

ARTIFICIAL INTELLIGENCE IN CONSTRUCTION MANAGEMENT

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Abstract— The advancement and tremendous growth of construction industry over the past decade has lead to challenges and new techniques. These techniques are very important. These management techniques are the solution to most of the problem faced by the industry. A brief timeline of research and development activities that could be grouped as development activities under the title of artificial network in construction management uses softwares like AUTOCADD, ARCGIS and PRIMAVERA. As per traditional instruments and techniques, in traditional instrumental of management method have limited linkage with the spatial aspects of construction work, a concept real time methods easy to view four dimension construction models was proposed . With the introduction of GIS, enhanced spatial and database management task throughout in a single environment has been discussed, suggesting GIS framework to be an excellent platform that throughout in a single environment has been discussed, suggested GIS framework to be an platform that could serve the purpose, an open source GIS package in today's world, recommended an open source GIS environment.

Keywords— 4D modelling, 3D visualization, GIS, Construction management, Planning and scheduling, Open source GIS, Artificial network in construction management.

1. INTRODUCTION

Rise in infrastructure and construction activities around the globe shaped the world to what it is, today. The backbone of the Modern world is the infrastructure and commercial world, be it any segment or part of life. Apart from that, the rapid globalization transcending boundaries, the demand of quicker and effective which lead the construction industry for better solutions. Irrespective of the area of application, management system governs the efficient functioning of any enterprises. The term management covers two main elements, resource management and time management. For an industry like the construction industry that has an immense potential to develop up high, due that lots of challenges that the governing system of management has faced problem, in order to help the enterprise attain the expected performance. A proper all-round management strategy can offer solution to most of the challenges faced by an organization.

As the matter of fact the target in construction field is construction material, labours, construction site, progress, supply chain network etc. it appears that there exists a lot of factors that has to be considered.

There are lot of different methods that help in different project activities relative to time period in the industry, some of the prominent ones being bar charts, network diagrams etc. owing to the fact that these methods/tools do not take main drawbacks have been identified, the former being the difficulty in interpreting complex schedules involved a huge number of activities without the help of a visual aid and different project members developing different interpretations about an element of the project, the re-planning work of the event of a change in plan or lag in the previous plans, Bansal and Pal (2008). Facts point towards the need of a methodology that include the spatial aspect of a project also in the planning process.

II. BACKGROUND

Early in 1990s there has been a growing interest in three-dimensional computer aided design (3D CAD) which can be used in construction project planning. 4D CAD applications are becoming more accessible and the use of this easier to share their point of view which allow construction planner to produce more efficient schedules. At present time, there are lot of different software and tool and techniques that comes to use in this area of project management. Some of the leading light are Primavera Project, MS Project and more etc. But these tools lack the most is the visual integration or research on the project design with the schedule. Project planning phase most of the variation creep due to the misinterpretation of the design and progress in three dimensions. A solution to the three dimensional interpretation is offered by a lot of available 3D modelling software packages like AutoCAD. But ultimately needed is an integration, more precisely, a real-time integration of the design and the governing schedule, i.e., a four dimensional or real time model of the project.

4D modeling concept is all about four dimensional modeling, which directly refers to three dimensional (3-D) of space and that one carefully be developed into a one for all solution to the problems can faced by organization. This concept has potential to bring about radical transformation to the global construction industries.

III. REVIEW

The finding by various researcher and proposed areas associated with model and project management has been duly reviewed and discussed forward.

Create and keep up development plans from building illustrations are most imperative to outline and development association for constructability survey and undertaking arranging. For making it simple mechanizing these errands, it requires joining a PC supported plan (CAD) framework with programing and database and arranging the 3D yield in better method for clarifying. Numerous advancement of various portrayal dialect for association designing application require three-dimensional 3D portrayal of a site. cherneff et al.(1991).Civil designing application requires 3D portrayal of a site. Oloufa et al. (1992) improvement of an interface to the framework name as HOOPS, which was question situated designs library, utilizing the Arc/Info GIS to build a three-dimensional portrayal of soil strata that would speak to detail log as mind boggling three-dimensional protest and incorporate such borehole information in a local geotechnical work base. Camp and Brawn (1993) emerged a GIS based well-log database and concocted system for building up a three dimensionally sub surface profile from detail logs they built up a method in which choosing and making subsurface profiles from the detail information log to settle on the premise geometric and water driven information for MODFLOW that showing the adaptability of log synopsis in database and GIS-MODFLOW interface. Not the same as the then ordinary application, a GIS based framework was created in which the data required for intending to the course which could be incorporated. In urban zones, loads of obstructions come in the way, as railroads, trenches and streets impact altogether. Choice of an appropriate way among predetermined number of decisions to existing snags like railroads, waterways and so forth., Path which lessens the danger of harming the current utilities, limiting the cost of development, for the most part in urban zones. Study makes us of two advances, to be specific , Expert framework show the human thinking process through an arrangement of foreordained principles and GIS to give information show abilities, Varghese and O'Connor (1995).

