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Comparative Cost Estimation of Residential Building

Prof. Amit Kale[1], Anuj Mohite[2], Tanmay Nalawade[3], Pratik Burande[4], Sanket Sethiya[5]
[1]*Assistant Professor,* [2, 3, 4, 5]*Department of Civil Engineering SAE Pune, Maharashtra Final Year Students, B.E Civil Engineering, SAE Pune, Maharashta*

Abstract: ***A construction project of any building is mainly based on 3 important steps that are planning, Cost Estimation of the building and proper execution of construction of the building. Construction cost estimation has the lion's share of the research effort in construction management. The Objective is to analyze the effectiveness of various cost estimation methods by comparing traditional and various online websites. This study will provide more accurate estimates that save time and minimize errors. The research conducted will be helpful for estimation of construction, also proving how the introduction of IT sector in construction industry is turning out to be beneficial.***
Keywords: Estimation, Construction Management, Online Websites, minimize errors.

I. INTRODUCTION

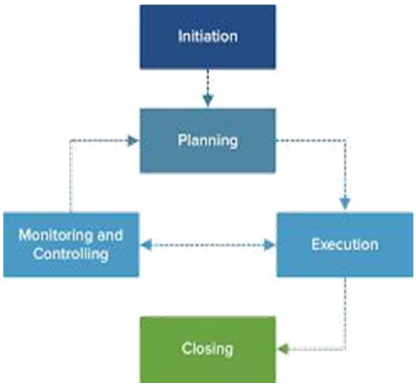
A. Cost estimation process is an important element of the construction industry which lays the foundation to the future planning of the project.

B. Estimation and costing is estimating the amount of material to be used and calculating the approximate budget required for construction.

C. Accurate cost estimation is crucial to ensure the successful completion of a construction project. Estimating construction is an example of knowledge intensive engineering task. However, engineers require several years to develop the necessary expertise to conduct the cost estimation process and this individual expertise is prone to subjectivity.

D. Manual or the traditional method is the most used method till date as the engineer can survey the report to the detail but on the other hand it is prone to human errors which can lead to issues and also at times, time consuming.

E. Online software or websites are very precise when it comes to estimating the cost of the building but each software may vary the final value as the parameters taken by different software are different which can eventually lead to differences also one must be familiar to the IT sector.



F. To ensure that the project goals are met within the stipulated time and cost, effective project planning and management is needed.

G. Planning ensures that the project manager gets the opportunity to analyze the work required and determine the appropriate strategies based on resource availability, construction methodology, constructability, cost, and time.

H. The result of this analysis is documented in a plan. Project management is needed to maintain the plan so that it correctly reflects the current state of the project and make out the future strategy needed to achieve the project's goals. An important task in project management is to analyze andevaluate the plan.

I. The owner has to verify the accuracy of the contractor's plan before it can be approved. Plans are also reviewed periodically to monitor progress and also when the contractor claims a change order. An objective way of analyzing such changes is essential to avoid any unfair advantage and the possibility of subsequent litigation.

II. OBJECTIVES

A. To study different techniques of estimation and costing for building.
B. Collecting the data and dimensions of an existing building.
C. Quantity and cost estimation by using software and conventional method.
D. Comparison (Analysis) between techniques for estimation and costing.
E. To find out suitable and flexible method for the customer.

III. LITERATURE REVIEW

1) Estimation and cost of residential building using conventional method vs HIT software (May 2019) - HIT-Office Software is more precise than comparing with MS Excel. The benefits of using HIT-Office Software for quantity estimation are, a lot of time could be saved on computing quantity take offs by employing HIT-Office than using traditional excel spread sheets
2) Cost Estimation of a Building using Cost Effective Building Materials (June 2019) - Through their analysis and comparison, they have managed to find many clear conclusions such as-Addition of fly ash improves the workability of concrete
a) Addition of 50% fly ash reduces 7day strength by about 20% when compared to control mix. But it acquires strength almost equal to that of control mix at 28 days and attained higher strength thereafter.
b) All hardened properties are similar for OPCC and HVFAC at 28 days.

And so on factors of effectively managing building material can help us to reduce cost of the project.

