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A Precise Guide to Construction Project Management and Project Accounting



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A Precise Guide to
**Construction Project Management
and Project Accounting**

By: Munir Ahmad – FCMA

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Foreword



It gives me immense pleasure to present this booklet titled **‘A Precise Guide to Construction Project Management and Project Accounting’** authored by Mr. Munir Ahmed, FCMA who is working as Director Finance and Administration at the PMO – Punjab Barrages Rehabilitation and Modernization Projects, Lahore. Based on his accumulated knowledge and experience in construction project management, Mr. Munir Ahmed has developed this precise guide which would be a useful reference guide for our members and students aspiring to join the construction industry.

The construction industry plays a pivotal role in the economic and social development of any nation. The pace of economic growth of any country is normally measured in terms of development of its physical infrastructures such as roads, highways, bridges and buildings. In this context, the role of construction project development is significant. The level of success in carrying out construction project development activities depends largely on the quality of managerial, financial, technical and organizational performance. Mr. Munir Ahmed has dealt with these aspects in a very concise manner.

I congratulate Mr. Munir Ahmed and the Research and Publications Committee of the Institute for accomplishing this task and presenting such a useful publication for benefit of our members, students, professionals, businessmen and other relevant stakeholders.

Zia Ul Mustafa, FCMA
Chief Executive and President

Preface



I would like to congratulate Mr. Munir Ahmed for making a worthwhile contribution by developing this document titled '**A Precise Guide on Construction Project Management and Project Accounting**' which, I am sure, would prove to be a useful reference guide for those who want to understand the basics of the construction project management.

The booklet has been written in a very simple and concise manner, outlining the different phases in construction project management such as how to prepare project proposal; how to award contract; how to plan and schedule the project; how procurement, sub-contracting and outsourcing is carried out; how risk assessment is performed; how inventory, plant and machinery and human resource are managed and how the project is executed. In addition, the booklet also explains briefly about the project accounting and reporting as well as project cost management. Some standards formats of cost statement issued in different phases of the construction project has also been included which would help in better understanding about the documentation.

I am thankful to the Research and Publications Committee and the Secretariat for their efforts in developing this booklet and hope that it would be a useful source of reference for our members and students as well those involved in construction industry.

Shahzad Ahmad Awan, FCMA
Chairman, Research & Publications

About the Author



Mr. Munir Ahmad is a Fellow member of Institute of Cost and Management Accountants of Pakistan and has done MBA from the University of Central Punjab. He has around thirty years working experience with leading MNC's and Public sector organizations such as Glaxosmithkline, KSB, Unilever Best Foods, Descon and Punjab Building Department.

The major areas of Mr. Munir Ahmed's expertise are Business Strategy, Business Information System, Financial Planning, Project Management, Performance Planning/Management, Performance Audit, Enterprise Controlling, International Corporate Reporting, etc. He carried out consulting assignments in Pakistan, UAE and KSA. He also conducted training on effective project management in UAE and on ERP in Saudi Arabia. Mr. Munir designed a campaign on "Let's Build A Better Nation" at Lahore. He has also co-authored a book "A Precise Guide to Internal Audit".

Mr. Munir also served as Program Manager at the Executive Development Center of the University of Lahore. He has conducted training workshops on Budgeting and Control for professionals and Oracle Application, organized by Oracle Corporation USA. He has also conducted workshops on Balanced Scorecard, Business Planning and Control.

Chapter 1

Overview of Construction Industry

Global Overview

- Construction is regarded as the most significant economic sector in the world and accounts for a major proportion of GDP in most of the countries.
- This sector plays a pivotal role in the global economic growth and contributes around 13.5 percent to the world GDP.
- Construction industry is the largest employer in the world and it is estimated that around 100 million people i.e. 7% of total employed labour force in the world, is in construction industry.
- Construction industry is estimated to consume around 50% of world's resources and one of the biggest sources of foreign exchange earnings for many countries.
- Construction industry in China employs 7% of total work force and contributes around 9% in country's GDP. In UAE, share of construction in GDP is 8 percent.

Pakistan Overview

- Construction is the second largest economic sector in Pakistan after agriculture. This sector is providing jobs to around 12 to 14 million of skilled, semi and unskilled workers in Pakistan.
- The Construction industry of Pakistan contributes a share of 2% to 2.5% in the national GDP as against the regional average of 5 percent. In 2012-2013, contribution to GDP was 2.4 percent. The share of construction in GDP has declined during last two decades due to steep rise in prices of raw material, funds shortage for PSDP projects and scarcity of financing opportunities.

- Construction industry in Pakistan supports more than 40 major allied industries of construction material such as cement, iron, steel, marble, electrical works, sanitary works, transport etc.
- Construction industry consumes products of almost 100 industries whose production depends to a great extent on growth of this industry.
- Construction industry in Pakistan consumes almost 80 percent of the national development budget and pays highest tax per million turnover.
- Construction industry in Pakistan contributes 13.5% to the world GDP and employs around 7% of the total employed labour force in the world.
- Construction industry in Pakistan has been declared 'industry status' which makes it entitled to avail all kinds of fiscal incentives and special treatment as envisaged in the investment policy.
- Construction sector achieved a phenomenal growth of 11.3% in FY 2013-14 as compared to a very dismal growth of negative 1.7% last year i.e. in 2012-13. This impressive growth of the construction sector surpassed the government's estimates by a margin of 5.3% which had aimed for a 6% growth in the construction sector in FY 2013-14. This remarkable growth is expected to have a multiplier effect on the economy as well as on employment and GDP.
- Construction is one of the potential components of industries and as reported in the Economic Survey of Pakistan, the share of construction in industrial sector stood at 11.48% in 2013-14.
- The government of Pakistan has identified Housing and Construction industry as the driver of economic growth. A spurt in activity in this sector unleashes a chain reaction in allied industries.
- During 2012-2013, construction and mining machinery worth USD 32.7 million were imported into Pakistan.
- At present, there is annual shortfall of 300,000 housing units in Pakistan. This is in addition to the backlog of 8 million housing units, as estimated by the State Bank of Pakistan.

Chapter 2

Understanding the Basics of Construction Project

One major problem in implementation of good quality system is non-documentation of the same. This is an effort to help different stake holders to understand the system.

