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Effective Implementation of Site layout on Construction Site: A Review Paper

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I. BACKGROUND OF STUDY

Site layout planning consists of identifying the facilities needed to support construction operations, determining their size and shape, and positioning them within the boundaries of the site. Inter-plot relationships arise mainly from process inter-connection, or common utility and ground loading requirements. Other relationships will arise through the flow of vehicles and people through the site and between plots; and from site major hazard assessment policies.

II. INTRODUCTION

A Site layout plan shows a detailed layout of the whole site and the relationship of the proposed works with the boundary of the property, nearby roads and neighboring buildings. Most applications should include an existing site layout plan and a proposed site layout plan. The Site layout plan shows the detailed layout of the entire site and the boundary of the property, along with proposed work relationships, nearby roads and neighboring buildings. Most applications should include existing site layout plans and proposed site layout plans. Site layout is an important management function which has influence over all aspects of work on construction site. These aspects also include health, safety and productivity. For managing safety, organizations must carry out a framework that can reduce the chances of inadequate structures and facilities. , parking and storage areas, access roads, and temporary facility locations.

III. NEED OF STUDY

A site layout consists of the footprint of a building, parking and storage areas, access roads, and temporary facility locations. An optimized site layout plan ensures the optimum usage of available space, lower project costs, lesser location of materials during construction, better accessibility to and security of a site, and safety of the work environment. To develop an optimum construction site layout, a construction manager takes into account various factors, many of which interfere with the site layout planning. Depending on the variables, each project has its own unique site layout plan. The first and most important variable of site layout planning, which drives decisions in reference to site logistics, is the actual size and location of the site. A list of the important variables that affect site layout because each project requires a unique set of variables, planning a site layout is a multi-objective task that varies from one construction phase to the next .Due ti which the scientific study of site layout is essential in current days and integrated approach of construction management parameter plays very important in it. In this article the past study will examine about the implementation of site layout to fix the direction of further work

IV. TECHNIQUES AND TOOLS OF SITE LAYOUT

Genetic algorithms :The total distance traveled but also cost and safety parameters as well. A multi-objective optimization model is developed aiming at minimizing a generalized cost function which results from the construction cost of a facility placed at alternative locations, the transportation cost among locations, and any safety concern in the form of preferred proximity or remoteness of particular facilities to other facilities or work areas. The development integrates the required robust search objective with the optimization capabilities of the genetic algorithms (GAs). The model has been tested on several test cases and the results of a comparative study with existing methods from the literature are presented. The evaluation indicates that the proposed model provides effective and rational solutions, in response to decision parameters and problem constraints, and that it results in more robust layout planning than previous methods both qualitatively and quantitatively (Ioanna N. Papadaki) 2016

Mathematical model: new approach that considers both quantitative and qualitative objectives for resolving the MOFL problem. However, the optimal seeking methods are computationally infeasible for large layout problems. Thus, suboptimal solutions need to be taken into consideration and a criterion to measure the solution quality is needed. In this paper, a new measure of solution quality, probability of superiority (POS), is offered to determine the probability that one layout is better than the others.

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We are optimistic that our proposed approach will be helpful in assisting the layout planners to select good-quality solutions in practical facility layout problems. D. Y. Sha (2001)

correlation research design.Primary data was obtained from questionnaires.A questionnaire was administered to permanent and casual employees who were skilled while a key informant interview were administered to safety officers. The questionnaire responses were input into statistical package for social sciences (SPSS) and Cronbach's alpha coefficient generated to assess reliability.These respondents were not included in the final study sample in order to control for response biasness.This study used both construct validity and content validity. For construct validity, the questionnaire was divided into several sections to ensure that each section assessed information for a specific objective, and also ensured that the same closely ties to the conceptual framework for this study. To ensure content validity, the questionnaire was subjected to thorough examination by two randomly selected permanent staff.The regression analysisis written as: Y= b0 + x1 b1 + x2 b2 + x3 b3 + x4 b4 +μ, Where b0 is the Y-intercept, b1 – b4 are the Beta coefficients of X1-X4 which are the independent variables and μ is the error term. Xn variables are defined as follows X1- knowledge of workers X2- Management prioritization X3- attitude of workers X4- practices Josephine Wanjiku (2016)

