Flexible Scheduling For Construction by Using Primavera Software

V.S. DIVYA

PG student, Department of civil engineering, Arunachala College of engineering for women, Manavilai, Nagercoil, Kanyakumari

Abstract- The purpose of this project is to optimize the resources by using the methods "Resource allocation, Resource levelling, time cost trade off". Resource allocation is used to assign available resources in an economic way. Resource allocation is the scheduling of activities and the resources required by those activities while taking into construction both the resource availability and the project time. Resource levelling aims to minimize the period variation in resource loading. Resource levelling involves redistribution and imbalance of allocated work. Resource levelling techniques were developing to enhance the shape of the resource histogram by reducing its variations. Time cost trade of is project duration can be reduced by assigning more resources to project activity. Doing this however increases project cost. The critical path method is used for scheduling a set of project activities. The analysis of resources also done by using primavera software.

Indexed Terms- Resource allocation, Resource Levelling, Time cost trade off, primavera.

I. INTRODUCTION

"The two main important factors in the construction field are time and money''. Time and money are mainly depending on the utilization of available resources and effective management, and proper planning at the right time and right place. There are four main resources in the construction field are man power, materials, machineries and money. The whole construction projects are depends on proper utilization of available resources. If not proper utilization of resources the project will be lost due to excess of time and cost. Planning and scheduling is important techniques of the management. Planning is necessary to understand the proper utilization of human and material resource and to the problems related to delay of construction projects.

In project management technology, resources are required to carry out the project tasks. They can be people, equipment, facilities, funding, or anything else capable of definition (usually other than labour) required for the completion of a project activity. The lack of a resource will therefore be a constraint on the completion of the project activity.

Resources may be storable or non-storable. Storable resources remain available unless depleted by usage, and may be replenished by project tasks which produce them. Non-storable resources must be renewed for each time period, even if not utilized in previous time periods.

Resource scheduling, availability and optimization are considered key to successful project management.

Allocation of limited resources is based on the priority given to each of the project activities. Their priority is calculated using the Critical path method and heuristic analysis. For a case with a constraint on the number of resources, the objective is to create the most efficient schedule possible minimizing project duration and maximizing the use of the resources available.

In economics, resource allocation is the assignment of available resources to various uses.

- Time Limited: The project must be finished by a certain time, using as few resources as possible. But it is time, not resource usage that is critical.
- Resource Limited: The project must be finished as soon as possible, but without exceeding some specific level of resource usage or some general resource constraint

- Resource over allocation: Assigning more tasks than what resources can handle within the standard work week.

In strategic planning, resource allocation is a plan for using available resources, for example human resources, especially in the near term, to achieve goals for the future. It is the process of allocating scarce resources among the various projects or business units.

There are a number of approaches to solving resource allocation problems e.g. resources can be allocated using a manual approach an algorithmic approach or a combination of both Resource Levelling optimizes histogram of resources on a project.

Resource allocation is the process of assigning and scheduling available resources in the most effective and economical manner. there may be contingency mechanisms such as a priority ranking of items excluded from the plan, showing which items to fund if more resources should become available and a priority ranking of some items included in the plan, showing which items should be sacrificed if total funding must be reduced.

II. OBJECTIVE OF THIS STUDY

The objective of this project is to develop the better schedules for construction project. The one of the aims to reach while constructing a resource feasible project schedule.
- To select the ongoing project for optimize the resources.
- To minimize the total duration of the project.
- To optimize the total cost of the project
- To allocate the all the resource for using primavera software and resource histogram.
- To evaluate and levelling of resources using primavera software.

III. LITERATURE REVIEW

Literature survey aimed to identify the Flexible Scheduling for Construction by using Primavera Software in construction industry.

This report "Resource Optimization in Construction of a Residential Apartment Using Primavera P-6 Software.'' Bhajanthri Thirumalesha,Rajani V.Akki And Basavaraj Bavi, Summaries the objective of this study on resources used in the construction industry is to optimize or reduce on wastages of the resources in construction project. resources optimization has been done by using project management software like primavera p-6.here material, manpower, money, have been taken in to consideration for optimization because they are most commonly used resources were found as an over allocated resources for some activities. Hence optimization was done to this resource and by modifying predecessors without affecting the duration of the project. These resources were levelled in such way that their allocation is well within maximum availability.