Business is the process of value exchange through creation and exchange of products and services for profit realization. Most of products and services are produced through discrete manufacturing or process manufacturing. For unique products and services special projects are required to be planned, executed and controlled.

Construction Industry is a major segment of our economy and plays a major role in national development. Construction is carried out through project management.

Construction Projects may be categorized as:

1. Residential
2. Commercial
3. Industrial
4. Infrastructure

Projects may be planned, executed, controlled and commissioned internally by the organization or may be entrusted to external organization for consideration. Certain Organizations are specialized for certain types of projects.

Project Management Institute, USA is the prime standard setting body of the World. PmBok (Project Management Body of Knowledge) is prime body of knowledge on Project Management. It is based on knowledge areas, processes and process groups. Likewise PRINCE II is also a body of knowledge.

This manual has been written for organizations doing construction project management. There are several phases in construction project management like Business Development, Proposal, planning, execution, close out and commissioning. This manual is applicable for all phases except commissioning, operations and maintenance.

Strategic Choice

There are wide categories in construction projects like Infrastructure, Water / Waste Water, Plant Construction, Oil/Gas, Aerospace, Ship Building, off shore drilling etc. Projects can also be categorized according to local and overseas. Further projects can be categorized public sector or private client based.

Only large scale organization can opt for unlimited categories. Other organizations make choice according to specific capabilities and capacities.

Further it is decided that which activities company will execute at own and which shall be executed through sub contracting, out sourcing. For large scale projects companies may form joint ventures.

There is also choice to be made for projected customer. It may be public sector, commercial, industrial or real estate developers.

Marketing / Business Development

Marketing or business development is a key function in Construction Management business. It starts with complete analysis of prospect clients and upcoming projects and follows with relationship development and management with prospect client organization.

In public sector and large scale organizations there is system of registrations. These are normally done on annual basis. In Public sector, these registrations are done on the basis of registration with Pakistan Engineering Council (PEC). PEC registers contracting organization according to capacities and experience.

Public Sector projects are included in Annual Development Program of Federal and Provincial with details of funding available. Contracting Organizations develop marketing plan according to the projects appearing in annual development plan. Donor organizations prepare their annual development plans. Large size private companies also prepare annual capital expenditure plans or announce major projects to be taken. It is normal to have pre-qualification of contracting organization for large scale projects.

The construction companies can get information from following sources:

- Tender Service
- Print Media
- Consulting companies

Tender Documents (detail of Work, specification and contract conditions) are issued only to the prequalified companies.

Business Development Department is responsible for making the Marketing Plan, Registrations, Prequalification, receipt of tender documents and submission of the same to prospect client after completion from the Proposal or Bidding department.

Business Development Department obtains the tender documents and get bid or no bid decision from the management. In case of bidding, business development department approaches the Proposal department for proposal. After getting the bid approved, the business development department may go for the bidding.

Chapter 3

Preparing Project Proposal and Awarding Contract

Proposal is project cost proposed to the prospect client. This may include Technical, Commercial and Financial proposal. This is one of the most important phases in the construction project management. Large scale projects can have lot of uncertainties. It is the responsibility of Proposal department to remove maximum possible uncertainties.

Process of proposal starts with review of tender documents. Study of implied documents like relevant classes of FIDIC, applicable quality standard, Purchase regulatory authority rules, tax law is also necessary. In most of the client provides an engineer estimate. Visit of proposed construction facility is must for proposal team.

WBS (Work Break Down Structure) is process of division of project into smaller executable units. It is first step towards project cost estimate. Computer Software like Primavera or MS Project are normally used. Plan at lowest possible level will be prepared. Work Packages shall be designed for each activity. These are divided into material, labour, sub contracting, consumables, equipment, tools utilization per unit activity. The Proposal Department will request the Procurement Department to arrange quotes from suppliers and subcontractors.

Project Schedule will be prepared on receipt of all cost items. Resources shall be loaded to activities. This will provide project cost estimate. This process can be completed using MS Excel. One has to take care of travelling, boarding, lodging, site facilities, transportation, contingencies, risk etc needs to be provided.

Care should be taken as to whether sales tax is reimbursable or included in the cost. Construction contracts are exempt from levy of Federal Sales Tax, so sale tax on procurement cannot be claimed as input sales tax. So it should be included in the cost.

After completion of draft proposal, it will be presented to the management for review to senior management along with synopsis. Management may approve for participation in the bid, revision or refusal. Submission is normally associated with bid bond or call deposit receipts (CDR) as certain percentage of contract. Organization can adopt any format for Internal processing for approval but proposal to projected client shall have to be submitted in required format and annexure.

Bidding is carried out by the prospect client according to stipulated declared procedures. Criteria for award of contract may differ from client to client. There may be financial, technical and commercial criteria.

Contract Management

Projects may be awarded as a result of competitive bidding or negotiation.

Projected client may ask to further negotiate the proposal. Finally proposal is either accepted or rejected by the client. On acceptance of proposal the same is converted into contract. No contract can be ultra virus the law of the country. In most of the cases there is a condition of performance bond. Contractor needs to submit performance or call deposit receipt. Amount deposited as bid bond may also get adjusted.

In the contract, client may provide details of managing staff, decision makers, course of action in case of dispute general conditions to sub contract, applicable standards and laws. Dispute may be resolved by mutual meetings, arbitration or through court of law.

Project Team Organization

After the award of the project, the first task for management is to appoint a project team and decide about the type of the organization i-e line, matrix or mixed. We assume that it is a line and staff organization and Project Manager with all the authority and responsibility. The size of project team is based on size, complexity and origin of project. Normally, the following officials and staff are taken on board:

1. Project Manager
2. Construction Manager
3. Planning Manager
4. Procurement and Subcontracting Manager
5. Quality Assurance Manager
6. HR/Administration Manager
7. Warehouse and Logistics Manager
8. Manager Plant and Machinery
9. Financial Controller

Project specific job descriptions of all managers, supervisors and staff are framed and agreed. In team formation it is said that it works in the sequence of forming, norming, storming and performing. Conflicts are major reasons of storming in teams. Project teams are assembled for a limited period. We have to make efforts for bonding and jelling of teams for performance.

Communication Management

Communication up, down and across the organization is very important. Communication with outside the organization is very critical.

