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Comparative Study on Steel Structure Auditorium Estimation

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Abstract
Construction cost estimation is a critical aspect of project management in the construction industry. Accurate estimation of construction costs, material costs, and labour costs is essential for effective project planning, budgeting, and resource allocation. With the advancement of technology, various software options are available to assist in construction cost estimation, offering different features, advantages, and limitations. In this project report, we have compared different software methods for construction cost estimation, including Microsoft Excel, Estimator 2.0, Primavera P6, and Construction Calculator mobile apps. The report provides an overview of these software options, highlighting their advantages and disadvantages in terms of accuracy, flexibility, efficiency, transparency, customization, collaboration, reporting capabilities, scalability, historical data tracking, user-friendliness, automation, cost-effectiveness, and compatibility. The report also discusses the strengths and limitations of each software option, including potential errors, learning curve, cost of licenses, customization options, updates and maintenance requirements, integration limitations, and platform compatibility. The report concludes by emphasizing the importance of carefully considering the specific needs and requirements of the project and the expertise of the team members when selecting the most suitable software for construction cost estimation.

1. Introduction

Cost estimation is an essential process in construction projects. It involves estimating the cost of materials, labour, equipment, and other expenses associated with the construction project. Accurate cost estimation is crucial to ensure that the project is completed within budget and on time. Inaccurate cost estimation can result in cost overruns, delays, and even project failure.The traditional method of cost estimation involves manual calculations, which are time-consuming and prone to errors. However, with the advancement of technology, cost estimation software has emerged as a solution to this problem. Cost estimation software uses algorithms and databases to automate the process of cost estimation. These software applications provide detailed cost estimates for different aspects of a construction project, including labour costs, material costs, and overhead costs. They also allow for easy customization of estimates based on specific project requirements and can generate reports in various formats. Cost estimation software offers several advantages over traditional manual cost estimation methods. First, it saves time and effort. Manual cost estimation involves a lot of calculations, which can be time-consuming and prone to errors. Cost estimation software automates these calculations, saving time and reducing the risk of errors. Second, it provides accurate cost estimates. Cost estimation software uses up-to-date databases and algorithms to provide accurate cost estimates, reducing the risk of cost overruns and delays. Third, it allows for easy customization of estimates. Cost estimation software allows users to customize estimates based on specific project requirements, making the estimates more accurate and relevant. Finally, it provides detailed reports. Cost estimation software generates reports in various formats, providing detailed information about the cost estimates, which can be useful for project management and decision-making. However, cost estimation software also has some limitations. First, it may require specialized training. Cost

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estimation software can be complex, and users may need specialized training to use it effectively. Second, it may not be suitable for all construction projects. Cost estimation software is designed for specific types of construction projects, and users may need to select the appropriate software for their needs. Third, it may not provide the same level of accuracy as manual cost estimation for some types of projects. In some cases, manual cost estimation may provide more accurate cost estimates than cost estimation software.

2. Literature Review

(1)Murat Gunduza et.al (2015) have studied an early cost estimation model for hydroelectric power plant projects. The main indicators considered and studied in this paper are the amount of energy generated in a hydroelectric power plant and the cost of investment and there by decide whether a project investment is feasible or not. Cost of the project is calculated by detailed hydrological study, site investigation, good basin planning, geotechnical survey and various tests of the soils. Multiple regression method and artificial neural network analysis are taken for the validation. The models are developed by the data collected from forty nine hydro electric power plant projects and five projects are used for the validation of the models. Comparisons of validation results revealed that the regression model had a 9.94%, and neural network model had 5.04% prediction accuracy. In this paper the neural network shows more prediction accuracy than the regression analysis. (2)Alfredo Serpell et.al (2013) studied about the cost estimation of new construction projects using an integrated, computerbased approach. The paper studies the limitations of computer programs based on parametric estimating methodologies and CBR. Historical data was effectively reused in the modeling which is used by the CBR method. 17 historical datas of construction were selected for the validation purpose. The system produced a suitably detailed and accurate cost estimate for each of the tested projects. This method generates estimates of construction projects with more accuracy and in an efficient way. The automation and support of CBR problem solving seems to make possible to carry out the scope definition process of a project in a short time and without too much effort. Each stage of the process can be assisted without the participation of manual information handling. (3)Hossein Shams Mianaei et.al (2012) have studied about the estimated cost for drilling wells using the cost estimation method Case Based Reasoning. It is obtained by studying the historic data's and their problems and uses the datas to solve new similar problems. The major findings of his study is that in the proposed CBR model despite limited data, the error of method according to the performance indicators was very low. Therefore, obtained estimation accuracy of the proposed CBR model is high and the model is useful. On the other hand, given that the available estimation methods spend much time to estimate cost, we could save time using the CBR method. In his proposed CBR method, if a feature doesn't have the value, it does not affect the model. While in other methods, if a feature doesn't have the value then the model is not solved. By this method the speed of drilling which is very important is increased.(4)Seokyon Hwang et.al (2011) has studied the effect of time gaps between cost estimation and on-site operations. As the construction cost varies according to the time the cost estimation is process is hard. Two time series models were considered in this paper by analyzing time series index data and comparing them with existing models in the present study. The developed time series models accurately predict construction cost indexes. In particular, the model responds to large change of costs, which allows for accurate estimation of the short-term and long-term periods. Overall, the models are effective for understanding the trend of construction costs. The analysis were categorized as Factor analysis and Pattern analysis. In his paper series of comparisons proved that the new models are more accurate than existing models previously developed by others. In particular, the new models responded sensitively and swiftly to quick, big changes to predict the series for the periods following the change. The proposed models are envisioned to serve well the following purposes: preparing the initial budget for a new project, taking advantage of short-term fluctuations

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of prices of resources for the activities, and determining the level of contingency due to price inflation. In this paper Time series models are more accurate than other models in the case of time gaps. [5]Kyong Ju Kim et.al (2010) has done a study of cost estimation model using the Case Based Reasoning and Genetic Algorithms. In case based reasoning similar cases from a set of historic data is compared and predict the construction cost. Cost estimation based on the Genetic algorithms are based on genetics and artificial intelligence. In this paper cost estimation of a bridge construction is taken. A genetic algorithm based method was adopted to find out the weightage of the parameters. By these methods the accuracy of the early cost estimation model is increased when compared to the conventional methods. This method can also apply to another type of construction projects which will increase the accuracy of the estimated cost. [6]Sung-Hoon An et.al (2006) have done a predictive modeling for cost estimation Experience is included in all process of construction cost estimating by the analytic hierarchy process. He proposed model which included experience in all processes of construction cost estimating by the analytic hierarchy process. The model overcomes the difficulty of measuring experience for determining the weights of attributes. Three different models were compared by their efficiency. The model using the analytic hierarchy process was more accurate, reliable, and explanatory than the other models, and closer to the original aim of the case-based reasoning model, for solving new problems using experience from previous cases. In his study a case based reasoning model using analytic hierarchy process was proposed. The result shows that the hierarchy based CBR method is more accurate reliable and explanatory than other models.

3. Materials & Methods

The cost estimation of an auditorium building is a crucial step in the construction process. It involves determining the approximate costs associated with the construction of the building, including materials, labor, and other expenses. The auditorium building under consideration is a single-story structure with a rectangular shape, with a utility purpose of serving as an auditorium. The building has a plan area of 1008 square meters and is designed to accommodate 400 persons in its seating arrangement. The height of the building is 7 meters, and the concrete grade used is M20, with all steel grades being Fe415 grade. The cost estimation process will take into account these building information details to arrive at an accurate estimate of the project costs.

