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Development of a Prediction Model for Construction Project Cost in India: an Analytical Approach A Review

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Abstract - The fundamental problem in the construction industry is that building projects are completed at taken a tolls significantly higher than estimated venture taken a tolls; consequently, it is fundamental to develop a taken a toll forecast show that detain all components influencing the extend taken a toll by means of relapse examination. Development costs are continuously inclined to vacillations, with a long-term design of expanding, making the estimating prepare a difficult errand. Vacillations within the fetched of building materials have a noteworthy affect on foreseeing the esteem of a venture and, as a result, on the project's great conclusion It is well known that civil engineering projects are prone to cost overruns and schedule delays. Lack of project scope and frequent changes leads to a negotiation process in terms of cost and time between the first party/owner and the second party/contractors. In the project life cycle, cost forecast is a precursor to budget prices and resource allocation, thus it is critical for any organization. The following objectives are framed based on the literature study: identify the construction cost predictability of various tools, identify the various influencing factors to predict the material price of cement and steel, model the Construction Cost Index (CCI), predict the construction duration (Especially for highway projects, as compared to other kind of projects. They are having more obstacles to complete the task), predict the land value, Regarding this issue this paper find the best methodology for the Prediction Model for Construction Project Cost by analysising the different researchers papers research.

Keywords - Cost, Predication, Construction Materials

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INTRODUCTION

Budget prices and resource allocation throughout a project's life cycle are dependent on accurate cost estimates, making cost forecasting a crucial function for any company. When the scope of a project is unclear, it may be challenging to compile the necessary information for a reliable cost estimate. The more specifics of the project are described, the more likely it is that the generated estimates will be correct. On the other hand, if the project is founded on faulty cost projections, the process of cost management becomes more difficult as it advances through the stages of elaboration. In addition, building projects are high-risk because of the nature of the business and the massive sums of money required to get started and keep going with a construction project. If the costs associated with these initiatives are underestimated or overestimated, the gap between the two will widen in the future. Interest has so grown in the techniques used in this field, their relative accuracy, and even their gaps. If the methods' associated gaps can be examined and solved, cost estimators will have an easier time and a smoother road ahead of them. The entire cost of a project may be calculated using traditional techniques, provided that you have complete information on the work packages, their costs, and their distribution during the project's lifespan. a predicted savings cushion.

LITERATURE REVIEW

Follwing research refred for to find the best methodology for the Prediction Model for Construction Project Cost

Seokheon Yun (2022) Since the advent of ML, several different approaches have been devised for estimating future building expenses using ANN models. There has to be a wide range of building cost prediction models to account for the fact that this process might vary significantly based on aspects including the facility's ultimate use, location, and purpose. The settings and hyperparameters of the ANN model may also change the prediction accuracy based on the variety and quantity of the data used. Predicting the various components of the overall building cost is sometimes required from the

planning stages. The need to forecast such sub-construction expenses arises in cases when a contract is not made as a single construction but is instead ordered separately into many sub-construction kinds. In this research, we propose a method for accurately predicting the multi-output construction cost by analyzing the prediction performance of multi-output machine learning in accordance with scaling and regularization, as well as a method for predicting the sub construction cost that makes up the total construction cost using a multi-output ANN model. Construction cost prediction for many uses is made possible by this technology, and it is anticipated that models for multiple uses based on research findings may be created and used.

Cyril Thomas, Jenson Jose (2022) Large-scale building projects are increasing day by day and because of that their construction costs become a matter of great concern, especially because of their lengthy construction periods. In particular, recent fluctuations of construction material prices have fueled problems like cost forecasting. This paper reviews the incorporation of artificial neural network for predicting the future cost construction materials. The main benefit of this study is providing construction stakeholders with a very reliable tool for expecting prices of coming projects, especially with the existing Rates of Inflation.

