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Management of Risk Factors in Oil and Gas EPC Projects: Global Approaches with Special Reference to India

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Abstract

Management of risk factors is a critical approach in the oil and gas projects related to Engineering, Procurement, and Construction (EPC). The objectives of the study are to understand the risk factors and risk management strategies in oil and gas EPC projects globally and in India. This is a narrative review based study and the sources of data are secondary. The conceptual frameworks of various research studies have been carefully analyzed. The study reflected the complexities of the risk factors such as unskilled human resource, lack of coordination among the stakeholders and non-technical risks. Risk-based engineering management execution in oil and gas EPC projects needs a systematic and integrated approach, leveraging advanced tools and techniques to ensure successful project outcomes.

Keywords: Project Management, risk factors, engineering, procurement, construction, oil & gas project

1. Introduction

Management of risk factors is a critical approach in the oil and gas projects related to Engineering, Procurement, and Construction (EPC). Oil and gas production is the keystone of the economy of the world (Torres et al. 2012). According to Mubin and Mannan (2013), "EPC is an advanced contracting method in which a single party is responsible to complete all the components of the project and further commission it and handover to the client within a predefined cost and agreed timeline." There are various risk factors involved while implementing the EPC projects. The success of such a project depends on how effectively the risk factors are handled and managed. However, failure to meet the terms of project requirements would be the monetary liabilities of the contractor (Damian M., 2011). Hence, in such projects, contractor mainly shoulders the engineering and construction risks. EPC based contracts are also known as "turnkey contracts." EPC projects are popular methods of project implementation by contractors. In international mega projects, operation of Project Risk Management methodologies is advantageous on all the aspects of project development. It can also be implemented as the source for bidding, tendering and execution (including cost, time, resource and quality management) (Mohebbi and Bislimi, 2012).

Globally, EPC is considered as a form of contract by the construction industry and the contractors involved in EPC have implemented a modern variant of engineering, procurement and construction management (EPCM) (Shyamal and Sabikhi, 2013). The roles of EPC contractors have been enlarged adopting the roles of project consultants and involving in managing the project from design to execution.



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This has limited the role of engineering consultants and large EPC companies have transformed into solution providers (Shyamal and Sabikhi, 2013).

This EPC or Turnkey model attracts customers, as the liability for the end product, including design and construction, lies with the contractor (Shyamal and Sabikhi, 2013). The authors mentioned that the customer's preference for EPC or Turnkey model over other model like packaged-based contract may be due to the various advantages of Turnkey model as shown in Table 1. In Turnkey (EPC) contract, since all responsibilities are shouldered on the contractors, significant risks are transferred to them and hence face and manage various challenges in successfully completing the oil and gas EPC projects (Shyamal and Sabikhi, 2013).

Criteria	Turnkey contract	Packaged-based contract
Price	Guaranteed price for execution	No guarantee on the price
Time	Guaranteed timeline for completion	No guarantee on the timeline
Procurement	Undertaken solely by the contractor	According to agreement between the two
		parties
Engineering/design	Responsibility of the contractor	Responsibility of the owner / developer
Responsibility	Contractor has complete	Contractor has defined responsibility
	responsibility	
	Contractor is single point of contact	Owner/developer has to coordinate with
Point of contact	for all matters for the project	several participants along with the
	developer	contractors
	Contractor is free to work with	
Level of	limited supervision delivering	Owner/developer to undertake a day-to-
Involvement	according to agreed milestones and	day supervision of most of the activities
	specifications	
Risk	Significant risks are transferred to	Significant risks retained with the
	the contractor	Owner/developer

Table-1: Turnkey contract and packaged-based contract

Source: Shyamal and Sabikhi, 2013

According to Food Business Insights (2023), the regions which are leading the Oil and Gas EPC Market globally are as follows:

- a. North America (United States, Canada and Mexico)
- b. Europe (Germany, UK, France, Italy, Russia and Turkey etc.)
- c. Asia-Pacific (China, Japan, Korea, India, Australia, Indonesia, Thailand, Philippines, Malaysia and Vietnam)
- d. South America (Brazil, Argentina, Columbia etc.)
- e. Middle East and Africa (Saudi Arabia, UAE, Egypt, Nigeria and South Africa)

In India, the oil and gas sector play a vital role to influence the decision-making process for all the other important sections of the economy (India Brand Equity Foundation, IBEF) (2024).

