CEM 520 Term Paper

Contracting Practices in Mega Projects

EPC and EPCM

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Outline

- Introduction
- Types of Contracts
- Contracting Strategies
- The Difference between EPC & EPCM
- EPC or EPCM … Which one to choose ?
- Conclusion

Energy Demand

- The demand for energy is increasing every year
- (OPEC) need to expend the production capacities to meet the world's need of energy

→ Mega Projects

Mega projects

Mega projects are defined as projects with a capital cost of more than $ 500 million .

Project Team

- Different people from different organizations are grouped together to form the project team.

- This requires a organizational change that result in a **cooperative relationship**.

Cooperative Relationship

Partnering

Contracting

The Contract

- A well written "contract" shapes the behavior of the project participants.
- The contract should define clearly the *legal, financial and technical* aspects of the project.

Project's Phases

- The Development Phase

  Basic Engineering

- The Implementation Phase

  Detailed Engineering, Procurement & Construction

- **Flexibility of using contracting approaches**

EPC contractor

When one contractor performs the whole implementation phase

(Detailed Engineering, Procurement and Construction)

we call him an EPC contractor

EPCM contractor

EPCM contractor does the Detailed Engineering, Procurement and only Manage the Construction.

Types of Contracts

1. Fixed Price
2. Cost Reimbursable (Cost-Plus)
3. Unit Rate

Types of Contracts

- Fixed Price

Owner and contractor will agree on specific cost when signing the contract and this will not change (except in some situations).

Types of Contracts

- To avoid this risk, contractors put high contingency (some times to 15% of the contract price).
- To reduce the high cost associated with this type, owner is advised to clearly define the scope of work so that the contractors do not exaggerate the unforeseen costs.

Types of Contracts

- Cost Reimbursable (Cost-Plus)

Owner and contractor will agree on a target cost when signing the contract.

Types of Contracts

- The target cost will include two parts:
  - The cost of (labor, material, equipment, subcontractor and overhead)

    in addition to the contingency and profit.
  - The risk fee which could be fixed or variable.
- If the contractor built the project within the target cost he will get both parts, otherwise he will get only part a.

