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A REVIEW ON PREDICTION OF MATERIAL PRICES IN CONSTRUCTION PROJECTS

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Abstract- *The rate of some kinds of construction materials can change vastly in very squat stages of time. The capability of a building contractor to exactly forecast upcoming construction material prices is critical to the achievement of his or her company. A building contractor with the capacity to accurately predict future material prices can have a thoughtful benefit over their opponents when it comes to competing for forthcoming projects.Facts of upcoming material prices can give a contractor the assurance to be more abundant withtheir cost estimates. On the other hand, the competition will carry on to be conventional with their estimates to account for the detail that they do not have a good knowledge what material prices will do in the future. Various ideal predicting tools are used to help the contractor to predict the material prices in construction projects. This paper discusses the function of various prediction tools in the construction field for the prediction of construction material price.*

Keywords- **Construction materials, Material prices, Prediction price, Artificial neural networks,regression analysis.**

1.INTRODUCTION

Every year the rate of construction materials is will change. The unexpected price changes affect projects carrying out rates and even impacts the capability to finish the projects. As a result of the rapid and vast changes that occur all over the world in construction materials prices. The construction market value in India is also affected. To avoid that problem, the contractor should have the skill to predict the future method that is skilled to predict the material price. It is essential that to predict the material prices variations during the implementation of the project and also for preparing the tenders. Predicting of material price is an important function for effectively handling projects in terms of more exactly estimating, pursuing and monitoring projects. There are many tools that can help the construction contractors by its ability to accurately predict the future material price. Some of the methods normally used for prediction of materials prices are Artificial Neural Network, Fuzzy Logic, and Statistical Method (includes regression analysis, MONTE CARLO method, ANOVA), and Trend Analysis.

2.ARTIFICIAL NEURAL NETWORK

Raja(2015) carried out a study on Artificial neural networks(ANN) are perfect tools to support the contractor track past prices, conditions affecting their prices and then forecast future prices. It is observed that artificial neural network is that they can be skilled in learning relationships that exist between a set of example independent input variables and a set of reliant on output variables. An artificial neural network can be easily trained to predict the future price of construction materials. In this study, they recognized seven factors that having some possible result of the price of construction materials. They were analyzed over a 10-year period to framing the lumber price. The author represents that an Artificial Neural Network can be easy to be trained to predict the future price of construction materials, such as framing lumber.

Mohamed Marzouk (2013) In this study a fuzzy logic model was formulated to calculate the degree of importance of each material in the item through the three main criteria namely,1. The percent of the elements share in the total cost items.2. The difference in the study of the elements price index during the study period and 3.the difference percentage in the cost elements price. In this research, they also made comparison between Artificial Neural Network and Regression Analysis.The results showed that Neural Networks technique overtakes regression analysis with respect to the estimated mistake in expected increase of the project's basics cost.

Amosedinakaran(2015) carried out to predict the electricity consumption (EC) for India. Population, per capita Gross Domestic Product(GDP), imports and exports are used as input variables. In order to point out the exactness of the obtained results of Artificial Neuro Fuzzy Inference System (ANFIS), a comparison is made with the results obtained using ANN and Support Vector Machine(LS-SVM). The performance of ANIFS is found

better than ANN and LSSVM. The results are compared with the 18th Electric Power Survey of India. The result offered in this study would be very much useful to Government agencies and organizations involved in the power sector planning, boiler manufactures, independent power producers, and others.

Martin Kapl (2010) In this research they compared two forecast procedures by its abilities to forecast market steel prices. One is based on the classical Box-Jenkins Autoregressive Integrated Moving Average(ARIMA) class, the other on Multichannel Singular Spectrum Analysis (MSSA). They find the two methods competitive with an advantage for MSSA to be expected as the time series grow longer. They formulate the MSSA model and conventional regression model to predict the steel prices. Both models can be shown to be forecast best but the MSSA technique gives more strong models for higher noise levels. Thus the prediction worth from both models is almost indistinguishable. However, the main profit of MSSA looks to be the greater flexibility for generalizations. In particular, we can, by recursive application of the defined forecasting technique, construct predictions with a much larger forecast

Margaret W. Emsley (2002) Neural network cost models have been technologically advanced using data collected from nearly 300 building projects.Models created by linear regression techniques have been used as a standard for assessment of the neural network models.The results showed that the major benefit of the neural network approach was the ability of neural networks to model the nonlinearity in the data. They presumed that there were positive benefits to using a neural network approach, as this should be adept of modeling the nonlinear relationships in the data.

Megha jaina (2015) In this Study, neural networks are introduced as a hopeful organization tool that can enhance current automation efforts in the construction industry, including its applications in construction engineering.Future possibilities of integrating neural networks and expert systems as a basis for developing efficient intelligent systems are described. This review that ANNs have been successfully applied to many construction engineering areas like prediction, risk analysis, decision-making, resources optimization, classification, and selection.

Faiq Mohammed Sarhan(2012) In this study, Multi-layer perceptron exercises using the back-propagation procedure neural network is formulated and offered for estimation of the production of construction projects. These are used in training the model and calculating its performance. It was found that ANNs have the ability to forecast the productivity for finishing workswith a very good degree of exactness of the factor of correlation (R) was 89.55%, and average precision percentage of 90.9%.The back propagation neural network (PBNN) model used in this work has proven to be very successful in modelling nonlinear relationships. Therefore, ANNs can be used instead of numerical programs to show the nonlinear function for any problem.

Ismaail Eisawyl (2011) carried out a study on Artificial Neural Network (ANN) approach to develop a parametric cost-estimating model for site overhead cost in Egypt during the year period 2002 – 2009. A satisfactory Neural Network model was technologically advanced through fifty-eight study for predicting the percentage of site overhead costs for building construction projects in Egypt for the future projects. In this paper, the results of the testing indicated an accuracy of (80%) and it can be used effectively in predicting the overhead cost.