Oil and gas energy demand in India is increasing fast with the rapid urbanization, economic growth, industrial expansion, electrification, etc., which is resulting to a huge amount of US\$542 billion investment opportunity over period till 2040 (PMI India, nd). However, the past experience reflected the average delay of 1.5 years in petroleum sector projects with average cost acceleration of 6.2 percent



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makes it crucial for the Indian oil and gas sector companies to adopt global best practices in project management (PMI India, nd).

The Government of India has adopted various policies for fulfilling the increasing demand. It has allowed 100 percent foreign direct investment (FDI) in many segments of the sector, including natural gas, petroleum products and refineries, among others (IBEF, 2024). Presently oil and gas sector in India is attracting both domestic and foreign investment, as attested by the companies such as Reliance Industries Ltd (RIL) and Cairn India (IBEF, 2024). Till July 2023, India's oil refining capacity is 253.92 million metric tons per annum, enhanced its position to the second largest refiner in Asia (IBEF, 2024).

In India, the major domestic players in oil and gas EPC are Larsen and Turbo Limited., Punj Lloyd Limited., Petron Engineering Construction Limited, Essar Projects (India) Limited, McNally Bharat Engineering Co. Ltd., Leighton, Engineers India Limited, Fabtech Project & Engineers Ltd., Jaihind Projects Ltd. etc. and the major foreign players in oil and gas EPC are Aker Solutions, Leighton Welspun Contractors Pvt. Ltd., Bechtel Corporation, Linde Engineering India Pvt. Ltd., Tecnimont ICB, Samsung Engineering, Uhde India Limited (Shyamal and Sabikhi, 2013)

EPC involves clients, contractors, designers in the planning, project execution and delivery. However, there are limited companies in India that are able to complete as risk management is a crucial process in project delivery and decision making (Nivedhaa, 2022).

Considering the importance of risk factors management in oil and gas EPC projects, the present review based study, has been done to understand the global process with special reference to India.

2. Objective

The objectives of this study are,

- a. To understand the risk factors in oil and gas EPC projects globally and in India.
- b. To understand the management of various risk factors in oil and gas EPC projects globally and in India.

3. Research Methodology

The present research is narrative review based study. The sources of data are secondary. The various secondary sources were searched in Google, Google Scholars, ResearchGate, Academia and Sodhganga and also various blogs of risk management, engineering etc. The most relevant literature related to the present research topic, mostly published and also unpublished articles, theses, reports and also blogs have been downloaded in two folders, namely International and India.

4. Review of related literature

All the downloaded research materials have been reviewed thoroughly prior to analyze keeping in mind the objectives of the study. The conceptual frameworks of the papers have been carefully analyzed for understanding the risk factors in oil and gas EPC projects and process to manage the risk factors by the engineers and other stakeholders. The analyses of review of most related literature has been presented in the following sections:

4.1. Risk Factors in Oil and Gas EPC Projects

The oil and gas industry has a strong relationship with uncertainty and risks (Saptarini and Nainggolan, 2022). Risk factors, are worldwide common challenges in the construction industry affecting the main constituents of projects like cost, time and quality (Kassem et al., 2019).



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According to Carr and Tah (2001) the two types of risk factors mainly related to the management are of internal risk factors and external risk factors. They revealed internal risk factors as relatively more controllable than external risk factors of a project. Khodeir and Mohamed (2014) revealed that technical challenges are generally internal and within the control of the project manager. The study of Kassem et al., (2019) had assessed the risk factors in construction projects in oil and gas processing facilities in Yemen. Their study findings revealed that in oil and gas sector construction projects, the internal risks were the most significant factors, followed by changes during construction project, instability of government, inaccurate project cost estimation, delay in decision making by government, flaw in project schedule assessment, political situation and war in the country (Kassem et al., 2019). Khvostina et.al, (2019) also mentioned about political pressure as one of the risk factors in oil and gas projects and also mentioned the other external risk factors such as socio-demographic issues, legal issues, ecological risks including weather, market problems and globalization. The authors highlighted the internal risk factors as property, informational, investment, operational, production, human resource, innovative, liquidity, managerial, technological, technical and financial.