Utility of building	: Auditorium
No of stories	:1
Shape of the building	:Rectangular shape
Concrete grade	:M20
All steel grades	: Fe415 grade
Plan area	:1008m^2
Seating requirements	:400 persons
Height of building	:7m

Auditorium Plan

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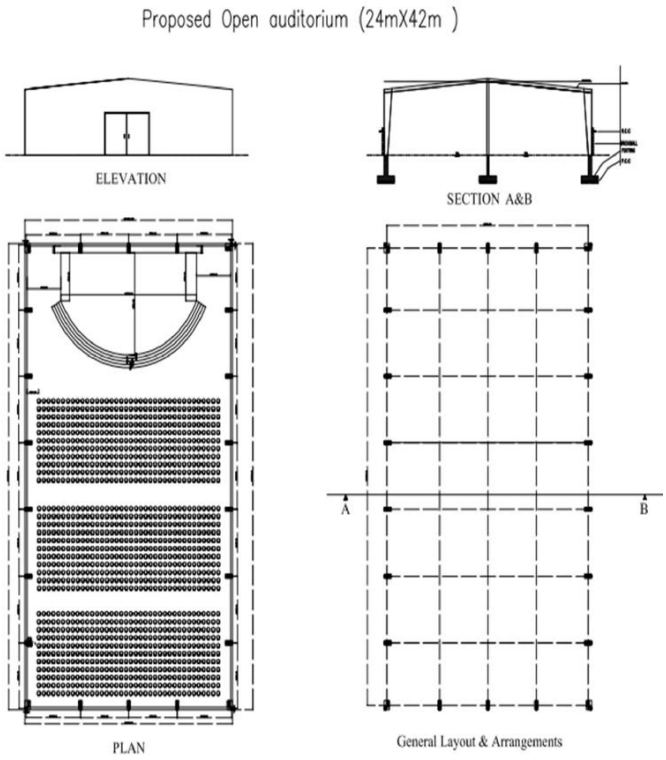

Fig 1 Auditorium Plan

4. Methodology

The methodology for this paper will involve the following steps:

- Identify and Select Software Programs: Identify and select the software programs to be compared, such as Microsoft Excel, Estimator 2.0, Primavera P6, and mobile apps, based on their relevance, popularity, and availability in the market.
- Literature Review: Conduct a thorough literature review to understand the existing research, studies, and best practices related to cost estimation in construction projects. Review relevant academic papers, industry reports, and publications to gain insights into different cost estimation methods, techniques, and challenges.
- Define Evaluation Criteria: Define the evaluation criteria and factors to be used for comparing the software programs. Examples of evaluation criteria may include accuracy of calculations, flexibility and customization options, collaboration and sharing capabilities, reporting and analysis features, ease of use, historical data tracking, and cost-effectiveness.
- Data Collection: Collect relevant data for cost estimation, such as sample construction projects with known costs, material prices, and labour rates. This data can be obtained from industry databases, published reports, or real-life construction projects.
- Software Testing: Use the selected software programs to estimate the construction cost, material cost, and labour cost of the sample projects. Input the relevant data, configure the settings as required, and obtain cost estimates using each software program.
- Comparison and Analysis: Compare the estimated costs obtained from each software program against the actual costs of the sample projects. Analyze the accuracy and reliability of each software program in terms of its ability to provide accurate and consistent cost estimates. Use the defined evaluation criteria to objectively evaluate and rank the software programs.
- Results and Findings: Summarize the results and findings of the comparison, highlighting the strengths and weaknesses of each software program in terms of cost estimation accuracy and reliability. Present the findings in a clear and organized manner.

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- Conclusion and Recommendations: Explain conclusions based on the results of the comparison and provide recommendations for selecting the most accurate and reliable software program for cost estimation in construction projects. Discuss the limitations of the study and suggest areas for further research or improvement.

5. SOFTWARE CALCULATION

5.1 Using MS Excel

The following estimation prepared by MS Excel software

AUDITORIUM BUILDING										
Sl.No	Description of Item Of Work	Nos	L	B	D	Counts	Unit	Weight (kg)	Unit Rate	Amount (Rs)
1	SUB-STRUCTURE									
a	Excavation	22	2.50	2.50	3.00	412.50	m^3		245	101062.50
b	Filling & Compacting Area	22	2.50	2.50	2.60	357.50	m^3		153	54697.50
d	Crushed Stone For PCC	22	2.50	2.50	0.05	6.88	m^3		315	2165.63
e	P.C.C in 1:4:8 mix	22	2.50	2.50	0.10	13.75	m^3		980	13475.00
f	PE Film (0.05 THK)	22	2.50	2.50	-	137.50	m^2		660	90750.00
g	Anti-termite	22	2.50	2.50	-	137.50	m^2		425	58437.50
h	Formwork for Footing	22	10.00	0.40	-	88.00	m^2		180	15840.00
	CONCRETE QUANTITY - Upto Plinth Level									
2	MAT CONCRETE									
a	Foundation For Footing	22	22.00	2.00	0.40	387.20	m^3		6500	2516800.00
b	Column Pedestal - Concrete M20	22	0.45	0.60	4.00	23.76	m^3		6500	154440.00
c	Plinth Beam - Concrete M20	2	0.23	0.45	24.50	5.07	m^3		6500	32964.75
d	Plinth Beam - Concrete M20	2	0.23	0.45	42.46	8.79	m^3		6500	57129.93
e	Flooring P.C.C in 1:4:8 mix	1	24.50	42.46	0.15	156.04	m^3		6500	1014263.25
3	STEEL SECTION QUANTITY									
i	Tapered Column Web Weight	22	0.58	0.012	7.00	1.08	m^3	8472.0		
ii	Tapered Column Flange Weight	22	0.25	0.016	7.00	0.62	m^3	4835.6		
a	Total Weight of Tapered Steel Column	-						13307.6	80	1064605.70
i	Mid Tapered Rafter Web Weight	8	0.58	0.012	11.60	0.65	m^3	5105.2		
ii	Mid Tapered Rafter Flange Weight	8	0.25	0.016	11.60	0.37	m^3	2913.9		
b	Total Weight of Tapered Steel Mid Rafter	-						8019	80	641528.63
i	End Tapered Rafter Web Weight	8	0.58	0.012	11.60	0.65	m^3	5105.2		

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ii	End Tapered Rafter Flange Weight	8	0.25	0.016	11.60	0.37	m^3	2913.9		
c	Total Weight of Tapered Steel End Rafter				-			8019	80	641528.63
d	Purlin - ISMC 125 - 6.1 m Per Bay	18		42.50		12.70	kg/m	9715.5	80	777240.00
e	Sag Rod - 12 Dia - 1 Nos Per bay	18		7.00		0.89	kg/m	112.1	80	8971.20
	TOTAL STEEL SECTION QUANTITY							39173.4		3133874.15
4	BRICK WALL									
	Short Wall	2	0.23	3.10	24.50	34.94	m^3			
	Long Wall	2	0.23	3.10	42.46	60.55	m^3			
	Deduction Door	6	2.50	1.00	0.23	3.45	m^3			
	Deduction Window	10	1.20	0.90	0.23	2.48	m^3			
a	Total Volume of Brick					89.55	m^3		1600	143281.54
b	Plastering Area Inside			89.55/0.23		389.35	m^2		500	194676.00
c	Plastering Area Outside			89.55/0.23		389.35	m^2		500	194676.00
d	Main Doors	4	2.50	1.00		10.00	m^2		1600	16000.00
e	Access Doors	2	2.50	1.00		5.00	m^2		1600	8000.00
f	Windows	10	1.20	0.90		10.80	m^3		1600	17280.00
5	SHEETING									
a	Side Sheeting (7m - Brick Wall Ht) - Short Side	2	4.00	24.50	-	196.00	m^2		50	9800.00
b	Side Sheeting (7m - Brick Wall Ht) - Long Side	2	4.00	42.46	-	339.68	m^2		50	16984.00
c	Roof Sheeting	1	23.20	42.46	-	985.07	m^2		50	49253.60
6	FLOORING									
a	Marbles	1	24.50	42.46	-	1040.27	m^2		550	572148.50
b	WATER PROOF : SSAP Waterproof System	1	24.50	42.46	-	1040.27	m^2		60	62416.20
c	Floor Polishing	1	24.50	42.46	-	1040.27	m^2		50	52013.50

