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IMPORTANCE OF DIGITALISING PROCUREMENT IN MATERIAL ACQUISITION FOR COST CONTROL AT ONSHORE FABRICATION PROJECTS OIL AND GAS INDUSTRY

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Abstract: *The improvement in cost control measures throughout the procurement process, particularly regarding resource cost awareness to mitigate cost overruns, is becoming concerning. The cost control component is necessary to enhance understanding of the current and prospective function of the procurement phase in acquiring the materials in multi-billion EPC projects relative to project value. This study defines onshore fabrication as an Engineering Procurement Construction (EPC) contract and project that entails the fabrication of offshore platforms, particularly jackets and topsides, intended for the upstream industry. The issue of inadequate coordination cannot be resolved merely by distributing resources and expending funds on projects without appropriate material management planning. Consequently, the implementation of a strategic digitalization plan is essential to organise and oversee cost control measures in order to execute procurement activities and responsibilities effectively, irrespective of budgetary excesses. The objective of this research is to provide a benefit of digitalization during the procurement process for onshore fabrication projects. This research utilises data gathered from semi-structured interviews with EPC procurement experts concerning current work procedures related to the material management in EPC projects, framed within Decision Making Theory as determinants of organisational success. The data was evaluated to discover the strategic constructions and qualities, as well as to ascertain the digitalization cost control component during the procurement phase's workflow for effective project cost management in successful EPC projects. The research indicated that successful EPC projects are associated with components of data sources about project activities such as planning and scheduling work programme during the review stage together with the prescribed fabrication cost or parameters to coordinate and mitigate cost overruns. The study's results*

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indicated that a digitalization strategy is essential for the EPC fabricator to effectively manage EPC projects.

Keywords: *Digital, Procurement, Material, Decision Making, Onshore Fabrication Projects.*

Introduction

Cost allocation pertains to the cost component and the methodologies for cost management. Although budgeting is frequently not a decisive element in effective project management, the allocation of material cost must be considered tally with the estimation of each work within the scope description. A viable option is to mitigate the impact of excessive costs in fabrication projects by implementing effective resource management systems in material cost initiatives.

Procurement entails acquiring goods and services within a certain timeframe and budgetary constraints, ensuring that the processes align with the organization's requirements. Procurement is a stage within the EPC project or phases. Procurement initiative to assess optimal resources in response to the engineering, project, and construction team's request. The EPC contract is an optimal procurement strategy to prevent deviations from the project timeline or budget. The EPC phase represents the design and construction approach utilised as a project delivery strategy (Komurlu & Er, 2020). Material allocation for this study cover site possession from Engineering (E), Procurement (P), and up to Construction / Fabrication (C) only, not including commissioning and loadout final stage, EPC as shown in Figure 1.

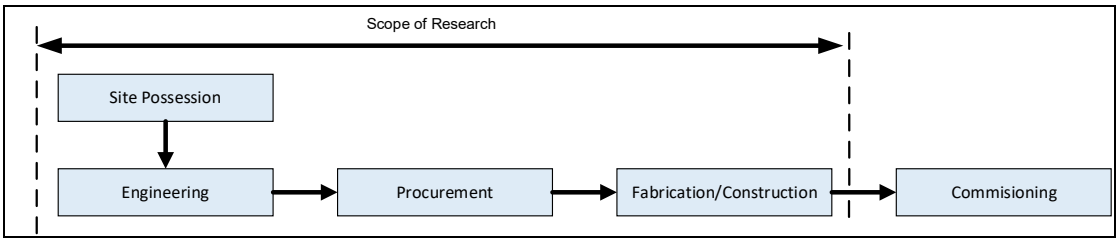

Figure 1: EPC Project on Material Acquisition

The Importance of Procurement Phase in Onshore Fabrication Project

Procurement in each project is one of the important stages to optimize project cost. Procurement phase that handles purchasing is a process for effective and efficient control and monitoring of purchasing function (Denis & Kilonzo, 2014). The ability in procurement to achieve material allocation to enhance policy and dynamics in organisations. The global market now has higher expectations for speed, value, and quality, exerting pressure on turnover (Cooper-Rooney, 2018). Plans and specifications were created first in the engineering phase, then in the fabrication phase, followed by the procurement phase for processing the request of various fundamentals (Olsen et al., 2005). The resources necessary for a new offshore oil platform (topside and jacket structures) or rebuilding an old one seems to be a rather complex sort of procurement involving multiple stakeholders.

