

A REVIEW ON APPLICATION OF QGIS FOR PROJECT SCHEDULING USING PRIMAVERA P6

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ABSTRACT

Planning and scheduling is important role in construction industry. Due to lack of increasing complexities in this field. Construction industry requires highly accurate planning scheduling and management of the process of the project which can reduce overall optimization of cost, time and resources. Construction planning is the necessary to schedule and determining general sequence, defining labor task, construction method and assigning responsibilities. Inappropriate planning can lead to major delays in the project work. For planning and scheduling work large amount of paper work, this can be solved using project management software which helps to give a planned approach to planning.

Keyword:- AUTOCAD, primavera p6, planning & scheduling, QGIS.

1. INTRODUCTION

Due to continuous growth of population & shorter availability as land, many multi stored buildings are constructed for people to live in limited area. These construction activities not only limited to Physical activities of allocating men, materials & machines but also it involves effective management of machines. man power & also materials with proper planning. The current day demand of housing industry requires a highly accurate planning, scheduling and management of the process of the project which may enable the general optimization of the value, time and resources. The right planning and utilization of resources play important role in cost and time optimization. Construction planning may be a fundamental and challenging activity within the management and execution of construction projects. It involves the selection of technology, the definition of work tasks, the estimation of the specified resources and durations for individual tasks, and therefore the identification of any interactions among the various work tasks. A good construction plan is that the basis for developing the budget and therefore the schedule bottlenecks, facilitate the timely procurement of necessary materials and otherwise insure the completion of a project as soon as possible. In contrast, poor scheduling may result in considerable waste as laborers and equipment await the supply of needed resources or the completion of preceding tasks. The normal approach for scheduling and progress monitoring techniques likes bar charts, Critical Path Method (CPM), Program Evaluation Review techniques (PERT) etc are still getting used by the project managers for planning. These are a significant disadvantage within the deciding purpose, as they fail to provide the required spatial aspects and data. There's a gradual increase within the pressure on the project managers to shorten the delivery time and reduce the prices involved in the process, without a decrease within the quality of the merchandise, i.e. the building. Geographical data system (GIS) and project management tools during a combination are often used to access the spatial aspects and therefore the time and price involved in the project. GIS allows project managers and different people involved within the project with different backgrounds to get the accurate information of the project and monitoring of activities. The project manager and client can use the visualization aspects at any stage of the project to watch the

activities and price flow. Growing pressure to shorten the project delivery times, new practices and increasing complexity of today's construction projects have resulted in a rise within the number of commercially available computerized planning and scheduling tools. But, the development industry has acknowledged that its current scheduling and progress reporting practices are in need of considerable improvements in quality. Research efforts to include visualization into scheduling and monitoring are motivated by the failure of traditional methods to supply information associated with spatial aspects. Bansal and Pal, have described the linking of the activities during a critical path schedule with the three dimensional model, which makes the project sequence easier to know. AutoCAD is mostly used to create both 2D & 3D drawings, which is used in Construction industry. In year 1982 AutoCAD was developed by John Walker with the help AUTODESK. AutoCAD is available in 14 different languages with respect to location. It mostly preferred in industries like civil, mechanical, telecom, architectural engineering. It is used in engineering to design, analyze & solve design issues by giving accurate designs. Primavera p6 is commonly used for planning & scheduling. In was launched in 1983 by primavera Systems Inc& was acquired by Oracle Cooperation in 2008. In this software we can plan, schedule & control large scale programs & individual projects. Also it is totally secure for multiuser access. It is also useful for multiple projects simultaneously. QGIS works like GIS software, it allows users to edit, analyze spatial information & also to composing & exporting graphical maps. QGIS software supports raster as well as vector layers. Vector data is stored as point, line or polygon features. The QGIS software can geo reference raster images in multiple formats. QGIS also supports different formats like Shape files, coverage's, dxt, etc. It integrates with other open source GIS packages like GRASS, Map server, GIS and Post GIS. QGIS has small install footprint, less RAM & Processing power as compared to GIS. QGIS software is available in 48 languages. It is open-Source & free application.

