't force any regulation to guide the contractor or training programs in risk management, as much as the PMC team is well trained and professionals but the projects managers in the fields need intensive training in risk management and need to adopt a risk management culture for this projects to be more beneficial for the contractors organizations first, the operators and the OEPA.

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INTRODUCTION

There are many studies undertaken in risk management emphasize the important of applying risk management process to projects and the value of a proactive formal structured approach to managing uncertainty has been widely recognized and many organizations are seeking to introduce risk processes in order of gaining promised benefits. According to the Project Management Institute (PMI, 2008) which is the largest professional organization dedicated to the project management field, Project Risk Management (PRM) is one of the nine most critical parts areas of the Project Management Body of Knowledge (PMBOK) of project commissioning, (Dziadosz & Rejment, 2015). This indicates a strong relationship between managing risks and a project success. While RM is described as the most difficult area within construction management, Risk management has become an essential requirement for construction projects (Abd El-Karim, Mosa El Nawawy, & Abdel-Alim, 2015, p203), its application is promoted in all projects in order to avoid negative consequences (Potts, 2008). Construction projects risk management continues to be a major feature of the project management in an attempt to deal effectively with uncertainty and unexpected events and to achieve project success. Cost saving and time performances are usually essential to all parties who are involved in a construction project, that is owner, contractor, and

subcontractor (Abd El-Karim *et al.*, 2015). The construction project owner's satisfaction is the main indicator of project success, which can be achieved by delivering a project in a timely manner, within budget, and according to the quality requirements.(Bu-Qammaz, 2015). The researcher proposes that in the large scale construction project such as oil field construction and the success of these projects preformed in such risky environment has a strong correlation with the methodology of risk management used as part of project management if risk wasn't planned, identified, analyzed, responses was planned and monitored this risk will directly affect the project constrain and the project objectives in terms of completing the scope, maintaining the project schedule, cost and quality as they will directly impacted by the process of risk management used during the project life time. Risk in terms of opportunity or threads must be identified analyzed and assessed in order to be dealt with.

MATERIALS AND METHODS

This is a descriptive study design based on individual interviews face to face covered the study population, there search aims to study the application of risk management on EPCC projects performed by construction organizations in oil field projects in Sudan and its effect on the projects outcome. The study interviews conducted in January 2018. All of the study population mainly located in Khartoum state (the capital of Sudan).

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Population under the Study: At the time this study was conducted there were only 9 EPCC approved contractor's construction organizations working in oil fields all of their central offices are in the city of Khartoum all of them were interviewed and their feedback included in the study. Oil operator in Sudanese oil field at the time of this study was 8 central offices are in the city of Khartoum and the 8 of them were interviewed and their feedback included in the study, and the Oil Exploration & Production Authority OEPA which is the Sudanese government body which managing the policies and approvals.

Ethical Consideration: Project managers in the construction organization, managers of the facilities departments in the oil operators, have been clearly informed about the academic purpose of the study. And assured that, the data provided will not be used in any way to support a decision; or harm against them.

RESULTS

OEPA: The researcher conducted an interview with the Ministry of Petroleum & Gas represented by the Oil Exploration & Production Facility Authority (OEPA) unit; the interview main purpose was to understand the overlap between the OEPA and the operators in the parts of monitoring & controlling the projects and the levels of authority both represents and apply over the projects running by the contractors, and that to better classify and understand the project stakeholders and their impact in risk management.

As per of the agreements signed by the government and the oil & gas operators, the government of Sudan is the ultimate owner for all the facilities in the Sudanese oil fields and then as per of the Ministry of Petroleum & Gas the oil & gas concern the operation companies are contractors for operation and the construction organizations are subcontractors. The OEPA main role is to optimize the usage of the facilities & the materials in order to minimize & optimize the usage of the investment expenditure and utilize the materials and facility usage between the different operators.