Decision Making Theory at Procurement Phase in Material Allocation

Need of decision-making theory in organizing the material allocation to get the best approach in reducing the project cost. A supplier may offer a low-quality product with a better and more reliable delivery time, whereas another may offer an uncertain delivery time with a high-quality product, presenting decision-makers with trade-offs. Uncertainty has been regarded as an

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essential component of the decision-making process (Kaviani et al., 2019). While, the O&G industry faces similar issues, but only a few papers have been reported in the current literature.Chang et al., (2009) study used production quality, stable delivery, demand change in time, service, pricing, delivery, technical ability, manufacturing capability, financial situation, and lead-time as decision criteria. Gupta & Barua, (2017) considered factors such as collaboration, environmental investment, resource availability, environmental management, research and design initiatives, and green purchasing. Furthermore, the engineering and procurement activities, including fabrication and module assembly time frames, must be precisely integrated into the overall schedule to achieve the desired cost and schedule benefits (Suppramaniam & Ismail, 2019).The project team needed to know whether the project was cost-driven or schedule-driven, which was not a concern for the project managers but was for the engineers. This point comes from the fact that the engineering team is responsible for providing the project design, which includes a variety of engineering deliverables. If the project is cost-driven, one must ensure that appropriate material resources are used within normal engineering timeframes. On the other hand, if the project is schedule driven related to appropriate manpower loading is required, which may necessitate the hiring of additional personnel to ensure that the deliverables are produced within the timeframes specified by the owner. Additional manpower necessitates increased coordination and effort, which may raise project costs, but that is the trade-off with the schedule-driven approach (Alnoor Akberali Halari, 2010). Design-thinking is an inductive and participatory process that requires designers to manage constraints, generate solutions, and adhere to project timelines in required to address project objectives (Stefaniak & Tracey, 2014).

Procurement Functions

The type of contract to be used and the types of contract documentation required are important factors to consider strategies in procurement. According to Momeni & Martinsuo, (2018), approximately 80% of the capital cost in optimising the resource allocation is related to the cost of materials, equipment, and construction. When relevant purchase orders and construction contracts are placed, the contracting and procurement market determines these costs. This occurs a significant time after the investment decision is made due to the long development and implementation time of major engineering and construction projects, The significant period after the investment decision is made. The difference in cost between the actual and target costs. Purchase orders for materials , as well as construction contracts, are awarded following competitive bidding at the appropriate time during project implementation, when the relevant part of the design engineering is completed. This allows for more effective competition as well as a more efficient contracting and procurement process. A so-called open book approach is required, with the owner having full audit rights over all project costs.

Workflow of Procurement Process towards Digitalization Conduct

Procurement is an important element of all projects and can provide practical approach for project execution. According to Alnoor Akberali Halari (2010), the costs of O&G project are spent on acquiring materials. Construction accounts for roughly half of all expenditures, making it a critical area of focus for cost effectiveness. Procurement effectiveness is primarily determined by the contract strategies used with the respective vendors, suppliers, and contractors all in trusted digitalized licensed software. The most important aspect of contract consideration is risk and determining which party is best suited to handle it. Most owners prefer to minimize risk by transferring it to third parties, but this comes at a high cost. Therefore,

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involving the procurement group early in the software is critical for planning and having a realistic schedule, resulting in timely material deliveries, and ordering ahead of schedule also provides an additional buffer to the schedule and the potential for cost savings. Failure to collect long-lead items early in the project results in materials not being available at the construction site when actually required. Thus, construction tradesmen frequently have no work fronts open, causing project delays and possibly cost overruns.A cost is a financial sacrifice made in order to make a profit. There will be no productive activity that will generate profit objectives for the Company if there is no cost. Cletus Akenbor & Thankgod Agwor (2015) claims that many organisations' operating costs are unnecessarily high, robbing the organisation of any profit that could have been made. There is a need to control costs in the procurement software to conduct business and keep costs within acceptable limits. Procurement acts in accordance with this principle to keep the price as low as possible while not exceeding the project's value. Figure 2 shows that the procurement workflow is within the cost limit applied in the procurement software and involved the components. If the actual cost differs from the planned cost by a large margin, cost-cutting measures are required. Procurement is the phase that involves intelligence in delegation of furnishing the request from the project team to the realistic at engineering and construction phase