Fig: 5.1 Project Creation

5.2 Using Estimator 2.0

The following estimation prepared by Estimator 2.0 software

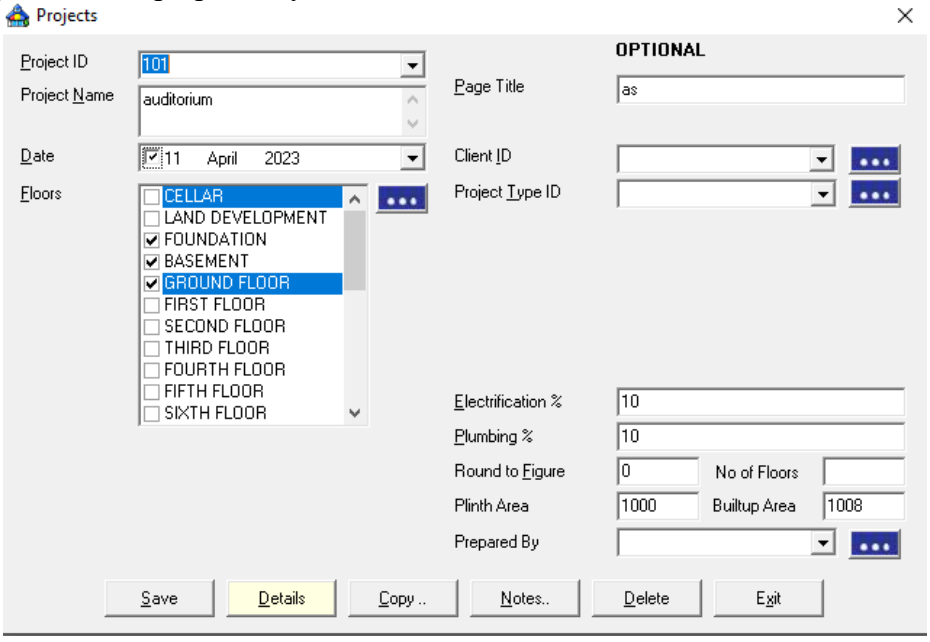

Fig: 5.2 Project Creation

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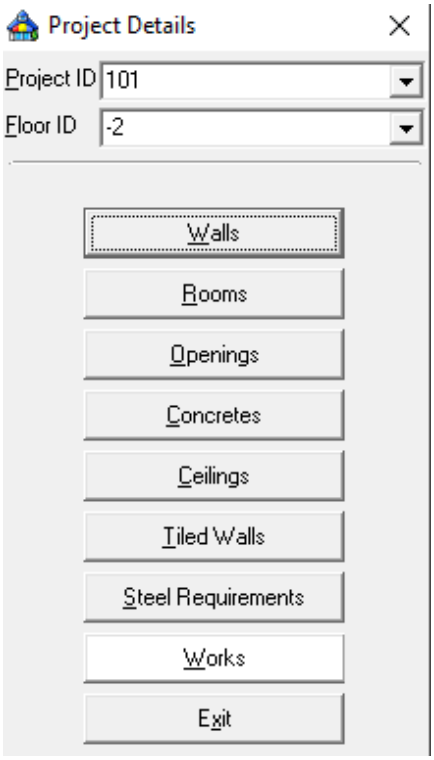

Fig: 5.3 Project Details

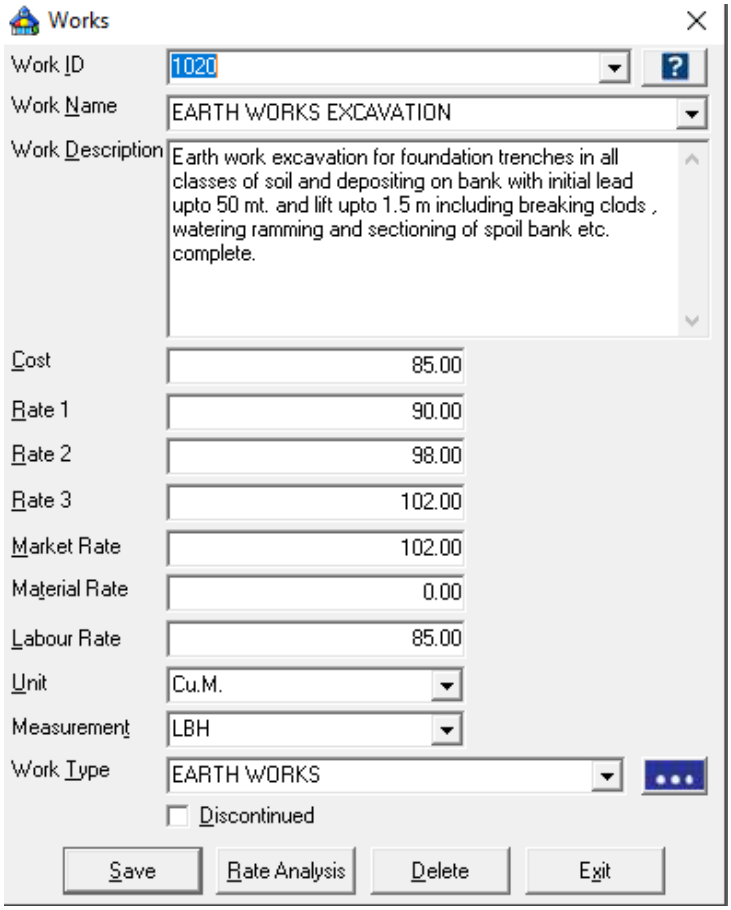

Fig: 5.4 Excavation details

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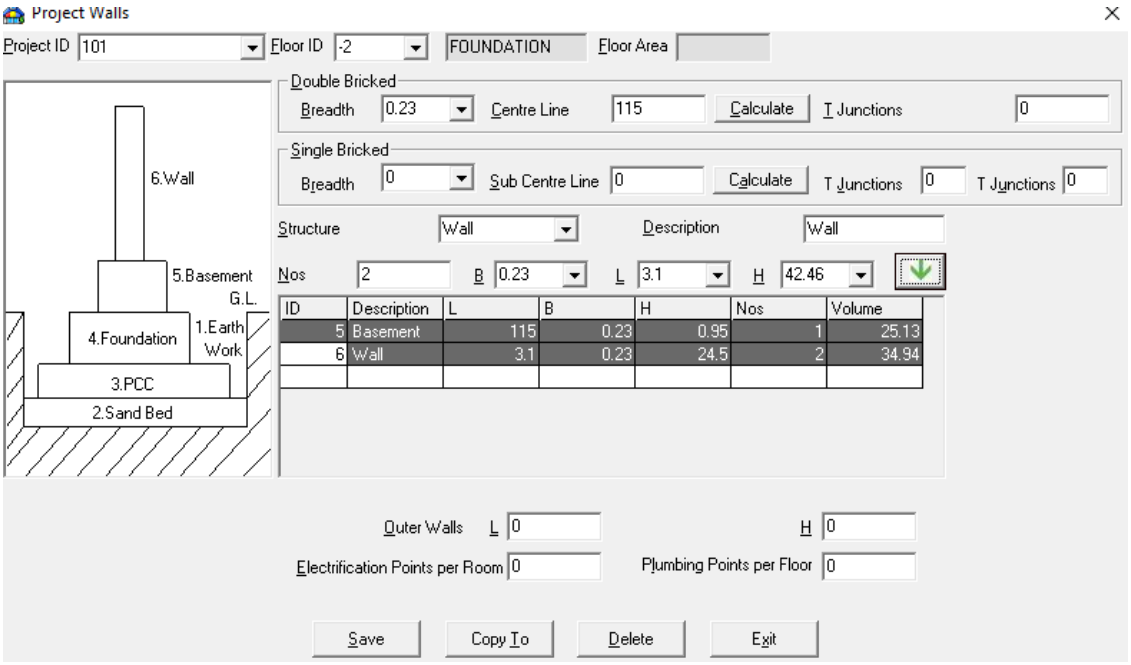

