

Identifying of project manager competence factors in managing EPC projects in Indonesia

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Abstract. The rapid development of the industry by enhancing the development of power plants, fertilizers, oil & gas operated by integrated construction companies or Engineering, Construction and Construction (EPC) companies, where EPC companies are required and have experience in planning and developing industrial projects. The higher technology and the sophistication of the design process that demands more need for skilled Human Resources i.e. Project Manager to handle and complete these projects. Project manager is responsible for the overall success of delivering the owner's physical development in cost constraints, schedules, quality, safety and environmental requirements. Therefore, they play an important role not only in the operating activities of engineering construction companies but also in the development of infrastructure in each country including Indonesia. Two stages of factor analysis were conducted on competence factors than the International framework of Project Manager Competences Development Framework and competence factor based on the basic theory of competence. There are 105 competence factors appeared from its analysis. All factors have validated by experts from the National Association of Design and Development of Indonesia (GAPENRI) as the Unity that manages EPC companies in Indonesia, Project Management Institute (PMI) Indonesian Chapter and Indonesian Project Management Specialist (IAMPI).

1. Introduction

With the rapid development of the industry to increase the development of the electricity, fertilizer, oil & gas industry operated by integrated construction companies, the contribution of the Engineering, Procurement and Construction (EPC) company is needed. Where EPC companies have experience in planning and developing integrated industrial projects. In general, the higher the technology and sophistication of the industrial design process, will require highly skilled Human Resources to be able to handle and complete these projects.

The use of management on each project is different, as its features differ. Initially, management concepts on a project were traditional, but since the 1980s, a new management concept called EPC (Construction Procurement Engineering) or integrated construction began. The concept of EPC is a management concept that integrates the phase from design to construction execution with only one main communication line / contract between owner and EPC contractor. This concept is considered more



efficient and usually projects that use this concept in the form of a well-known industrial project with EPC project title [1].

At EPC, the contractor holds all the responsibilities from the beginning. It includes the provision of engineering services, procurement of materials and construction services. With the rapid development of the global economy, demonstrated by the development of all industrial sectors, has made the popularity of increased revenues for EPC projects. The need for EPC projects has been influenced by several factors, namely: population growth, national economic growth, and sustainable development concerns [2].

Low productivity and high residual volume in construction projects are influenced by: labour productivity, construction methods, reworking, incomplete drawing, poor communication, delays of inspections, supplier qualifications, competencies and training, technology for products, construction plants and equipment development [3, 4, 5, 6, 7, 8].

2. Methodology Research

Every EPC company should have involved the project managers and his/her team work who are experienced in carrying out good work, which does not only refer to time, cost and quality. However, mastery of occupational health, safety and environmental issues is a mandatory requirement to be implemented. In terms of enforcing regulations that are requirements that have been set out in a work contract and several regulations, the role of the project manager most important crucial to achieve project success and its performance.

a. Collection and analysis of data

In the context of this study, the collection of articles from the academic journal and competences standard related to Project Manager Competency was carried out on EPC projects that constructed by several EPC companies in Indonesia within 10 years. The article taken is an academic article obtained by web engine search. Key words used are: 'Project Manager Competency', 'Competences factor', 'Project Management', 'EPC Project', and 'Project Performance'.

This study only collected a number of books and articles related to the Project Manager Competency factors in EPC projects that conducted in Indonesia from 2009 to 2018. These factors were classified and written in the form of Ms. Excels and given name based on the critical success factors of competency. At the initial stage, by collecting factors using various google search engines with keywords, there were 20 articles and 6 books on project manager competency which are EPC projects were found.

b. Results and discussion

In general, delay factors or cost overrun in the construction phase are mostly caused by a lack of competence on the part of project managers. The desire to speed up projects is one of the reasons why certain stages are passed without adequate care. According to several Handbook of Project Manager Competency Development Framework, Project Manager Competency is measured by the compliance of Project Managers toward various stages, starting at planning and continuing through the entire life cycle of project. The design must be equipped with quality assurance in the method of implementation, proper work equipment and materials that comply with safety and environment standards. The Project Manager involved in the selection process is responsible for schedule, cost, quality, safety and environmental care — thus reviewing a company's history of Project Manager Competency should be

part of selecting a EPC Company. The next stage is the comparison stage with competences factor based on Basic Theory. In this case, efforts are necessary to find out the standard of competency between International Framework for Project Manager and Basic Theory. In the last stage, collections are critical success factors to managing the EPC project’s completion.