After various review of literature and discussions with the oil and gas industry experts, Basak (2020) in her research study had broadly classified risks into two categories, viz., technical risks and non-technical risks. Table 2 shows that technical risk consists of nine risk factors and non-technical consist of four risk factors. The technical risks are challenges in the execution of the contracting companies to develop, deliver and manage its services and to support project operations (Boateng, et al., 2015). On the other hand, non-technical risks according to Basak (2020) are external business environment of a company and are often comparatively unmanageable in nature. The consequences of these risks could be managed through repeated scanning, forecasting and proper strategy (Tah and Carr, 2001). In oil and gas projects, non-technical risks or challenges are becoming more complex, mainly for exploration and production activities that needs to be managed properly (Adekoya and Ekpenyong, 2016).

Rui et al. (2018) in their study conducted in Nigeria to assess the technical and non-technical risk factors affecting oil and gas projects and found that technical challenges were not the major causes of the poor performance. However, non-technical risks viz., local content, community, security and partnership had a considerable role in timeline and budget overruns.

Classification of Risk Factors			
Technical Risks	Non-technical risks		
Client owner related risks	Political and regulatory risks		
Consultant related risks	Social risks		
Contractor related risks	Environmental risks		
Procurement related risks	Economic/ Financial risks		
Site related risks			
Management related risks			
Contract related risks			
Design related risks			
Construction/project related risks			

Table-2: Risl	k classification
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Source: Basak, 2020



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Thuyet et al. (2007) had mentioned in his study about various risk and uncertainties of a project because of manifold factors such as complexity of planning and design, involvement of different interest groups, such as, project owner, consultants, contractors, vendors, resource availability (material, equipment, funds, etc.), climatic environment, social apprehensions and additionally economical and political statutory regulations (Thuyet et al., 2007). The authors (Thuyet et al., 2007) conducted a case study of Vietnam's oil and gas construction projects and identified top ten key risks which were as follows (as cited by Kassem et al., 2019):

- Bureaucratic government system and lengthy project approval procedure
- Poor design
- Incompetence of project team
- Inadequate tendering
- Late internal approval process from the owner
- Inadequate project organization structure
- Improper project feasibility study
- Inefficient and poor performance of constructors
- Improper project planning and budgeting
- Design changes.

The authors Ruqaishi and Bashir (2013) studied oil and gas industry construction projects in the Gulf Cooperation Council Countries and revealed seven key factors responsible for not completing project within the timeline (as cited by Kassem et al., 2019). The seven key factors were:

- Poor site management and supervision by contractors
- Problems with subcontractors
- Inadequate planning and scheduling of projects by contractors
- Inadequate management of schedules of contractors
- Delay in delivery of materials
- Lack of effective communication among project stakeholders
- Weak interaction with vendors in the engineering and procurement stages

Mubin and Mannan (2013) had identified analyzed and quantified coherent risks of oil and gas sector EPC projects. They had proposed a model to assess and quantify risks involved in the process. Also, mitigation measures were proposed by the authors for all the decisive risks to successfully complete oil and gas project. Mubin and Mannan (2013) had also mentioned in their article that many contractors reported to suffer huge loss as a result of insufficient knowledge of project risk identification, risk assessment and their mitigation. A number of contractors refused to bid for EPC contracts under certain jurisdictions. When the contractors properly manage the greater risk EPC projects with effective planning, the rate of return is almost double their turnover in a decade (Mubin and Mannan, 2013). Hence, it is important to understand the effective management methodologies of risk factors in oil and gas EPC projects.

4.2. Global Risk Management in Oil and Gas EPC Projects

AlNoaimi and Mazzuchi (2021) revealed that the oil and gas projects are vulnerable to high risk due to the technological complexities, involvement of different stakeholders, etc. However, following tools and techniques of risk management, the risks and hazards are overcome in the oil and gas industries.



Management of risk factors is a strategy to assure continuous progress in work application and future planning and decision making process (AlNoaimi and Mazzuchi, 2021).

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).

The various steps of risk management according to the authors Sohrabinejad and Rahimi (2015) were risk identification, analysis, risk assessment, prioritization and act in response to project risks controlling of reducing negative corollaries. The research of Hamid (2019) highlighted three factors of competency such as motivation, knowledge and risk culture influencing toward implementation risk management successful. The risk managements in oil and gas management field highlighted by Saptarini and Nainggolan (2022) in their conceptual framework were project, program and portfolio management, occupational health safety and environment management and stakeholder management.