Fig: 5.5 Material Quantity various activity

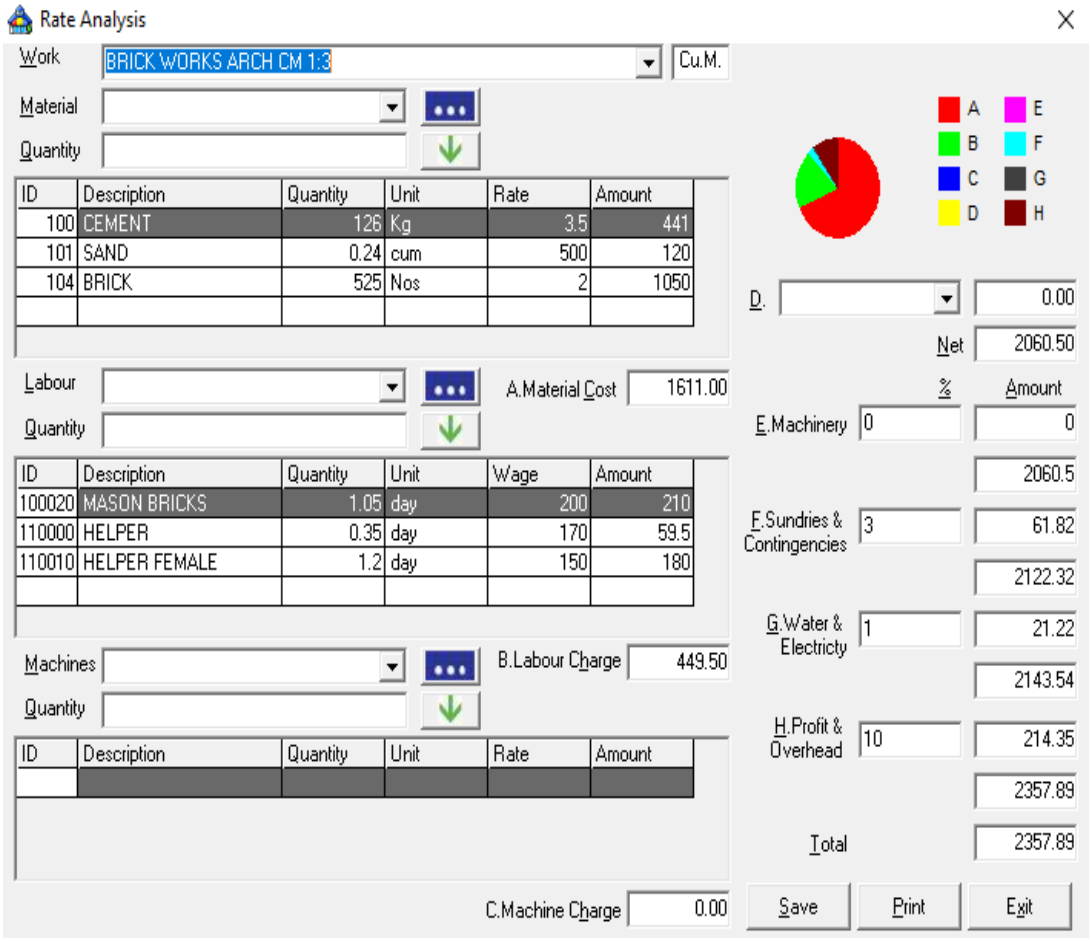

Fig: 5.6 Rate Analysis various activity

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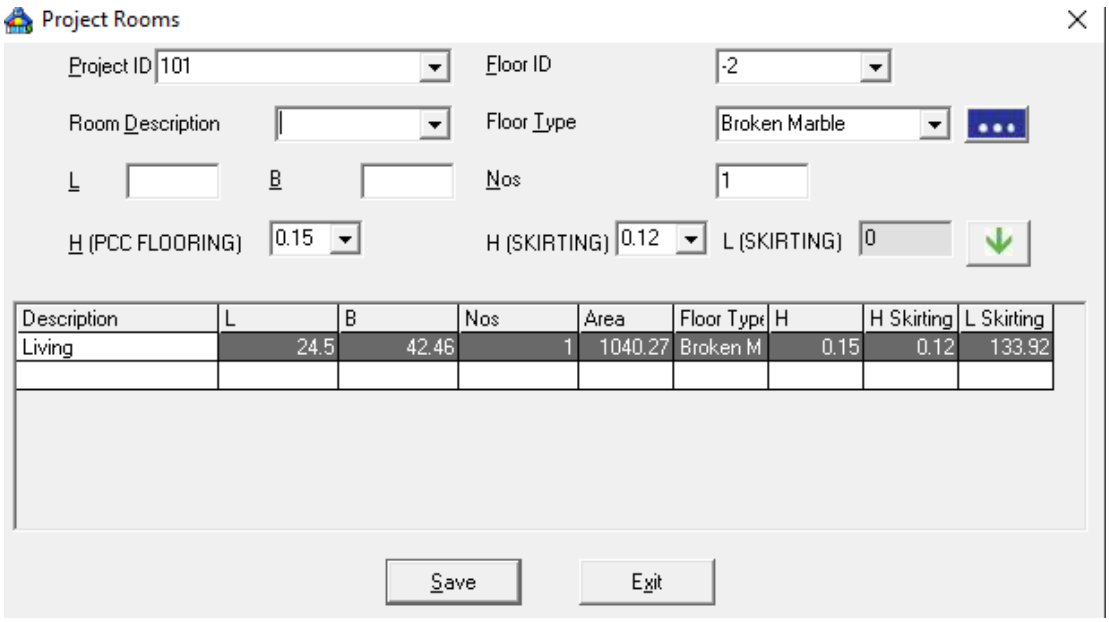

Fig: 5.7 Flooring Details

Estimator™ 2.0

Sn No	Description	Volume	Unit	Rate	Amount
1	Excavation	412.5	m^3	245	101063
2	Filling & Compacting Area	357.5	m^3	153	54698
3	Crushed Stone For PCC	6.9	m^3	315	2166
4	P.C.C in 1:4:8 mix	13.8	m^3	980	13475
5	PE Film (0.05 THK)	137.5	m^2	660	90750
6	Anti-termite	137.5	m^2	425	58438
7	Formwork for Footing	88.0	m^2	180	15840
8	Foundation For Footing	387.2	m^3	6500	2516800
9	Column Pedestal - Concrete M20	23.8	m^3	6500	154440
10	Plinth Beam - Concrete M20	5.1	m^3	6500	32965
11	Plinth Beam - Concrete M20	8.8	m^3	6500	57130
12	Flooring P.C.C in 1:4:8 mix	156.0	m^3	6500	1014263
13	Total Weight of Tapered Steel Column	13307.6	kg	80	1064606
14	Total Weight of Tapered Steel Mid Rafter	8019.1	kg	80	641529
15	Total Weight of Tapered Steel End Rafter	8019.1	kg	80	641529
16	Purlin - ISMC 125 - 6.1 m Per Bay	9715.5	kg	80	777240
17	Sag Rod - 12 Dia - 1 Nos Per bay	112.1	kg	80	8971
18	Total Volume of Brick	89.6	m^3	1600	143282
19	Plastering Area Inside	389.4	m^2	500	194676
20	Plastering Area Outside	389.4	m^2	500	194676
21	Main Doors	10.0	m^2	1600	16000
22	Access Doors	5.0	m^2	1600	8000
23	Windows	10.8	m^3	1600	17280
24	Side Sheeting (7m - Brick Wall Ht)	535.7	m^2	50	26784
25	Roof Sheeting	985.1	m^2	50	49254
26	Beam Reinforement 12 Dia	9874.0	kg	70	691180
27	Sunshade & Lintel Reinforement 6, 12 & 20 Dia	7541.0	kg	70	527870
28	Column Reinforement 6 & 20 Dia	6454.0	kg	70	451780
29	Footing Reinforement 16 Dia	7952.0	kg	70	556640
30	Painting	2125.4	m^2	60	127526
31	Elevation work	2%			205017
32	Electrical work	1%			102508
33	Plumbing work	15%			1537627
34	Supervisor charge	1%			102508
35	Land scaping	4%			410034
36	SUPERVISIONS CHARGE	15%			1891281
37	LABOUR CHARGE	45%			5673844
	Total Amount :				20173667.17

Fig: 5.8 Estimator 2.0 Output

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5.3 Using Primavera P6

The following estimation prepared by PRIMAVERA P6.