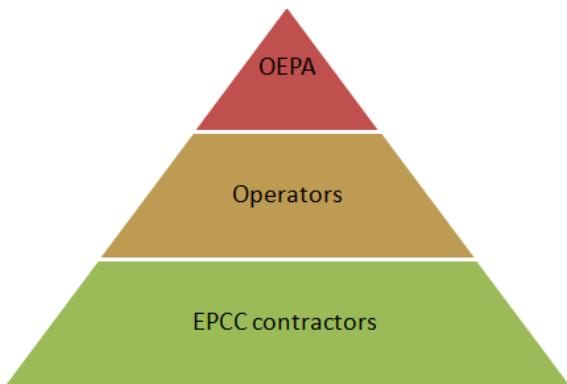


Figure 1. Levels of Authorities

From the OEPA respondent point of view in terms of risk management the contractors for construction working in Sudan oil fields don't have a clear risk management process in general most of the contractors depends on the project manager experience in the project type and the location. The OEPA teams are never invited to risk management meeting by the contractor or even the operator for any EPCC project and the contractors definitely are not following the standard process

for risk management. The OEPA in general don't interfere in the contractor's process but they do approve the bidder list, for the operators, the ministry job is to supervise the operators and then the operators manage their contractors, normally the ministry only interferes in cases on complains or to witness the kick off meetings of the project and the design review and the HZOB and commissioning meeting. Generally, the ministry has a team assigned to each operating company and this team represent the OEPA. Based on experience, and achievement some contractors have a string in terms of experience and personal the ministry support, but if the national contractor meets the requirement gets a recommendation and support by the OEPA and sometimes the OEPA directs the operators to give the project single source to certain national contractors for their good records. The bad record achieved by the contractors in terms of time delay or cost overruns or bad quality in some cases the contractors listed in the black list and never worked for the ministry again.

Operator: The operators highlighted that the main issue in the work undertaken by the contractors is the lack of project management process and the lack of time management. As well as the OEPA none of the operators was invited to any risk management meeting, but risk was discussed internally for the facility department of the operators during the project management meetings. And their feedback gets recorded and sent only as suggestions to consider by the contractors. The operator uses the project outcomes (cost, time & quality) to define the project constraints and to evaluate it. The operators found that the main problem in the process managed by the contractors to be unorganized, lack of project management process and the lack of time management. For the operators it's the contractor's responsibility to maintain a good project management practice and a risk management practice as well.

The operators agreed with the OEPA in that the degree of how risk management affects project success depends on the following factors:

- Depends on the project size,
- The project is new or repeated
- The experience of the contractor project manager and the team performing the projects activates.

The operators found that proper training can fix the problem in lack of risk management process and knowledge.

Contractor's: Only two contractors out of nine have a clear risk management process, one of the contractors there is a risk identified on the level of section head departments (SH) and management, but that is not well communicated to project managers and the project managers still depend on their experience in past projects only to manage projects risks. Other contractors don't have an official practice to risk management it depends mainly on the project manager experience.

Studying the practice of risk management used in the EPCC contractors in oil field the researcher found the following;

Risk management plan: the majority of the contractors perceive risk management planning as part of the health safety environment (HSE) plan, two contractors develop a risk management plan as a part of the project execution plan but that's during tendering only to submit the planning package with the technical proposal tender document and they never actually

work accordingly to during the project phases. One contractor develops a risk management plan as a part of the project controls

Risk Identification: The majority of the contractors doesn't do any risk identification and only depends on experience to handle risk when they became issues. One of the contractors has a list of the previous identified risk from lesson learned as part of the quality standers, but this list is not communicated with the projects managers!

Risk Analysis: The majority of the contractors doesn't do any qualitative analysis for risk, the only type of risk management is job safety hazard Analysis (table format) as part of the HSE protocol and there are no quantitative risk analysis techniques of any kind.

Risk Response: All of the contractors used to add a reserve to the project cost and schedule. Only one contractor out of the nine which has expert consultant projects manager as a projects Section head uses a wider range of response techniques like insurance, risk transfer, backups in materials. The Chinese contractor which has a higher capacity in manpower they usually add labor to the projects as a risk response in case of time delay,

The majority of the contractors accepted all of the risk for the last project and used the reserve in time & cost to cover, in many cases the miss calculated reserved didn't cover the risk and the project out comes get affected.