A project success depends on timely assessment of risk factors within the project duration and approved budget (Nguyen et al., 2015). The engineering skilled management of risk factors in the oil and gas sectors is a rising need for successful completion of projects. Effective risk management helps in controlling the project costs, with proper planning of tentative project completion dates, as the risk management planning entails all facets of a project from inventory, tender work, and finalization of order, human resource planning and the quality aspects (March, and Shapira, 1987).

According to Nassar (2018), Director, Project Execution (Middle East, Egypt and Turkey), risk management in the oil and gas construction industry is though one of the significant success factors for construction projects, yet construction risk management is found to be one of the most feebly understood areas of project management resulting to the project failure. The six risk management processes outlined by Nassar (2018) are as below:

- **a. Risk Management Planning** involves all stakeholders to plan the project procedural outline, participants and time structure of risk management activities during the project life cycle.
- **b. Risk Identification** uses recognized methods and techniques to examine vital processes in identification and documentation of possible risks in the planning stage.
- **c. Qualitative Risk Analysis** involves subjective assessment of risk likelihood of participants and ensures to understand the nature and result of the risks.
- **d.** Quantitative Risk Analysis is numerical analysis of the probability and impact of risk factors and to analyze the impact on overall project risk.
- e. Mitigation and Response Planning identifies, assess and plan suitable methods to control or get rid of risks, as well as ways to enhance the probability of an opportunity occurring.
- **f.** Monitoring and Control of Risks is done over all phases of the project, in evaluating the effectiveness of risk response planning, management of enduring risks.

Nassar (2018) with extensive experience on EPC projects in oil and gas industry had designed an integrated risk management model for construction projects, which is shown in Figure 1.

Hatmokol and Khasani (2019) revealed that more than 80 percent of oil and gas projects globally experience project delays, which may result to vast financial repercussions to the contractors. Hence, it is essential to manage delay risks factors. The study of Hatmokol and Khasani (2019) assessed the delay of risk factors of EPC projects.

4.3. Risk Management in Oil and Gas EPC Projects in India

Engineers India Ltd. (EIL), a leading global engineering consultancy and EPC company has a track rec-



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ord of 23 Turnkey/EPC projects. EIL uses risk management as an effective tool to manage its business and project risks. Project risk management at EIL involves quantitative risk assessment and trending, robust framework, cross functional involvement and wide coverage of project risks. Also, EIL inspires a risk management culture amongst its employees through various interactive means (EIL, 2016).

A PMI report (PMI India, nd) was based on a study conducted by Nielsen India interviewed top management and project managers with minimum 15-20 years of experience in oil and gas companies and associated EPCs active in the Indian oil and gas sector. According to the findings, the project management practices in Indian oil and gas sector reflected that 25 percent of surveyed oil and gas companies had a dedicated independent risk management services and 67 percent of EPC respondents mentioned that the depth and details of risk identification, assessment mitigation strategy followed in a project was determined by client requirement (PMI India, nd). Around 76 percent of respondents mentioned about the project management skill deficiency in the Indian oil and gas sector (PMI India, nd). Around 64 percent of the respondents mentioned that time overruns occurred primarily due to delay in EPC selection, due to bureaucracy and decision making process was lengthy (46 percent), lack of flexibility in operational decision making (56 percent) etc. Another reason for project delay mentioned by the respondents was lack of coordination among the stakeholders. So far as project cost escalation was concerned, three top reasons reflected in the study were project management skill deficiency, lack of detailed planning and resultant frequent cases of scope creep (PMI India, nd). Dr. Palanivel Thiagarajan, finance and human resources management minister of Tamil Nadu between May 2021 and May 2023 discussed in the Project Management South Asia Conference 2023 about the primary reasons behind cost escalation in various government projects (PMI, 2023). According to him, over-ambitious targets without a realistic assessment of feasibility, inefficient organizational design and transient government structures with frequent changes of the roles of elected officials and bureaucrats are the main reasons for cost escalation. Lack of expertise, institutional memory and continuity are also the hindrance to achieve meaningful outcomes (PMI, 2023).