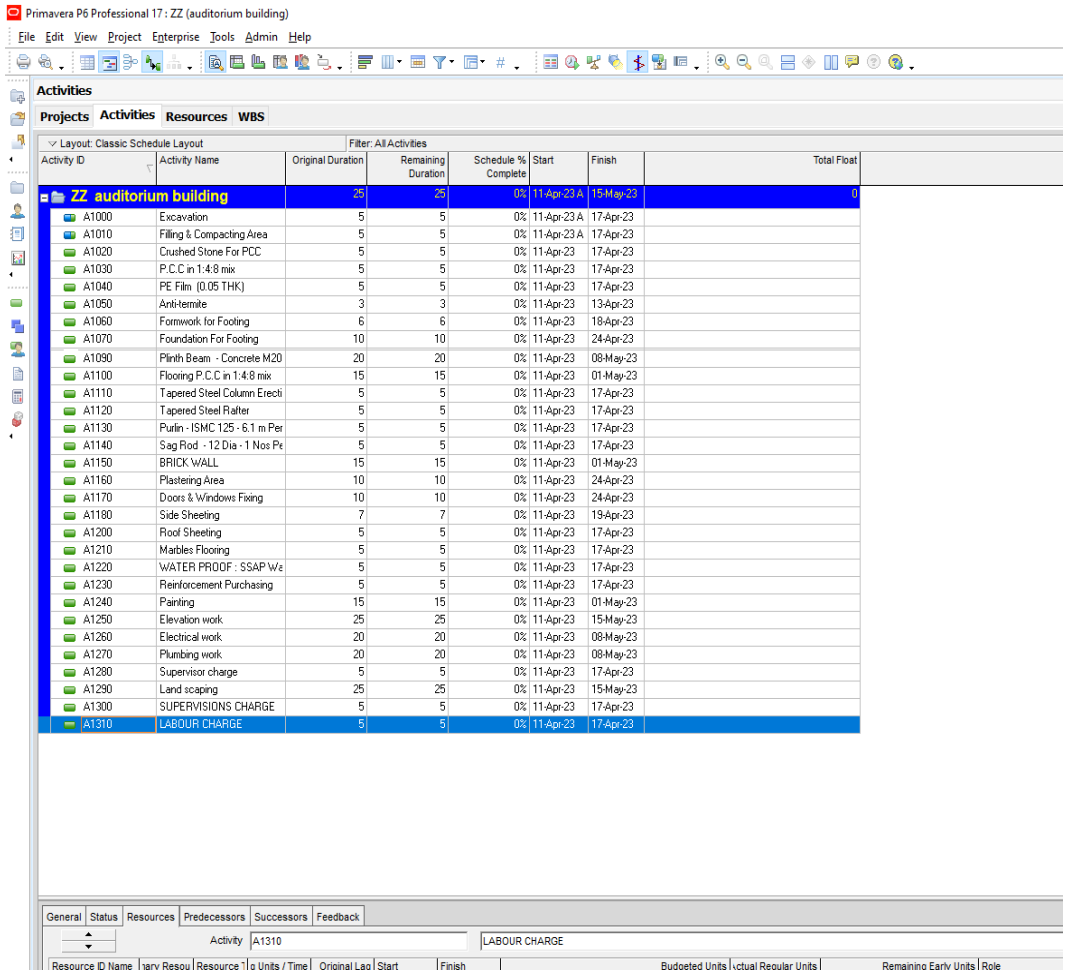

Fig: 5.9 Primavera WBS Activity Creation

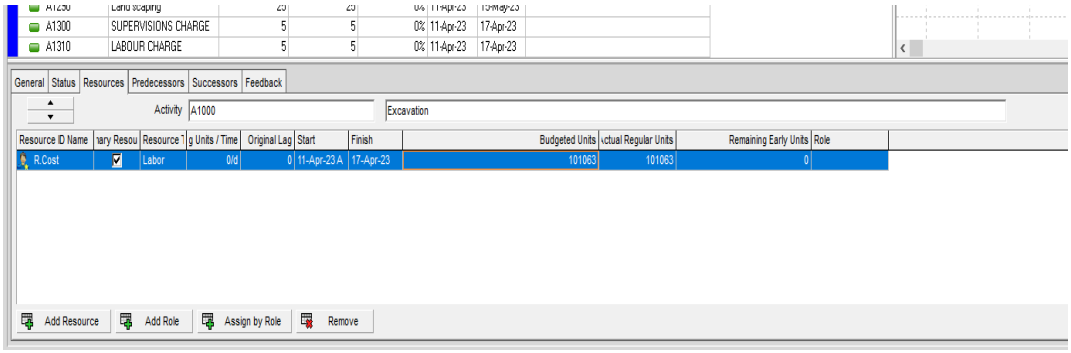

Fig: 5.10 Primavera Resource Allocation

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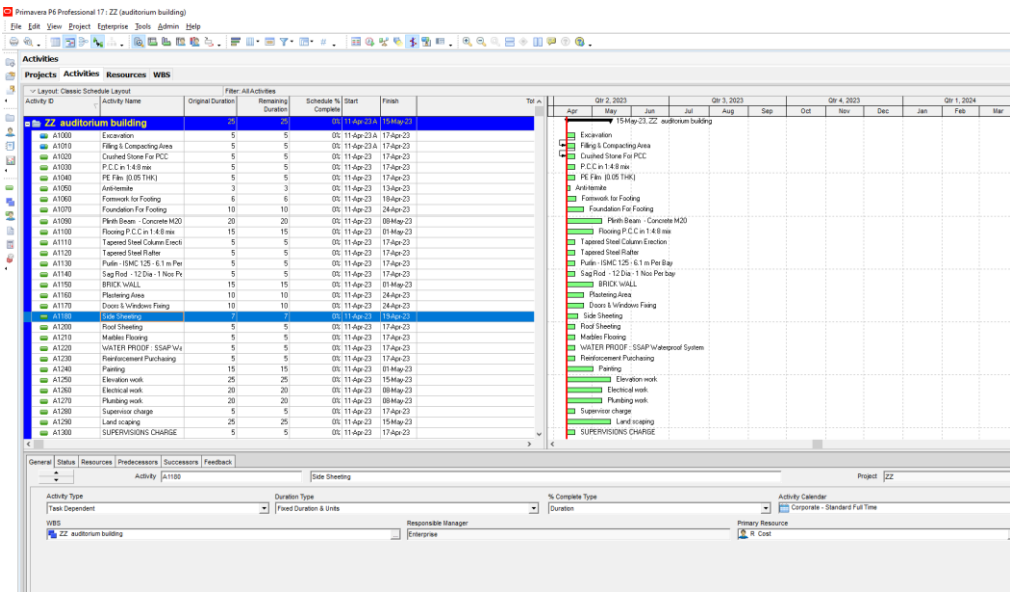

Fig: 5.11 Primavera Resource & Relationship Assigning

auditorium building

Activity Resource and Role Assignments

Resource ID Name / Activity ID	Activity Name	Budgeted Cost	Remaining Units 01-Apr-23 - 31-Dec-23	Apr 2023	May 2023	Jun 2023
Product Development Resources						
Product Marketing Group						
Lendell Jackson						
Cost						
A1000	Excavation	3,828,906.25				
A1010	Filling & Compacting Area	7,866,093.75				
A1020	Crushed Stone For PCC	3,863,981.88		2166		
A1030	PCC in 1:4:8 mix	1,817,187.50		13475		
A1040	PE Film (0.05 THK)	1,421,875.00		90750		
A1050	Anti-termite	5,839,843.75		58438		
A1060	Formwork for Footing	4,851,000.00		48		
A1060	Formwork for Footing	3,830,000.00		15840		
A1070	Foundation For Footing	4,100,000.00		2516800		
A1090	Plinth Beam - Concrete M20	5,193,597.50		63066	27028	
A1100	Flooring PCC in 1:4:8 mix	3,979,703.13		946646	67618	
A1110	Tapered Steel Column Erection	1,713,556.25		1064606		
A1120	Tapered Steel Rafter	3,973,328.13		1283057		
A1130	Purlin - ISMC 125 - 6.1 m Per Bay	3,817,500.00		777240		
A1140	Sag Rod - 12 Dia - 1 Nos Per bay	3,851,900.00		8971		
A1150	BRICK WALL	3,393,668.12		133729	9552	
A1160	Plastering Area	7,368,437.50		398935		
A1170	Doors & Windows Fixing	1,860,000.00		41280		
A1180	Side Sheeting	3,858,000.00		26784		
A1200	Roof Sheeting	7,891,950.00		49254		
A1210	Marbles Flooring	2,757,781.25		572149		
A1220	WATER PROOF : SSAP Waterproof System	3,935,456.25		212937		
A1230	Reinforcement Purchasing	3,886,875.00		2227470		
A1240	Painting	3,056,960.63		119024	8502	
A1250	Elevation work	2,995,125.62		183649	144296	
A1260	Electical work	4,975,628.12		1147809	491918	
A1270	Plumbing work	2,462,936.88		1721714	737877	
A1280	Supervisor charge	1,497,057.50		163973		
A1290	Land scaping	5,990,251.25		367299	288592	
A1300	SUPERVISIONS CHARGE	5,576,250.00		3246660		
A1310	LABOUR CHARGE	2,043,673.75		1460997		
Subtotal		9,898,525.00		18914766	1775384	
Subtotal		9,898,525.00		18914766	1775384	
Subtotal		9,898,525.00		18914766	1775384	
Subtotal		9,898,525.00		18914766	1775384	
Total		9,898,525.00		18914766	1775384	

Fig: 5.12 Primavera Cost Estimate Output

5.4 Using Construction Calculator Mobile App

The following estimation prepared by Construction Calculator Mobile App.

