NEPAL ENGINEERING COUNCIL

LICENSE EXAMINATION PREPARATION COURSE
FOR
CIVIL ENGINEERS

ON
ENGINEERING ECONOMICS

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10.4 Project Management

- Information system
- Project risk analysis and management
- Project financing
- Tender and its process
- Contract management.

Information System

- All firms/organizations operate in dynamic environment i.e continuous changes are occurring in the firms.
- To respond to these changes, the managers need to have accurate and timely information.
- The project management information system (PMIS) provides such information to managers.

PMIS deals with the information of the following:

a. People
b. Equipment
c. Procedure

Here, dealing means : Obtaining, storing, retrieving and analyzing the information as and when needed.

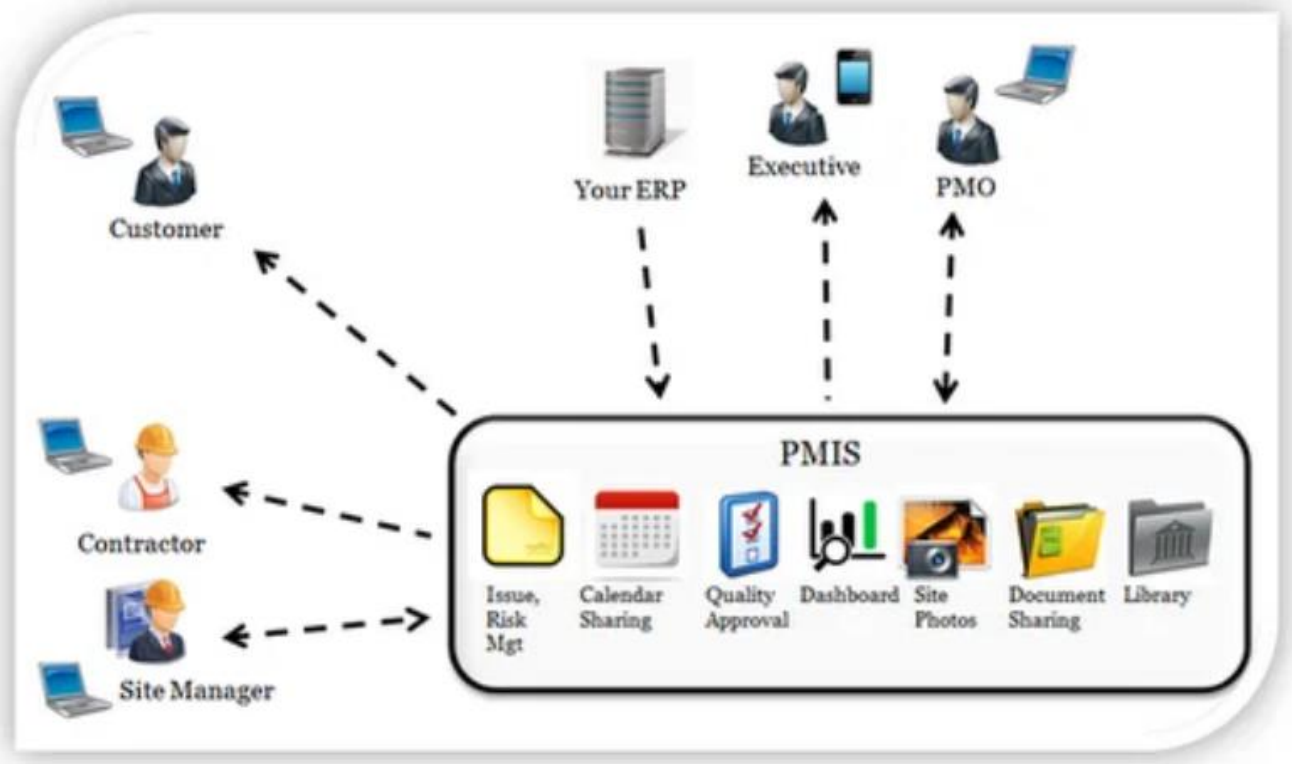
Information System Working

- A separate department/officer may be allotted with the task of management of the information in the organization
- PMIS needs separate manpower, funds , equipment and guidelines to operate itself.

The main task of PMIS is :

a. Policy flow from management

b. Information flow to management



Objectives of PMIS

- To reduce project duration
- To make better use of resources
- To increase productivity
- To decrease price/cost
- To bring new facts to knowledge
- To reduce uncertainty in decision making
- To communicate effectively with the users
- To interpret feedbacks properly and work accordingly

Project Risk Analysis and Management

Risk:

- Risk is an uncertain event , if occurs, has a positive or a negative effect on a project
- A risk has a cause and , if it occurs , a consequence.