Well defined discipline is required to establish the process of quality communication across the organization and outside the organization. Formats and channels are required to be defined and established both of internal and external communication.

There should be clearly defined discipline for emails, telephonic and verbal communication. Record of all sort of communication must be kept as permanent record for future reference.

Chapter 4

Planning and Scheduling

After award of project, Project Manager will establish his office. The Project Manager will receive all relevant papers from proposal and business development department and arrange a detail briefing for his team.

Planning Manager will prepare detailed plan at level most appropriate for the project. Normally planning upto level four should be considered.

- ✓ Level 1=Discipline
- ✓ Level 2=Area
- ✓ Level 3=Zone
- ✓ Level 4=Activity

Planning Manager will appoint as many Discipline Zone, Area planners as required by the project WBS. All the executable activities shall be entered on project planning software. Time duration of each activity will be entered. Dependencies shall be marked and critical path ascertained. Material and non Material resources shall be loaded to activities. Time fenced budget will be obtained.

On completion of detailed plan Material Requirement Plan will be prepared.

Proposal or Bid will be converted to Revision 0 budget. Project Team will discuss the same in detail. In case of major variation from proposal Revision 1 will be prepared. Normally, prices taken in proposal are not very effective and based on history and budgetary quotes. These are economized by having negotiated quotes. Project life based, one year, three month, one money and one week schedules be prepared.

Financial Controller will prepare monthly projected profit and loss and cash flow. In case of some project based balance sheet may also necessary.

Planning Department will issue material requirement plan and sub contracting schedule to sub contracting. Manpower requirement schedule will be issued to Human Resource / Administration department for arrangement.

Planning department will further share plans and schedule with Construction Managers and issue daily schedule and time sheet at appropriate level to construction manager or his designated staff. Planning will also receive filled daily schedule and time sheet from construction manager or his designated staff for entry into the system. It will then issue project progress report to relevant corners for comments and feedback.

Plans and schedules be revised regularly to counter variations and change orders.

Mobilization

Normally client requires submission of plan by the contractor prior to start of practical work at site. This plan may be different from working plan of the contractor. Project Manager will arrange meeting with competent authority and submit working plan for approval. He will further arrange possession of site to mobilize. On availability of site, he will move to the site. Erection of site facilities shall be started according to plan. Manpower shall be moved according to plan so are the other resources.

Document Controlling

One department is normally established to control all kinds of documents like drawings, work instructions. The Document controller designs a scheme of coding of all documents. He receive documents from client, consultant, design and quality etc. and makes as many copies of document as required. He issues documents for construction, planning etc. He keeps complete track of movement of all documents.

Chapter 5

Risk Assessment and Assurance

Construction projects are very uncertain. Very few projects are completed on time and within budget. There are lots of risk associated with construction projects such as:

Financial Risk :

There may be risk that company may not be able to meet financing requirements. There may be risk that company may not be able to pay its creditors on time.

Commercial Risk

There is risk that company may not be able to arrange required supplies and sub contracts.

Technical Risk

There is risk that company may fail to design the project in detail.

Legal Risk

There may be changes in the legislatures which adversely affect the company.

There are internal and external factors associated with these risks. Contractor need to assess the nature and quantum of risks.

There may be following means against risk assurance:

- Avoid the Risk
- Transfer the Risk
- Expose to Risk

This is done by risk prioritization as high, medium and low.

Chapter 6

Procurement, Sub-Contracting and Outsourcing

Construction projects are composed of material, man power, sub contracting, plant and machinery, management and supervision, site facilities etc.

Procurement is a major function in construction projects. It provide support in proposal and construction. On receipt of schedule from planning along with procurement budget, procurement analyze the demand with respect to cost and time.

Procurement is divided into two parts: (1) Local Purchase, and (2) Imports

It can further be divided into following categories:

- Major Construction Materials
- Project Specific Items
- Consumables
- Loose Tools
- Plant and Machinery
- Others

Procurement will try to commit rates on project life basis. It will get quotes and per-forma invoices from suppliers, distributors, wholesaler/ dealers and retailers. There should be at least three quotes in case of availability and priority.

On receipt of quote per-invoice comparative statement will be prepared for approval. In case of variation from budget, the same will be got approved from the management which is project manager in most of the cases.

On approval of comparative statement, Purchase Order will be issued. Normally integrated ERP systems are used for this purpose. In case of imported materials contract or letter of credit will be issued by the bank.

On receipt of material at site, goods received note/ purchase receipt/ receipt note (organizations use different names) will be issued by the store department. Some organization use same document as Inspection and some use separate document.

Copy of Purchase Order, Goods Receipt Note, Inspection Report and Supplier Commercial Invoice is sent to Finance Department for payment. In integrated system, these documents are entered in the system. Finance Department make the payments according to the conditions of contract. All relevant records are updated. Entries for tax deduction at source and sales tax are made according to the law.

If material is imported, the negotiable documents are received from bank and accepted for payment. In case of major discrepancies these are returned to bank for rectification. On acceptance of documents, Goods in Transit is debited and bank is credited.

In case of sub contracting, request for quotes shall be made to projected sub contractors. Comparative statement will be prepared on receipts of proposals from sub contractors. It may also be compared with projected internal cost. Sub contractor may be selected on the basis of financial, technical and commercial quotes.

After negotiation cost is further economized. Conditions to sub contract are normally kept in line with main contract. Payment is made on work certified basis. Certain % of payment may be retained as warranty.

Chapter 7

Management of Inventory, Plant and Machinery

Inventory management is the process of physical custodianship and record handling of inventory. Presently, data processing is handled through integrated systems. Systems handles purchase receipts, issues to project for consumption, surplus returned to store from project site, return of defective material to supplier, quantity and value adjustment. Some bulk materials like earth, sand, gravel is directly issued for consumption.

For common items same coding is adopted company wide. For project specific items separate range may be adopted. In case of sub contracting, sub contractor is responsible for handling of inventory supplied by the main contractor issued for consumption. Authorities and limits are designed for Internal control. System of ware housing, locations, pallets and bins is designed.

Plant and Machinery Management

Project Manager and his team need to decide about purchase verses lease rental. In case of established companies normally major plant and machinery is available in plant and machinery pool. In such case, Project Manager has to make request to central department for transfer of machinery.