3) Web-Based Architecture for Automating Quantity Surveying Construction Cost Calculation (June 2020**)** - The proposed web-basedQSframework aims to automate quantity surveying duties and accurately estimate construction costs. The web-based architecture was implemented using ASP.NET and C# coding facilities for managing and calculating the costs of concrete construction project phases.
4) Estimation and Management of Construction Cost (June 2016) - Through pre-control, control in process, enterprises can strengthen the calculation and control of the project cost in all phases of construction, and can realize the goal of saving and reducing the construction cost. To provide data for future cost management, an evaluation is often carried out to prepare a detailed cost analysis of the completed project and to develop lessons learned to improve future design decisions.
5) Smart Web Application on Quantity Survey, Estimation and Costing (December 2015) - To estimate the amount of the material used we would require dimensions and volume of each item. To find out the volume or area, the model will use is LONG WALL-SHORT WALL method. The real-time rates of the materials will ensure the correct estimated cost and estimate the need of indexing. Hence introducing IT in this field of material estimation and costing will be very useful and hence would help to save time and eradicate errors anticipated during manual work.
6) Automated Wood Construction Cost Estimation (April 2017**)** - The authors developed an automated wood construction cost estimation method and algorithms to address the lack of interoperability across different BIM platforms and the need to reduce manual inputs from estimators. The proposed method reads and extracts quantities of wood building objects by leveraging the fundamental geometric representation of wood building elements in an IFC model.
7) Using Intelligent Techniques in Construction Project Cost Estimation (December 2014) - The method of the presented paper was based on two parts. The first part was concerned with a literature survey to examine the current state of intelligent solutions in the construction industry. Regarding this matter, we have chosen exclusively the journals that specialise in both information technology and construction management, within a time frame of ten years.

IV. METHODOLOGY

A. Initiation
1) Select a site
2) Collecting information regarding site

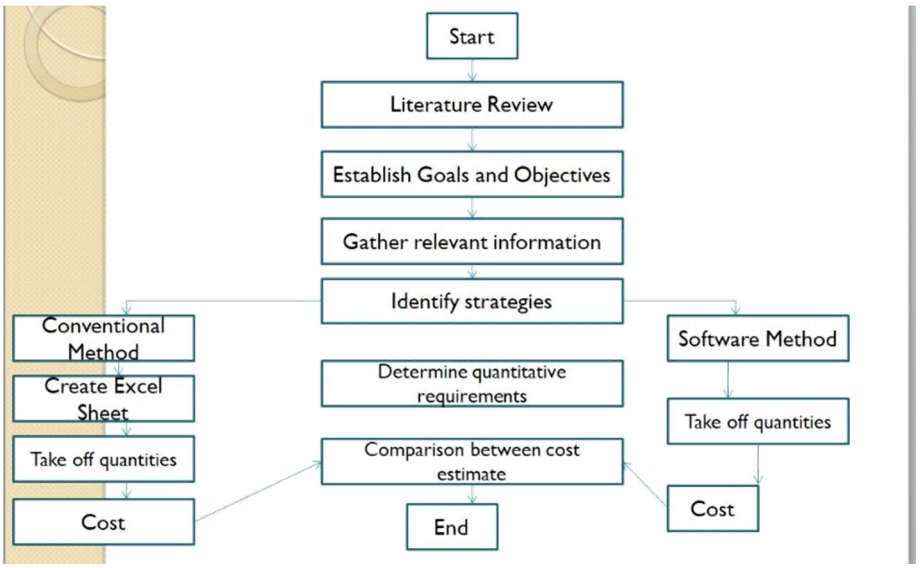
B. Planning
1) Investigating on the data
2) Assigning the work
3) Estimation of building
4) Review of the conventional estimation

C. Implementation

1) Searching Websites
2) Total estimation by that website.
3) Review on the total estimation by the websites.

D. Closure

1) Review Complete
2) Comparing different methods
3) Result
4) Project Closure



E. Available Data

1) Name of the Project :- Rajas Residency
a) Location :- Ghatkopar, Mumbai
b) Total Built up area :- 28,500 sq.ft
c) G + 15 having 27 no. of flats
d) Duration for completion of the project = 4 years
e) Actual Project Cost – 5.70 Cr

2) Name of the Project - Anuj Aura

a) Location - Ghatkopar
b) Total Built up Area – 80,000
c) G + 16 having 108 flats
d) Estimated time for completion of the project 2021-2025.

