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Cost Planning and Estimation for Residential Building

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Abstract:- Now a day's population is increases and land required for living is decreases so need to construct the multistoried building, for the multistoried building it is necessary to planning and find out the preconstruction cost by using various methods, because of big scale budget. In project management the cost planning is the very important factor, it is the system of cost estimation and cost control for the building during the design and development.

The aim of this research is to calculate the preconstruction cost of residential building by using elemental method of estimating and define the terms used in the research. The calculation of quantity required for construction of building is done by using Microsoft Excel with the help of auto cad drawings. If the architectural drawings are accurate, it gives the more accurate cost of project.

Keywords:- *Data collection,drawings, planning and estimation, Excel, Autocad, Elemental method.*

I. INTRODUCTION

Due to the fast growth of industrialization it affects on the sector of construction and construction projects becomes more difficult to keep the total cost within the budget, to illustrate it is well known the total cost of planning of pre-contract construction and it is useful for the obtains the accurate result. However the estimation of residential apartment is important point of departure because of imperfect structural design data. For the cost estimation required the drawings, duration of each activity as well as current market rates material and labor cost, etc. it is useful while calculating the total estimate.

A. Description of the project

The Building is used for this study is residential building name as Pride Aashiyana, it is loacated in pune. This project provides all amenities that a contemporary home buyer would want to have. Pride Aashiyana is a part of the suburban area of Dhanory. Dhanory is connected to nearby localities by wide roads. Residents of the locality have easy access to community facilities like schools, colleges, hospitals, recreational areas and parks. The Facilities within the complex are thoughtfully created.

Pride Aashiyana is a domestic complex situated in lohegaon, pune. It offers 548 apartments, covering a total area of 10 acres and unit area of 1050 to 1400sq.ft.

B. Objective of the paper

- To collecting the details of architectural drawings and market rate of material.
- To collecting the cost data of building construction.
- To process the data of cost into the information of cost of construction.
- To calculate the cost of construction.

The objective of this research is to know the model of estimation based on the element of the building or apartment, and calculate the quantity in excel sheet (using the excel software).

II. LITERATURE REVIEW

B. Terminologies of cost planning

Cost planning is the method of finding the cost of project i.e. how much will be the cost of project. In cost planning focus on the duration and schedules only. For getting the undertaking of finance and for finding possible undertaking income cost planning is very important. The cost planning is important for the successful project planning, design and construction of building and it is useful for the getting the clear image of construction cost of project.
Cost planning consists of three steps:

- Preliminary Approximate Estimate.
- Cost Plan
- Cost Checking

Planning help to reduces confusions as well as over additional budget and delays in project. Due to the planning we can reduces the uses of resources. In cost management process the cost planning is play an important role for finding the budget, the budget is find out by estimation using various methods. Due to the planning we can avoid the proactive and reactive mistakes by analyzing same project done in past, so the planning is used for reduces time period as well as control the over budget.

D. Cost Management

The cost management is the process of planning, estimating, budgeting and controlling the cost. The project should have to complete within the budget and duration.
In this cost management we have to plan all activities we will doing in future means at the time of construction as well as we established the cost plan according to the details of drawings, market rates and location of site.

- Elements of cost management

1. Cost estimation
2. Cost budgeting
3. Cost checking

C. Cost Estimation

Cost estimation is the finding cost of project and developing the estimates as well as measurement for cost is useful for the resources to complete the project work and activities.
Cost estimation is calculated by using various methods which are given bellow:

- Approximate method
- Cubic content method
- Unit method (elemental method)

D. Accuracy of Cost Estimation

The accuracy of estimation is depends on the details of drawing as well as information of market rate. The location of site can be affect on accuracy. If the drawings are more accurate that time degree of accuracy is more.

E. Background for cost estimation

According to historical established model of cost estimation it is divided into the three groups. The first model is originated from the functional elements of the buildings. The cost plan approach is used in England at the end of 1950's up to the 1960's.The second model was derived from the regression analysis and it has used since mid of 1970's[McCaffer, 1975] [1], The model is started to develop in beginning of 1980'sand it is generally based on the Monte Carlo simulation technique[Touran,1992] [2].

Cost Estimation model is classified from their characteristics i.e. the cost estimation based on quantities; e.g. the cost estimation like mono-priced used such as square, cube and envelope, resource model which is used in the phase of construction, this model is depends functional elements of building as well as operational units of building. The second is the untraditional like regression models, experimental models and simulation models.[Akintoye and Fitzgerald, 2000] [3], [Ashworth, 1988][4], [Bledsoe,1992][5], [Flanagen & Tate ,1997][6], [Mann, 1992] [7], [McCaffer et.al.,1984][8]. [Newton, 1991] [9], [O'Brien, 1994] [10].

The cost of project is needed to estimate within the accuracy range, but there is the largest problem standing in front of cost estimation, it is particularly in the initial stage due to the lack of preliminary data and bigger uncertainties as result of solution. [Verlinden et al 2007].