Site layout BIM and GIS: This paper presented a new approach for integrating GIS and BIM that enables managers to visualize the 3D model of tower cranes in their optimal locations. Tower cranes are typically used on many building construction sites to lift a wide variety of materials vertically and horizontally. Identifying minimal number and optimal location of tower cranes, especially when they operate with overlapping work zones, can create a challenge for managers. This process comprises a variety of spatial data that can be presented in the 3D visualization model. Thus, there is a need for a new tool with spatial analysis and visualization capabilities within a single environment. Integrating GIS with BIM seems to be an appropriate approach to solve such problems. Javier Irizarry(2012)

V. EFFECT OF LOCATION

Most of the projects are planned based on availability of manpower. B. The study shows the distribution of projects in various sectors. 56.3% from infrastructure sector, 33.3% from real estate, 6.3% from industrial sector and remaining 4.1% from others such as maintenance projects. C. Out of 16 numbers of real estate projects 11 projects are having urban location, 4 are based in sub-urban areas while only 1 Real Estate project is located in rural area. D. Mostly Infrastructural projects are going on. Out of 27 Infrastructural projects, the location of 11 projects is in urban areas, 9 are located in sub-urban areas and only 2 projects have rural origin. E. Industrial projects are mostly located in rural areas. F. Other projects such as maintenance projects are going on in urban and sub-urban areas. Varun Kumar Sharma(2015)

1) *Site Layout Optimization:* A fundamental aspect is to emphasize the necessity of creating awareness about the effective site layout planning. By following the generic procedure and applying basic fundamental principles, some of the suggestions are provided by analysing the currently faced problems on the site. In this project, we have suggested an optimized site layout for Pune Metro Rail Project. Suggested site layout is based on relationship chart and activity relationship diagram drawn on the basis of practically faced challenges. The grouping of facility is helping us to keep the proximity relationship of the temporary facility. The suggested site layout for Pune Metro Rail Project is prepared in such manner that major work proceeds smoothly without any delay and will decrease overall project cost and duration. Tejal. S. Kasat (2017)
2) *Site Layout Planning and Safety:* The objective function is formulated to minimize the total site layout cost. the objective function focuses on three cost components that are travel cost TCt, relocation cost RCt, and constraint-violation cost CVCt which occur in each construction stage(t). Minimize total site layout cost = minimize [ ] …...Eq.(1) Where T=number of construction stages; TCt=travel costs between all facilities in stage t; RCt=relocation cost of moveable facilities in stage t; and CVCt=constraint-violation cost for all facilities in stage t [1]. Travel cost/meter = (labour cost + vehicle cost)/travel distance. ……. Eq(2) Relocation cost/sqm = (Dismantle cost + Vehicle cost + Erection cost)/area of warehouse. ..……Eq(3) y facilities, construction productivity and cost effectiveness. This research is helps to identify a global optimal location and orientation for each temporary construction facility on site. Also it is capable of generating global optimal dynamic site layout plans by estimating and optimizing the future costs of layout decisions. The advantage proposed study is to minimize the cost of material flow and equipment flow within the site and also achieves safety on the site. Mr. Yogeshwar Dhanure (2016)
3) *Selection Of Adequate Site Location And Site Layout:* selection of adequate construction site location for future investment is complex, low structured and multi-criteria problem. To take into account all the dimensions, the proposed model for selection of adequate site location is devised. The model is based on AHP (for designing the decision-making hierarchy) and PROMETHEE (for pairwise comparison of investment locations) methods. As a result of mixing basis feature of both methods, operational synergies can be achieved in multi-criteria decision analysis.

Such gives the decision-maker a sense of assurance, knowing that if the procedure proposed by the presented model has been followed, it will lead to a rational decision, carefully and systematically thought out. Ivan Marovi(2017)

4) *Construction Site Layout and Environmental Aspects:* n this paper, a developed optimization model for solving the site layout planning problem was presented. In developing the new model, two main features were introduced. Measuring distance between facilities in the site using actual route distance and incorporating safety considerations and environmental aspects are considered. The developed model was implemented on a spreadsheet Excel because of its simplicity in use and programmability features. The program was coded using the macrolanguage of Microsoft Excel, tested, and then experimented. Also, the dynamic nature of the site layout planning problem is considered by integrating the model with MS Project Microsoft Corporation 2000. In order to validate the performance of the developed model, a real-life construction project with 28,500 m2 site area was tested. The obtained results proved that satisfactory solutions were obtaine Haytham M. Sanad (2008)

VI. DISCUSSION

A number of the published studies are mentioned in the previous sections. As indicated previously, the process of construction site layouts are influenced primarily by a number of factors, such as the applied construction method, project's activities schedule, workers and equipment distribution, materials mobilization, etc.; the thing that limits the effectiveness of the optimization methods where interactions would happen among those factors and let the process of planning of site layout very complicated practically. On contrast, the developed simulation tools are capable of considering those factors, although very few applications of simulation have been utilized in planning of site layout as a number of them are aforementioned. Moreover, the published studies didn't consider the environmental impacts caused by projects in the developed sites layout planning; usually, time and cost of travelling are the decision variables.