Risk Management:

- It is the process of identifying, quantifying and responding to risk throughout the life of the project to meet the project objectives .
- Risk management aims to improve the likelihood that a project will be completed on time and on budget .

Elements of Risk Management:

a. Risk identification
b. Risk quantification
c. Risk response development

Sources of Project Risk

1. Change in project scope and requirements
2. Design errors and omissions
3. Inadequately defined roles and responsibilities
4. Inaccurate cost and schedule estimates
5. Insufficient skilled staff
6. Force majeure
7. New technology

Types of Project Risk:

A. INTERNAL RISK

a. Local

- Labor
- Materials
- Plant
- Site
- Sub-contractor

b. Global

- Client
- Design
- Environmental
- Financial
- Management
- Location

B. EXTERNAL RISK

a. Economic

b. Physical

c. Political

d. Technological

Effective Management of Project Risk

1. Risk Management Planning
2. Risk Identification
3. Qualitative and Quantitative Risk Analysis
4. Risk Response Planning
5. Risk Monitoring and Controlling

Project Financing

- Project financing is a method of funding projects that involve substantial capital investment and long-term cash flow.
- The funding is secured primarily based on the cash flow and assets of the project itself, rather than the creditworthiness or assets of the project sponsors

Capital Budgeting Decision

- It is the investment decision of the firm
- It is the firm's decision to invest its current funds most efficiently in long term activities
- Answers questions like where to invest? How to invest?

The investment decision of the firm includes following types of investment

a. Addition, modification or replacement
b. Introducing new product
c. Expanding the business

- The investment decision involves comparison between different alternatives or proposals
- Each of the proposal should be evaluated on the criteria that suitably fits the objective of the organization.

Investment Decision Criteria

A. Traditional Criteria:

a. Payback Period

i. Simple Payback Period

ii. Discounted Payback Period

b. Accounting Rate of Return (ARR)

- ARR is obtained by dividing the average income after taxes by the average investment

ARR = (Average income) / (Average investment)

Avg. Income = (Income – Expenses-Taxes) / No. of years

Avg. Investment = (Original investment + Salvage value) /2

- Acceptance rule : Accept the project if ARR is more than the minimum rate established by the management

Investment Decision Criteria

B. Discounted cash flow criteria:

a. Net present value / Net future value / Net annual value
b. IRR
c. Profitability index or B/C ratio

Capital Structure Planning

Capital:

Capital is the term describing wealth, which may be utilized to economic advantage.

Capital Structure:

It refers to the composition of long term sources of fund to finance the investment such as

a. Equity share: (profit is shared in the form of dividends, the share holders are considered to be the owner of the company)
b. Long term debt: (Interest is paid but profit is not shared)
c. Preference share
d. Debentures
e. Reserves
f. Surplus

- Preference Share Capital:
  - Characteristics of both equity share and debt.
  - Two types of dividends are provided to preference share holders
    a. Dividend based on fixed % which is paid after tax deduction
    b. Dividend based on earning (like dividend paid to equity shareholders)
  - Preference share holder are also considered to be the owner of the company but don’t have voting rights

- Debenture :
  - It is the bond issued without any collateral
  - Also known as unsecured bond
  - A company having strong credit position and highly profitable investment and high amount of assets issue debentures.

Tender and its process and contract management

Contract

Contract is define as agreement concluded between two or more parties for performing or not performing any work.

The main objective of entering to contract is to seek legal action/ remedies if any party breach the contract.

Elements of contract :

a. Two or more competent parties
b. Offer and acceptance
c. Intention of creating legal relations
d. Free consent
e. Lawful purpose
f. Possibility of performance
g. Written and registration

Classification of contract

In construction, there are two types of contract-

1. Competitive bid contract,
2. Negotiated contract.

1. Competitive bid contract: It is executed on the competitive bid basis. It leads towards low contract price but with high quality works. it is practiced two ways-

a. Lump or stipulated sum contract, and

b. Unit price contract.

2. Negotiated contract: If the owner wishes to assign the construction work to a reliable party through a dialogue, it is then termed as Negotiated contract. The owner is free to select any party.. They are of the following types-

1. Cost + percent of cost,
2. Cost + fixed fee,
3. Cost + Fixed fee + Profit sharing clause, and
4. Cost + sliding fee.

Contractor's fee = R(2T-A), where, R = base %age rate

Classification of contract

On the basis of responsibilities allocated, the contract can be classified into following types:

- Conventional/ Traditional Approach
- Owner-Builder Approach
- Design–Build or Design- Manage (Turn Key)
- Build-Own-Operate-Transfer (BOOT)
- Construction Management Contract
- EPC Contract

BOOT projects are contractor financed turnkey contracts.