Chan and park also studied on the cost estimation model they identified factors which contribute to cost of project, for calculate of pre construction cost of project model they used principle element technique and assess relative importance of determination of factors [Chan and park, 2005][11].

Oberlender and Torts both were developed the scoring system of an estimatation for measuring impact of the four determinants of accuracy on estimates who involved in preparation of estimation i.e. what was the data we know about project, factor considered at the time of preparing estimation and how was estimation prepared. [Oberlender and Torts, 2001][12]. after that Torst and Oberlender studied to develop the model which enables estimators to evaluate the accuracy of the early estimates [Torts and Oberlender, 2003] [13].

III. METHODOLOGY

F. Research Methodology

In this research total cost of project is estimated by using elemental method. For this we were calculated by following steps:

- *Project Introduction:*
  In project introduction it is the description of overall parameter of project as well as site location.
- *Scope of project:*
  The purpose of the project, details of work, work breakdown structure and provide the overview on design basis.
- Collection of architectural drawings:
  In this step we were gathering the architectural drawings for calculating the cost of project according to the functional elements.
- *Pre-estimation planning:*
  From this step we were reduces the future effort at the time of construction of project i.e. from previous similar project we can reduces the same accident.
- *Elements description and quantity take-offs:*
  Estimates elements of building and calculate the quantity required details of work on sheet.
- *Summary:*
  The purpose of summary is to state the total estimated cost of the project, duration as well.
- *Checking and documentation:*
- *Estimate filing and issues:*

G. Pre- data collection

The pre-data collection is the collection of information about the project as well as architectural drawings, same project work information which will useful for this project which can help to get accuracy and reduces the efforts as well. After that in this stage location of site, material required, machines and equipment and other resources.

H. Post –data collection

In this stage according to information collected in pre-data collection only estimation is did means total cost required for the project is calculated.

The estimated cost sheet is calculated from computer aided building drawings i.e. by measuring the dimensions in the computer aided drawings and it is calculated in Excel sheet

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(Software), by using the elemental or functional. The format in excel sheet is given bellow (figure 1):

Project:	Pride Ashiyana F tower						Contract No:					
Title:	Architectural Finishes-Tower F						Package					
Date:				########	Sft		Trade:					
Sr.No.	Item Description	Unit	Nos	L	B	D	Qty	Perimeter	Formwork Qty	Avg Beam Depth	Slab thick	Remarks
A	Concrete For Substructure											
	Excavation for Foundation											
	PCC						97.74		-			
	Below Raft						97.74					
	PCC Below RW raft						90.27					
	Grid F12 to D9	Cum	1.00	28.08	4.55	0.15	19.16					
	D9 to C8	Cum	1.00	7.86	4.55	0.15	5.36					
	C7 to D7	Cum	1.00	10.24	4.55	0.15	6.99					
	D8 to D4	Cum	1.00	29.01	4.55	0.15	19.80					
	D5 to D3	Cum	1.00	19.08	4.55	0.15	13.02					
	D3 to A1	Cum	1.00	38.01	4.55	0.15	25.94					
	PCC below Lift Raft						7.46					
	For L1	Cum	2.00	3.33	3.33	0.15	3.33					
	For L2	Cum	2.00	4.14	3.33	0.15	4.14					

Fig 1:- Quantity calculation in excel format.

After this calculation quantity entry of substructure element and superstructure element in group which is shows like bellows (figure 2)

SR No	Description	Unit	Podium	Area in sft	Constant	Remark
	Substructure					
1	Concrete	Cum	0	0	0.000	Cum/BUA
2	Steel	Kg	0	0	0.000	Kg/BUA
3	Shuttering	Sqm	0	0	0.000	Sqm/BUA
	Superstructure					
4	Concrete	Cum	0	0	0.000	Cum/BUA
5	Steel	MT	0	0	0.000	Kg/BUA
6	Shuttering	Sqm	0	0	0.000	Sqm/BUA
	Overall					
4	Concrete	Cum	0	0	0.000	Cum/BUA
5	Steel	MT	0	0	0.000	Kg/BUA
6	Shuttering	Sqm	0	0	0.000	Sqm/BUA
Superstructure						
4	BBM					
	Sub structure			0	0.000	Sub structure
	Super structure	Sqft	0.00	0	0.000	Super structure
	Total	Sqft	0	0	0.000	overall built up area
5	Internal plaster					
	Sub structure			0	0.000	substructure
	Super structure	Sqm	-	0	0.000	Super structure
	Total	Sqm	0	0	0.000	overall built up area
6	External plaster					
	Sub structure	Sqm		0	0.000	substructure
	Super structure	Sqm	-	0	0.000	Super structure
	Total	Sqm	0	0	0.000	overall built up area

Fig 2:- Elemental calculations for substructure and superstructure

Finally according to the elemental cost estimation total cost of project is represented as cost "per square feet" on salable area, in percentage and total amount required, given as like. (figure.3)