Hoijat Adelil (1998) In this paper, a regularization neural network is framed and a neural network architecture is obtainable for assessment of the cost of construction projects. The model is applied to estimate the cost of reinforced-concrete pavements as an example. The result of estimation from the regularization neural network depends only on the training reinforced - concrete. It does not depend on the architecture of the neural network and the number of iterations essential for training the system.

3. REGRESSION ANALYSIS

Abbas Heiat (2002) In this research they compared the neural network estimation method to regression approach for software effort estimation. The study shows that neural network method was competitive with regression when a third generation language data set was used in the study. But, in the second study when a combined third generation and fourth generation languages data set were used, the computed Mean Absolute Percentage Error(MAPE) of the neural network model was expressively lesser than MAPE of a regression model. One possible extension of this research is to include one or more productivity factors into the ANN models and decide their impact on the estimating software development effort.

Saravanan (2015) In this study they aims to provide an correct and exact prediction model for electricity demand using population, imports, exports, per capita Gross Domestic Product (GDP) and per capita Gross National Income (GNI) data for India. Four altered models were used for different combinations of the above five input variables and the effect of input variables on the estimation of electricity request has been established. The performance of the ANFIS

technique is showed to be better than Multiple Linear Regression (MLR) and Artificial Neural Networks. The predicted electricity consumption increases approximately 8.04% annually from 2013 to 2020. Finally, in this study, it is predicted that the future electricity consumption of India would vary between 1440.4 and 1588.5 bkWh in the year 2020.

Kannan(2014) In this study is to define the development of an electric energy consumption model which is able to forecast the future electricity consumption (EC) of the domestic sector (DS) in India. Computational intelligence (CI) methods such as Artificial Neural Network (ANN), Least Square Support Vector Machine (LS-SVM) and Adaptive Neuro Fuzzy Inference System (ANFIS)are used. Population, Per capita Gross Domestic Product (GDP) and electricity manufacture are used as the input variables. The EC-DS is the forecast output variable. A 31-year data set is used to train the network and 7-year data set is used to check the network. Mean Complete Percentage Error (MAPE), Mean Bias Error (MBE) and, Root Mean Square Error (RMSE)are used as performance calculation criteria. Results obtained using ANN, LS-SVM and ANFIS methods are related with each other. The performance of ANFIS is found to be more efficient than ANN and LS-SVM. The future projections are carried out for the period between 2015and 2025.The results of the presented study are helpful to give a new direction to the energy planning studies by policy designers, producer of power system components and independent power producers among others.

Hesham A. Bassioni (2012) The Prices of steel, cement, sand and crushed stones were collected for the period from 1997 to 2010and divided into two sections based on the economic growth.A computer based analysis was conducted using Forecast X and SPSS software. The Results indicated that the outputs on applying the Time Series models in both the programs were nearly identical.

Pereira (2011) In this study, the time series analysis of rebar prices in Brazil and concluded that the existence of a long- run relation between prices of raw materials, international prices and domestic prices, and thus assist in predicting future prices of rebar.

4. ANALYTICAL METHODS

Akintoye(1998) In this study understanding of upcoming developments in construction rates is likely to effect the construction investment strategy of a variety of interested parties, ranging from private and public customers to building contractors, property speculators, financial institutions, and construction professionals. This study derives leading indicators for construction prices in the United Kingdom. These pointers are based on two investigational methods: turning points of the basic indicators in relation to construction price turning points; and predictive power of delays of the simple pointers. It is concluded, based on the analyses, that unemployment level, construction output, industrial production, and ratio of price to cost indices in manufacturing are consistent leading indicators of construction prices.

Wang(1998) Carried out estimating of building rate indices in Taiwan is presented. Building price indices have always been used to measure the differences in construction labour and material costs. These guides have been conventionally based on ancient statistical information in Taiwan. However, the indices fall short in predicting the future cost trends in the construction industry. In this study the characteristic data that make up the construction cost guides, the major determining aspects were recognized as (1) the number of difference, (2) the required periods of preceding construction cost indices, (3) the weight related with each previous construction cost index, (4) the mean value of the series of construction cost indices that have been converted into a stationary series, and (5) the approximation of the errors between the predicted prices of construction cost indices and the detected values of construction cost indices. An analytical model has been recognized to prediction the present and future construction cost indices based on these factors, and its feasibility tested by using the observed data of the construction cost indices obtained from the Executive Yuan of the Republic of China. It concluded that model is judiciously suitable in predicting the trend values of construction cost indices in Taiwan.

Tareq(2015) carried out to introduce a new and alternative approach of using a neural network for cost estimation of the expressway project at the early stage.In this study the application of Artificial Neural Networks, as a modern technique, in Iraq construction industry is needed to confirm successful management, and many of the construction firms feel the need of such system in project management. The model was built for the forecast the price of expressway project. The information used in this model was collected from Stat Commission for Roads and Bridges in Iraq. It was found that ANNs have the ability to forecast the Whole Price for expressway project with a good degree of accuracy of the coefficient of correlation (R) was 90.0%, and average accuracy percentage 89%. In this study the ANNs model developed to the impact of the internal network parameters on model performance indicated that ANNs performance was relatively insensitive to the number of hidden layer nodes, momentum term, and learning rate.

5. CONCLUSION

Changes in the construction material cost have an impact on construction project.Prediction of material prices can have a greater benefit to the contractor over their competitorswhen it comes to competing for projects. This paper discusses about the use and function of predicting tools like Artificial neural network, regression analysis and analytical method.From this paper it was concluded that Artificial neural network is more effective tool than other predicting tools.

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