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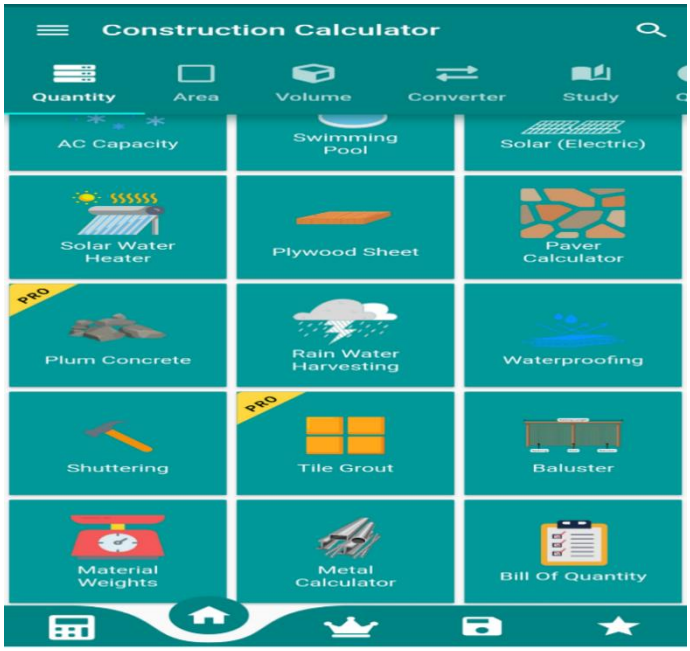

Fig 5.13 App Menu

Fig 5.14 Volume of Concrete Calculation

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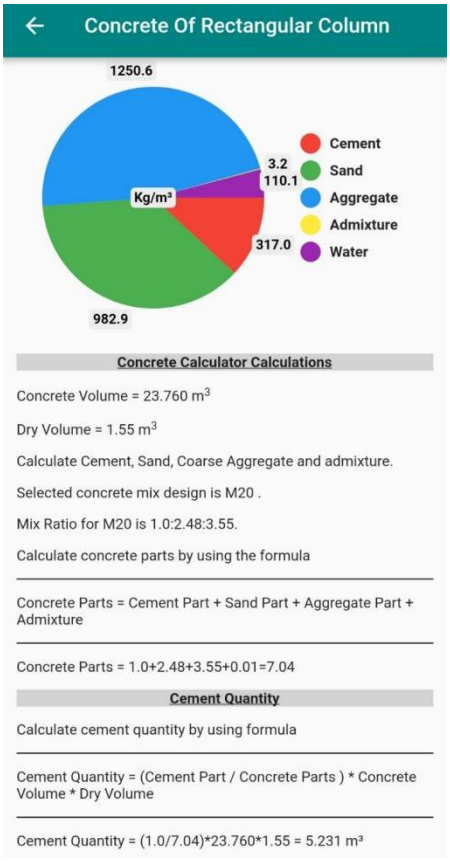

Fig 5.15 Concrete Volume Detail Calculation

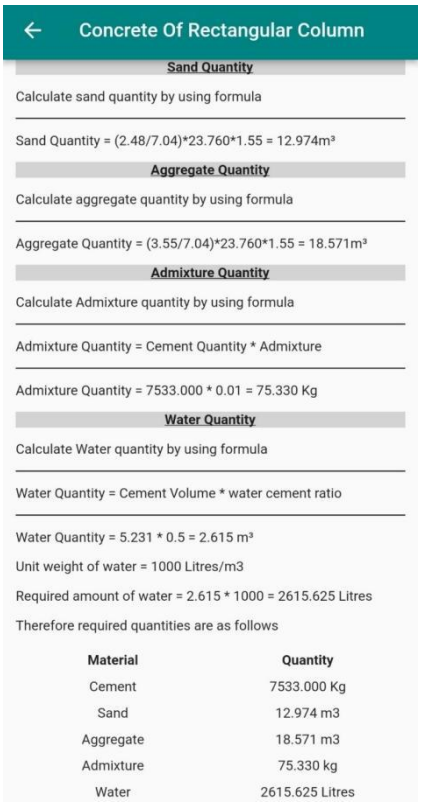

Fig 5.16 Concrete Volume Detail Calculation

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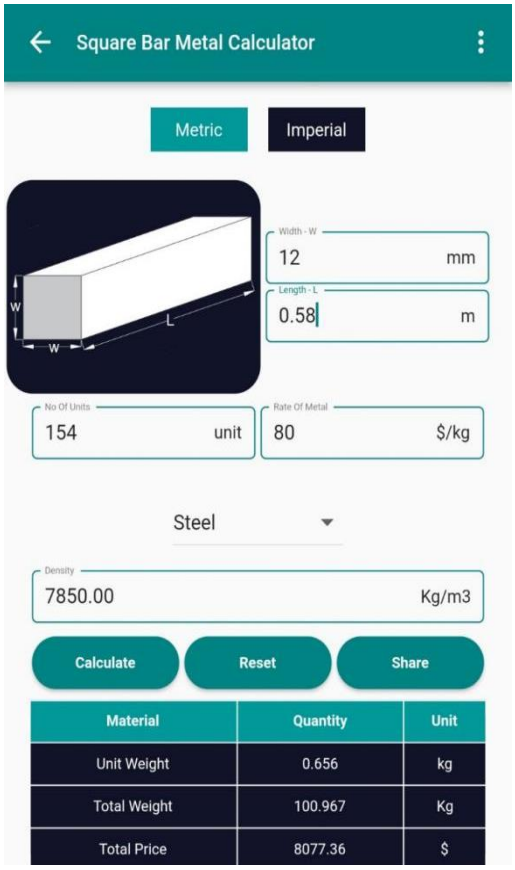

Fig 5.17 Steel Weight Calculation

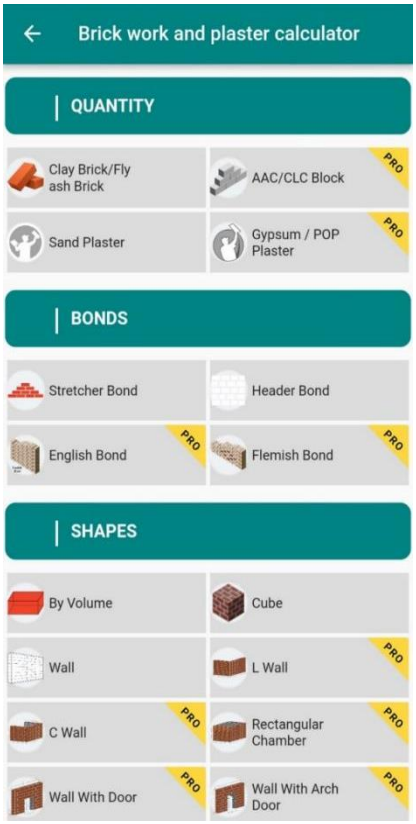

Fig 5.18 Brick Calculation

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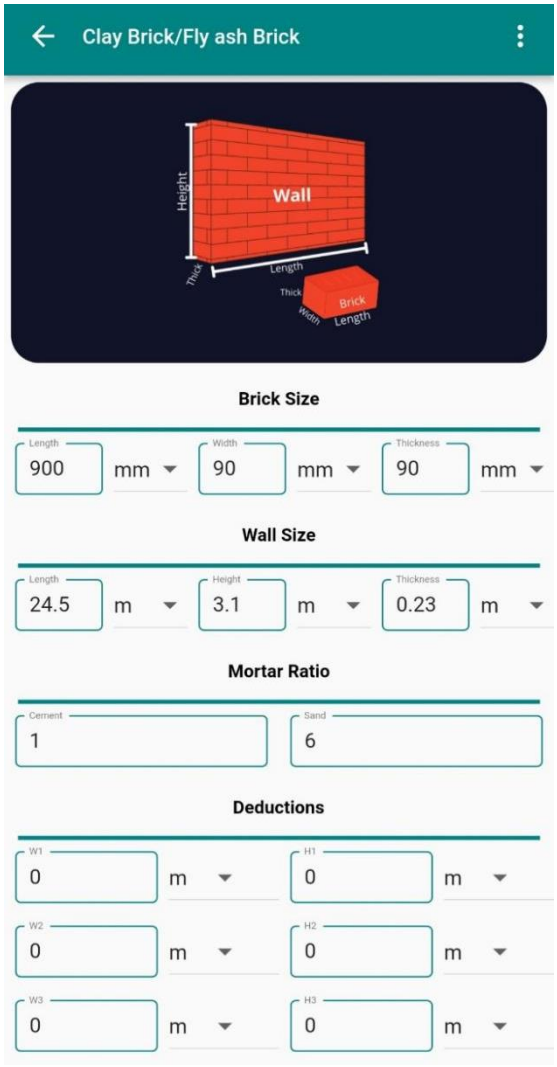