EPC contract is also known as LumpSum Turnkey Contract

METHODS OF WORK EXECUTION/CONTRACTING

A. Force Account :

Procurement of works, goods or services by the entity itself.

Limit upto Rs. 1 lakh

B. Direct Procurement:

- Procurement of works, goods or services from the contractors in the standing list of the entity
- Limit upto Rs. 10 lakh (for goods and works)
- Limit upto Rs. 5 lakh (for consulting)

<u>Direct procurement can be done in following conditions</u>:

1. If only one supplier or construction entrepreneur or consultant or service provider has the technical efficiency or capacity to fulfill the procurement requirement.
2. If only one supplier has the exclusive right to supply the goods to be procured and no other appropriate alternative is available.
3. If the services of a particular consultant with his unique qualifications is immediately needed for the concerned work or where the service of the same consultant is indispensable.

C. Sealed Quotation

- Limit upto Rs. 20 lakh
- Notice shall be published in national newspaper by giving a period of at least 15 days

D. National Competitive Bidding

- Limit Rs. 20 lakh to Rs. 5 Billion
- Notice shall be published in national newspaper by giving a period of at least 30 days

E. International Competitive Bidding

- Limit above Rs. 5 Billion
- For projects with estimates between Rs. 5 Billion and Rs. 10 Billion, there must be the involvement of domestic contractor (At least 25% share)
- 5% Domestic preference is given i.e. if a domestic contractor is involved, then the contract is awarded to such J.V even if their bid is 5% more than the lowest
- Notice shall be published in national/international English newspaper by giving a period of at least 45 days

Work through User’s Committee

- Cost estimate up to Rs. 5 crore may be carried out or obtained from users committee
- Rs 5 crore (For Co- Operatives)
- Rs .1 Crore (For Normal user’s committee)

- Works with heavy equipment is prevented in this type i.e only labour intensive works are to be done through user’s committee

Tendering/Bidding

Tender is an offer in writing by the tenderer (the person who offer the tender) to execute some specifies work or to supply some specified some goods at certain rate/ amount within a fixed time period under certain conditions of agreement

Purpose of tendering;

a. Transparent use of fund
b. Use of money in intended purpose
c. Equal opportunity to all eligible bidders

Process of tendering

- Bid Documents Preparation
- Invitation to Tender/Bid
- Sales and Registration of Bid Documents
- Bid Submission (Earnest money by all bidder)

<- 2-3% of estimated amount. (Cost estimate should be given for projects of estimated cost upto 2 Crores)

- Bid Opening
- Bid Evaluation
- Letter of Intent
- Letter of Acceptance (Performance Security by successful bidder)

<- Performance security amount = 5% of Bid amount if bid is within 85% of cost estimate
= [(0.85 x Cost estimate – Bid Price) x 0.5] + 5% of Bid Price , otherwise

- Contract
- Notice to proceed – after which the actual work start

Details of Tender Notice

1. Name of the authority publishing the notice
2. First date of publication
3. Brief description of the job.
4. Date time and place where and when the tender document is available and to be submitted.
5. Cost of the tender document
6. Cost estimate (optional) up to 2 crore work
7. Date, time and place of opening bid
8. Earnest money and security deposit amount
9. Expected date of acceptance of successful bids etc.

NOTE:

- The earnest money is returned to the unsuccessful bidder
- Within Fifteen (15) days of the receipt of Letter of Acceptance from the Employer, performance security should be deposited
- This is refunded after completion of defect liability period (DLP) i.e. Maintenance period.
- DLP generally taken as 365 days
- Amount of earnest money and performance security = Double the amount for foreign contractor.
- Liquidated damage: The damage occurred to the owner, due to the delay in completion of job in time.

Fine is charged to the contractor in case of delay @ of 0.05% of contract amount per day but not exceeding 10 %

Parts of Bidding Documents

- PART I Bidding Procedures
  - Section I Instructions to Bidders (ITB)
  - Section II Bid Data Sheet (BDS)
  - Section III Evaluation and Qualification Criteria (EQC)
  - Section IV Bidding Forms (BDF)
- PART II Requirements
  - Section V Works Requirements (WRQ)
  - Section VI Bill of Quantities (BOQ)
- PART III Conditions of Contract and Contract Forms
  - Section VII General Conditions of Contract (GCC)
  - Section VIII Special Conditions of Contract (SCC)
  - Section IX Contract Forms (COF)