2. LITERATURE REVIEW

1. Satinder Chopra: concluded that the Activity ID and Activity Description both the foremost unused part can greatly enhance the standard of the schedule if used properly. It's the duty of the design team to carefully decide the Activity ID structure beforehand so, that schedule preparation flows smoothly with none conflicts. Further research on how other fields like Original duration, Remaining Duration, Tasks bars within the Gantt chart, Start and Finish dates are often presented to offer maximum understanding to the user for efficient schedule development.
2. P. Esaki Thaana: found time management system is taken into account to perform a key role in organization, which is responsible to finish the project during a specific time, budget cost within a particular period of your time. Poor time and price performance are major problems faced by housing industry. The most objective of this research is to organize the right planning and scheduling for the 6 lanes road work construction at VOC PORT TRUST, Tuticorin. The most advantage of project was timely execution and completion of the project using primavera P6 software. The construction project has completed before the contract duration.
3. Y.Umesh (2015): Proper planning and scheduling is extremely essential in projects for sinking and scheming delays of the project. Extensive amounts of your time, money, resources are wasted annually during a housing industry thanks to improper planning and scheduling. With globalization the development projects became infinite and sophisticated. Planning of such projects requires huge amount of documentation work, which may be reduced with the assistance of project planning software. These study are to plan, schedule, and track a residential project with help of primavera software, study the results generated, it's possible to propose which method is suitable for the chosen residential project.
4. Ismail Abdul Rahman: study identified time management alongside their effectiveness level in large construction projects. From the development organization that deals with huge projects data was collected. Relative Importance Index calculation was employed to assess the extent of effectiveness which is useful for time management techniques and software adopted within the construction project.

3. METHODOLOGY

Methodology has been developed for creating inter-relationship between 3D components of the structure and construction schedule using GIS platform. AutoCAD 2016 was used for 2D drawings and Primavera P6 for scheduling of activities, both of them were imported in QGIS. The following method consists of GIS approach and management approach. Construction planning is a process in which construction managers use to layout, how they will manage & execute whole construction project, from designing to deploying workers & sub-contractors. Preparation of work breakdown structure with defined activities. Also WBS involves unique approach for various outcomes. Importing drawing to QGIS digitizing, Geo-referencing in software. Schedule preparation for activities in work breakdown structure. In Primavera Preparation of schedule will do. Scheduling allots dates to project activity. It is useful for tender formulating. It is intended to match resources of materials, machines & labors with project work tasks over time. It improves performance safety. Primavera Project Planner is specialized in managing all kinds of projects, small, medium and large; throughout the planet. Its sufficient functions to assist the user plan for the time, resources and price then later monitor them. It's wont to handle very large and sophisticated projects, especially within the engineering and construction business. Geographic data system (GIS) may be a computer based tool which may be used for capturing, storing, analyzing, querying and displaying the geographic information. Modern GIS technologies use digital information, that various digitized data creation methods are used. the foremost common method of knowledge creation is digitization, where a tough copy map or survey plan is transferred into a digital medium through the utilization of a CAD program, and geo-referencing capabilities. the development schedule prepared using Primavera isn't capable of graphical or picturing also as real time monitoring. Few attempts are made within the past to inter link project management software's and GIS so on reap the advantages of both the applications. Primavera gives us an in depth plan & schedule of the works to be accomplished /executed. If this schedule is complimented with a picturing from GIS, it can create a really effective platform for executing also as monitoring of the project.

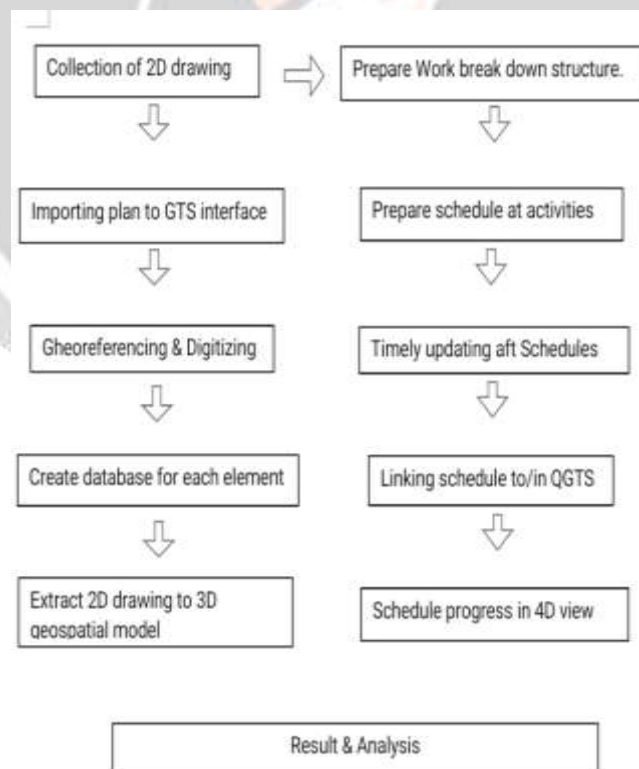


Fig-1: Work process

Step 1: Creating AutoCAD drawings

The plan of construction project is formed using AutoCAD, that only typical plan is used for calculations from which a study area was considered.