Fig 5.19 Brick Volume Calculation

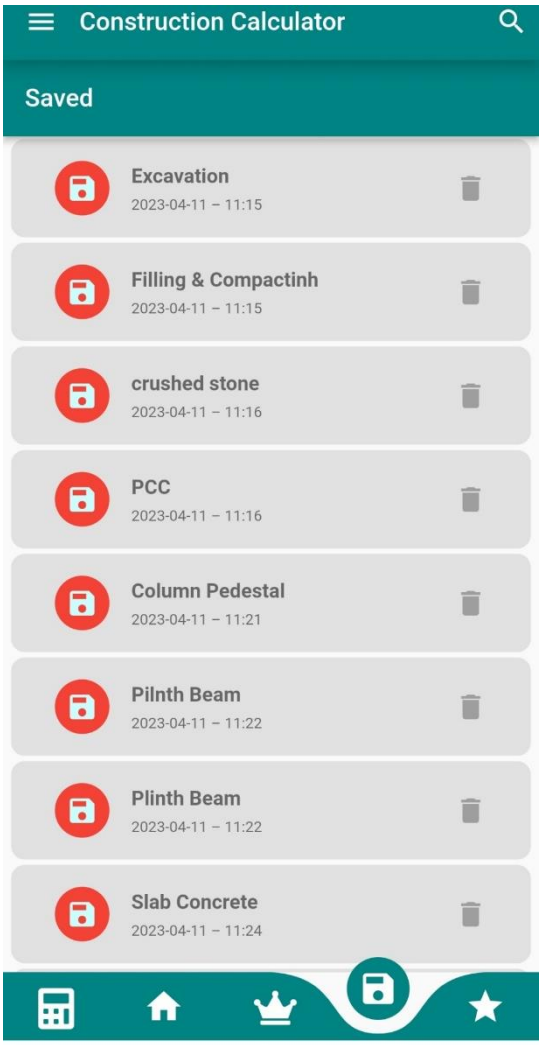

Fig 5.20 Output Summary

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6. RESULT & DISCUSSION

Table 1: Rate comparison of Software

S.NO	DESCRIPTION	EXCEL SHEET	ESTIMATOR 2.0	PRIMAVERA
1	**SUB-STRUCTURE**			
a	Excavation	101062.50	101063	
b	Filling & Compacting Area	54697.50	54698	
d	Crushed Stone For PCC	2165.63	2166	2166
e	P.C.C in 1:4:8 mix	13475.00	13475	13475
f	PE Film (0.05 THK)	90750.00	90750	90750
g	Anti-termite	58437.50	58438	58438
h	Formwork for Footing	15840.00	15840	15840
2	**MAT CONCRETE**			
a	Foundation For Footing	2516800.00	2516800	2516800
b	Column Pedestal - Concrete M20	154440.00	154440	
c	Plinth Beam - Concrete M20	32964.75	32965	27088
d	Plinth Beam - Concrete M20	57129.93	57130	
e	Flooring P.C.C in 1:4:8 mix	1014263.25	1014263	946646
3	**STEEL COLUMN QUANTITY**			
I	Tapered Column Web Weight			
ii	Tapered Column Flange Weight			
a	Total Weight of Tapered Steel Column	1064605.70	1064606	1064606
i	Mid Tapered Rafter Web Weight			
ii	Mid Tapered Rafter Flange Weight			
b	Total Weight of Tapered Steel Mid Rafter	641528.63	641524	1283067
i	End Tapered Rafter Web Weight			
ii	End Tapered Rafter Flange Weight			
c	Total Weight of Tapered Steel End Rafter	641528.63	641529	
d	Purlin - ISMC 125 - 6.1 m Per Bay	777240.00	777240	777240

e	Sag Rod - 12 Dia - 1 Nos Per bay	8971.20	8971	8971
4	**BRICK WALL** Short Wall Long Wall Deduction Door Deduction Window			
a	Total Volume of Brick	143281.54	143282	133729
b	Plastering Area Inside	194676.00	194676	Plastering total 398935
c	Plastering Area Outside	194676.00		Door window total 41280
d	Main Doors	16000.00		Door window total 41280
e	Access Doors	8000.00		Door window total 41280
f	Windows	17280.00		Door window total 41280
5	**SHEETING**			
a	Side Sheeting (7m - Brick Wall Ht) - Short Side	9800.00	26784	26784
b	Side Sheeting (7m - Brick Wall Ht) - Long Side	16984.00		
c	Roof Sheeting	49253.60	49254	49254
6	**FLOORING**			
a	Marbles	572148.50		572179
b	WATER PROOF : SSAP Waterproof System	62416.20		212937
c	Floor Polishing	52013.50		
d	False Ceiling	98507.20		
7	**REINFORCEMENT**			
a	Beam Reinforement 12 Dia	691180.00	691180	
b	Sunshade & Lintel Reinforement 6, 12 & 20 Dia	527870.00	527870	
c	Column Reinforement 6 & 20 Día	451780.00	451780	
d	Footing Reinforement 16 Dia	556640.00	556040	Total 2227470
8	**Painting**			
a	Inner wall- painting	23361.12	-	
b	Outer wall- painting	101570.09	-	
c	Painting for Joineries	2400.00	-	
d	Painting for Grill work	194.40	-	

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		14169806.50	127526	119024
9	Elevation work	283396.13	20507	183649
10	Electrical work	1416980.65	102508	1147809
11	Plumbing work	2125470.97	1537627	1721714
12	Supervisor charge	141698.06	102508	163973
13	Land scaping	566792.26	410034	367299
	TOTAL	18704144.58	-	-
14	SUPERVISIONS CHARGE	2805621.69	1891281	324666
15	LABOUR CHARGE	1262529.76	5673844	1460997
	TOTAL COST FOR CONSTRUCT	22772296.22	20,173667.17	18914766

Percentage comparison of table

Sub structure:
In Excel sub structure total estimation is – ₹ 3,36,427.63 and its Percentage is 1.47%
In estimator 2.o sub structure total estimation is – ₹ 3,36,430 and its percentage is 1.66%
In primavera sub structure total estimation is -₹ 3,36,430 and its percentage is 1.66%
In estimator 2.o substructure there is no validation in percentage comparing to estimator 2.o sub structure and primavera substructure
Excel sub structure is 0.49 percentage less. hence we recommend excel for substructure

Mat concrete:
In Excel Mat concrete total estimation is – ₹ 37,75,597.93 and its Percentage is 16.57%
In estimation 2.o Mat concrete total estimation is – ₹ 37,75,598 and its percentage is 18.7%
In primavera Mat concrete total estimation is -₹ 37,75,413 and its percentage is 19.57%
Excel Mat concrete is 3 percentage less than primavera and 2.23 % less than estimator 2.o. hence we recommend excel for Mat concrete

Steel column:
In Excel Steel column total estimation is – ₹ 31,33,874.16 and its Percentage is 13.76%
In estimation 2.o Steel column total estimation is – ₹ 31,33,870 and its percentage is 15.53%
In primavera Steel column total estimation is -₹ 37,75,413 and its percentage is 19.76%
Excel Steel Column is 6 percentages less than primavera and 1.77 % less than estimator 2.o. hence we recommend excel for Steel Column

Brick wall:
In Excel Brick wall total estimation is – ₹ 3,37,958 and its Percentage is 1.67%
In estimation 2.o Brick wall total estimation is – ₹ 5,73,913.54 and its percentage is 2.52%
In primavera Brick wall total estimation is -₹ 6,97,784 and its percentage is 3.68%
Excel Brick wall is 2.01 percentages less than primavera and 0.85 % less than estimator 2.o. hence we recommend excel for Brick wall

Sheeting:
In Excel Sheeting total estimation is – ₹ 5,73,913.54 and its Percentage is 2.52%
In estimation 2.o Sheeting total estimation is – ₹ 3,37,958and its percentage is 1.67%
In primavera Sheeting total estimation is -₹ 6,97,784 and its percentage is 3.68%
Excel Sheeting is 0.85 percentages more than estimator 2.o and 2.01% more than primavera. hence we recommend estimator 2.o for Sheeting