An another report "Resource Using Primavera P6 Optimization Of Construction Project" written by Vignesh V, This paper present the success of a project depends upon the efficiency of the project management the work done by utilizing the scheduled resources of men, material, machine, money and time. Accurate and workable planning is very difficult for large projects the schedule may be increase due to resource levelling. Certain changes can be made in the software such as Microsoft project and primavera. The activities consuming the same resources would not be allocated in parallel.

An another one report "Analysis Of Academic Building By Planning, Scheduling And Resource Allocation Using Oracle Primavera P6'' written by Vipin Kumar,Dr.Sreenivasreddy, Shahpur Maneeth And P.D.Brijbhushan, Primavera p6 helps in effectively scheduling the project by assigning relationship at a time for each activity reduce the float. Resource allocated activity and can managed and reassigned the time. Multiple resource for the each activity can be allocated in effectively for manpower, machinery or material. Resource histograms to know that a particular resource is need for particular month or duration of time. Then the resources allocated at different working location. Overall activity manage of time till the end of project.

This paper presents "Optimization Of Construction Resource By Comparing Primavera Alevelling Nd Mat Lab"'Merin Saji,K.Shobana, The objective of this project is to develop using genetic algorithm For obtaining a better resources profile. The model is observed that the Total construction cost is reduced and duration will be increases. A real Time project solved using this optimization software shows the better Result can be obtained. Effective use of resource levelling is to minimize the project cost. Primavera commonly used in scheduling of Construction projects MATLAB software can be used for developed Resource levelling problem.

This report "Optimization And Levelling The Resources Of An Existing Building By Using Primavera Software'', shashank bharakumar, Prof.S.S.Deshmukh, This paper proposes a quantitative assessment approach for resource optimization for project schedule in objective primavera p6 software is used for the resources levelling. Resources are levelled with the help of primavera p6 software and resource schedule optimization techniques term of resource optimization and levelling problem is one of the highly important issues in project manager. Resource optimization and resource levelling time and cost should be managed properly.

The report A Study on Optimization of Resources for Multiple Projects by Using Primavera'' B.S.K.Reddy, S.K.Nagaraju and M.D Salman, Resource utilization is all about co-relating resources its availability session and reducing their undesirable demand. Resource levelling preference at the resource supply station by resource optimal benefits .resource levelling at project job site demand of resource projects. The resource levelling is to reduce wastage of the construction resources. Resources levelling is done for using the primavera software and histogram for used. The main objective of this project is resource levelling for without impacting cost and duration.an integer linear optimization model of resource levelling used. The objective function of the model minimizes the resource requirements between desirable non-uniform resource levels.

The report "Using Primavera Software In Resource Allocation And Project Evaluation Of Construction Projects'' written by Hamed Ziaidoostan,Hamidreza Ghaneh,Matin Amanin And Mahamadmahi Gholipoor, Resource allocation is one of the most important management tasks in construction projects .One of the main objectives of this project is successful implementation of construction failure in executive plans and resource utilization. The resource allocation includes financial resources, time, cost and money. The resources will be allocated in an effective manner with successful implementation of plans, employees, operation, control and commitments.

The report "Schedule Control of an Apartment Building using Primavera Techniques Vijay K, Associate Professor, Department of Civil Engineering, Resource management is one of the most important aspects of construction project management in today's economy because the construction industry is resource intensive and the costs of construction resources have steadily risen over the last several decades. Thus general schedule control techniques are useful in optimizing resource scheduling and project duration. General methods such as crashing techniques, reducing the activity duration, increasing the resources, applying calendar or increasing the working hours of the resources. These techniques help to reduce project duration use of unlimited availability of resources for completion of a project. Through it is observed that resources are limited in real project scenario. It has been observed that the project delays occur due to insufficient supply of resources. In large scale projects, preparing an accurate and workable plan is very difficult. The main aim of this study is to analyse the schedule control techniques by constraints and activity types is done using primavera P6 software for an apartment building. The project schedule control decreases the duration due to apply of constraints, level of effort, resource dependent it has an effect on the project duration.