The Central department may charge pre- agreed rent of such machinery. In case of purchase we have to decide about the life of machinery. If machinery is not useful on any other existing or new project, cost will be project over project life.

Arrangement of proper shed and workshop is necessary for smooth operations.

Rent will be charged to project. Cost in shape of fuel, manpower, depreciation, repair and maintenance will be charged to relevant activity on basis time utilization on worked out rate. Difference between the standard rate and actual rate will be considered variance and charged to the specific project.

Chapter 8

Human Resource Management

Human Resource / Administration department is responsible for arrangement and management of all activities related to hiring and management of work force. Site facilities and administrative matters like relations with Government Departments (e.g. social security, EOBI, Labour department etc) is normally considered as the responsibility of Human Resource/Administration. In case of overseas project, visa arrangement and travelling is also handled by the Human Resources / Administration.

Human Resource / Admin Manager will receive labour and staff requirement schedule from planning department. He will coordinate with HR Department for surplus pool and arrange deployment. For balance requirement, he will contact head hunters or place an advertisement in the paper. On receipt of application he will short- list final candidates and shall arrange interview / test with relevant departments. On finalization, he will issue appointment letters. On joining of staff, he will arrange induction and training if required.

There may be following two categories of workforce:

Permanent manpower is supplied by the head office to project. This is paid as per terms and conditions settled by the head office. Head office debits monthly cost to the project.

Contractual manpower is hired for project life. Normally monthly payment is made to such manpower according to terms and condition agreed on appointment letter.

Manpower hired from labour contractors- In this case payment is made to the labour contractor and he pays to manpower.

Daily wages manpower is hired on daily basis and paid on basis of agreed rate and attendance.

All incidental cost related to manpower like travelling, leave pay, food, medical is charged to relevant head of account.

Chapter 9

Project Execution and Billing

Construction Manager and his team will hold a meeting with Planning Manager on construction plan. Construction Manager will receive working drawings along with work instructions from documentation controller.

Planning Manager will issue daily schedule to construction manager area wise. In case of EPC (Engineering Procurement Construction) projects Design or Engineering first phase, Conceptual design is converted into detailed working or shop drawings.

Construction Manager or designated representative will prepare material issue requisition for issuance of material. For tools returnable material requisition will be issued. Construction Manager or his nominated area / zone manager will arrange plant and machinery.

Large scale projects normally associated with certain advance payment at start of the project. Normally such payments are conditioned to submission of bank guarantee or putting material at site. Such payments are normally known as mobilization advance. Such payments are adjusted against progress payments.

Project may be of two types as far as billing is concerned. It may be either **milestone based billing** or **progress billing**.

1) Milestone Billing

In milestone based billing, the payment is based on completion of certain milestone established in the contract. The method of submission of bills is different from client to client. In case of public sector projects, bills are prepared on a standard measurement book by the Sub Engineer. It is checked by the Sub Divisional Offices / Assistant Engineer and audited by nominee of Auditor General and Approved by the Executive Engineer. The Bill is in two parts i-e Abstract of quantities and Abstract of Cost. Vouchers are printed in specified format.

2) Progress Billing

In progress billing, billing and payment are based on quantitative progress or work certified by the client. Normally certain percentage is retained by the client as security for work completion and performance up to certain period. Items which needed to be executed, in addition to contract quantities, are charged as claim. Normally price escalation clauses are provided in contract. For public sector project this is approved according to formula given on Ministry of Finance on its web site. At the close of the day Area Manager or any designated person will complete daily schedule with actual progress and input and return it to Planning department.

Chapter 10

Project Accounting and Reporting

Accounting is the process of recording, analyzing, interpreting and reporting of the financial transactions. It is a well regulated profession by statutes, standards and generally accepted accounting principles. Statutory bodies, law, professional bodies and international organizations made great contribution towards this profession.

Development in information technology has provided great ease in managing the accounting function. In ERP software, financial and cost accounting is covered. For Project Accounting, we have to be integrated with other modules in Supply Chain, Project Systems / Project Management Systems, Material Management, Production Planning, Human Resource Management etc.

IT Systems like MySap, Oracle, Great Plains offers such flexibility. These systems are costly and need competent and trained resources to handle and operate and handle the system. Customized system are also considered for such applications. These takes a long time to develop but it helps avoid bugs and leads to little documentation.

There may be two options to design and implement system for the project. If broad band internet connection is available at project site, than project based local area network will be linked with head office based system through wide area network / virtual private network etc. In other case, all applications needed to be installed and configured on local server. After installation and configuration we need to design accesses and privileges for each user. Master file on system can be uploaded by computer integrated migration. We shall discuss the process, based on business cycles:

- 1) Project Finance
- 2) Revenue Cycle
- 3) Purchase Cycle
- 4) Execution Cycle
- 5) Human Cost Management Cycle
- 6) Assets Management
- 7) Plant and Machinery Management
- 8) Repair and Maintenance
- 9) Loose Tools
- 10) Site Facilities
- 11) Insurance
- 12) Taxation

1) Project Financing

Project based companies have to make special arrangements. Company may get finance by hypothecation of stocks and receivables and mortgage of plant and machinery. Mobilization advance is a major source of finance. Leasing can be the other option for financing of plant and machinery.

In Financial Accounting, General Ledger is the control centre of financial information. Information recorded in any other module is also recorded in General Ledger in summary or detail form. The detail of information is based on transaction translation and chart of account. Chart of account adopted at projects is same as that of head office or sub set of the same. Financial Calendar is also same.

2) Revenue Cycle

In most of the cases, contracts are subject to advance payment from client as mobilization advance. Such receipts are recorded as 'advances from customers' and adjusted according to the conditions of the contract.

Invoicing or billing is recorded in the Invoicing Module. All items provided in the contract are recorded as 'master item' in the inventory as master record. Additional claim items are also entered in the system. Format of billing varies client to client. So format needs to be changed every time. Required number of copies are prepared. The same are signed by the authorized officer of the company. Signed bill is submitted to client for certification, verification and payment. In certain cases, work is first got certified to avoid undue deductions. Representative of the client will certify the bill and submit to his Finance department for payment. Finally, the Finance Department will issue the cheque after deduction of tax and amount withheld.

On receipt of cheque, the Financial Controller will enter the payment to credit of client. Tax deducted at source or any amount charged back will be entered as receivables and cost. Tax such deducted is advance income tax and it is adjustable against company income tax liability.