Contract Document

- The document that describes in detail the scope of the agreement and responsibilities of the parties of it is called "Contract document".
- All the documents must be accurately cross referred according to the following serial.

i. The contract agreement

ii. The letter of acceptance

iii. The tender

iv. Conditions of contract
   - Special condition of contract/ condition of particular application
   - General condition of contract

v. The specifications

vi. The drawings

vii. Priced bill of quantities

viii. Addenda (It clarifies corrects and provide additional information)

Pre Qualification

- It is a kind of short listing of eligible bidder and avoids crowding of bidder.
- Pre qualification is decided on the basis of the following criterias:

i. Experience and past performance on similar contracts.

ii. Capabilities with respect to personnel, equipments, and construction and manufacturing facilities

iii. Financial position

iv. Litigation history

Note : PQ is not required when amount of the work is less than 20 Million rupees(Rs. 2 crore)

Post Qualification

- All the eligible bidders participate in the bidding process.
- It may include single envelop system (Financial proposal only) or double envelop system (Financial proposal in a envelop and technical proposal in another envelop).
- In double envelop system successful bidders are selected by adopting one of the three following methods:

i. Short list from technical proposal and select the lowest bidder to award the contact. (Mostly followed in Nepal)

ii. Select the lowest bidder first and check the technical proposal. If technical proposal is ok select the party. If technical proposal is not ok select next lowest bidder and check the technical proposal.

iii. Give weight to both technical proposal as well as financial proposal. Select the bidder getting highest mark.

Some Key Provisions

- Mobilization Fund : up to 20% (Half in first installment and half in 2nd Installment)
- Retention Money: 5 % of total billing amount is retained as retention money. Paid after Defect Liability Period
- Price Escalation: Construction Contract having longer duration (> 12 months or multi year contract) should have price escalation clause. Should not exceed 25% of original price

MCQs

1. What is the purpose of project risk analysis and management?

a) To eliminate all project risks completely

b) To identify and assess potential project risks

c) To ignore project risks and proceed with the project

d) To allocate all project risks to external stakeholders

2.Which of the following is a source of project financing?

a) Venture capitalists

b) Project charter

c) Project team members

d) Project auditors

MCQs

3. What is the purpose of project financing?

a) To determine the project's scope and objectives

b) To ensure the project is completed on time

c) To secure financial resources for project activities

d) To assess and manage project risks

4. What is the primary objective of the tendering process in Nepal?

a) To maximize profits for the project owner

b) To select the lowest bidder for the project

c) To ensure transparency and fairness in procurement

d) To expedite the project execution timeline

MCQs

5 Which government body is responsible for overseeing the tendering process in Nepal?

a) National Planning Commission

b) Ministry of Finance

c) Public Procurement Monitoring Office

d) Department of Commerce

6 Which of the following element is the source of risk to a project ?

a. New technology
b. Force majeure
c. Lack of skilled staff
d. All of the above

MCQs

7. The political factors come under which of the following categories of risk ?

a. Internal risk
b. External risk
c. Political factor is not a source of risk
d. None of the above

8. The formula for ARR is :

a. ARR = (Average investment) / (Average income)
b. ARR = (Average O&M expenses) / (Average investment)
c. ARR = (Average Liability) / (Average investment)
d. ARR = (Average income) / (Average investment)

MCQs

9. The bond issued without any collateral is called

a. Preference share
b. Equity share
c. Debenture
d. Debt capital

10. If two parties enter into an agreement for performing or not performing any work, then it is known as:

a. Contract
b. Tender
c. Procurement
d. Adjudication

MCQs

11. . The process of composing/raising the required fund from different sources such as equity, preferred stock, bond and debenture is known as

a) capital structure planning

b) project financing

c) capital budgeting decision

d) deducing earning per share

12. Which of the type of contract is followed in construction of majority of Hydropower Projects in Nepal /

a. EPC contract
b. BOOT contract
c. Conventional Contract
d. Construction Management Contract

MCQs

13. What is the upper limit of the cost of the works to be concluded through National competitive Bidding?

a. Rs. 2 Billion
b. Rs. 3 Billion
c. Rs. 5 Billion
d. Rs. 7 Billion

14 . The price escalation is considered for project with life of

a. Less than a year
b. More than a year
c. More than 15 months
d. More than 3 years

MCQs

15 . If cost estimate is Rs. 1 crore. The Bid amount submitted by the contractor is Rs. 80 Lakhs, then the possible amount of performance security is

a. 6 Lakhs
b. 6.5 Lakhs
c. 7.5 Lakhs
d. 8 Lakhs

THANK YOU