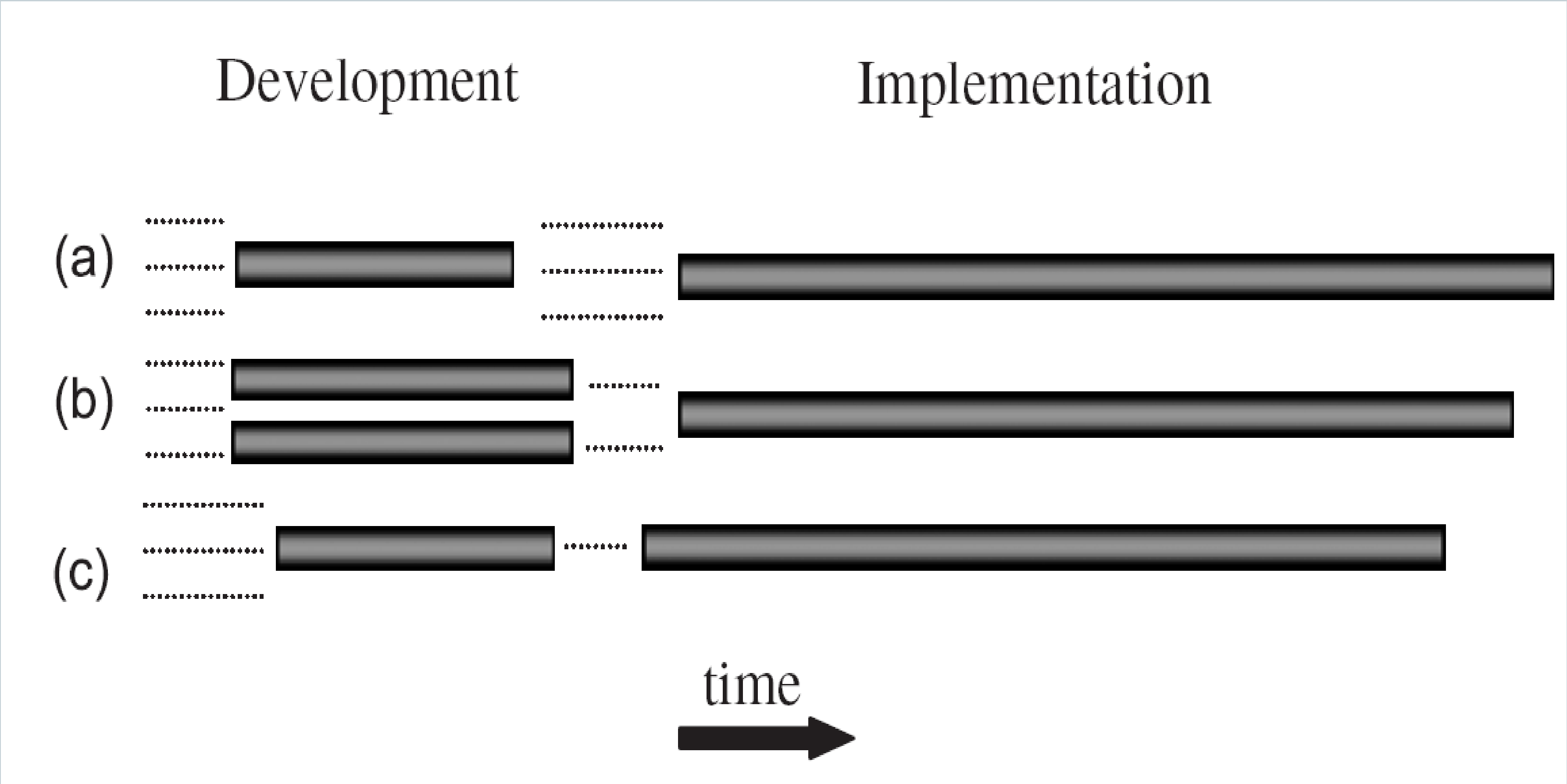
Types of Contracts

- Unit Rate

The project activates are known but the exact quantities are not.

The cost cannot be known until the completion of the project.

Contracting Strategies



Contracting Strategies

- All of contracting strategies involve competitive bidding between multiple contractors for the development phase.
- However, for the implementation phase, the number of competitors is different.
- Adopting one of the three strategies depends largely on the development phase.

Contracting Strategies

- The the development phase is usually called the Front End Engineering Development (FEED)

- The engineers set the design parameters, define the project scope and break down the project scope into packages according to the engineering disciplines involved.

- It allows the owner to test the market prices and seek competitive tendering.

Contracting Strategies

- The main contractor for the development phase should be a process supplier (licensor).
- A licensor is engineering company which has the technology (process engineering design) needed to implement the chemical process that is necessary for producing the final product of the facility.

Contracting Strategies

- The owner usually uses the cost reimbursable type of contract for the development stage.

- One of the factors that affect which contracting strategy to choose is the type of the licensor, for example whither he is an EPC contractor or not.

Contracting Strategies

Contracting Strategies

- The owner may continue with the same FEED contractor (licensor) if he is capable of developing the FEED package into detailed design and build the project.

- The contract usually will be based on similar terms and conditions used in the FEED stage.

- Sometimes a *joint venture* is established between the owner and the FEED contractor .

Contracting Strategies

Contracting Strategies

- The owner build a mechanism in the FEED contract (which is usually based on a cost reimbursable type) to convert it to fixed price contract after the completion of FEED.
- Owner does this to ensure that he can use fixed price contract besides the other two types because most contractors do not like to use the fixed price contract.

Contracting Strategies

The availability of contractors will decide how the owner will choose the type of contract

Contracting Strategies

<u>Few contractors</u>

FEED contractor will have a strong position

Now there are two possible scenarios :

- The owner will award the contract for the FEED contractor based on fixed price after negotiation on the prices without depending on pre-agreed mechanism in the FEED.
- The FEED contractor insists that he will build the project on cost reimbursable basis. This is essentially option 1.

Contracting Strategies

Good number of contractors

Also here there are two possible scenarios :

- Owner may appoint the FEED contractor (or other engineering or project management companies) to assist the owner in contracting with third party contractor which will develop the detail design, procure the materials and construct the project.
- By this, the owner chooses to implement the project using the EPC route.