According to International Accounting Standard no 11 there is a process of revenue recognition. Revenue is recognized according to the percentage of completion method. A relationship of cost and revenue is established on the basis of estimate. For example a project is having projected revenue of Rs 100 million and cost of Rs 80 million. If cost to date is Rs 40 million, the recognized revenue can be calculated as under:

$$100/80 \times 40 = 50 \text{ million}$$

If revenue recorded through invoices is Rs 52 million than Rs 2 million needed to be reversed. In most of the cases, the Work in Process account is used to make this adjustment, as shown in the following entry. If this variance becomes the permanent feature than estimate needs to be revised.

Billing Revenue	2 million
Work in Process	2 million

Debit Notes, Credit Notes to and from client are needed to be certified by relevant authorities to books of accounts.

3) Purchase Cycle

Cost incurred prior to award of project should not be charged to the project.

Procurement is very important function on projects and is a specialized function. Approved budget is basic yard stick for procurement. In established companies, there is detailed historical information about procurement of all major items.

Purchase is initiated on request for purchase from Planning Department. Procurement Department will analyse the demand with respect to schedule of supply and will raise request for quotation to projected suppliers. In certain cases, companies have established rate contracts with suppliers. The Procurement Department will negotiate schedule of supply and raise the purchase order. In other cases, comparative statement is prepared on receipt of quotes/ Performa invoice (For imported material). Selected supplier will be further negotiated. Purchase Order, Contract, Letter of credit will be raised to selected supplier. As currently systems are integrated as such there is no need for circulation of hard copies. However, some organizations still circulate copies to the Finance and Stores Departments.

On receipt of material at warehouse, a 'Goods Received Note' is prepared by warehouse staff. Quality Department approves/ rejects the goods received either on Goods Received Note or on separate inspection report. In case of rejection supplier is notified to lift his material. Commercial Invoice submitted by the supplier is received by Procurement Department and sent to Finance for payment.

Finance department will process the payment before due date through verification of Commercial Invoice, Goods Received Note and Purchase Order. Construction Projects are exempt from levy of sales tax. So Sales Tax on Purchases cannot be claimed as input sales tax. It will become part of cost. Projects are subject to Provincial Sales Tax so we can claim input. This process is applicable to purchases of all kinds of materials. Income Tax will be deducted at source.

For imported materials, negotiable documents are received through the bank. On acceptance of document, the bank debits to company account. The same is debited to Goods in Transit. On receipt of imported material at site, 'Goods received note' is prepared. Goods in Transit is transferred to relevant Inventory or asset account. Taxes refundable are debited to proper accounts classification in books. Custom, Duty and Inland clearing charges are debited to inventory or relevant asset account.

For sub contracting, sub contracts are formed like purchase order. Payment is made on verified invoice from construction manager. Tax deduction will be managed like material procurement.

4) Execution Cycle

In project accounting, modules cost codes are defined. All cost (material, manpower, sub-contracting, equipment, consumables, tools etc are debited to activities with reference to cost code and date. Same is also integrated with General Ledger. We can get reporting at any level of WBS from Project Accounting.

5) Human Cost Management Cycle

In most of the cases, construction projects are away from urban areas. Construction companies need to provide residential facilities to staff and labour. Transportation is also provided.

Attendance is recorded through bio metrics time recording machine linked to computers. Payroll system can either a part of ERP or stand alone. Entries are made in the project accounts.

Payroll cost of supervisory and managerial staff is debited to an account. Labour cost is debited at appropriate level on WBS. This can be allocated to activity level for cost accounts.

Salary of staff provided by the head office is debited by head office to project. Salary of contractual staff and daily wages is paid from projects through payroll processing. Daily wages is also paid from project through payroll, Manpower arranged through labour contractor is paid to labour contractor. Cost of residential facilities is also debited.

6) Asset Management

Number of fixed assets are required to execute the project. These may be categorized as follow.

- 1) Land (Normally not required for construction sites for construction projects)
- 2) Building or Lease Hold Improvement
- 3) Plant and Machinery
- 4) Office Equipment
- 5) Furniture and Fixture
- 6) Motor Vehicles
- 7) Scaffolding

Assets required at projects are arranged in number of ways. We assume that land is not required. For building, land is to be provided by the client either on rent or free. Certain building will be taken by client at the end of the project. Some portion of the building needs to be demolished at the end of the project.

For building taken by the client at agreed price may be or may not be charged with any cost. For buildings needed to be demolished at the end of project will be depreciated over project life.

Plant and Machinery may be supplied by head office of contracting company on agreed charge. In case plant and machinery is purchased specially for the project, it is considered economic life. If there is reasonable assurance that machine will be useable after project close, then the same will be depreciated over life of the project. If machine is not useable after project, the same will be closed and depreciated over project life.

Office equipment, furniture & fixture and Motor Vehicles may be charged like plant and machinery. Scaffolding is charged according to company policy.

Fixed Asset Purchases may be routed through Capital Work in Progress or direct debit to relevant asset head. Assets may be entered in the Asset Management System for depreciation. In case of rented equipment, rent may be charged to expense account.

7) Plant and Machinery Operational Cost

The cost of fuel, manpower, depreciation, rent, maintenance, transportation, consumables is associated with operations of plant and machinery. Construction manager will agree to actual hours used on any activity. Proper log book is necessary for time recording to allocate cost. Cost is apportioned to activities on time used basis.

8) Repair and Maintenance

Repair and maintenance is recorded in the relevant head and apportioned to activities.

9) Site Facilities

All costs related to site facilities, like offices and residential facilities, may be accumulated under proper heads of account.

10) Loose Tools

The cost of loose tools is normally charged as period cost. In case of major tools, it may be allocated over the project life.

11) Insurance

Construction projects are risky in many respects. Normally it is condition by the client to arrange the Contractor. All Risk Insurance on the name contractor, joint name or client name. Premium is based on clauses of the policy.

Premium paid against policy is charged to project life cycle. Actual loss covered in the policy is claimed from insurance company. Difference between the actual loss and claim received is charged to the project cost.

12) Taxation

Projects are subject to Income Tax at company level. Tax deducted at source is treated as advance tax. If there is reasonable assurance that contractor will not be subject to tax due to overall losses, he can apply to the Commissioner of Income Tax for exemption from deduction of tax at source.