Diana Car-Pusic (2021) this research provides a hybrid process-based and data-driven strategy for estimating construction costs at the outset of a project. Both the general regression neural network (GRNN) and Bromilow's "time-cost" model are used here. Among the three neural network prediction models used, GRNN produced the most precise results, with a MAPE of 0.73 percent and an R2 value of 99.55 percent. There is a 0.998 correlation between the calculated values and the real ones. The primary function of the cost prediction system (CPS) is to make preliminary cost estimates for a project, and the corresponding model was developed to facilitate this process. As a component of both the DSS and the broader BMIS (Building Management Information System), the collected data are fed into the Cost Model (CM). When it comes to estimating construction costs early on in a project, the model may be valuable to all parties involved, particularly during the bidding and contracting stages.

Basma Mohamed (2021) The focus of this study is to fill this knowledge gap. Unfortunately, most of this information is either forgotten or overlooked. Ultimately, this may solve the shortcomings of the existing literature in this area by preventing the loss of information and leading to its reuse in sustainable capacity building and maintaining effective resource allocation among new construction and restoration projects. Extensive testing showed that the suggested strategy outperformed other methods in the literature in terms of predicted accuracy (7.4% for time and 4.5%). In addition, the sensitivity analysis shows that the choice of payment and procurement methods, as well as the type of constructed facility, have the greatest impact on the estimated time and cost of highway project construction.

P. Velumani (2021) It is difficult for builders and academics alike to reliably estimate how long a building project will take. There are a lot of people and resources trying to figure this out. The goal of this research is to use four analytical methods to get an estimate of how long a certain building project will take. Factors such as contractor and consultant choice, project cost, project quality, project size, environmental conditions, and so on all have an impact on how on schedule a construction project is able to be completed. There is a lack of universal standardization and care in the design of currently accessible commercial tools. Each instrument has its own unique set of circumstances in which it excels. The most difficult aspect of building in India is estimating how long major road projects would take. The paper's approach to this issue involves classifying and analyzing the acquired data in order to discover adequate methods to anticipate the length of the highway road projects, which is a significant obstacle to their timely completion.

Sanaz Tayefeh Hashemi (2020) Managerial decision-making relies heavily on accurate cost estimates for upcoming construction projects in order to mitigate any delays caused by inadequate risk assessment. In order to accurately estimate and predict project costs using machine learning methods, a large dataset is required. Cost estimate using machine learning approaches has been offered for over 30 years, therefore this research gives an analysis and study of such publications. The significance of this publication lies in its in-depth examination of machine learning methods and its use of an analytical approach in direct cost and indirect cost estimates for building projects. In the first section, we gather relevant studies from Google Scholar and Science Direct publications in order to analyze the ideas.

Mohammed Hasware(2019) In this research, the Artificial Intelligence tool was used to correctly anticipate the costs of various building materials, and the findings were confirmed by being compared to those obtained using the Linear Trend method. The following conclusions are taken from the findings of both models based on the co-efficient of Regression variable (R2). • Models based on neural networks operate well with data with a non-uniform structure. Given the potential for price fluctuations in the construction business, they are more applicable to real-world situations. • For one-directional data, linear trend progression models are better data-fit. That is to say, numbers will either continue to rise or fall. Neural Networks provide for more accurate tracking and analysis of material cost variation. This is useful for developing reliable project budget estimates, which form the foundation of any project plan. So this may be a useful resource for making

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S. Vinodhini (2015) In poor nations, where price variations may have a significant impact on the success or profitability of a project, precise prediction of the cost of aluminum materials is a crucial technique. Previous research has linked the price of aluminum to changes in the price of energy, the price of other raw materials, the demand for power in the sector, and the cost of producing the metal. The findings revealed that the ANN method outperformed both the Trend analysis and the SPSS analysis in terms of precision. The use of an artificial neural network for prediction seems promising.

A. M. El-Kholy (2015) This article used a questionnaire survey to examine the impact of cost overrun sources on building projects. The literature has established these factors. The survey questionnaire was organized to elicit yes/no data on the presence of the aforementioned factors in real-world initiatives. The impact of each factor on the project's bottom line was quantified by assigning a weight to the questionnaire responses. It was expected that factors with a relative relevance weight more than 10 would be substantive enough to be included as explanatory variables in the model. Eleven major factors were found as a result. The proportion of budget overruns was the variable under study. Two models were created to estimate the likelihood of cost overruns for building projects. The first regression-based model. Modeling was performed using data from 20 projects, and validation was performed using data from the remaining 10 projects. Foregoing eleven factors were discovered to be included in the most effective model for forecasting the proportion of cost overruns.

