

Figure 7: Electrician over allocation

Table 4: Change in Electrician duration for different resource constraints

Resource constraints	19	17	15	13	12
Duration for Electrician	222	234	248	252	254.89
Total increased duration	779.67	779.67	780.5	780.5	781.5

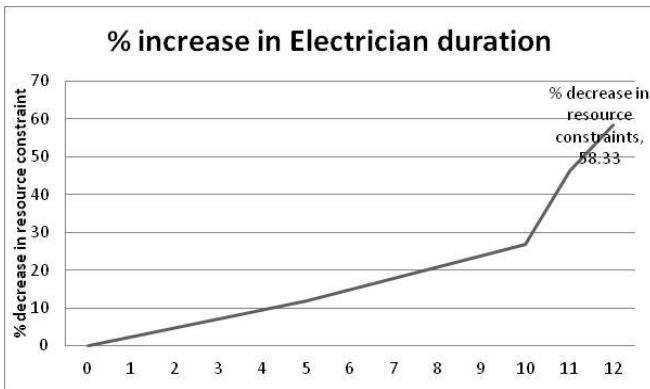


Figure 8: % decrease in resource constraints vs. % increase in Electrician duration

A. Cost of Project

Total indirect cost = Rs.12, 324,600

Average indirect cost per day = Rs.17410

The total increased cost for increased duration is shown in table 5.

Table 5: Increased cost for increased duration

Increased duration in days	Increased cost in Rs	% increase in cost
708	135,570,600	0
735	136,040,670	0.35
749.95	136,300,950	0.54
755	136,388,871	0.60
760.28	136,480,796	0.67
779.67	136,818,376	0.92
780.5	136,832,827	0.93
781.5	136,850,237	0.94

Figure 9 Illustrates the relation between increased cost of project and increased duration of project.

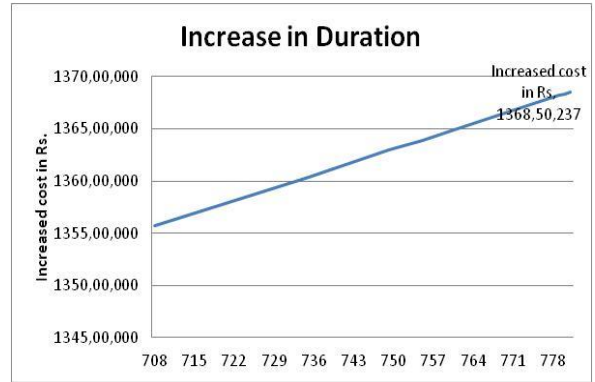


Figure 9: Increased cost vs. increased duration

4. Result

Actual required duration to complete the project is 708 days. After resource levelling duration of project is increased to 781.5 days.

Thus the project duration increased by 10.38%.

Increase in project duration causes increase in the project cost.

Project cost is increased to Rs.136, 850,237.

Thus, project cost increases by 0.94%

5. Conclusion

The paper presents a resource constrained project schedule as per the site conditions. For resource constrained analysis resource levelling is done. The resource type for this project is considered manpower (labor) only. The project schedule increases day by day cost due to sudden requirement of labor or any unavoidable circumstances thus, it has an impact on the overall cost of the project. Duration is increased for decrease in resource constraints. The resources are masons, Male coolie and Electricians etc. Increase in duration (% increase) is 10.38% which causes increase in project cost by 0.94%. Thus the resource scheduling reduces the unexpected loss of the project which may be caused due to the huge variations in the usage of the resources.

References

- [1] Prof. A. Ray Chaudhuri, B. Sivakonda Reddy, Prof. A. Ray Chaudhuri, "Resource Management in Construction Projects – a case study" Engineering Science and Technology: An International Journal (ESTIJ), ISSN: 2250-3498, Vol.2, No. 4, August 2012 PN (660 – 665)
- [2] Indrasen Singh, P. Venkateswaralu, "Planning and controlling of a National Highway Project- A case study", Journal of the Indian Road Congress Paper No.613, April – June 2014 PN (91 – 102)
- [3] Antony Prasanath MA, Thirumalai Raja K, "Analysis of cost & schedule Performance of Residential Building Projects by EVM technique", Journal of Construction Engineering, Technology and Management ISSN: 2347-7253, Vol. 4, (2014) PN (1-7)
- [4] Tarek Hegazy, Wail Menesi, "Critical Path Segments Scheduling Technique" Journal of Construction Engineering and Management ASCE/ (Oct 2010) PN (1078-1085)

- [5] Awad Hanna, Aviad Shapira, Mounir Asmar and Craig Taylor, "Impact of crew scheduling on project performance", Practice Periodical on Structural Design and Construction ASCE (2013) PN (35 – 44)
- [6] Robert B. Harris, "Packing method for Resource Levelling", Journal of Construction Engineering and Management © ASCE, vol no 116, June 1990 PN (331 – 350)
- [7] Khaled El-Rayes and Dho Heon – "Optimizing Resource Leveling in Construction Projects", Journal of Construction Engineering and Management © ASCE, Vol. 135, No. 11, November 1, 2009. PN (1172 - 1180)
- [8] James E. Seibert and Gerald W. Evans, "Time-Constrained Resource Leveling", Journal of Construction Engineering and Management, ASCE Vol. 117, No. 3, September, 1991. PN (503 – 520)
- [9] O. Shaked and A. Warszawski, "Conshed : Expert System for Scheduling of Modular Construction Projects", Journal of Construction Engineering and Management, ASCE/ vol 118, Sept. 1992 PN (488 – 506)
- [10] Piotr Jaskowski and Anna Sobotka, "Scheduling Construction Projects Using Evolutionary Algorithm", Journal of Construction Engineering and Management, ASCE/ Aug 2006 PN (861 – 870)
- [11] Daniel Castro-Lacouture, Gürsel A. Süer Julian Gonzalez-Joaqui; and J. K. Yates, " Construction Project Scheduling with Time, Cost, and Material Restrictions Using Fuzzy Mathematical Models and Critical Path Method" ASCE , ISSN 0733-9364/2009/10-PN (1096–1104)
- [12] A. Kastor a, K. Sirakoulis, "The effectiveness of resource levelling tools for Resource Constraint Project Scheduling Problem", Science Direct International Journal of Project Management 27 (2009) PN 493–500
- [13] Liberatore MJ, Pollack-Johnson B, Smith CA. Project management in construction: software use and research direction. J Constr Eng Manage 2001;127(2):101–7.
- [14] IS : 7272 (Part I) – 974 "Recommendation For Labour Output Constants For Building Work Part I North Zone (Sixth Reprint February 2001)
- [15] Maharashtra Jeevan Pradhikaran (Government of Maharashtra Undertaking) Schedule Of Rates For The Year 2012 – 2013 (Effective from 24th December 2012)
- [16] "Estimating, Costing, Specification and Valuation in Civil Engineering" By M. Chakraborti

Author Profile

Rhuta Joshi is a post graduation student of Construction and Management in Civil Engineering Department, BSCOER, Narhe, Pune, Savitribai Phule Pune University.

V.Z. Patil is an Assistant Professor Civil Engineering Department at BSCOER, Narhe, Pune, Savitribai Phule Pune University, Pune Maharashtra.