Construction contracts are not covered under Federal Sales Tax. So sales tax paid on purchases will be the part of cost instead of being refundable.

Chapter 11

Project Cost Management

Most of the construction projects are cost overrun due to multiple internal and external reasons. Some are controllable whereas others are uncontrollable. The process of cost control starts with the proposal. In most of the cases detailed drawing and specifications are not available. In case of EPC (Engineering, Procurement and Construction) project only basic information is available. The Proposal department has to rely on lot of judgements based on experience. We should avoid errors of the estimates.

Cost Control is the next step to cost accounting. For effective decision making, precise and timely information is very important. Integrated Systems like ERP provide such required information. In Engineering or design, lot of improvisation can be done to make an economical design. Man hours utilization should be kept at the optimum level.

Material is a major component of project cost. Maximum care is required to keep cost within the limit. Quantity control is responsibility of planning and construction departments whereas price is the responsibility of procurement department. Provision of information about over run is the responsibility of Finance department. We have to prepare cost to date, balance to complete (with trend) and cost at completion. Information of bad happenings is of no help and we have to control the situation.

Labour or man power cost may be the second highest cost, though for sub contractor this may be the highest cost. Rate and Efficiency need to be kept under control.

Plant and Machinery may be owned by the company or rented. Usage over and permissible time, Idle time fuel cost control are very important.

Apportionment of Management, Supervision, Travelling, Repair and maintenance, quality cost are very important.

Trend analysis is very important in project cost management so is Earned Value Analysis. This analysis identifies variance between budgeted cost of work performed, budgeted cost of work planned and actual cost of work performed.

Chapter 12

Quality, Health, Safety and Environment

Quality Management at construction projects is very important. Quality parameters are normally provided in the contracts documents, which are based on certain standards like ASTM, DIN, BS, PSI etc. Clients normally have great emphasis on quality.

Most companies are certified under ISO quality system. Quality manuals are prepared for compliance.

Poor quality can result to cost escalation as a result of re-work and delays. Normally, quality issues arise due to poor understanding. Project Team should be trained on value of quality management. It should be considered as everybody's responsibility.

Quality assurance process can be divided into following phases:

- 1) Quality Assurance of Incoming Materials
- 2) In Process Quality Assurance
- 3) Quality Assurance of Final Work

In case of precision, welding welders deployed need to qualify procedures and quality tests. For incoming materials there may be multiple processes. Vendor or Supplier Managed Quality may be considered with consequential losses reimbursement. Sample based quality testing is another option. In case where reliance is poor on supplier quality, 100% population or quality needs to be tested.

There must be continuous surveillance/ audit on work in progress. For this purpose, arrangement be made with client to provide punch items on timely basis for rectification.

There should be regular calibration of all instruments.

For in process construction, non conformity to standards are either pointed by internal quality inspector or client inspectors. These must be cleared as soon as possible.

As a good corporate citizen, the company should have health, safety and environment policy. Further it is stipulated by the client to have good practices.

Safety of human being is most important thing in any kind of manufacturing. There should be laid down procedures to ensure safe work environment. There are regulations for compliance by Environmental Protection Authority (EPAs).

Chapter 13

Management Information System

Precise timely information improves the decision making process. Integrated systems provide great flexibility in capturing of data and processing of information. Projects are different from normal business.

Normal business closes at the end of financial year, whereas projects cross financial and calendar years. There may be two sets of information viz. Management and Statutory. We have to keep record and track for full project life.

Normally such systems comprises of the following modules:

- 1) Sales and Distribution
- 2) Material Management
- 3) Financial Accounting
- 4) Controlling
- 5) Cash and Banks
- 6) Asset Management
- 7) Project Management System
- 8) Payroll and Allied Matters
- 9) Primavera or MS Project

Construction sites are normally away from head office and in remote areas. In spite of great development in information technology still broad band internet is not available at construction site. Further, integrated applications are very costly and difficult to manage. Arrangements should be such that these should be most cost-effective. Where cost is constraint, one can manage with small business solution and MS Excel.

There are following information desirable at a moderate construction Project:

Report	Frequency
Finance	
Projected Profit and Loss, Balance Sheet, Cash Flow	Monthly Basis – Revised on project plan revision
Profit and Loss	Monthly
Project Analytical Study	Monthly
Balance Sheet	Monthly
Cash Flow	Monthly
Project Plan vs. Progress	Daily, Weekly, Monthly
Procurement	Weekly, Monthly
Quality	Daily, Weekly, Monthly
Headcount	Monthly

Chapter 14

Monitoring and Control, Demobilization and Close out

For smooth execution, the project need to be monitored and controlled at every level on a continuous basis. Normally, a Project Manager is the main responsible person for this function. At the Head Office of Construction companies, there are specialized departments to monitor and control the projects.

The role of such departments differ from organization to organization. It may be consultative, advisory, controlling or mix. Project Manager delegates his powers to Managers and Supervisors according to the work break down structure and function.

There are following critical areas of projects which need to be monitored and controlled.

- 1) Cost
- 2) Schedule
- 3) Progress
- 4) Quality
- 5) Risk

Demobilization

After close of project, it is the process of transfer / dismantling of all temporary facilities like site facilities (if not to be taken by the client under contract clause), surplus material either to be transferred to other projects, head office or sold out. The plant and machinery should be moved to central location or returned.

After Clearance of site, the Project Manager will report back to the head office.

Close Out

There are two phases of project close out:

- 1) **Physical Close Out:** When all the activities given in contract and change orders have been completed, including punch list killing. Work completely measured and certified by the client. If there is any operation and maintenance period, the same is included and completed and certified.

- 2) **Financial Close** is a stage where all bills of suppliers and sub contractors have been accepted and accounted for; costs associated with warranty period and those associated with demobilisation have been provided; and the final accounts of the project has been prepared and approved.

Lesson Learned

After close out of the project, deep analysis is carried out about the project as to what went good and what went wrong. This is important for future reference and to avoid bad or wrong happening.

Case Study

One of the largest construction company is engaged in operations in Pakistan and Middle East. As per the law of Middle East, it obtained local sponsorship and equity participation with local companies. It had manufacturing facilities in several countries and in Middle East it is managing all kind of projects. It is working as EPC (Engineering, Procurement and Construction) company and for large-scale projects it is also working as major sub contractor. It got regional or business area offices in major countries of Middle East. These offices are provided support from Head Office based in Lahore.

