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Equipment Management in Construction by Using Optimality Analysis

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ABSTRACT: The management of equipment is an essential task in project each construction industry. Today the management systems are available to assist construction companies efficiently .It will describe requirements for the equipment management, allocation of equipment, equipment cost in a each activity . The development is based on the Optimality Analysis and evaluation of optimal solution the equipment mainteintly, the assignment problem and simplex method the equipments are maintained. The willingness of equipment managers to adopt realistic optimisation techniques indicates the current need for research in construction equipment management. In the area of optimality analysis of construction equipment, there exist a numberof mathematical models proposed. In spite of the amount of work done by researchers, there exists the need for a more realistic purchasing or renting for construction equipment. The main objective of this project, the minimizing the equipment cost and reduce delay the project by the optimality analysis.

KEYWORDS: optimal solution, Realistic optimization, Equipment management, optimality analysis.

I. INTRODUCTION

Construction equipment is a major resource in the building process for a construction project. When is equipment owned by a contractor, it forms a sizable portion of his assets requiring proper managementpractices.Construction equipment are the most crucial and critical resource for a construction company. Construction equipment are a prerequisite for timely completion of all construction projects. As a matter of fact the equipment are one of the most capital intensive long terms investments that a construction company makes. Expenses related to construction equipment have a major impact on wether the company's balance sheet shows profits or losses and in what quantity. Construction Management is not a new idea. The function of the Construction Manager is to work on behalf of the owner to complete a project within the plans and specifications provided. In the last few years construction practices have changed dramatically. Technology, materials, government bureaucracy, financing, design, and engineering have all advanced.

Construction equipment management refers to continuous evaluation of the construction equipment fleet and its cost while at the same time considering the projects at hand. The process of balancing the expense and use of the construction equipment against the timelines and income from the projects can be called construction equipment management. Construction equipment should ideally pay for themselves by helping the owner earn more than it costs to own, operate, maintain, store and use the machine. Operation costs are a recurring expense based on frequency of use while idle sitting machines are a drain to the income.The cost of equipment in a project varies from 10% to 30% of the total cost of the project, depending upon the extent of mechanisation. In modern fully mechanised projects the cost of equipment goes upto 30%. The important rules of proper planninig, selection, procurement, installation, operation, Maintenance and equipment replacement policy. With the growing use of machinery it has become necessary for

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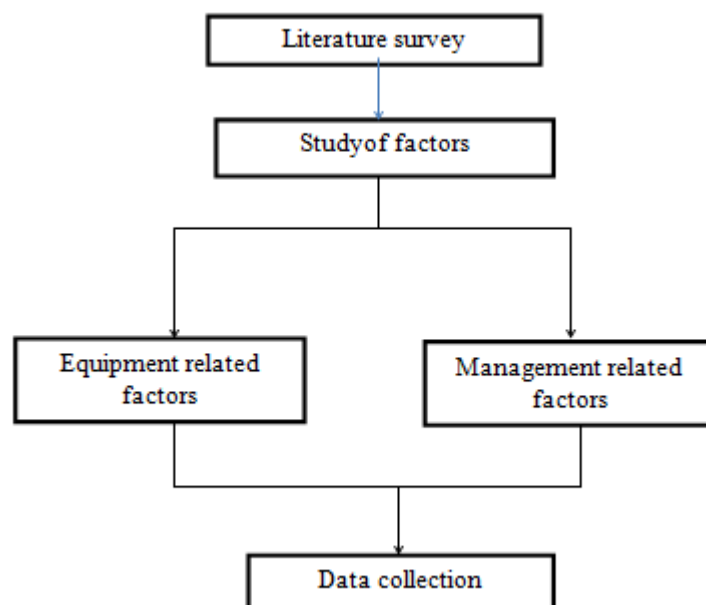
construction engineers to be thoroughly familiar with the construction application and upkeep of the wide range of the modern equipment.

