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A Review on Factors affecting Selection of Onsite Construction Equipment

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Abstract: ***Today's construction projects are highly mechanized and becoming more so every day. With the growing industrialization of construction work, the role of onsite equipment and machinery is vital in achieving productivity and efficiency. Planning in the construction industry is plays an important part in the successful outcome of a project. For having the best result in profit for a construction industry choosing the best alternative for obtaining equipment is one of the most important issues. The identification of the factors that affect on equipment selection has been carried out using different literatures and by interviewing from experts in construction. This paper has been planned to deal with the identification of factors affecting equipment selection, developing a framework for assessing the factors affecting equipment selection.***
Keywords: construction equipment; factors affecting; equipment selection

I. INTRODUCTION

Equipment selection plays an important role in the implementation of many construction projects. This is even more important in the selection of large construction projects, where equipment is an important part of the work. In such projects, the equipment fleet represents the bulk of the bid price. Successful maintenance and construction managers realize significant impacts on their projects when equipment management decisions are not made appropriately and on time. Since the choice of equipment is heavily influenced by various factors, most contractors help them determine their experience and historical data on similar projects in a single flight. Although this is a good approach in the conceptual phases of the project, it is also inadequate to reach the benchmark of the equipment fleet due to the volatile nature of the construction projects. Other approaches, such as expert systems, are useful only if they are linked to a database of historical data. To overcome this, the proposed model is based on integrating the structural data of the selected instruments with a comprehensive financial operation analysis for the different areas of work. The model developed at this time examines the optimization of a set of tools on the analysis of general economic activity.

II. STUDY OF LITERATURE FOR CONSTRUCTION EQUIPMENT SELECTION

A. Schaufelberger et al. (1999) state two general factors that must be considered in the selection process for a mechanical vessel: (a) cost efficiency; which involves looking at machine size without the right type; and (b) function in different ways; which involves the choice of equipment that can perform many tasks on site. They reiterate that with the increase of industry and manufacturing, this is a very important and complex issue for companies to evaluate and make the best decision in a pool of many alternatives. [1]

B. Aviad shapira et al. (2005) developed a selection model based on the analytic analytic process (AHP), a multidisciplinary decision-making approach, with the aim of providing solutions for the systematic evaluation of soft objects, and the weight of soft gains compared to costs. The model has the ability to handle a large number of different objects in a way that reflects the reality of complex objects, captures the context and unique contexts of a project, and allows the manifestation of user experience and authenticity. The proposed model provides a suitable practical tool that compels users to plan, strategize, guide them in making rational, consistent decisions, and provides space for all necessary calculations. [2]

C. Gransberg et al. (2006) argued that the first thing to consider would be to match the right equipment with the right type of work. Another possibility would be the availability of the right equipment for proper services, maintenance and maintenance. They suggested two factors that could be considered when choosing the right equipment: (i) the type and nature of the site work including the distance to be visited and (ii) the desired production as a critical factor affecting the selection of equipment. They said the selection of the equipment was usually made of comparable equipment on the ships in service. Similar accounts for equipment production, equipment capacity, and costs. Industrial and heavy construction projects require extensive use of large scale mining equipment, reinforcement, mixing, concrete and finishing, pipelines, railways and many other specialized works. [3]

D. Aviad shapira et al. (2007) downplayed that the selection of the right equipment is usually critical to the success of the project. This study raised the issue of soft thinking when choosing equipment for construction projects to (1) increase awareness of their nature, diversity and enrichment (2) their important role and potential impact on decision-making outcomes and (3) the potential difficulties of self-evaluation and integration in the broader selection process. The existing state of the art equipment selection models analyzed was found to be sufficient for both the available materials and provides a means for systematic analysis. Six cases of large size, which are complex construction tasks are investigated to obtain a comprehensive list of common soft materials. This investigation revealed that processing of soft objects in the present invention is actually not organized and is not integrated within the systematic selection process. It is described a desirable selection process that often responds to the identified needs in research. [4]