The report, "The effectiveness of resource levelling tools for Resource Constraint Project Scheduling Problem Author links open overlay panel" A.Kastor,K.Sirakoulis, The PERT/CPM network techniques are based on the assumption that all

needed resources will be available. The scarcity of resources is a usual reason for project delays. For the solution of the Resource Constrained Project Scheduling Problem (RCPSP) other methods have been applied. The objective of these methods consists in minimizing the project's duration by considering both the precedence and resource constraints. Project Management software packages solve the resource conflicts using resource levelling. The paper evaluates the effectiveness of resource levelling tools of three popular packages by comparing the results when levelling two real construction projects as case studies.

The report "Resource Optimization In Construction Of A Residential Apartment Using Primavera P-6 Software", Bhajanthri Thirumalesha, Rajani V.Akki,Basavaraj Bavi, Resource management is the important feature of the construction project management in today's economy. Cost and time factors purely depends on the how the resources are effectively used in the construction project. Project manager faces the difficulties such as resource allocation and resource planning in construction projects due to large-scale projects. Thus, old method of resource management system cannot handle today's project. To overcome by the difficulties some software was introduced like primavera can manage the projects in proper way. This software will help in resource management process.

The report "Schedule Control of an Apartment Building using Primavera Techniques" Vijay K, Associate Professor, Department of Civil Engineering, Resource management is one of the most important aspects of construction project management in today's economy because the construction industry is resource intensive and the costs of construction resources have steadily risen over the last several decades. Thus general schedule control techniques are useful in optimizing resource scheduling and project duration. General methods such as crashing techniques, reducing the activity duration, increasing the resources, applying calendar or increasing the working hours of the resources. These techniques help to reduce project duration use of unlimited availability of resources for completion of a project. Through it is observed that resources are limited in real project scenario. It has been observed

that the project delays occur due to insufficient supply of resources. In large scale projects, preparing an accurate and workable plan is very difficult. The main aim of this study is to analyse the schedule control techniques by constraints and activity types is done using primavera P6 software for an apartment building. The project schedule control decreases the duration due to apply of constraints, level of effort, resource dependent it has an effect on the project duration.

The report "The effectiveness of resource levelling tools for Resource Constraint Project Scheduling Problem Author links open overlay panel" A.Kastor,K.Sirakoulis, The PERT/CPM network techniques are based on the assumption that all needed resources will be available. The scarcity of resources is a usual reason for project delays. For the solution of the Resource Constrained Project Scheduling Problem (RCPSP) other methods have been applied. The objective of these methods consists in minimizingthe project's duration by considering both the precedence and resource constraints. Project Management software packages solve the resource conflicts using resource levelling. The paper evaluates the effectiveness of resource levelling tools of three popular packages by comparing the results when levelling two real construction projects as case studies.

The Report "Resource Optimization In Construction Of A Residential Apartment Using Primavera P-6 Software" Bhajanthri Thirumalesha, Rajani V.Akki,Basavaraj Bavi, Resource management is the important feature of the construction project management in today's economy. Cost and time factors purely depends on the how the resources are effectively used in the construction project. Project manager faces the difficulties such as resource allocation and resource planning in construction projects due to large-scale projects. Thus, old method of resource management system cannot handle today's project. To overcome by the difficulties some software was introduced like primavera can manage the projects in proper way. This software will help in resource management process.

IV.   CONCLUSION

Flexible scheduling enhances the results from CPM and the current techniques used to enhance its schedules. The model is successfully utilized to solve different objectives such as resource levelling, resource allocation, cost optimization with resource constraints. For each objective, Flexible Scheduling found better solution when offering three-sided trade-off between cost, time and efficiency. In the case for resource levelling, results extracted by flexible scheduling out performed classical solutions in terms of minimizing variations; however an additional managerial cost resultant from the selected scenarios. Hence, a new cost of levelling was introduced such that project managers can decided to trade for better levelled resources. IN addition, with the rest of objective, solutions provided by flexible scheduling out performed current techniques in terms of time and cost despite the increasing in labour cost. They are detailed and handily such that it tells for each activities how many workers to be assigned and for how many working hours per day.

REFERENCES

[1] A Guide to the Project Management Body of Knowledge (PMBOK Guide). (2013). PMI.

[2] Ahamed E. Haroun, Adil H.A. Loghman, And Salam Y. M. Mahmoud..Etc (2012) "Scheduling Problem under Constrained Resource: A Historical Review of Solution Methods And Computer Application" Journal of Science and Technology

[3] Amir Azaron, Cahit Perkgoz. and Masatoshi Sakawa. (2010), 'A genetic algorithm approach for the time-cost trade off in PERT networks', International Journal of Earth Science and Engineering, Volume 09, No.03, pp-506-509.