Operation research is a method of analysis by which management receives aid for their decision. It offers alternative plans for a problem for decision by adopting analytical methods. Best alternative is then selected and implemented. The methods of operation research which can be applied to equipment management are :waiting line models, equipment replacement models, simulation, transportation model and linear programming. Assignment problem was introduced in 1957 by Koopmans and Beckmann to model a plant location problem. The assignment problem is most used for mathematicians, computer scientists, operations researchers and practitioners. The simplex method is the standard simplex method which is mainly used in linear programming and mathematically equivalent but differs in implementation. In this method the table has represents constraints adjusted to set of basic variables.

II. REVIEW OF LITERATURE

This study about equipment management in construction were carried out from various literatures. In paper “Plant and equipment management to minimize delays in road construction projects”, the author says about theoretical comparisons for issued based and study of factors for delay the project. For in paper “ A analysis of construction equipment management used in construction projects for improving productivity”, While the equipments are purchasing, leasing or renting and guide in optimising the profitability. In civil engineering construction project, the cost of equipment can vary from 25% -40% of the total cost. For the construction activity, promote the optimising value of the project. “Productivity increase by optimum utilization of machines and man power energy”, in this paper focuses prove 5 key productivity factors can be studied and using the concept of comparison of fuzzy numbers, it is introduced a very effective method for solving these problems. With the problems assumptions, the optimal solution will be carried out by using simplex method.

III. METHODOLOGY

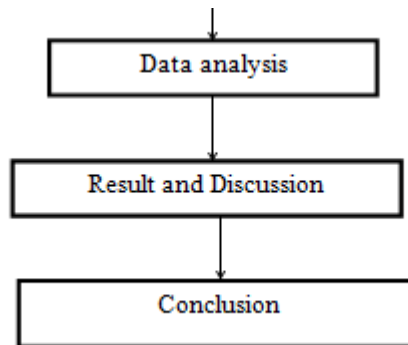


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DATA COLLECTION

Construction of residential building datas was collected, the activities and its corresponding durations involved in construction is given in table 1.

ID	Activity Name	Duration
1	Site Work	3
2	Procurement of materials	3
3	Earth work excavation for Foundation	4
	For Septic tank	1
4	Concrete pouring for footing	2
5	Sand filling for footing	1
6	Plinth beam construction	5
7	Rough carpentry work in G.F	2
8	Ground floor wall construction up to sill level	5
9	Concreting for lintel & sunshade for G.F	2
10	Wall construction upto G.F roofing	2
11	Roof construction for ground flooring	13
12	Rough wiring & plumbing work for G.F	3
13	Stair case construction	5
14	Plastering for G.F inner & outer walls	10
15	Rough carpentry work in F.F	2
16	First floor wall construction up to sill level	5
17	Concreting for lintel & sunshade for F.F	2
18	Wall construction upto F.F roofing	3

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19	Roof construction for First flooring	13
20	Rough wiring & plumbing work for F.F	3
21	Stair case construction	5
22	Plastering for F.F inner & outer walls	10
23	Rough carpentry work in S.F	2
24	Second floor wall construction up to sill level	5
25	Concreting for lintel & sunshade for S.F	2
26	Wall construction upto S.F roofing	3
27	Roof construction for First flooring	13
28	Rough wiring & plumbing work for S.F	3
29	Stair case construction	5
30	Plastering for S.F inner & outer walls	10
31	Railing installation	3
32	Curtain wall installation	1
33	Finishing wiring & plumbing	15
34	Finishing carpentry work	25
35	Sanitary fitting	12
36	Rock wall ceiling	2
37	Painting	20
38	Cleaning	10
39	Finishing work	10

Total estimated cost for residential building to the each and every activities for the table 2

	MATERIAL (65%)	LABOUR (25%)	TRANSPORTATION (65%)
Ground Floor	2234103	846921	348560
First Floor	2177191	834956	317548
Second floor	2213482	874766	316356
	6624776	2559343	982494
GRAND TOTAL-10166613/-			

IV. RESULT & DISCUSSION

From the above data collected the equipments are allotted for a corresponding and their cost are estimated by using Assignment problem in table 3. From this estimated cost it is clearly defined that usage of equipment give better results than man power, the work duration is also minimised. Thus the project is effectively finished by equipment.

