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 or 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, 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                | 42 (comply)| 30 of 46  | 36 of 47  |                  |
|     | (3 standards)                  | 16 of 58   | 16 of 46   | 11 of 47  | (not comply)     |
| 2   | Basic Theory (3 Books)         | 39 (comply)| 31 of 46  | 33 of 47  |                  |
|     | (not comply)                   | 19 of 58   | 15 of 46   | 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 surveys to adjust     | 1. Pre Construction Meeting                    |
| 2. Plan & develop Project Management Plan            | work methods to be used          | Establish and Control of oral and written     |
| 3. Create surveys on existing field conditions       | 2. Conducting Consultations and  | communication with the work team and project   |
| 4. Planning of Monitoring Method and Control Project Work | Coordination with               | owners and other stakeholders                |
|                                                     |                                  |                                               |
|   |   |
|---|---|
| 5. | Plan method of Perform Integrated Change Control |
| 6. | Develop Start-up and Close-out Project |
| 7. | Plan Detail Scope of Work Management |
| 8. | Collect and identify all requirements within Contract document |
| 9. | Define and clarify detail Scope of Work |
| 10. | Create and detail design of Work Breakdown Structure |
| 11. | Meeting conduct to Validate Detail Scope |
| 12. | Control Scope Method Arrangement |
| 13. | Develop scope details with subcontractors, suppliers and vendors |
| 14. | Distribution of scope with partnership |
| 15. | Plan Schedule Management in detail for each section |
| 16. | Determine the detail of the activities of each section |
| 17. | Divide the sequence of activities in detail with their sequences |
| 18. | Estimate and develop all activity Resources |
| 19. | Estimate Planning of Detail Activity Durations |
| 20. | Plan and Develop Detail Schedule each section |
| 21. | Plan method of Control Schedule |
| 22. | Minimize critical paths to work items that cannot be parallel |
| 23. | Plan and develop Cost Management |
| 24. | Plan Estimates Detail Costs |
| 25. | Plan and Determine Detail Budget Work |
| 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. | Project Owners and their partnerships |
| 40. | Contract Document Comprehension and Subcontract Content |
| 41. | Interpreting Preliminary Concept, Specification and Technical Drawing |
| 42. | Interpreting Bill of Quantity and Price List |
| 43. | Specifications and Project Administration Needs |
| 44. | Design and expand a lean organizational structure and maximize the empowerment of existing resources |
| 45. | Review for the Project Execution Plan to be implemented |
| 46. | Review for the Project Execution Budget to be implemented |
| 47. | Conducting and Driving All Human Resources, Materials and Equipments for Work Implementation |
| 48. | Preparing a complete bidding method to get competitive resources |
| 49. | Review of All resources to be involved based on site last condition |
| 50. | Monitoring the Implementation of Engineering Works Methods |
| 51. | Monitoring the Implementation of Resource Methods |
| 52. | Maintains lines of communication with all parties |
| 53. | Ensures quality of information prior to issuing |
| 54. | Take Active Role in the Beginning of Project Activity |
| 55. | Creates a team environment that promotes high performance |
| 56. | Builds and maintains effective relationships among all of team member |
| 57. | Motivates and mentor’s program for team members |
| 58. | Takes accountability for delivering the program |
| 59. | Uses influencing skills when required |
| 60. | Direct all work teams according to their expertise at the right time |
| 61. | Control and manage all types of work in an integrated manner |
| 62. | Builds and maintains the project team |
| 63. | Resolves conflict involving project team or stakeholders |
| 64. | Plans and manages for project success in an organized manner |
| 65. | Cognitive ability in managing job control in an integrated and comprehensive manner |
| 66. | Uses appropriate program management tools and techniques |
| 67. | Seeks opportunities to improve project outcome |
| 68. | Applying a familial attitude in avoiding internal conflicts and trust crises |
| 69. | apply attitudes and behaviours that are believed by everyone inside and outside the work environment |
| 70. | Control all resources effectively and efficiently |
| 71. | Periodically review the results orientation of each work item |
| 72. | Monitor each work item in doing efficiency and review |
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 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, 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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