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Figure-1: Integrated Risk Management Model for Construction Projects (Source: Nassar, 2018)

5. CONCLUSION:

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This review based study on risk factor identification and risk management in oil and gas EPC projects globally and with special reference to India would help various stakeholders, planners, engineers, project managers in understanding the effective risk managements in oil and gas EPC projects. The integrated risk management model for construction projects by Nassar (2018) would help the project implementers including management to improve project management performance for successful completion of oil and gas EPC projects within the timeline and competently managing complexities of the risk factors such as unskilled human resource, lack of coordination among the stakeholders and non-technical risks such as delay in decision making by government, political pressure, environmental risks, economic or financial risks. Risk-based engineering management execution in oil and gas EPC projects needs a systematic and integrated approach, leveraging advanced tools and techniques to ensure successful project outcomes. The previous international and national (India) studies reflected the contractor's refusal or reluctance to bid for EPC contracts under certain jurisdictions. Hence, it is important to understand the effective management methodologies of risk factors in oil and gas EPC projects as the rate of return are generally found to be almost double their turnover in a decade, if the contractors manage risk factors in the oil and gas EPC projects effectively and in coordination with all the stakeholders. Also, the support of the political leaders and the government of the implementing countries are crucial for the success of such projects and global development in oil and gas sectors.

In future, researchers may conduct in-depth research on risk management in oil and gas EPC projects of some reputed companies of developed and or developing countries to understand the detail risk manage-



ment strategies adopted by such reputed companies.

References

- Adekoya, A., and Ekpenyong, E. (2016). Managing Non-Technical Risk in Exploration and Production (E&P) Projects: Opportunity to leverage the IA Process. In 36thAnnual Conference of the International Association for Impact Assessment (IAIA16); Resilience and Sustainability, Aichi-Nagoya, Japan.
- 2. AlNoaimi F. A. and Mazzuchi T. A. (2021); Risk Management Application in an Oil and Gas Company for Projects; *International Journal of Business Ethics and Governance (IJBEG);* Vol. 4, No.3, DOI: 10.51325/ijbeg.v4i3.77
- 3. Basak Munmun (2020); An Empirical Investigation of Critical Risk Factors Impacting Schedule Overrun in Upstream Gas projects in Australia; PhD Thesis; School of Built Environment; Science and Engineering Faculty; Queensland University of Technology.
- 4. Boateng, P., Chen, Z., and Ogunlana, S. O. (2015). An Analytical Network Process model for risks prioritisation in megaprojects. *International Journal of Project Management*, *33*(8), 1795-1811. doi:10.1016/j.ijproman.2015.08.007
- 5. Carr, V. and Tah, J.H.M. (2001). A fuzzy approach to construction project risk assessment and analysis: construction project risk management system. *Advances in Engineering Software*; Vol. 32 Nos. 10/11, pp. 847-857.
- 6. EIL (2016). Risk Management Solutions across the hydrocarbons value chain; Engineers India Limited; A Government of India undertaking.
- 7. El-Reedy M. A. (2016); Project Management in the Oil and Gas Industry; Scrivener Publishing LLC; Canada
- Food Business Insights (2023); Oil and Gas EPC Market Size In 2023: Share, Latest Trends & Forecast 2023 To 2030; Precision Reports; https://www.linkedin.com/pulse/oil-gas-epc-market-size-2023-share-latest-trends-w05jf/
- 9. Hamid Abdul (2019); Developing Risk Management Framework for Wellhead and Christmas Tree Equipment; PhD thesis; Faculty of Engineering Technology; Universiti Tun Hussein Onn Malaysia.
- 10. Hatmoko, J. U. D., and Khasani, R. R. (2019). Mapping delay risks of EPC projects: a case study of a platform and subsea pipeline of an oil and gas project. In *IOP Conference Series: Materials Science and Engineering;* (Vol. 598, No. 1, p. 012095). IOP Publishing.
- 11. India Brand Equity Foundation (IBEF) (2024); Oil and Gas Industry in India Report; Ministry of Commerce and Industry; Government of India; https://www.ibef.org/industry/oil-gas-india.
- Kassem M. A., Khoiry M. A. and Hamzah N. (2019); Risk factors in oil and gas construction projects in developing countries: a case study; International Journal of Energy Sector Management; Vol. 13 No. 4; pp. 846-861.
- Khodeir, L. M., and Mohamed, A. H. M. (2014). Identifying the latest risk probabilities affecting construction projects in Egypt according to political and economic variables. From January 2011 to January 2013. *HBRC Journal*, 11(1), 129-135; doi:10.1016/j.hbrcj.2014.03.007
- 14. Khvostina I., Havadzyn N. and Yurchenko N. (2019); Manifestation of emergent properties in risk assessment of oil and gas companies; *SHS Web of Conferences*; 65, 08001; https://doi.org/10.1051/shsconf/20196508001.