F. Analysis Of Data

1) Websites used for this survey are – Ultratechcement.com, Civil-engineering-calculators.com, Birlaa1.com, Property.todaypricerates.com
2) Comparing the output parameters from the available data we found out that different websites show different output parameters.
3) These different parameters can be helpful for the customer or the user meeting their needs.

INPUT PARAMETERS	Ultratechcement.com	Civil-engineering-calculators.com	Birlaa1.com	Property.todayprices.com
Location	✓	✗	✓	✓
Built-up Area	✓	✓	✓	✓
Building Type	✗	✗	✗	✓
Approx cost(per square ft area)	✗	✓	✗	✗
Quality Of Material	✓	✗	✗	✓
New Foundation Compatibility	✓	✓	✓	✗
Additional Foundation Compatibility	✗	✗	✗	✓

In the above table input parameters of different websites are given.

OUTPUT PARATMETERS	Ultratechcement.com	Civil-engineering-calculators.com	Birlaa1.com	Property.todayprices.com
Total Amount OF Project (In Rupees)	4.36 Cr	4.65 Cr	5.70 Cr	4.5 Cr
Cash Flow Graph Over The Period	✓	✓	✗	✗
Quantity Of Each Construction Material Required. • Cement • Sand • Aggregate • Steel • Finishers (Paint ,Tiles , Bricks) • Fittings (Windows, Door, Plumbing, Electrical, Sanitary)	✓	✓	✓	✗
Pricing Of Each Construction Material According To Quantity.	✓	✓	✗	✗
Expenditure According To Construction Stage	✗	✗	✗	✓

In the above table output parameters from the different input data are given. The desired output may vary according to different website.

V. ESTIMATED VALUE FROM WEBSITES VS ACTUAL COST

A. Project – Rajas Residency

Construction Material	Ultratechcement.com	Birlaa1.com	Civil-engineering-calculators.com	Actual Cost
Cement	5296725	6840000	7632642	9346000
Sand	1732800	2280000	5724481	1600000
Aggregate	3021000	2850000	3443997	2000000
Steel	4987500	2280000	11448963	6168560
Finishers (Paint ,Tiles , Bricks)	9576000	14250000	7679182	6000000
Fittings (Windows, Door, Plumbing, Electrical, Sanitary)	7046340	8500000	10611234	9700000
Total Cost	**4.2 Cr**	**5.7 Cr**	**4.7 Cr**	**5.7 Cr**

VI. ESTIMATED VALUE FROM WEBSITES VS EXPECTED COST

A. *(Area Plinth Method)*

Project – Anuj Aura

Construction Material	Ultratechcement.com	Birlaa1.com	Civil-engineering-calculators.com	Estimated Cost By Traditional Method
Cement	14868000	33000000	28312960	4000000
Sand	8480000	11000000	21234720	2800000
Aggregate	4864000	13750000	12775360	2000000
Steel	14000000	11000000	42469440	28560000
Finishers (Paint ,Tiles , Bricks)	33200000	68750000	28485600	21440000
Fittings (Windows, Door, Plumbing, Electrical, Sanitary)	19779200	41250000	39361920	30000000
Total Cost	12 Cr	27 Cr	17.26 Cr	22 Cr

Above data show comparison between the estimated parameters such as cement, sand, aggregate, steel, finishers and fitting with the estimated cost by traditional method.

B. *Our Verdict*

1) After analyzing the output parameters , two websites stand out on the top, Birlaa1.com , Ultratechcement.com .

2) One can have flexibility while using ultratechcement.com as the cost can be varied on the type of the grade used. Accordingly one can also not exceed his budget by adjusting the grade

3) Birlaa1.com is the most precise one when it came to estimation of the total cost. Final total amount varies accordingly to the input location which are Metro, Urban, Semi-Urban, Rural.