Application in the territory of development industry getting awesome significance, Cheng and O'Connor (1996) built a robotized site format framework, ArcSite which distinguishing a reasonable design for recognizing information or finding the brief offices in development work. ArcSite fills in as data identifying with development site format, TF databases, Arc/Info databases, and calculations for coordinating and mechanizing are brief office design outline. All the framework advancement is improved the situation a self-learning or heuristic way to deal with demonstrate the procedure of human like basic leadership, trailed by encircling of a target work called relationship list to decide the ideal site of every transitory office, considering every conceivable advantage quantitative and subjective foundation. Doyle (1998) propose the supposition that demonstrating and arranging was intended to the basic leadership process, to standards of arranging process and to aid the transport or offer thoughts. This sort of work capability of web arranged GIS and VR programming was additionally inspected with specific references to the teach of arranging of web situated GIS and VR programming was survey with that reference to the orders of urban outline and arranging alongside the capacities of web to spread this fill in as a component. This sort of focal points and disservices of innovation offer distinctive thought about terms of the level of unwavering quality, client preferred standpoint and client interactivities. The execution of this kind of innovation to wide range is done just when wide no of potential client or their expertise to deal with these innovation which incorporate organizers, foundation directors, manufactured condition group, understudy gatherings and intrigued individuals from the general openly prevalent. As of late abusing a greater amount of the mechanization capacities was advancement has done in various fields, Cheng and Chen (2000) made utilization of a programmed plan observing framework utilized for precast building development work. ArcShed is the framework to assist the designers in the erection of pre-assembled structure which is an essential movement in a precast development. The strategy for standardized identification system help in plan arranged in view of the establishment plan..

In 2002, a GIS-based visual simulation system was introduced called GVSS was used in a complex dam construction in China and the simulation was carried out, taking into consideration various uses in different field, calculating all the factors for every step of construction process and making a reasonable project schedule to achieve the objective of project. It offers planning, visualizing, spatial and non-spatial data management and querying capabilities. Akinci et al. (2002) also came up with same idea of 'work space planning' that implies representing various types of spaces required by construction activities in 3D over a time scale. This technology that automatically generate project-specific work spaces from generic work space of its nature being and a project-specific IFC (industry foundation class) is proposed associated with attributes that describe when, where, how long they exist, and how much volume they occupy.

A system starts which called construction materials exchange that operated over a network of 2,000 buyers which was implement in china that was the excellent example starting that GIS has a great potential to be made use of in E-commerce system to provide better services in location-based queries, business area analysis, and transportation analysis. Transporting cost, referring to the costs involved in transporting construction materials, is a complex subject, dependent on many factors, instance, the locations of local distributors, which cut the rate on transportation, similarly finding buyer, demand can easily known.

This progression changing the general pattern in the field of development four dimensional in constructional administration was examined, inspected and recorded by Heesom and Mahdjoubi in the time of 2004 and accordingly it featured the way that a large portion of the prior 4D CAD recreation amassed in visual stylish purposes just and not very many bundles offer this capacity to complete expository errand on the created reenactment. They presumed that four dimensional innovation empowered organizers to anticipate potential issues at the preconstruction stages. The reality attributable to the conventional strategies of planning and process control procedures neglect to give data relating to the spatial parts of a development venture, Arditi (2006) advancement a framework called PMS-GIS, Progress observing System with Geographical Information Systems in which the engineering configuration was executed utilizing a PC supported drafting (CAD) program and the work routine was created utilizing an undertaking administration programming and the outline and calendar data incorporate level of fruition and information connected to a GIS bundle, and for each refresh, the framework deliver a CPM-produced bar diagram close by a 3D rendering.

These innovation created to stages according to administration goes in the hand work booking, material planning. The technique that used the dynamic linkage between the exercises in the booking and comparing 3D segments, as an other option to the current 4D PC supported outline instruments, to manufacture a model and connection it with the development plan utilizing a few in-house contents written in GIS condition. Bansal and Pal (2008) included that the majority of the 4D CAD innovation simply bolstered outline and arranging stages, however not extend administration organize while this kind of framework have guaranteed a coordinated undertaking administration, all in a solitary situation. Nejatbaks(2008)created an apparatus, 'Passage CS' that used GIS based administration in checking and booking a burrowing employment and devices for venture advance, profiling and so forth in a straightforward UI. This sort of errand site determination and fire reaction administration field are generally overseen by utilizing a Geographical Information System (GIS), as these procedure required an abnormal state and measure of coordinated geospatial data. Two information models were produced – an association structure level model was utilized as a part of improving the data procured from the Building Information System, while the geospatial information demonstrate went about as the layout for making physical records and information based structure in the geospatial condition. Programming parts to exchange building data framework.