Business Development office in UAE got information that a Japan based large scale company has obtained a Gas Development Project near Abu Dhabi, UAE. Business Development Department approached the procurement and sub contracting department of main contractor and offered its services. Business Development department got tender document for preparation of proposal. A team in Proposal Department was nominated for preparation of proposal. Proposal team was supported by business development from UAE. Selected team of proposal from head office visited the project site and had meeting with projected client for technical details and other clarifications.

Company developed a specialized software for preparation of bid. This is state of the art application, having capabilities of interfacing with Primavera project planner and some other project planning application developed in house. This application has all sorts of work packages like material, labour, sub contract, equipment utilization, tools, sub contract and site facilities. This system is integrated with procurement data ware house of company and capable of handling multi currencies with translation to base currency.

Work Break Down structure at level three was prepared on Primavera Project Planner with great care. Proposal application was reviewed for all work packages. Work Packages not available in the application were configured. Data from Primavera Project Planner was transferred to proposal application. System needs a reasonable time to process the proposal from input provided from Primavera project planner.

The draft results were checked by the proposal team and later discussed with business development team in Abu Dhabi. Certain changes were proposed by business development. Process of proposal was repeated in light of proposed changes from proposal team. Revised proposal was presented to combined session of management from Head Office and Abu Dhabi. Although it was competitive bid but seems that client will ask for further negotiation. Hence, margin of negotiation from bid was decided.

Technical and commercial bids were also prepared. Team was selected to go for bid under the leadership of business area head. Bid submitted was declared successful in bidding process initially. Client asked for detailed review. Client had lot of clarification during review process. A final round of negotiations was done to finalize the price. It was a fast track, turnkey project. Client made it clear that time available for completion of the project will be strictly followed. In case of delay heavy penalty will be imposed.

Finally, the project was awarded to the company with one year duration. Immediately, core team was appointed by the senior management from head office. Some of the nominees were already present in UAE. Initial planning was done at Abu Dhabi Business Area Office. Administration Department was informed about mobilization and de mobilization schedule. Appointed Project Manager had a project kick off meeting with client with summary project schedule and for site possession, working drawing, work methods and mobilization advance.

Separate project bank account was established. Mobilization advance was received. Site facilities were established in portable cabins imported from Saudi Arabia.

Local Area Net work was established. All software were installed with accesses and privileges. It was not fully integrated but applications were time tested.

Planning team established its office and started working. Planning received all necessary record from business development, proposal and client. Work was distributed to planners. Level four plan was prepared with necessary schedules.

Budget Rev 0 was prepared by planning and Finance. It was agreed that same will be reviewed after three months.

A comprehensive meeting was held by project manager on team briefing. Project Plan and schedules were approved for execution. Procurement, Plant and Machinery and Administration were given the respective schedules for execution.

Area In-charges received construction drawings and relevant procedures from document controller. On arrangement of material, labour, cub contract, plant and machinery, consumables, tools etc physical work was started at site. Reporting mechanism was set up between different project disciplines, project management, business area office and head office. System of daily weekly and monthly reporting was agreed. At the end of first month, progress was slow and cost was high. This was alarming for Project Manager, Business Area Head and Management in the head office. There were certain delays in site hand over in certain cases. This was notified to the client. This trend continued for major life of the project.

There was risk that project will not be able meet its financial objectives. It was declared a green field project by the client. In execution, it was observed that it got live underground electricity lines on many places. This posed a threat to life and property. Further it hindered the progress. The same was notified to the client.

One good thing was that project team was optimistic about the results. There was no major conflict. Project team was committed to finish the project on time. One General Manager was appointed to guide project team from head office. He was a experienced professional and improved the team performance.

Company had a system of Daily Schedule and Team Sheet for progress planning and measurement. This did worked as planned. There were lot of quality issues at the end. Project Team killed all punch list item on time. There were major accident or health safety issues. Claims for additional work were settled amicably. Progress payments were received on time basis. Major concern were cost overrun and slow progress. It was a threat that penalty will imposed on late completion.

After six months, project revision was made. It was agreed that was major issue of error in project cost estimate at the time of proposal. Second procurement could not manage purchases in efficient manner, that there same lapses in consumption.

Project team started work on twenty four hour basis and finally it completed the project before time. Client announced substantial amount as timely completion bonus. This compensated the loss up to great extent due to cost overrun.

It was a tough project. Use of knowledge, competencies and skills make it a successful project. On this project, company first time used the **cost analysis system** by integrating data from all systems like Financials, Planning, Progress, Equipment, Manpower, Consumable and Tools.

On completion of the project, common surplus, common materials, consumables, Plant and machinery were transferred to other projects. Portable cabins, furniture and fixtures, tools and surplus material was disposed off on best options. Manpower was de mobilized back to Pakistan for further deployment. With utilization of knowledge of project management with general principles of management project was a success.

List of Documents

1. Bid Summary
2. Bid Material Cost
3. Bid Of Labour Cost
4. Bid Sub Contract Cost
5. Bid Equipment Cost
6. Bid Site Facilities Cost
7. Budget
8. Plan
9. Invoice
10. Debit Note
11. Credit Note
12. Request For Purchase
13. Request for Quote
14. Comparative Statement
15. Purchase Order
16. Goods Received Note
17. Store Issue Requisition
18. Profit and Loss Account
19. Balance Sheet
20. Cash Flow
21. Analytical Study
22. Non Conformity Reports
23. Risk Analysis

ABC Company Limited
Project Proposal Approval Form

Proposal No:

Date:

Proposal Name

Client:

Validity:

Rs

Material	XXXXXXXX	
Man Power	XXXXXXXX	
Sub Contracting	XXXXXXXX	
Supervision	XXXXXXXX	
Equipment	XXXXXXXX	
Site Facilities	XXXXXXXX	
Risk	XXXXXXXX	
Financial Cost	XXXXXXXX	
Other	XXXXXXXX	
Total		XXXXXXXX
Project Margin		XXXXXXXX
Proposed Price:		XXXXXXXX
Less Sales Tax		XXXXXXXX
Net Price		XXXXXXXX

Prepared By

Checked By

Approved By

Project Proposal Approval Form

Estimated Bid Material Cost

ABC Company Limited

Estimated Material Cost

Proposal No:

S. No	Description	Unit	Rate	Qty	Amount	Remarks

Estimated Bid Labour Cost

ABC Company Limited

Estimated Labour Cost

Proposal No:

S. No	Description / Craft	Unit	Rate	Qty	Amount	Remarks

Estimated Bid Sub Contracting Cost

ABC Company Limited

Estimated Sub Contracting Cost

Proposal No:

S. No	Description	Unit	Rate	Qty	Amount	Remarks

Estimated Bid Equipment Cost

ABC Company Limited Estimated Sub Contracting Cost

Proposal No:

This cost may be divided into three parts i-e Equipments purchased and charged to project, received from head office and rented.