Contracting Strategies

<u>Good number of contractors</u>

- The second scenario is similar to the one above except that the third party contractor will not construct the project but will manage the construction process.
- By this, the owner chooses to implement the project using the EPCM route.

EPC

- EPC is a contracting approach in which only one general contractor is responsible for delivering the complete facility to the owner who need only to 'turn a key' to start the operation.
- Essentially this a Lump Sum Turn Key (LSTK) type of contract, the term used in the traditional construction project contracts.

EPC

- You remember that (Lump Sum) indicate the pricing method which is fixed price and (Turn Key) indicate the delivery method which is design (engineering) and construction.

- So, if it is LSTK type why the name changed to EPC? One reason for that is to emphasis the importance of **Procurement** which is an important activity in the oil and gas projects.

The Difference between EPC & EPCM

- For both EPC and EPCM, the **(C)** letter indicates the construction of the project.
- However, in the EPCM it is associated with the (M) letter which is an indication of Management. Therefore, CM means Construction Management.
- It is in the construction stage where the main difference between EPC and EPCM comes.

The Difference between EPC & EPCM

- The EPC contractor is the responsible contractor for constructing the project according to the design package prepared during the engineering stage **and** the equipments and materials purchased during the procurement stage.

The Difference between EPC & EPCM

- In the other hand, the EPCM contractor is not responsible for constructing the project.

- EPCM contractor manages the construction which done by other parties. He acts as the owner representative and creates (on behalf of the owner) a direct contractual relationship between the owner and construction contractors, subcontractors and suppliers.

- After all, the owner will be responsible for construction.

The Difference between EPC & EPCM

- EPCM in fact is a professional services contract unlike the EPC contract which is considered as construction contract.

The Difference between EPC & EPCM

- EPC contract is based on the concept of **'single point of responsibility'**.
- The EPC contractor is the general contractor who performs the work directly by his own staff or indirectly by vendors and subcontractors. For the owner he is the only single point of responsibility.
- The owner has little authority to intervene during the construction.

The Difference between EPC & EPCM

- EPCM contract has more flexibility.
- EPCM is selected when the owner wants greater role in procuring the equipments and selecting the construction contractors.
- Therefore, the owner has more control on the project.
- During construction, the EPCM contractor manages and administrates the construction contracts.

EPC or EPCM … Which one to choose ?

- There are many criteria for selecting EPC or EPCM. In this paper we will explore **risk sharing** criteria.

EPC or EPCM … Which one to choose ?

- The EPC contract is usually priced using the fixed price method whereas the EPCM uses the cost reimbursable method.

EPC or EPCM … Which one to choose ?

- In the cost reimbursable contract, the risk is uniform during the project life cycle and do not depend on the project stage.
- However, this is not the case in the fixed price contract. For example, changing the scope of work during design stage has different effect than in the construction stage.

EPC or EPCM … Which one to choose ?

- The main difference between the EPC and EPCM is in the risk distribution between owner and contractor.

EPC or EPCM … Which one to choose ?

- In EPC contract, the allocation of most of the risk is to the contractor.
- The contractor will put higher contingency to account for these risks, therefore *the cost of EPC is usually higher than the cost of EPCM*.

EPC or EPCM … Which one to choose ?

- On the other hand, the owner in EPCM assumes most of the risks as he is the responsible for the approval and review of the engineering, procurement and contraction processes.

- The owner actually is the one who derives the project.

EPC or EPCM … Which one to choose ?

- In EPCM contract, the owner emphases on the reducing the high cost associated with EPC option although he will have complicated contractual relationships and possible delays in the schedule.

- *The cost in EPC is higher than in EPCM but the time is shorter*. Therefore, owner should compromise between the two.

Conclusion

- In this paper, we have showed that many mega projects are expected in the next years due to increase demand for oil and gas as sources of energy.
- We have discussed contracting issues related to these projects.
- General and detailed contracting strategies were presented.
- More emphasis was given to the EPC and EPCM contracts since they are the two common types used today in the oil and gas projects.

Thank You