Daniela Mackova (2017) Considering gross floor area, number of stories, and floor area of one storey as variable inputs in prediction while taking into account the intensity of the deployment of labor resources, this study aims to present a developed prediction model based on computer experiment to fill the void in construction duration estimating in Slovak construction conditions. Multiple linear regression analysis is used to develop a model for predicting how long a construction project will take. Investors and builders may use this model to estimate contractual construction times for homes quickly and with a high degree of accuracy. The methodology of the aforementioned prediction model might be applied in the future to define models for estimating construction times in sectors other than building.

Othman Subhi Alshamrani (2016): In order to estimate how much it will cost to construct conventional and sustainable three-story college buildings in North America, a user-friendly regression model has been built. O.S. Alshamrani / Journal of Taibah University for Science 11 (2017) 315-323 323 Using RS Means, we calculated the typical national building cost in 2014. Building envelope and structural types were also taken into account in addition to the floor size, floor height, and number of storeys. Mathematical equations and comparisons of predicted and observed data were used to verify the model. The mathematical validation showed a 94.3% correctness, whereas the model validation showed acceptable differences. In addition to predicting the outlay for midrise campus buildings, this model allows universities to evaluate the financial viability of sustainable buildings in comparison to conventional buildings and to evaluate the relative costs of concrete and steel.

Krzysztof Zima (2015) Case-based reasoning (CBR) is used in this research to determine the cost per unit of building materials and labor. The CBR approach relies heavily on a database of previously seen and remembered "cases" in order to solve new issues. Finding the best-fitting situations and adapting them to the new challenge is how new solutions are developed. We'll demonstrate how to figure out the cost per unit by looking at the pricing already out there, in other words the estimates provided in the bids on offer. Case-based reasoning (CBR) systems are represented by databases in which both cases and their resolutions are maintained. Therefore, this study introduces the idea of a knowledge base to aid in the calculation of construction costs during the planning phase of a project.

Ayman A. Abu Hammad (2008) The purpose of this study is to provide a method for estimating future costs and timelines for projects by analyzing past ones. Project managers may utilize the validated critical route time and budget from the model during the planning phase. The following order is used as a guide for doing research: i) Check the project's time and money efficiency using a nonparametric test. ii) Using past performance data, create generic multiple-regression models to forecast project cost and duration. Statistical analysis of the % forecast error reveals a sizeable problem; as a consequence, iii) individualized multiple regression models are constructed for each project type to ensure statistically sound outcomes.

Finally, the margin of error is estimated to be 0.035% at the 95% confidence level. time

Concluding Remark: The duration of reasonable construction projects is difficult to forecast, both for projectors and researchers. Several researches and approaches have been developed to address this issue. The purpose of the study is to estimate the building's completion time utilizing four different analytical approaches. Numerous factors, such as contractor choice, consultation, project costs, project efficiency, the number of projects, environmental issues, etc., affect the quality of the final products of construction projects. There is no predetermined level of standardization and widespread worry over the commercially accessible resources at this time. Each strategy is effective in its own context. Predicting how long Indian road construction would take is the biggest challenge for a variety of reasons. This research strategy seeks for suitable instruments to predict the duration of road construction by classifying and analyzing the data gathered in a variety of ways. The 363 government infrastructure projects that used conventional contracting were analyzed. In addition to the aforementioned techniques, this study also makes use of Artificial Neural Network (ANN) models, smoothing methods, time series analysis, and Bromilow's time cost models. Smoothing methods with a constant value of 0.3 were shown to provide much superior outcomes compared to other approaches, with an inaccuracy of 1.2% being observed. Cost-based construction time prediction tools including the exponential smoothing approach, Bromilow's time cost model, neural networks, and time series analysis are commercially available.

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