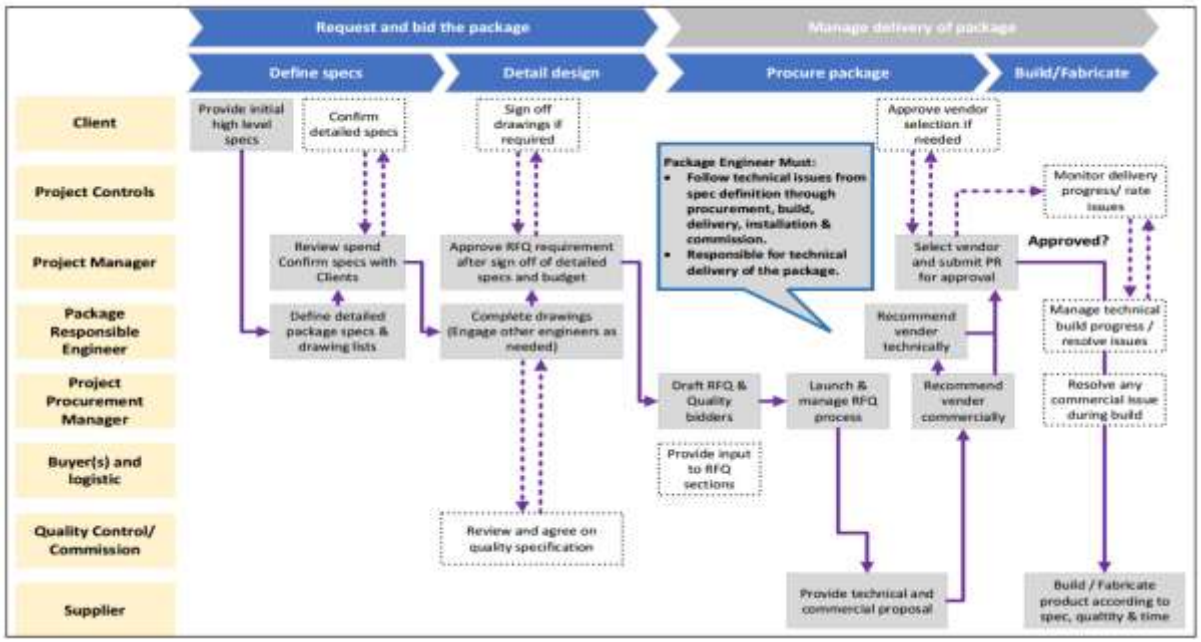

Figure 2: Contract Award and Project Procurement Approval Process Applied in Digitalization

Cost Control Elements in Material Allocation

Cost control elements are based on their nature or function and make it easier to find the cost of an activity. These cost control elements are developed for components and work in purchasing reference. The sense of elements satisfies the owner and fabricator for adaptable accounting. It must provide cost feedback for researching the cost patterns and provide detailed data, justification, recommendation and cost code required by fabricators. Pollack et al., (2018) stated that the purpose of cost highlighted are to provide cost feedback for estimating purposes in the most efficient framework for facilitating the control of other resources which are manpower, machinery and other resources according to contracts. Also provide information

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for compiling capital asset ledger, provide cost breakdowns that are useful to divisions in developing reliable product and distributive costs, guarantee maximum accuracy in costing by being easy to understand and apply by fabricator and Client. The cost control element serves as an excellent checklist of all items that must be considered as reference. Cost control is an exercise in tidying up by avoiding valuable resources and encouraging resource efficiency and cost awareness as per Procurement Workflow in the digital system. Costs can be reduced by improving the efficiency of material use, labour productivity, and machinery. Aside from previous researchers' study on cost estimate and cost plan, this study focuses on cost control and management are critical competence of the Procurement to ensure that the integrity of planned project cost is sustained within the project delivery amidst several construction risks that tend to direct projects towards cost overrun.

Conclusion

The decision maker needs to refer to the relevant documents (data sources about project activities such as planning and scheduling work programme) during the review stage together with the prescribed fabrication cost or parameters for each strategy and cost control element to determine the actual value of required material for acquisition for the projects. This is important because the level of achievement for material acquisition will significantly affect the project cost.

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