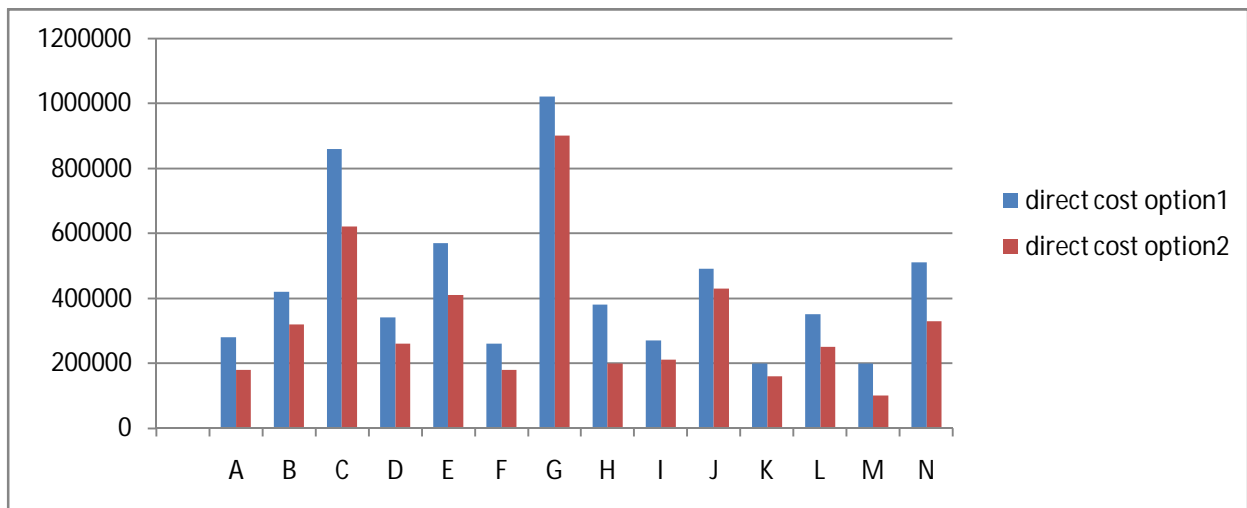
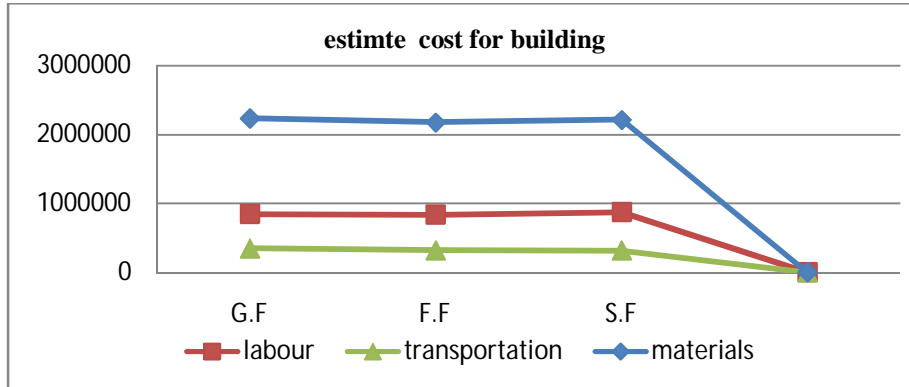
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Activity ID	Duration(weeks) Option1	Duration(weeks) Option2	Direct Cost Option1	Direct Cost Option2
A	1	2	280000	180000
B	2	4	420000	320000
C	7	10	860000	620000
D	4	6	340000	260000
E	3	4	570000	410000
F	3	5	260000	180000
G	4	7	1020000	900000
H	6	9	380000	200000
I	5	7	270000	210000
J	6	8	490000	430000
K	3	4	200000	160000
L	3	5	350000	250000
M	1	2	200000	100000
N	3	6	510000	330000



Graphical representation of equipment direct cost

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V. CONCLUSION

This from this project it is concluded that the usage of machine decrease as the usage of man power, but increase as the effective of the building construction. Cost over run and excess duration are minimised by applying machine the construction process. Here the Assignment problem is done the optimisation of resources.

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