VII. CONCLUSION

A. From this research we conclude that the best reliable website and method for cost estimation which helps to reduce initial investment and to maintain the cash flow throughout the project .

B. Website such as Birlaa1.com is more precise in total cost estimation of the project as compared to the other websites and traditional method .

C. So this can help the user to save time , save money and also to bid for right price in bidding .

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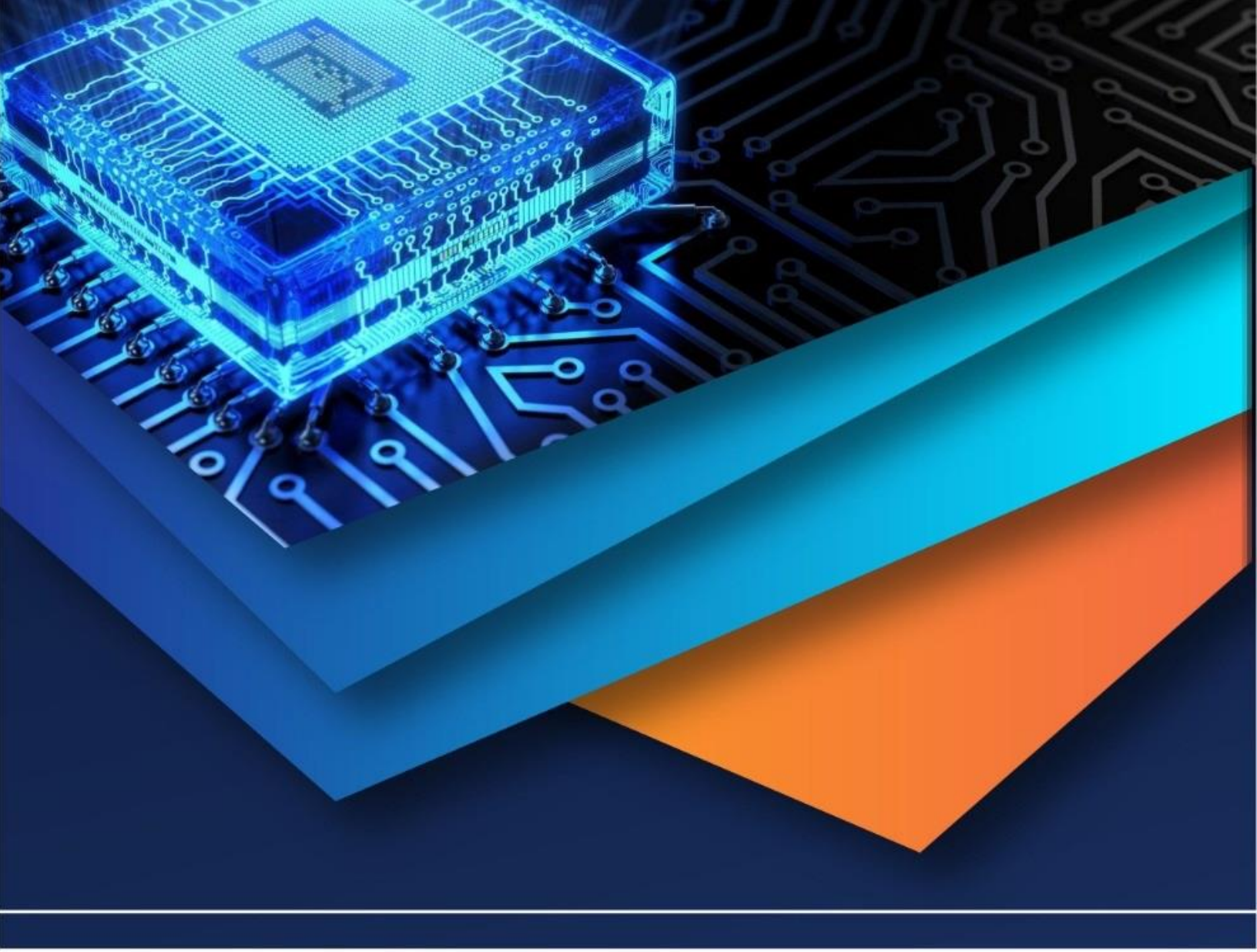

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