E. P. Valli et al. (2012) presented a selection model that provides a comprehensive solution for systematic assessment of the characteristics of behavioral decisions. It will lead the construction industry to manage a variety of complex processes without losing their usefulness. It also includes the context and unique contexts of the project, allowing for the manifestation of user experience and authenticity. It provides a framework for the formation process and ensures consistency of resolution. It also provides a guide for almost every local plant and thus allows the developer to explore any mechanical option. [5]

F. Nizar markiz et al. (2012) stated that increasing the capacity of heavy-duty land-based equipment selection based on economic performance analysis is a key role in the success of large construction projects. Economic performance analysis is performed on tool vehicles while taking into account the cost of manufacturing and the total efficiency involved in many global operations. The use of the model provides the necessary equipment for carrying out world operations by providing the user with a final report prepared which covers ownership and hiring a comprehensive cost. The model is validated by a case study to demonstrate its numerical strength and to measure its accuracy. The results are expected to be of great importance to contractors and will contribute to the maintenance of traffic management systems by incorporating a computer model that combines heavy equipment performance analysis and its associated economic analysis. [6]

G. Avetisyan et al; Chamzini et al. (2012) stated that the separation of the equipment n, the age and capacity of the horse and the type of fuel used, can significantly affect the price. They identified the nine-point process and divided them into two broad categories i.e. profitable processes based on technical performance and cost process. [7]

H. Alessio Angius and others; Marcello Coledani et al. (2016) stated that the focus should be on device selection in an adaptable assembly cell, where various easily modifiable hardware modules surround the skeleton structure to provide different assembly technologies with different execution modes and performance. The modularity provided by the architecture considered by the possibility of rapid setup of the assembly line can also be used, allowing the reorganization and re-establishment of various hardware modules to deal with the production of individual components. Both the cost and performance of the equipment will be taken into consideration to identify the most promising configurations. [8]

I. Sangyok Han; Ahmed Bufargoon ; Mohammed al-Hussein and others. (2017) proposed a three-dimensional based crane evaluation system (3D-CES), which designs, validates and simulates three-dimensional (3D) visualization of mobile crane operation, and not the most efficient cranes. The crane lift schedule supports operation selection based on identifying safety and productivity aspects during the crane lift study, but also the plan. Further, these factors have been shown to help increase the efficiency, timeliness and profitability of construction management through effective collaboration and communication. As shown in the case study, 3D-CES allows users to create and select the most suitable crane operation by providing crane digital lift information, sequences, cranes facing up, positioning and material pick points, even when the design is constantly changing. [9]

J. Temiz et al; G. Kallis et al. (2017) conducted a study aimed at selecting an appropriate excavation machine for the construction site taking into account qualitative and quantitative criteria. Standards derived from the literature are defined as purchase cost, engine power, fuel consumption, hydraulic pump flow rate, operating load, service conditions, secondary market, spare part condition and operator comfort. The decision making methods of the Analytical Hierarchy Process (AHP) and the Preference Ranking Organization Method (PROMETHEE) are used to select the appropriate excavation machine and compare the results to assess the effectiveness of the methods. It is found that the results of both methods are consistent in the same order and sorting options. [10]

III. CONCLUSIONS

Two factors must be considered in the selection process of the equipment fleet: (a) cost effectiveness; considering the size of the equipment in addition to the appropriate type; And (b) versatility; Including the selection of devices to perform multiple tasks on the task. [1] The AHP-based tool selection model provides an effective, convenient tool for practically systematic and systematic thinking, guiding them in making logical, consistent decisions and facilitating all necessary computations. [2]

Two factors to consider during the selection of appropriate equipment are: (a) the type and condition of site work; Including the distance traveled and (b) the desired productivity; As an important factor influencing the choice of equipment. [3]

Both the cost and the performance of the equipment are taken into account when choosing the equipment configuration. [8]