Risk monitor & control: The majority of contractors depends on projects manager experience in handling projects risk, and with the absent of the risk management plan the monitoring of project risk depends on project manager monitoring the schedule & the budget deviations.

The effect of the risk management practice on the projects outcome:

The majority of the contractor's projects managers believe that the process they used is effective but need some changes. contractors believe that risk management process used by them and other contractors it's not effective, and they always acquire cost overrun and time overrun.

Scope: The operators always strict when it comes to project scope and no changes are accepted in the project scope and according to that the majority of the contractors meets the project scope as per of the plan, in some cases the lack of communication or project managers/project team involvement in the planning and proposing phase which leads to gaps between the operator expectation and the delivered scope .

Time: Most of the projects performed by the contractors had schedule delay the contractors argued that there are many reasons of delay and mostly for ether external risk that like financial and security hazard or internal like organization and leadership failure. The main issue is that if the contractor was not able to clarify the delay a LD will be applied and the project cost will be affected.

Cost: All contractors had cost impact caused by the schedule delay and the attempt to fast track the project, tough tender

competition forces the contractors to under price the commercial proposal.

Quality: The majority of contractors believed that they have met the quality requirement for the project. The majority of the project managers classify the projects by size and level of complication and repetition. But all of them gave correlation between the usage of risk management tools & techniques and project successes/ failure 6-7 out of 10 degree. For not using the stander practice of risk management by project manager risk the contractors argued that risk is exaggerated to a certain extend depends on the project size and using the practice stander add more paper work to the project!

DISCUSSION

All of the above show a high level of control by the OEPAs over the contractor's performance and as well the OEPAs team is aware about the lack of risk management and the contractors performance in the matter of risk management but still no proactive matures were taken to improve the attitude towered risk and its management by the OEPAs as on the top of the authority hierarchy. The operators stated that during the tendering process, the technical parts includes evaluation for the contractors capabilities in terms of experience the operator evaluate the team of the contractors, which shows that the operators will mostly be aware of the experience of the project manager and the team performing the project in advance to the project kick-off and will be able to identify any knowledge gape if available yet the main issue faced by all of the operators is the lack of project management and risk management process! the question to ask is why the operator doesn't have a strategy to improve the contractors process or to prevent the issues related to risk management practice from threaten the project outcomes in terms of cost time and quality. The contractors practice of projects management in general depends on their organization process assess and the organization culture, for the risk management the researcher founds that none of the contractors follows a risk management stander practice, the OEPAs and the operators are not satisfied from the contractors process in terms of risk management practice but they didn't force any regulation to guide the contractor or training programs in risk management, as much as the PMC team is well trained and professionals but the projects managers in the fields need intensive training in risk management and need to adopt a risk management culture for this projects to be more beneficial for the contractors organizations first, the operators and the OEPAs.

There is a correlation between risk management & project successes but the degree depends on the following:

- Depends on the project size
- The complication level including how many contractors and subcontractors involved
- The project is new or repeated
- The experience of the contractor project manager and the team performing the projects activates.

A research with mathematical approach must be undertaken to study this correlation and its extend

Here are the suggestions of the contractor's project managers to improve the process of risk management ;

- Training is the most effective method to improve the practice, starting from management to enforce the culture of risk management its self and to add awareness about the risk management. Proper training on project management or cost management most of the contractors have a good experience and knowledge but they are not trained in project management and they don't follow the process of the owner. Adds extra human resource training on teamwork and sense of responsibility of the project team.
- Risk management must not focus only on HSE and to do proper risk management. And to list all lessons that they learned and to share it with the team within the project rather than afterward.
- Changes in the internal procedure for approvals to minimize the internal risk of time lost(move or toward matrix/projectize organization rather than functional)
- Simple risk management process stating by risk management plan and must have a list of risk registered and qualitative & quantitative in one process & response, the problem will be in monitor & control the risk due to the load for the project manager a risk watcher/owner must be assigned

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