- 15. March, J.G. and Shapira, Z., (1987). Managerial perspectives on risk and risk taking. Management Science. 33(11), pp. 1404-1418.
- Mohebbi A. H. and Bislimi N. (2012); Project Risk Management: Methodology Development for Engineering, Procurement and Construction Projects -A Case Study in the Oil and Gas Industry; Faculty of Economic Sciences, Communication and IT Karlstads Universitet, Universitetsgatan, Sweden.
- Mubin S. and Mannan A. (2013); Innovative Approach to Risk Analysis and Management of Oil and Gas Sector EPC Contracts from a Contractor's Perspective; *Journal of Business & Economics*; Vol.5 No.2; pp. 149-170.
- 18. Nassar Nadim (2018); 6 steps to manage ALL of the risk on EPC projects; LinkedIn Corporation; https://www.linkedin.com/pulse/6-steps-manage-all-risk-epc-projects-nadim/
- 19. Nguyen, A. T., Nguyen, L. D., Le-hoai, L., and Dang, C. N. (2015). Quantifying the complexity of transportation projects using the fuzzy analytic hierarchy process. *International Journal of Project Management*. http://doi.org/10.1016/j.ijproman.2015.02.007
- 20. Nivedhaa B (2022); Risk Assessment, Mitigation and Management of EPC Contract Projects; A thesis; Department of Architecture; Institute of Science and Technology (Deemed to be University); Chennai
- 21. PMI (2023); Managing Cost Overruns in Indian Infrastructure Projects; Key note address by Palanivel Thiagarajan in *The Project Management South Asia Conference* (PMSAC23) on Exploring the Interplay of Human Creativity and Digital Tools in Project Management.
- PMI (Project Management Institute) India (nd); A PMI Report On Project Management Practices In Indian Oil And Gas Sector – An Executive Summary; Conducted by Nielsen India; PMI Organization Centre Private Limited, Mumbai.
- 23. Rui, Z., Cui, K., Wang, X., Chun, J.-H., Li, Y., Zhang, Z., Patil, S. (2018). A comprehensive investigation on performance of oil and gas development in Nigeria: Technical and non-technical analyses. *Energy*, *158*, 666-680. doi:10.1016/j.energy.2018.06.027
- 24. Ruqaishi, M. and Bashir, H.A. (2013). Causes of delay in construction projects in the oil and gas industry in the Gulf cooperation council countries: a case study; *Journal of Management in Engineering;* Vol. 31 No. 3, pp. 1-8.
- 25. Saptarini D. A. and Nainggolan Y. A. (2022); Risk Management in Oil and Gas Field Development Project with Marginal Resources: A Case in Mature Field in East Kalimantan; *European Journal of Business and Management Research;* Vol 7 | Issue 5; pp 45-53; DOI: http://dx.doi.org/10.24018/ ejbmr.2022.7.5.1629
- 26. Shyamal Sushi and Sabikhi Sonam (2013); Engineering, Procurement and Construction (EPC): Braving the headwinds; EY Leadership Team (EPC Sector); Ernst & Young LLP Publisher, India.
- 27. Sohrabinejad, A., and Rahimi, M. (2015). Risk Determination, Prioritization, and Classifying in Construction Project Case study: Ghard Tehran Commercial Administrative Complex. *Journal of Construction Engineering*, 2015.
- 28. Tah, J. H. M., and Carr, V. (2001). Knowledge-Based Approach to Construction Project Risk Management. *Journal of Computing in Civil Engineering*, 15(3), 170-177. doi:10.1061/(ASCE)0887-3801(2001)15:3(170)



- 29. Torres, N., Afonso, O. and Soares, I., (2012) Oil Abundance and Economic Growth A Panel Data
Analysis.TheEnergyJournal,[online]332.http://www.iaee.org/en/publications/ejarticle.aspx?id=2479.
- 30. Thuyet N. V., Ogunlana S. O. and Dey P. K. (2007); Risk management in oil and gas construction projects in Vietnam; International Journal of Energy Sector Management Vol. 1 No. 2; pp. 175-194.