[4] anafha anirudhgalagali(2017)time cost quality trade off in construction project management''

[5] Anagha, Anirudh. and Galagali. (2017), 'Time cost quality trade off in construction project management', SSRG International Journal of Civil Engineering, Volume 4, Issue 8.

[6] Andrew Fernans Tom, Sachin Paul (2013) "Project Monitoring And Control Using Primavera" International Journal of Innovative Research in Science, Engineering and Technology

[7] Anuj Dubey (2015) 'Resource Levelling for a Construction Project', IOSR Journal of Mechanical and Civil Engineering (IOSRJMCE) e- ISSN: 2278-1684, p-ISSN: 2320-334X, Volume 12, Issue 4 Ver. IV (Jul. - Aug. 2015), PP.05-11, www.iosrjournals.org

[8] Anuj Dubey. (2015), 'Resource leveling for a construction project', IOSR Journal of Mechanical and Civil Engineering, Volume 12, Issue PP 05-11.

[9] Archibald, R. D. and Villoria, R. L. (1966) 'Network-based management systems (PERT/CPM)', Wiley, New York.

[10] B. S. K. Reddy, S K. Nagaraju, M D Salman (2015) "A Study on Optimisation of Resources for Multiple Projects By Using Primavera" Journal of Engineering Science and Technology

[11] B. S. K. Reddy, SK. Nagaraju and MD. Salman (2015) 'A Study on Optimization of Resources for Multiple Projects by using Primavera', Journal of Engineering Science and Technology Vol. 10, No. 2 PP. 235 – 248 © School of Engineering, Taylor's University

[12] b.s.k.reddy, s.k.nagaraju and m.d salman(2015)a study on optimizationof resources for multiple projects by using primavera''

[13] Bhajanthri Thirumalesha, Rajani V.Akki. And Basavaraj Bavi. (2017), 'Resource Optimization in Construction of a Residential Apartment Using primavera p-6 Software', International Research Journal of Engineering and Technology, Volume 04, No.06.

[14] Bhushan , Tatar.V. and Prof. Rahul S. Patil. (2009), 'Time and cost optimization techniques in construction project management', International Journal of Latesr Trends in Engineering and Technology, Vol.07, No.03, pp.230-237.

[15] Devikamalam.J.Jane Helena. 2013 "Resource Scheduling Of Construction Projects Using Genetic Algorithm" International Journal of Advanced Engineering Technology

[16] Eliyahu m. goldratt (1990) 'What is this thing called theory of constraints and how should it be implemented?' North River Press, Croton-on-Hudson,N.Y.

[17] Francois Berthaut..etc (2011) "Optimal Resource Constrain Project Scheduling With Overlapping Modes" International Journal of Advanced Engineering Technology

[18] Gido, J. and Clements, J. P. (2003) 'Successful project management', Thomson/South-Western, Mason, Ohio

[19] Hamed Ziaidoostan, Hamidreza Ghaneh. And Matin Amanin. (2013), 'Using primavera software in resource allocation and project evaluation of construction projects', Interdisciplinary Journal of Contemporary Research in Business, Volume 4, No 12.

[20] hamed ziaidoostan,hamidreza ghaneh,matin amanin and mahamadmahi gholipoor(2013)using primavera software in resource allocation and project evaluation of construction projects''

[21] James E. Seibert, Associated Member, ASCE, and Gerald W. Evans; Journal of construction engineering and management; "Time Constrained Resources Leveling".

[22] Jin-Lee Kim and Ralph D. Ellis Jr.(2008) "PermutationBased Elitist Genetic Algorithm for Optimization of LargeSized Resource Project Scheduling", Journal of Construction Engineering and Management

[23] John C. Hildreth and Brian P. Munoz (2005) 'An Introduction to the Management Principles of Scheduling', A report presented to the Virginia Department of Transportation and the vdot-vt Partnershifor Project Scheduling AdvisoryBoard.

[24] Kastor And K. Sriakoulis (2010) "Effectiveness Of Resource Leveling Tools For Resource Constraint Project Scheduling Problem" International Journal of Project Management

[25] kastor,k.sirakoulis(2008)the effectiveness of resource levelling tools for resource constraint project scheduling problem''

[26] Kastor.A. and Sirakoulis.K. (2008), 'The effectiveness of resource leveling tools for resource constraint project scheduling problem', International Journal of Project Management 27, pp.493-500.

