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A Review Paper on Identification of Crucial Site Layout Planning Factors in Construction

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Abstract: ***Site space is a limited resource where all the facilities are to be provided. Site space being limited, appropriate site layout planning of temporary facilities is crucial for enhancing the productivity and safety of construction site. Site layout planning; however is a complex problem and researchers have attempted to solve it using variety of optimisation-based techniques. Various techniques like Genetic algorithm, simulation technique and ant colony optimisation techniques are used for site layout planning. This paper attempts to identify crucial factors in construction affecting site layout planning. It includes identifying facilities that are temporarily needed to support construction operations on a project but do not form a part of the finished structure.***

Keywords: Site layout planning, crucial factors, techniques, site space, facilities

1. Introduction

Site is the most important resource in construction. It decides the other components of the building during construction. Earlier it was the neglected resource or not given prime importance. Now-a-days due to site scarcity i.e. limited site space, high cost of purchasing, site selection and site space is considered as important as other resources. Due to limited space there arises a need for proper site layout planning. As the site space is limited all the temporary and permanent facilities required are to be provided within the available space. Such that it does not affect the other activities and considering the cost involved in it. Site layout planning is to locate plant and equipments, site offices, work spaces etc to complete a construction work in safe and efficient manner. Site layout planning has been recognised as a critical step in construction process. The major part in planning is identifying the factors that affect site layout and to determine relative positions of the facilities within available space on site so that they can function efficiently. There are two types of layout planning's- static layout planning and dynamic layout planning. Also various techniques are involved in it as Genetic algorithm, Ant Colony Optimisation, Simulation techniques and Cad-based site layout planning for irregular facilities. Good site layout planning helps in minimising travelling time and movement costs of plant, labour and materials, activity interference during construction work and site accidents. Thus site layout planning can affect or enhance the construction progress. In construction, the major facilities needed throughout the construction are considered and the layout is planned depending on the past experience and common sense. But the selection, location and the co-ordination of the facilities is not considered. In fact, site layout planning is the pre-planning task. Site layout planning affects the other tasks such as scheduling, material handling, financial aspects, labour costs etc. So, it is important of all the tasks in construction.

2. Site Layout Planning Techniques

Various studies have been done on the site layout planning. Site layout problem has been solved by researchers using different techniques like Genetic algorithm, Ant Colony Optimisation, Simulation techniques and Cad-based site layout planning for irregular facilities.(IJIET ISSN:2319-1058)

2.1 Genetic Algorithm

This technique is used to minimize travel time and cost of construction. There are two approaches to genetic algorithm (1) Quantitative method and (2) Qualitative method

2.2 Simulation Techniques

In simulation model time based factors such as total project time and resource idleness is taken into account during planning. This technique is suitable for site layout planning of projects where repetitive Activities take place and there is limitation on the number of resources.

2.3 Ant Colony Optimisation (ACO)

Ant colony optimisation algorithms are higher level procedures for handling combinatorial optimisation objects. The central component of Ant Colony Optimisation is the pheromone model, which is used to probabilistically sample the work space.

2.4 Cad-Based Site Layout Planning

Cad-based site layout planning is used for unequal and irregular temporary facility using robust search and optimisation capabilities of Ant Colony Optimisation algorithm.

3. Factors Affecting Site Layout Planning

3.1 Site Location

The location of the site is of prime importance. The site location affects the cost of the project. The geology and geography of the site affects the further plan of the project.

3.2 Site Space

Site space being limited the further planning depends on the availability of site space. All the temporary and permanent facilities need to be accumulated within the available space.

3.3 Site Accessibility

In case of large projects proper planning of layout of roads is important leading from the nearest highway. Internal roads should also be properly planned for easy flow of work.

3.4 Inter-Relation of Facilities

The positioning of the temporary as well as permanent facilities is important. The facilities should be placed such that there is inter-relation between the two for easy flow of work and minimisation of cost of transportation and also to minimise the number of accidents.

3.5 Safety

Fire is a major cause of accidents on site, fire extinguishers are must. Medical services should be provided on site with a doctor and a first aid kit. Basic safety equipments like safety shoes, safety goggles, safety gloves etc are must.

3.6 Adjoining Structures

The structure adjoining a site may be a hospital school building or any residential or commercial structure. Proper care should be taken while placing the temporary facilities near the hospitals and schools so that there is no disturbance caused.

3.7 Bye-Laws

There are certain norms to be considered during planning a proper site layout. All the bye-laws should be taken into account for a proper site layout planning.

3.8 Availability of Funds

The most important factor from where the actual procedure starts is the funds available for starting the site. The other things are to be managed according to the availability of funds.

3.9 Advance Software and Techniques

There are software's available for site layout planning. AL-DEP, CORELAP and CRAFT are the software's developed by the researchers for effective site layout planning.

4. Conclusion

Site layout planning is the critical step in the construction. Site layout planning affects or enhances the construction progress. Hence proper planning is essential. The major part in planning is identifying the factors that affect site layout. Researchers have also developed various techniques like genetic algorithm, ant colony optimisation and cad based techniques. Also software's are developed for proper planning.

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