VII. CONCLUSION

Site must be designed to maximize efficiency of operations in order to promote worker productivity, to shorten project time and to reduce cost.It must create a project with a good work environment in order to attract and retain the best personnel and thus contribute to better work quality and productivity.A well planned site including all facilities and utilities lead to: increasing productivity and safety reducing area needed for temporary construction maximizing utilization

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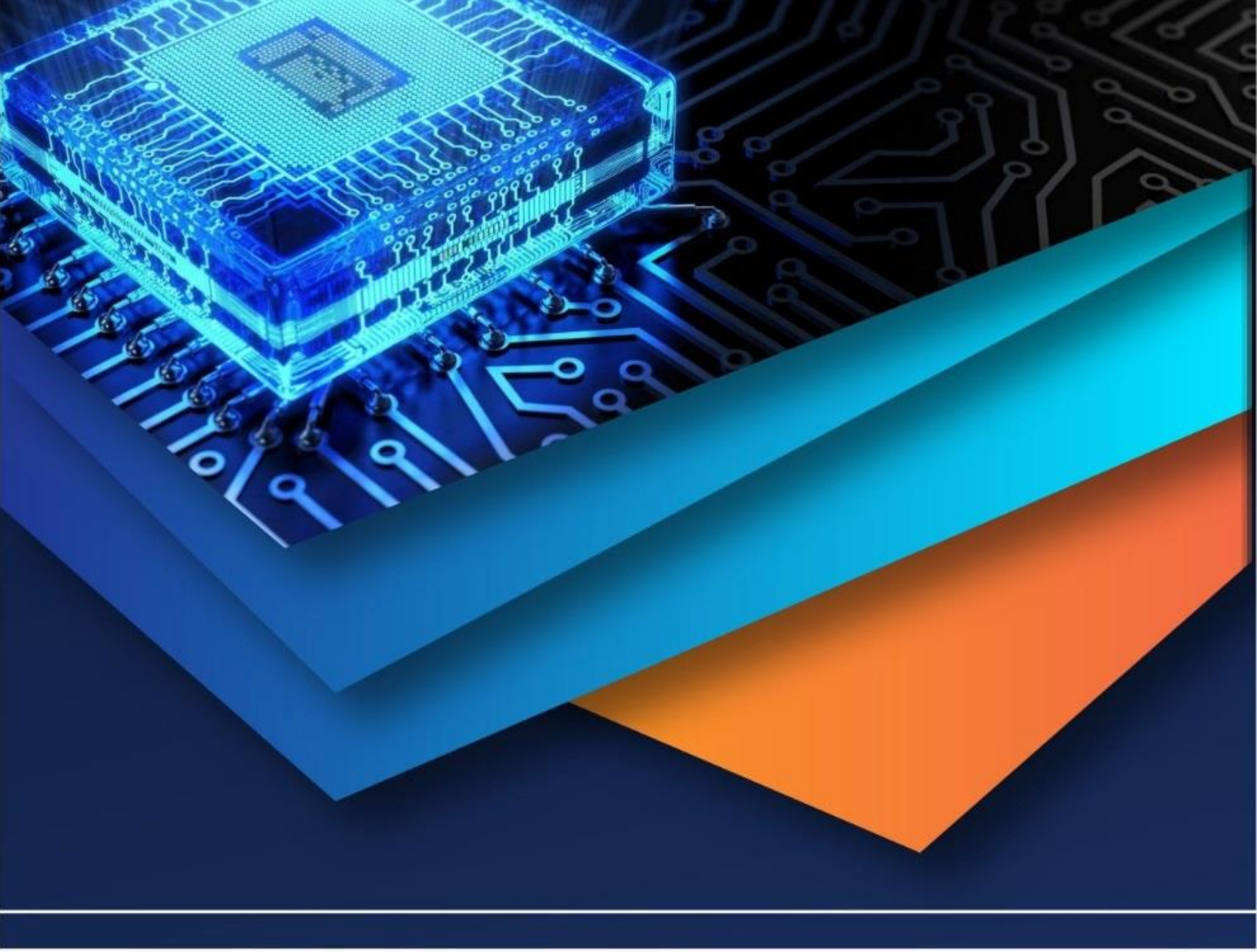
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