[27] Maroto, C., Tormos, P., & Lova, A. (1998). "The evolution of software quality in project scheduling". (W. J, Ed.) Project scheduling - recent models, algorithms and applications

[28] Maruthi s, Dr J R Patil and Rohit S Agawane, 2015Optimization for Fluctuations in resource demands in construction projects by Volume:02 Issue:03,june

[29] Merin Saji, Shobana.K. and Vadive.M. (2016), 'Optimization of construction resource leveling by comparing primavera and MAT lab', International Journal of Advanced Science and Engineering Research, Volume: 1, Issue: 1.

[30] merin saji,k.shobana (2016)optimization of construction resource by comparing primavera a levelling and mat lab"

[31] Milos Seda (2008) "A Construction to Shift Algorithms for Resource-Constrained Scheduling With Dynamic Changes" International Journal of Advanced Engineering Technology

[32] Ming Fung Francis Siu, S.M.ASCE; Ming Lu, P. Eng., Simaan Abourizk, and Vincent Tidder; "Quantitative Assessment of budget sufficiency and resource Utilization for Resource Constrained Project Schedules". Vol-2 Issue-4 2016 ijariie-issn(o)-2395-4396 2893 www.ijariie.com 499

[33] Qingyou Yan, Qian Zhang. and Xin Zou. (2016), 'cost optimization model for multi resource leveling problem without project duration constraint', Hindawi Publishing Corporation Discrete Dynamics in Nature and Society, Volume 2016.

[34] qingyou yan,qian zhang,and xin zou(2016)cost optimization model for multi resource leveling problem without project duration constraint''

[35] Reddy.B.S.K, Nagaraju.S.K. and Salman.M.D. (2015), 'A study on optimization of resources for multiple projects by using PRIMAVERA',

Journal of Engineering Science and Technology, Volume 10, No. 2

[36] Rhuta Joshil, Pros. V. Z. Patil (2013) "Resource Scheduling Of Construction Project: Case Study" International Journal of Science and Research

[37] Said M. Easa, Member, 1989,"Resource Leveling in Construction by Optimization" ASCE, Journal of construction of engineering and management.

[38] Shashank Bharatkumar Malpani, "Optimization and leveling the resources of an existing building by using primavera software" PG scholar, M.E, Department of Civil Engineering, Trinity Academy of Engineering (TAE), Savitribai Phule Pune University, Pune, India

[39] Shashank,bharathkumarmalpani,prof.s.s.deshmukh(2016)optimization and levelling the resources of an existing building by using primavera software''

[40] Steiness, K. (2014, August 26). "Resource Leveling Best Practices". Retrieved July 3, 2015, from MPUG: http://www.mpug.com/articles/resource-leveling-best-practices/

[41] sujatha bala ,dr.sahdeo mahto(2017)''Resource allocation by histogram and time scale method with pert/cpm"

[42] T.Subramani, K.Chinnadurai (2015) "Construction Management And Scheduling of Residential Building Using Primavera" International Journal of Application or Innovation in Engineering & Management

[43] Tran, H.-H., & Hoang, N.-D. "A Novel Resource-Leveling Approach for Construction Project Based on Differential Evolution".

[44] Veena H C¹, Schedule Control of an Apartment Building using Primavera Techniques 1Post graduate Student, Department of Civil Engineering, NCET,Bangalore, Karnataka, India

[45] vignesh v (2017) resource using primavera p6" optimization of construction project

[46] Vignesh V1 B.E., 5015 "Resource Optimization of Construction Project Using Primavera P6"

Thiagarajar College of Engineering, Department of civil Engineering, Madurai-62, India.

[47] vipin kumar,dr.sreenivasreddy,shahpur maneeth and p.d.brijbhushan (2017)''analysis of academic building by planning,scheduling and resource allocation using oracle primavera p6''

[48] wajid hussain,dr.m.k.trivedi and dr.r.kansal(2015)optimization of construction resource allocation and leveling using genetic algorithm''

[49] Winter, R. (2006). "Proper Implementation of Resource Leveling. Ron Winter Consulting".

[50] Yang, B., Geunes, J., & O' Brien, W. J. (2011, April). "Resource- Constrained Project Scheduling: Past Work and New Directions".