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Flooring:
In Excel Flooring total estimation is – ₹ 7,85,087.4 and its Percentage is 3.44%
In estimation 2.o Flooring total estimation is – ₹ 7,85,087.4 and its percentage is 3.44%
In primavera Flooring total estimation is -₹ 9,35,636.7 and its percentage is 4.94%
Excel flooring and estimator 2.o flooring values and percentage are same but the primavera differ a 1.34 % more than excel and estimator 2.o

Reinforcement:
In Excel Reinforcement total estimation is – ₹ 22,26,470 and its Percentage is 9.78%
In estimation 2.o Reinforcement total estimation is – ₹ 22,26,870 and its percentage is 11.03%
In primavera Reinforcement total estimation is -₹ 22,27,470 and its percentage is 11.77%
Excel Reinforcement is 1.99 percentages less than primavera and 1.25 % less than estimator 2.o. hence we recommend excel for Reinforcement

Painting:
In Excel Reinforcement total estimation is – ₹ 1,27,525.21 and its Percentage is 0.56%
In estimation 2.o Reinforcement total estimation is – ₹ 1,27,526 and its percentage is 0.63%
In primavera Reinforcement total estimation is -₹ 2,46,549.49 and its percentage is 1.30%
Excel Reinforcement is 0.74 percentages less than primavera and 0.11 % less than estimator 2.o. hence we recommend excel for Reinforcement

Elevation work:
Elevation work 1.24% in excel, 0.10% in estimator 2.o and 0.97% in primavera. Hence we recommend estimator 2.o for elevation work

Electrical work:
Electrical work 6.2% in excel, 0.50% in estimator 2.o and 6.06% in primavera. Hence we recommend estimator 2.o for electrical work

Plumbing work:
Plumbing work 9.8% in excel, 7.62% in estimator 2.o and 9.10% in primavera. Hence we recommend estimator 2.o for Plumbing work

Supervisor charge:
Supervisor charge 0.62% in excel, 0.50% in estimator 2.o and 0.86% in primavera. Hence we recommend estimator 2.o for Plumbing work

Land scaping:
Land scaping 0.62% in excel, 0.02% in estimator 2.o and 1.94% in primavera. Hence we recommend estimator 2.o for land scaping

Supervision charge:
Supervision charge 12.32% in excel, 9.37% in estimator 2.o and 0.86% in primavera. Hence we recommend estimator 2.o for Supervision charge

EXCEL, ESTIMATOR 2.0,MOBILE APPLICATION
Difference between the above three are
EXCEL- Rate and area can be with accuracy. In Excel we can generate accurate answers even for decimals.Area and rate can also be calculated.But only drawback is duration.

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ESTIMATOR 2.0-Rate and area can not be given with accuracy but labour and duration can be given with accuracy.

MOBILE APPLICATION

Rate cannot be given area calculation and labour calculation can be done but duration takes long time. When compared to excel and estimator 2.0 mobile application is little slower and accurate value is not obtained.In mobile application area can be calculated only for feet and meters.Rate calculation cannot be done in mobile application.Area and weight calculation can be generated with accuracy in mobile application.Calculation can be divided in percentage output can be taken as printouts.

PRIMAVERA

Prima vera is a software in which for a building construction from starting till ending how many labours are needed and time duration to complete the building can be estimated.

Recent development in primavera is estimation costing can be estimated. draw back in primavera is estimation costing can be done.Draw back in prima vera is estimation calculation,time consuming.Reason is we have to give project details along with estimation.If reference book is given it will be useful to complete the calculation with accuracy because we can refer the labour,duration project details from that reference book.

PRIMA VERA

Excavation, filling and compaction area cannot be calculated but crusher stones and pcc calculation can be done in prima vera.

RCC-column pedestal concrete cannot be calculated in excel but it can be done in mobile application.

Tapered column, tapered flange weight, weight rate can be calculated in prima vera.

Total weight and rate of tapered steel can be calculated in prima vera.

Total weight and rate of midtapered also can be calculated in primavera

Purlins and tapered end steel rafter cannot be calculated in prima vera.

In excel an estimator 2.o all calculation can be done but when compared to excel estimator 2.o varies more than 2% that is if the calculation value is 1 lakh in excel but In estimator 2.o the value is 3 lakhs .

in excel inner and outer area of plastering can be calculated but it canot be calculated estimator 2.o,primavera and mobile application but it can be calculated totally.

JUSTIFY:

Microsoft excel enables users to identify trends and organize and sort data into meaning categories. Excel performs well in small construction estimation works and it is user friendly .It is recommended only for residential building and it is not recommended for high rise buildings and commercial structures. It can generate and calculate to faster, when compared to estimator 2.0, primavera and mobile application. And it is cost control and easy to estimate.

The major drawback of Microsoft excel is every one can change the value and details entered. Either you can change the format or you can change it to pdf of paper format. Excel sheet majorly used for tiny works.

In estimator is an on premise solution for windows, designed to helps builders, architects, contractors and engineers automate processes related to estimate preparation, tender comparison, work order issuance, purchase request generation and more. Key features includes project management, items wise summary, labor building, and project rate analysis and cost control.

Teams using Estimator 2.O can store projects in a unified database and manage automated data backups for safeguarding critical data from mishaps and accidents. User can classify the stored data into various groups based on rooms, calculations, steel requirement and more. Additionally, the solution, preview allows businesses to generate to generate, preview and print reports, which can be exported as portable documents.

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There are lot of project management software tools to choose from and there are few that truly seen to dominate the space, like oracle's primavera p6.

- Time lines
- Risk management
- Reporting and analysis
- Calendar & activity views etc….

By comparing the above given software's estimator 2.O, excel, primavera and mobile application. Excel is a cost controller and user friendly, tiny building structures can be estimated and duration can be less but comparative estimator 2.O is similar to excel but it may uses for HiRISE buildings and commercial structures. And then primavera has high maintenance and high cost. HiRISE structures building can be estimated but may differ when compare to both excel and estimator 2.O. By concluding that estimator 2.O is best for above comparative case study

RESULT

Final calculation in excel is better for estimation when compare to primavera, estimator 2.o and mobile application

CONCLUSION

Construction cost estimation is critical in project management, and software tools like Microsoft Excel, Estimator 2.0, Primavera P6, and Construction Calculator Mobile app are used for efficient cost estimation. This chapter discusses the results of a comparative analysis of these software tools, considering factors like accuracy, efficiency, convenience, versatility, and cost-effectiveness. The findings provides insights for construction professionals to make informed decisions when selecting software for cost estimation. Implications for project management, challenges, and recommendations for future research will also be addressed.

When it comes to building cost estimation in construction projects, there are several software options available,

Microsoft Excel offers advantages in accuracy, flexibility, efficiency, transparency, and data analysis tools. It can be customized and allows for collaboration, providing cost monitoring and organized data storage. Templates and formulas can be reused. However, it has limitations such as limited features, manual data entry prone to errors, lack of automation for complex calculations, collaboration challenges, limited reporting capabilities, scalability issues, lack of industry-specific features, and requires manual maintenance and updates.

Estimator 2.0 is known for its user-friendly interface, automated calculations, predefined databases, customizable templates, cost breakdowns, and reports. It offers efficiency, accuracy, professionalism, collaboration, and historical data tracking. However, it may have a learning curve, cost considerations for licenses, compatibility and integration limitations, limited customization options, updates and maintenance requirements, potential user errors, and limitations in flexibility for handling unique or complex project requirements.

Primavera P6 is a comprehensive project management software with robust cost management, dynamic cost updates, resource management, advanced reporting and analysis, customization, collaboration, integration with other systems, project visibility, and control, and historical data tracking. However, it has a steeper learning curve, cost of software, complexity and scalability, limited focus on cost estimation, dependency on software, updates and maintenance, compatibility and integration limitations, and potential user errors.

Construction Calculator Mobile app offer advantages in mobility, real-time updates, accuracy, efficiency, multimedia capabilities, data organization, cost tracking, and analysis. They provide a user-friendly interface, cost-effectiveness, and real-time cost tracking. They can also integrate with other tools. However, they may have limited functionality, small screen and user experience, data input accuracy, dependence on internet connectivity, limited collaboration and sharing, security and data privacy concerns, platform compatibility, and limited customization and updates.

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In conclusion, the best software for building cost estimation depends on the specific needs and requirements of the project, as well as the preferences and expertise of the team members using the software. It's important to carefully consider the advantages and disadvantages of each software option and possibly trial or demo them to evaluate their suitability for the specific project needs before making a final decision.

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