Based on data collected from the Indonesian National Work Competency Standards / SKKNI [9, 10, 11], International Framework of Project Manager Competency [12, 13, 14], Competences Basic Theory [15, 16, 17] and some articles within many sources [18, 19, 20, 21, 22, 23, 24, 24, 25, 26]. There are several factors of Project Manager Competency (Table.1)

Table 1. Comparison table of competency factors implemented in Indonesia

No.	Framework	PMCD (PMI)	ICB (IPMA)	ACF (APM)	Remarks
1.	SKKNI standards)	(3 42 of 58 (comply) 16 of 58 (not comply)	30 of 46 (comply) 16 of 46 (not comply)	36 of 47 (comply) 11 of 47 (not comply)	
2.	Basic Theory Books)	(3 39 of 58 (comply) 19 of 58 (not comply)	31 of 46 (comply) 15 of 46 (not comply)	33 of 47 (comply) 14 of 44 (not comply)	

Referring to all the competency factors shown in Table 1 above, it can be combined against the competency factors of Project Manager and the types of factors that competences as summarised in Table.2 and detail in Table.3:

Table 2. Classification of competency factors

No.	Kind of competency	Number of factors	Remarks
1	Knowledge competences	58	10 dimensions
2	Technical Competences	22	5 dimensions
3	Personal Competences	35	6 dimensions

Table 3. Detail of competency factors

Knowledge	Technical	Personal
1. Project Agreement Understanding	1. Conduct field surveys to adjust work methods to be used	1. Pre Construction Meeting
2. Plan & develop Project Management Plan	2. Conducting Consultations and Coordination with	2. Establish and Control of oral and written communication with the work team and project owners and other stakeholders
3. Create surveys on existing field conditions		
4. Planning of Monitoring Method and Control Project Work		

5. Plan method of Perform Integrated Change Control	Project Owners and their partnerships	3. Maintains lines of communication with all parties
6. Develop Start-up and Close-out Project	3. Contract Document Comprehension and Subcontract Content	4. Ensures quality of information prior to issuing
7. Plan Detail Scope of Work Management	4. Interpreting Preliminary Concept, Specification and Technical Drawing	5. Take Active Role in the Beginning of Project Activity
8. Collect and identify all requirements within Contract document	5. Interpreting Bill of Quantity and Price List	6. Creates a team environment that promotes high performance
9. Define and clarify detail Scope of Work	6. Interpreting Specifications and Project Administration Needs	7. Builds and maintains effective relationships among all of team member
10. Create and detail design of Work Breakdown Structure	7. Design and expand a lean organizational structure and maximize the empowerment of existing resources	8. Motivates and mentor's program for team members
11. Meeting conduct to Validate Detail Scope	8. Review for the Project Execution Plan to be implemented	9. Takes accountability for delivering the program
12. Control Scope Method Arrangement	9. Review for the Project Execution Budget to be implemented	10. Uses influencing skills when required
13. Develop scope details with subcontractors, suppliers and vendors	10. Conducting and Driving All Human Resources, Materials and Equipments for Work Implementation	11. Direct all work teams according to their expertise at the right time
14. Distribution of scope with partnership	11. Preparing a complete bidding method to get competitive resources	12. Control and manage all types of work in an integrated manner
15. Plan Schedule Management in detail for each section	12. Review of All resources to be involved based on site last condition	13. Builds and maintains the project team
16. Determine the detail of the activities of each section	13. Monitoring the Implementation of Engineering Works Methods	14. Resolves conflict involving project team or stakeholders
17. Divide the sequence of activities in detail with their sequences	14. Monitoring the Implementation of Resource Methods	15. Plans and manages for project success in an organized manner
18. Estimate and develop all activity Resources		16. Cognitive ability in managing job control in an integrated and comprehensive manner
19. Estimate Planning of Detail Activity Durations		17. Uses appropriate program management tools and techniques
20. Plan and Develop Detail Schedule each section		18. Seeks opportunities to improve project outcome
21. Plan method of Control Schedule		19. Applying a familial attitude in avoiding internal conflicts and trust crises
22. Minimize critical paths to work items that cannot be parallel		20. Apply attitudes and behaviours that are believed by everyone inside and outside the work environment
23. Plan and develop Cost Management		21. Control all resources effectively and efficiently
24. Plan Estimates Detail Costs		22. Periodically review the results orientation of each work item
25. Plan and Determine Detail Budget Work		23. Monitor each work item in doing efficiency and review
26. Planning of Control Costs Method		
27. Plan the source of the initial costs in detail		
28. Plan and develop Quality Management Method		
29. Planning Method in terms of Perform Quality Assurance		
30. Planning a Comprehensive Quality Control		
31. Develop innovative concepts of quality monitoring and assurance		
32. Plan Detail of Human Resources Management		
33. Acquire Project Team selectively		
34. Develop Project Team with job requisition		
35. Manage Project Team with proven qualification		
36. Creating a matrix method for efficient in terms of dedicated of the human resources		
37. Plan Communication Management Method and Infrastructure		
38. Design and create appropriate communication affairs		