Step 2: Creating work breakdown structure (W.B.S.)

WBS for the project is to be done to make project control effective and convenient.

Step 3: Initiating scheduling.

Process Primavera P6 software is employed because the scheduling tool. The project was scheduled supported the activities identified within the WBS described in Step 2. This tool is employed to schedule the project showing the beginning and completion dates, locating the critical path, showing the interrelationships and sequences between the activities. Thus, the activities which belong together but are located at different positions were joined together "feature class". for instance all the numerous components of the Column were merged into one merged feature class called the "BLDG Column" activity.

Step 4: Creating database.

Creating database w.r.t. feature class, activities the characteristic needed for every layer were created during a database. This database includes information all about the components that are included during a project.

Step 5: Create updates of PRIMAVERA P6 schedule.

The percent complete information on the activities is entered within the database. This information will utilize in step VII to calculate the percent complete for each activity, which is obtained by calculating the standard of the percent complete of the activities.

Step 6: Run-time application.

The run time application is developed by the using Visual Studio 5.0 in C# language. With the help of this run-time application an interface was developed. Here the user would come to know about things of the source file. The interface displays present date and time. Its sink lists for the user to select accordingly.

Step 7: Import information about activities and update GIS database.

The percent complete information is transferred with the assistance of custom run time application to PRIMAVERA P6 whenever a progress evaluation is made and thus the appliance is run. PRIMAVERA P6 was run to urge the updated schedule network. The updated schedule shows the progress of all the activities.

Step 8: Showing progress of all activity in 3-dimensional view. The project 3D view was created in Arc Scene a module of Arc GIS. We know the activity layers created in Step V were converted into 3D layers in Arc Scene.

Step 9: Preparing report as per required form.

The progress of labor was shown in graphical format and in several colors. the quantity of labor done on the varied activities might be seen in 3D view. The project was updated as progress information became available and thus the corresponding MS project schedule was sent to Arc Scene. The updating was through with the help of a custom runtime application.

4. RESULT & DISCUSSION

The Construction Industry features a huge number of tasks involved and price involved in these projects is additionally very large. The Project Managers have a tough time monitoring the projects between site and office. They need to return on site to understand the progress of labor and choose the sequence of labor .they're generally confused on what to try to next or what would be the changes faced by them in future. Therefore the cost involved is large and it varies w.r.t.to the completion of the project i.e. time. the normal approach for scheduling and progress control techniques like bar charts and therefore the critical path method are still getting used by the project managers for planning which a significant disadvantage for the choice is making purpose because the spatial aspects fail to supply the specified information. there's pressure on the project managers to shorten the delivery times and thus the present scheduling and progress reporting practices are in need of considerable improvements in quality and

efficiency. So we used primavera software for planning & scheduling. In this software the project completion date consistent with the planned schedule. It helps as compared of baseline schedule with the revised schedule which inform about the added activities or deleted activities from the project schedule. It provides a thought of arranging the specified resources for the upcoming activity. Integration of Geographical data system (GIS) and project management software's with visualization was recognized together of the foremost important tools for achieving this goal. QGIS gives its users a world of different options for special processing right from the start and it is free. There are endless tools in respect to the license you acquired. QGIS is very fast compared to other software such as ArcGIS. We can work with a voluminous amount of data from a variety of sources in Qgis. It analyzes spatial location and organizes layers of information into visualizations using maps and 3D scenes, the most objective of this piece of labor is to display the progress and sequence of construction add 3-D while synchronizing this information with a proper CPM work schedule. this is able to help all parties involved during a construction project to see the progress during a natural way, hence minimizing delays and price overruns. Additionally to monitoring the schedule, the system also can be extended to watch quantities of materials, costs, and resources.

