Construction Planning of an Offshore Petroleum Platform

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The study evaluated the project life cycle for the construction of a fixed petroleum platform which comprises of the planning, design, fabrication, load-out, transportation, installation and commissioning phases.

The project life cycle, like several offshore structures located in open waters and exposed to severe forces must be planned in great details for a successful execution. It is therefore necessary to study and gather all necessary information on the construction of a platform with the objective of creating a client, consultant and contractor’s work breakdown structure (WBS) template in a project planning software. The results of this study eventually serve as a guide which can be adjusted to suit the planning and management for the construction of a fixed petroleum platform depending on the soil characteristics, environmental and operational parameters.

An oil platform is a large structure used to house workers and machinery needed to drill and then produce oil and natural gas in the ocean (Wikipedia 2007). There are different types of petroleum platforms and each of these types is chosen primarily due to water depth considerations, and secondarily due to the intended service and quantity of deck equipment necessary to perform its service. To develop a WBS for the construction of a fixed jacket petroleum platform, the following issues were investigated:

1) Planning: It takes into account operational considerations (i.e. the function, location, and orientation of the platform) and environmental considerations (including winds, tides, currents, ice, shallow gases, earthquakes and marine growth) (Sadeghi 2001),

2) Design: It analyzes the dead loads (i.e. weights of the platform structure and any permanent equipment and appurtenant structures which do not change with the mode of operation), live loads (loads imposed on the platform during its use and which may change either during a mode of operation or from one mode of operation to another) and environmental loads (loads imposed on the platform by natural phenomena including wind, current, wave, earthquake, snow, ice and earth movement),

1 This publication is part of a MSc.-thesis in Construction Management of the 1st author presented to Girne American University.
3) Fabrication: It takes into account the portion of the offshore platform, the jacket which is manufactured onshore and assembled either in close proximity to the manufacturing site or at the location where the offshore platform is to be positioned for production.

4) Transportation: It is the movement of the platform components from the fabrication yard to an installation site, using cargo barges which should be of adequate number, proper size and structural strength (American Petroleum Institute [API] 2001).

5) Installation: It consists of positioning and leveling the platform on the site and assembling the various components into a stable structure in accordance with the design drawings and specifications.

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements (PMBOK 2004). The project stakeholders which are primarily made up of the client, consultant and contractor are individuals and organizations actively involved in the project. The South Pars gas field and Resalat oil field projects in the Persian Gulf were reviewed to create a WBS for the project stakeholders and decomposed into project planning and management levels with each level giving a detailed description of works to be carried out.

In figure 1, the considered client’s WBS for level 1 of project planning and management is shown.

Figure 1. Client’s WBS for level 1 of Project Planning and Management
This can be decomposed further as follows: i) project integration which consists of assessing project needs, completing major studies and making recommendations, developing a project charter, developing a preliminary scope statement, and developing a project management plan, ii) site assessment which consists of identifying potential sites, assessing regulatory and environmental impacts, identifying project sites, recommending sites and applying for permits, iii) scope management which consists of developing a scope management plan and statement, iv) project design which consists of a conceptual and basic design, v) time/cost management which consists of activity definitions, sequencing, resource estimates and duration, vi) bidding process and selection of contractors which consist of advertisements to interested contractors, evaluation of received proposals and selection of the contractor, vii) detailed engineering, procurement, fabrication, load-out and transportation, installation, hookup and commissioning (i.e. the jacket, piling and topsides). Figure 2, shows the considered consultant’s WBS for level 1 of project planning and management.

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Figure 2. Consultant’s WBS for level 1 of Project Planning and Management

This can be decomposed further as follows: i) endorsements of basic design; would consist of revision of calculated notes, drawings, and technical specifications, procedures, MTO and listing of deficiencies and missed points, ii) performing calculations; would consist the performance of the following analyses: in-place, earthquake, fatigue, load-out, transportation, cathodic protection, sea fastening, launch/lift, installation and topside installation (Sadeghi 2001). Figure 3, shows the considered contractor’s WBS for level 1 of project planning and management. This can be decomposed further as follows: i) award of contract; would consist of receiving notice to proceed and signing of the contract, submission of bonds and insurance documents, and preparation and submitting the project schedule, ii) fabrication of materials, load-out and transportation, launch/lift and installation;
would consist of the jacket, piling and topsides, iii) delivery and close-out of project; would consist of submitting the shop drawings, as-built drawings and operational manuals.

The study identified the necessary workpackages required for the construction of an offshore petroleum platform. With the input of these levels in a project planning software, the client, consultant and contractor would be able to determine their roles and responsibilities for the execution of the platform construction as well as planning, monitoring, and controlling the scope of the project.

### References