S. No	Description	Unit	Rate	Qty	Amount	Remarks

Estimated Site Facilities Cost

ABC Company Limited
Estimated Site Facilities Cost

Proposal No:

S. No	Description	Unit	Rate	Qty	Amount	Remarks

Budget Revision 0

ABC Company Limited

Budget Revision 0

Project:

Client:

Validity:

Proposed Price:

Less Sales Tax

Net Price

Rs

XXXXXXXX

XXXXXXXX

XXXXXXXX

Material

XXXXXXXX

Man Power

XXXXXXXX

Sub Contracting

XXXXXXXX

Supervision

XXXXXXXX

Equipment

XXXXXXXX

Site Facilities

XXXXXXXX

Financial Cost

XXXXXXXX

Other

XXXXXXXX

Total

XXXXXXXX

Project Margin

XXXXXXXX

Prepared By

Checked By

Approved By

Project Plan

ABC Company Limited

Project ABC

Activity Code	Description		Time 1	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7	Time 8	Time 9	Time 10
xxxxxx	A	Planned										
		Actual										
xxxxxx	B	Planned										
		Actual										
xxxxxx	C	Planned										
		Actual										
xxxxxx	D	Planned										
		Actual										
xxxxxx	E	Planned										
		Actual										
xxxxxx	F	Planned										
		Actual										
xxxxxx	G	Planned										
		Actual										
xxxxxx	H	Planned										
		Actual										

Prepared By

Checked By

Invoice

ABC Company Limited

Invoice No:

Date:

To

--

[illegible]

Debit Note

ABC Company Limited

Invoice No:

Date:

To

The following information was obtained from the review of the records:

[illegible]

Credit Note

ABC Company Limited

Invoice No:

Date:

To

[illegible]

Request for Purchase

ABC Company Limited
Request For Purchase

RFP
No:
Date:

Code	Description	Unit	Budgeted Unit Cost	Qty Required	Budgeted Cost	Date Required	Suggested Supplier

Request for Quote

ABC Company Limited
Request For Quote

RFP
No:
Date:

Code	Description	Unit	Budgeted Unit Cost	Qty Required	Budgeted Cost	Date Required	Suggested Supplier

Comparative Statement

ABC Company Limited Comparative Statement

No	Description	Unit	Supplier 1		Supplier 2		Supplier 3		Remarks
			Rate	Amount	Rate	Amount	Rate	Amount	

Prepared By
Checked By
Approved By

Purchase Order

ABC Company Limited
Purchase Order

P.O. No:

Date:

To

[illegible]

Goods Received Note

ABC Company Limited
Goods Received Note

Good Received Note

From:
No:
Date:

S. No	Code	Description	Unit	Qty Received	Qty Accepted	Qty Rejected	Remarks

Store Issue Requisition

ABC Company Limited
Store Issue Requisition

From:
No:
Date:

S. No	Code	Description	Unit	Qty Required	Qty Issued	Remarks

Required By:
Issued By:

Profit and Loss Account

ABC Company Limited
Monthly Profit and Loss Account

Project ABC

Activity Code	Description	Time 1	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7	Time 8	Time 9	Time 10	Total
	Billing Revenue											
	<u>Project Cost:</u>											
	Material											
	Manpower											
	Sub Contracting											
	Supervision											
	Machinery											
	Other											
	Total Cost											
	Project Margin											

Balance Sheet

ABC Company Limited

Project ABC
As at xx/xx/xxxx

Description

Fixed Assets

Land	XXXXXX
Building	XXXXXX
Plant and Machinery	XXXXXX
Office Equipments	XXXXXX
Furniture and Fixture	XXXXXX
Motor Vehicles	XXXXXX
Total Fixed Assets	XXXXXX

Current Assets

Cash and Bank	XXXXXX
Accounts Receivables	XXXXXX
Stock	XXXXXX
Total Current Assets	XXXXXX

Total Assets	XXXXXX
---------------------	---------------

Long Term Liabilities

Long Term Loan	XXXXXX
Other Long Term Liabilities	XXXXXX

Total Long Term Liabilities	XXXXXX
------------------------------------	---------------

Short Term Liabilities

Accounts and Notes Payable	XXXXXX
Short Term Loans	XXXXXX
Total Short Term Loans	XXXXXX

Head Office Investments	XXXXXX
-------------------------	--------

Total Liabilities and Investment	XXXXXX
---	---------------

Cash Flow

ABC Company Limited

Project ABC Monthly Cash Flow

Description	Time 1	Time 2	Time 3	Time 4	Time 5	Time 6	Time 7	Time 8	Time 9	Time 10	Total
Opening Balance											
Receipts											
Project Billing											
Other											
Total Receipts											
Payments											
Suppliers											
Payroll											
Others											
Total Payments											
Net Change											
Balance C/F											

Analytical Study

ABC Company Limited

Project ABC Analytical Study

Activity Code	Description	Budget			Actual		Balance Cost to Complete	Cost at Completion	Variance		
		Project	To date	Month	To date	Month			PTD	Month	At Completion
	Billing Revenue										
	<u>Project Cost</u>										
	Material										
	Manpower										
	Sub Contracting										
	Supervision										
	Machinery										
	Other										
	Total Cost										
	Project Margin										

Non-Conformity Report

ABC Company Limited

Project ABC
Non-Conformity Report

S. No	Description	Date Reported	Status	Estimated Close	Remarks

Risk Analysis

ABC Company Limited

Project ABC
Non-Conformity Report

S. No	Description	H	M	L	Remarks