5. CONCLUSION

From this literature, it's clear that Q-GIS software (integrated GIS based 4D model) has been develop and used for the visualization of the construction process and it's progress of the project and this software is used to applied successfully in varies possible similar areas of civil engineering. we used Q-GIS interface in this research study to develop building construction information system by connecting this software with AutoCAD which is used for 2D - 3D drawing and Primavera P6 for schedule the project and necessary construction information and documents, from this unification of all drawings, schedule and project information a four dimensional model was developed which includes all spatial and non spatial information. we can monitor, control and edit construction sequence of the project with the help of this developed model and this is best suitable for it by including all the project information. This QGIS software was used for handling complete project information in a single interface which we can analyzed and visualized later also Planning, scheduling and tracking of any construction project are often done efficiently using Primavera P6 software. Management of multiple projects are often administered efficiently using Primavera P6 software. The Primavera P6 software is extremely useful in resource smoothing and resource leveling operations. The Primavera software tracks the project during a better manner. With the utilization of earned value performance indices like Schedule Performance Index (SPI) and price Performance Index (CPI) project progress are often tracked during a better manner. The Primavera software helps find out critical activities of the project in order that special concern are often given to those activities and delay within the project are often avoided. About 5% reduction within the cost of labor are often achieved using Primavera software.

6. REFERENCES

1. U. Y. Polekar and R. R. Salgude, "Planning, scheduling and tracking of a residential project using Primavera software," vol. Volume 3, Issue 5, 2015.
2. Venkata Reddy Keesara and DasariKarthik(2014) "4D Planning and Scheduling of the Construction Project Using Project Management Software and GIS".
3. International Journal of Innovative Technology and Exploring Engineering (IJITEE) "Applications of 4D GIS Model in Construction Management" ISSN: 2278-3075, Volume-8 Issue-9, July 2019.
4. A Review on GIS based Construction Project Management Yadhukrishnan.A.V1, Amba Shetty.
5. A.C. Kumar and T. Reshma," 4D applications of GIS in construction management," Advances in Civil Engineering, Volume 2017, Article ID 1048540, 1-9.
6. V.R. Kumar and T. Navneethakrishnan,"4D model through GIS for planning and scheduling of residential construction projects,"Research Journal of Applied Sciences, 2012, 7(4), 222-228.
7. G.M. Naik, M. Aditya and S.B. Naik," GIS based4D model development for planning and scheduling of a construction project,"International Journal of Innovation, Management and Technology,2011, 2(6), 447-451.
8. S.E. Poku and D. Arditi," Construction scheduling and progresscontrol using geographical information systems," Journal of Computing in Civil Engineering, 2006, 351-360.
9. K.C. Reddy and C.S. Prasad," Application of QGIS for parking study in Tirupati," International Journal of Advance Engineering and Research Development, 2017, 4(10), 846-851.16. T. Subramani and K. Chinnadurai," Construction management and scheduling of residential building using Primavera" International Journal of Application or Innovation in Engineering & Management,2015, 4(5), 188-198.