SR.NO	ELEMENT / ITEM	TOTAL AMOUNT	COST PER SQFT ON SALEABLE AREA	PERCENTAGE
1	PROJECT WORKS			
A	GENERAL WORK-EXCAVATION & ALLIED WORKS	-	-	0%
B	RCC STRUCTURE WORKS	-	-	0%
C	ARCHITECTURAL WORKS	-	-	0%
D	MEP	-	-	0%
E	BUILDING AMENITIES	-	-	0%
F	INFRA & EXTERNAL DEVELOPMENT	-	-	0%
G	LANDSCAPE- SOFTSCAPE & HARDSCAPE	-	-	0.0%
H	PROJECT PRELIMINARIES	-	-	0%
J	SOFT COST AND OTHER EXPENCES	-	-	0%
K	CONTINGENCIES & ESCALATION & OTHER SOFT COST including TAXES & CESS	-	-	0%
	GRAND TOTAL	-	-	0%

Fig 3:- Elemental cost required for project in percentage.

Graphical representation for above element is given bellow as a sample:

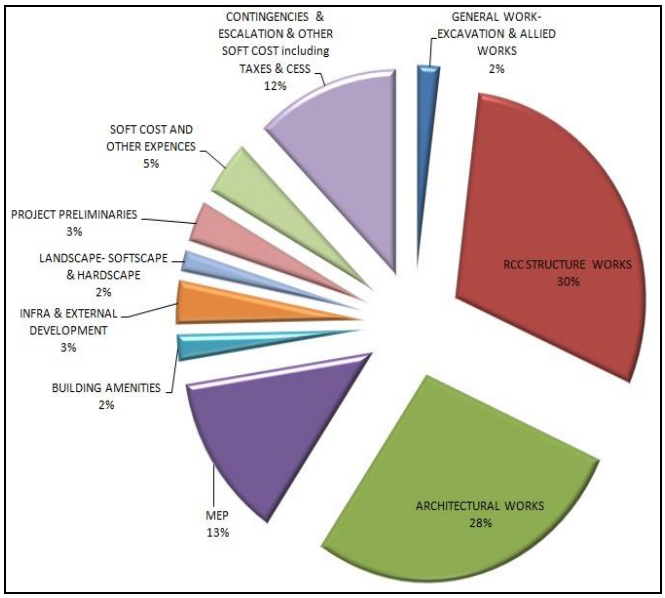

Fig 4:- Graphical representations for elemental estimation in percentage.

IV. CONCLUSION

This research project of residential building is concluded as per planning, estimation. Total cost of project can be estimated in feasibility, even in case knowing the construction area that time it's easy to estimate.

As per planned:
Project duration=455days
Planned budget of project=555,972,573
After updating day to day progress report up to 12th February 2018
Original duration=550 days
Actual cost=535,923,562 the project is completed

From above statement we concluded that project is made within the budget and within the duration due to the accurate planning and scheduling and it helps to improve the quality of construction also, Due to the elemental estimation it easy to estimate the total cost of project.

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REFERENCES

[1]. McCaffer, R., (1975), Some examples of use of regrassion analysis an estimation tools, Quantity surveyoy, December.p.81-86.

[2]. Touran, A., (1992) Monto Carlo Technique with Correlated Random Variables, Journal of Construction Engineering and Management, 118-2, p.258-272.

[3]. Akintoye A., Fitzgerald E., (2000), A survey of current cost estimating practices in the UK,Construction Management and Economics, 18, p.161-172.

[4]. Ashworth, A. (1988). Cost studies of buildings, Longman Scientific and Technical, Harlow, Essex, U.K.

[5]. Bledsoe J.D.(1992), From Concept to Bid-Succesful Estimating Methods R.S. Means Company Construction Consultants and publishers, p. 3-23.

[6]. Flanagan R., Tate B., (1997), Cost Control in Building Design Blackwell Science Ltd.,p.43-48.

[7]. Mann T., (1992), Building Economics in Architects, Van Nostrand Reinhold, p.15-26.

[8]. McCaffer, R., McCaffrey, M. J., and Thorpe, A.,(1984),Predicting Accuracy of Early Cost Estimates Based on Estimate Quality, Journal of Construction Engineering and Management,127-3, p.173-182.

[9]. Newton, S.,(1991), An agenda for cost modeling research, Construction Management and Economics., 9-2 , p.97-112.

[10]. O'Brien, (1994), Preconstruction Estimating Budget Through Bid, McGraw-Hill, p.15-108.

[11]. Chan S.L., Park, M., (2005) Project cost estimation using principal component regression, Construction Management and Economics 23-3, p.295-304.

[12]. Oberlender, G.D., Trost, S.M., (2001), Predicting Accuracy of Early Cost Estimates Based on Estimate Quality, Journal of Construction Engineering and Management.

[13]. Trost, S.M., Oberlender, G.D., (2003), Predicting Accuracy of Early Cost Estimates Using Factor Analysis and Multivariate Regression, Journal of Construction Engineering and Management 129-2, p.198-204.