3D CES often allows the design and selection of most applicable cranes by providing crane digital lift information even after design changes. [9]

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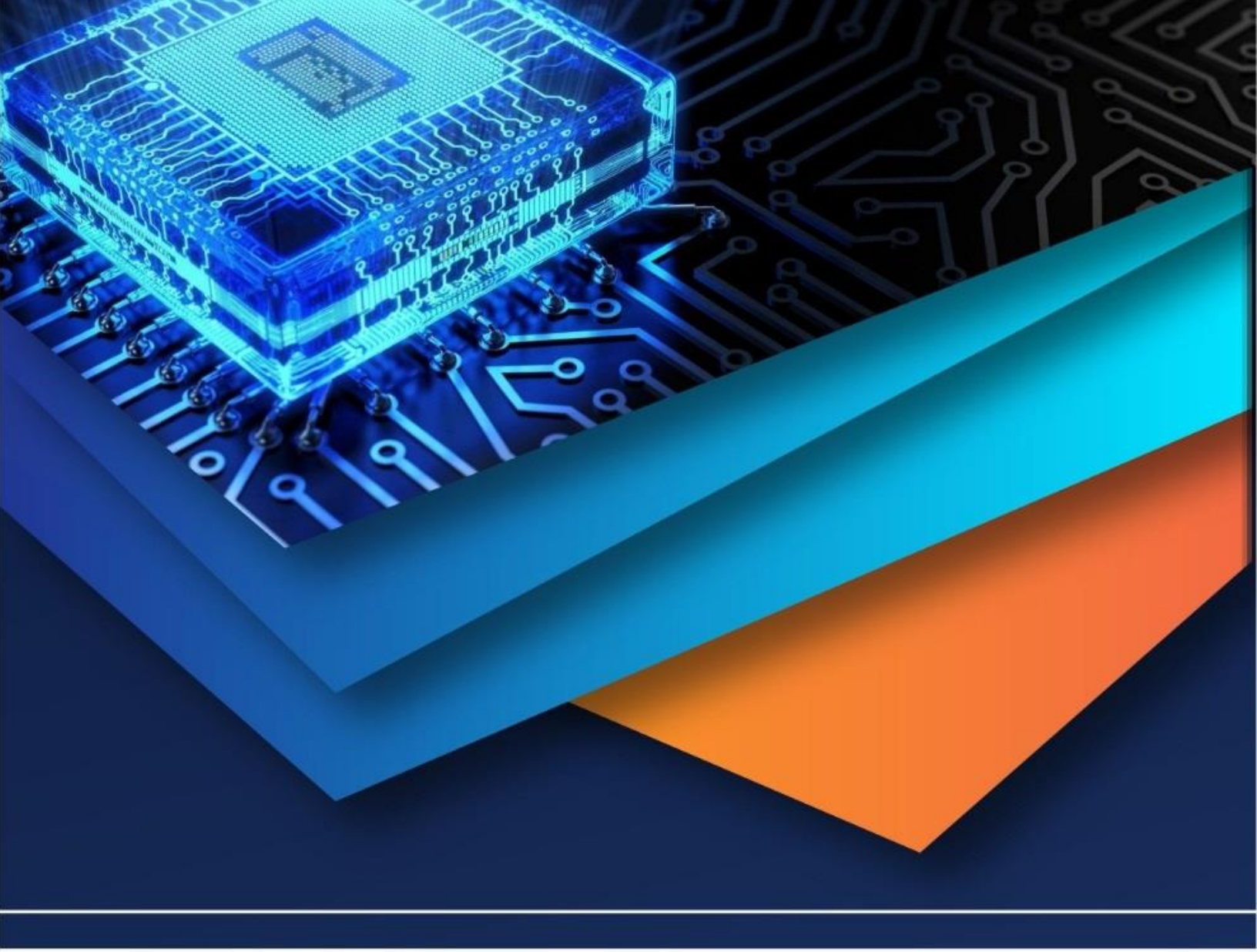

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