39. Plan several alternatives of the means of communication that will be used	15. Monitoring the Implementation of Security and Safety Work Methods	optimization that can still be done
40. Create Control Communication Plan		24. Take learning from past failures in order to develop every activity in the future
41. Plan and Develop Risk Management		25. Resolves project execution problems in comprehensive
42. Identify and Mitigation Risks	16. Monitor all Construction Work Activity	26. Maintains project stakeholder involvement, motivation, and support
43. Create and Perform Qualitative Risk Analysis		27. Changes at the required pace to meet project needs
44. Create and Perform Quantitative Risk Analysis	17. Monitor the logistics flow journey made by the procurement team	28. The ability to behave professionally in taking attitudes and decisions
45. Plan Risk Responses and Contingency		29. Applying the assessment of the achievements of all resources by giving reward and punishment
46. Plan Control Risks Method	18. Monitoring for the Implementation of Quality Control	30. Make relaxing moments with the work team, in the busy work activities
47. Plan the costs that will be incurred to anticipate the inevitable handling of risks		31. Always show good ethics and speak politely with everyone
48. Plan Procurement Management and Execution Method	19. Controls and reports for the Implementation of Occupational Safety and Security	32. Demonstrates commitment to the project in seriously
49. Conduct procurement with several qualifications of goods and services		33. Handles personal and team adversity in a suitable manner
50. Plan Control Procurements Method	20. Control and report for the Pre-commissioning & Commissioning activities	34. Operates the project organization with integrity
51. Empower the use of local resources in the procurement of goods and services		35. Manages a diverse workforce within several qualification
52. Closing procurement after all needs are fulfilled optimally	21. Preparing Close Out Report for Execution Budgetary	
53. Identify all Stakeholders		
54. Plan Stakeholder Management Method	22. Preparing Close Out Report for the Analysis of Project Execution Method	
55. Manage all Stakeholder Engagement within Project objective		
56. Consideration in Stakeholder Engagement for the impact of the existence of a project		
57. Provide continuous socialization to various levels of stakeholders		
58. Planning control of several potential negative impacts on stakeholders		

Looking at some of the above competency factors, it is clear that the competency factors of Project Manager are somewhat critical factors in order to manage the progress of project performance by the project of completion to the its performance. There is a need for commitment from all stakeholders who play a role in the development of these EPC projects, so that the same focus is reminded each other about the competence factors that will require in the industrial work place. The EPC company is one of the main executor in this work should be very concern in the competency factors of project manager that refers to the competency factors that are referred to in the work accordingly.

Table 2 shows that, out of 6 dimension factors, there are 35 factors of personal competences it is generally caused by the critical of the competency factors in managing EPC Projects in Indonesia. However, personal competence factors of the project manager competency was also supported by the process of learnings in their knowledge and technical competences. Besides that, almost all competences factors were related to the performance of project completion using project performance indicators, which many must pay attention to (Schedule, Cost, Quality, Safety and Environment).

3. Conclusions

Based on the description in the section above, the parties involved in the EPC work activities seemed must be understand to the meaning of critical success factors starting from the project manager and the related staff involved in these projects. Where in every activity they must have observed the performance factors that will achieve and be reminded regular meeting, progress meeting and milestone achievement discussion.

Also, it is required that every party involved in regulating and overseeing the performance of national EPC companies in Indonesia, to conduct an assessment of the project manager and all of his employees in implementing specific project management programs in his/her projects.

In addition, related institutions that play a role in providing competency test certification for Project Managers in EPC companies, to be even more stringent in certifying their assessments.

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