This was first kind of study which is dedicated to mining sites, Ke-Ke and Wei-Wei (2010) developed a strategy of visualization of 3D geological bodies and 3d ore-body that served functions like mine planning, mining design, coal seam changes helping in emergency disaster relief etc. The management scheme developed Naik and Aditya (2011) shared some connection with the work done by Dierkes et al. (2000) with the Primavera P3 software being the creation of schedules that were later linked with the GIS layers. Jabbar (2011) clearly mentioned the utilization of GIS in many different ways managing civil engineering project at all steps as planning, data collection, environment analysis, design, construction, operation and maintenance.

IV. DISCUSSION AND CONCLUSION

As the above review clearly shows that GIS has been applied efficient and successful manner in various field potential areas of civil engineering, construction industry is one of them. The studies carried out in this domain proved the flexibility of GIS in management of construction work that could visualize and should have data management skills.

Construction organization is one ranging from small to high, low to large business groups. As such, pricing of the supporting mechanism, whether it related artificial intelligence as software's, machinery etc., surely acts as a obstacle of something to a fir completion between the participating group. All the concern taking into for software side alone. However, any mention of the commonly used GIS packages and the growth of popularity gained by some of the earlier attempts. Those attempts shows successful utilization of GIS software. These has been limited options or flexibility of available tools in GIS. This complexity in the construction work used a mix of software, in early attempts were made on simple projects that involved very limited number of layers attributes. However GIS software is the excellent data management capabilities of GIS. The difficulty face by construction industry is the imperfect management of resources, time and money, GIS is the great solution of that.

In the present scenario, GIS tools can make a necessary contribution to this construction organisation. GIS based project modelling and management artificial intelligence can facilitate Successful execution of the project by reduction time, minimizing time, construction costs, and thereby ensuring enhanced productivity.

REFERENCES

- [1]. B. Akinci, M. Fischer and J. Kunz (2002). "Automated Generation of Work Spaces Required by construction Activities". Journal of Construction Engineering and Management, 128(4), 306-315.
- [2]. V. K. Bansal and M. Pal (2006). "Potential of geographic information system in building cost estimation and visualization". Automation in Construction.
- [3]. V.K. Bansal and Pal (2008). "Generating, Evaluating and Visualizing Construction". Journal of Computing in Civil Engineering.
- [4]. M.Y.Cheng and Chen (1997). "Automated Schedule Monitoring system for Precast Building Construction Using Enhanced Geographic Information System Construction". Proceeding of the 14th ISARC, Pittsburgh, USA, 380-387.
- [5]. M.Y. Cheng and M.C. Brown (1993) "GIS procedure for developing three-dimentional sub-surface profile". Journal of computing in civil engineering.
- [6]. J.T. O'Conner and M.Y.Cheng.(1996). "Arcsite: enhanced GIS for construction site layout". Journal of Construction Engineering and management.
- [7]. B.J. Cherneff , R. Logeher (1991)."Construction- schedule generation". Journal of computing in Civil Engineering.
- [8]. N.Dierkes, T.Howard(2008)."Construction management done spatially :GISintergration into pipeline construction inspection and management". Proceedings of Water Environment Federation.
- [9]. S.Doyle, M.Dodge, A.Smith(1998). "In the web based mapping and virtual reality technology for modelling urban environments". Computers, Environment and Urban Systems.
- [10]. D. Heesom, and L. Mahdjoubi(2004). "Trends of 4D CAD applications for construction planning". Construction Management and Economics.
- [11]. U. Isikdag, J. Underwood and G.Aouad(2008). "The applicability of building information models in geospatial environment in support of site selection and fire response management process". Advance Engineering Informatics
- [12]. M.N Jadid(2014). "Interactive construction engineering GIS- based electronic document management system". Journal of Engineering sciences.
- [13]. X. Ke-ke, and L.Wei-Wei(2010). "DESIGN and Realization od 3D Modeling and Visulization of Orebody Based on GIS". International Conference an E-Service and E-Entertainment (ICEEE)
- [14]. B. Koo, M. Fischer (2000). "Feasibility study of 4d cad in commercial construction". Journal of Construction Engineering and Management.
- [15]. H. Li,Z. Chen,L.Yong and C.W.Kong(2005), " Application of integrated GPS and GIS technology for reducing construction wasie and improving construction efficiency". Automation in construction.
- [16]. N. Nejatbakhsh (2008). Implementation of customized GIS- based tool for tunnel construction site management.
- [17]. G. M.Naik, M.Aditya and S.B.Naik(2011). "GIS –based 4D Model Development for Planning and Scheduling of a Construction Project".International journal of innovation , management and Technology.