10. A.F. Tom and S. Paul," Project monitoring and control using Primavera" International Journal of Innovative Research in Science, Engineering and Technology, 2013, 2(3), 762-770.
11. N. Ya'acob, A.M. Azizie and N.M. Alam," Parking system using geographic information system (GIS)" IEEE Conference on Systems, Process and Control, 2016, Malaysia, 12-16.
12. V.K. Bansal, and M. Pal," Generating, evaluating and visualizing construction schedule with geographic information systems," Journal of Computing in Civil Engineering, 2008, 233-242.
13. Heesom, D., &Mahdjoubi, L., (2004). Trends of 4D CAD applications for construction planning. Construction Management and Economics, 22, 171-182.
14. AdjeiKumi, Theophilus; and Retik, Arkady (1997). "Library-based 4D visualization of construction processes." Proceedings of the Information Visualization Conference; IEEE, Piscataway, NJ, 315-321.
15. T. Subramani and K. Chinnadurai; "Construction Management & Scheduling Of Residential Building using Primavera", International Journal of Application or Innovation in Engineering & management", Vol 4, Issue 5, 2015.
16. V. Kolagotla," Geographic information system and its application to project management in construction industry," 10th ESRI India user Conference, 2009, 1-12.
17. S. Staub-French, A. Russell, and N. Tran, "Linear scheduling and 4D visualization," Journal of Computing in Civil Engineering, vol. 22, no. 3, pp. 192-205, 2008.
18. hamedziaidoostan, hamidrezaghaneh, matinamanin, mohamadmahigholipoor, using primavera software in resource allocation and project evaluation of construction projects, interdisciplinary journal of contemporary research in business, april 2013 vol 4, no 12.
19. Hitanshu Saini, Khushpreet Singh, Uma Malik, Project Management Using Primavera International Journal of Civil Engineering and Technology (IJCIET)Volume 8, Issue 8, August 2017.
20. M. Y. Cheng and S. C. Yang, "Planning, scheduling and tracking of a residential project using Primavera software," Journal of Construction Engineering and Management, vol. 127, no. 4, pp. 291-299, 2001.
21. P Raghunath Reddy, B.HarishNaik Planning and ResourceScheduling of Residential (G+7) Project Using Primavera International Journal of Innovative Research in Science,Engineering and Technology(An ISO 3297: 2007 Certified Organization) Vol. 5, Issue 10, October 2016.
22. Ms.DeepikaKandMrs.Suchithra S, Study on effectivescheduling and cost management of a project, International Journal of Modern Trends in Engineering and Research (IJMTER) Volume 03, Issue 03, [March - 2016].
23. Vishal AnnappaNimbal, Prof. Balasaheb Jamadar, Planning, Scheduling and Allocation of Resources for multi-storied Structure using Oracle's Primavera p6 software, International Research Journal of Engineering and Technology (IRJET) eISSN: 2395-0056 Volume: 04 Issue: 07 | July -2017.
24. T. Subramani, A. Sarkunam, J. Jayalakshmi, Planning and Scheduling of High Rise Building Using Primavera, T. Subramani et al Int. Journal of Engineering Research and Applications www.ijera.com ISSN : 2248-9622, Vol. 4, Issue 6 (Version 5), June 2014, pp.134-144.
25. P. EsakkiThangam, R. Magdalene Benila, Planning, Scheduling and Time Management of Six Lanes Road Construction Work at V.O.C Port Trust using Primavera P6 Software IJSTE -International Journal of Science Technology & Engineering | Volume 2 | Issue 11 | May 2016.
26. Satinder Chopra, Arvind Dewangan, Developing an Efficient Schedule in Primavera P6: Significance of Activity ID &Descriptions, International Journal of Innovative Research in Science, Engineering and Technology(An ISO 3297: 2007 Certified Organization) Vol. 3, Issue 7, July 2014.
27. Bhandari, S., Bhandari2, D., &Kumari, M. (2013). Application of Geographical Information System in Progress Monitoring of Construction Project. International Journal of Scientific & Engineering Research, Volume 4, Issue 12,december, 100-107.
28. M. Fischer, "Benefits of four-dimentional (4D) models for facility owners and AEC services providers." Proc. 6th construction congress D.K. Walsh ed., ASCE, Reston, pp. 990-995.
29. R.J Dzung, H.P Tserng, & W.C Wang, "Automating Schedule Review for Expressway Construction", Journal of Computing in Civil EngineeringASCE/January/2006.
30. Vijay Kolagotla Assistant Manager-Planning Gammon India Ltd. "Geographical Information System and Its Application to Project Management in Construction Industry", 10th ESRI India User Conference2009.
31. Paul Eastwood Harris, "Project Planning & Control using Primavera P6" BPB Publications.
32. Sushant Pradhan, Rajendra S and Vijay K, "Planning,Scheduling and Resource Optimization of Multiple Projects Using Oracle Primavera P6", International Journal of Research in Engineering and Technology, Vol 5, Issue 6, June-2016.

33. Dhinesh M, Kaleeswaran S, Manikandan Ashok S (2017), "Planning, Scheduling and Tracking of Residential Building Using Project Management Software", SSRG International Journal of Civil Engineering- (ICRTCETM) - Special Issue, ISSN : 2348 – 8352.
34. Belsur Nagaraj, Brijbhushan S, Maneeth P D (2017), "Scheduling, Monitoring And Cost Analysis By Earned Value Method Of Phase-2 (Reach-2a From Pier No.443 To Pier No.470) Using Primavera P6, International Journal of Engineering Development and Research (IJEDR), ISSN: 2321-9939, Volume 5, Issue 3.
35. Anne Therese V, Suchithra L, Jose Renoldo S (2017), "Management of Multi Construction Projects using Primavera", International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET), ISSN: 2319-8753, Vol. 6, Issue 7.
36. AkashRajkumarWadhwa and DattatraySantramShinde, "Project Management Using Primavera P6 8.2", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 3, Issue 11, Nov-2016.

