Research on Risk Prediction of Construction Section in Construction Project Based on Fuzzy Artificial Neural Network

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Abstract. In this paper, the fuzzy artificial neural network (ANN) is briefly described, and the fuzzy artificial neural network is used in the risk prediction of the project construction. The risk prediction of the construction project in the construction section is studied from four parts.

Introduction

Construction projects generally have a long time-consuming, investment ratio, the impact of many factors, from the engineering construction project engineering design, engineering construction, project decision-making, project completion and acceptance of the entire process, need to analyze from a scientific point of view, This paper studies the risk prediction of the construction project in the construction section by combining the fuzzy theory with the neural network [1], which is based on the interaction between the historical project construction project and the future development direction of the construction project. Combined with a project example, based on the fuzzy artificial neural network engineering construction project in the construction section of the risk prediction in-depth study for the construction project to provide a scientific risk forecasting method, establish a sound risk early warning system, and effectively reduce the construction project in the construction process In the presence of security risks and quality risks.

The Fuzzy Artificial Neural Network Model

Fuzzy artificial neural network model is a combination of fuzzy theory and artificial neural network theory of a comprehensive theoretical knowledge, with identification, association, learning, information processing and other functions. According to the risk early warning system of the construction project in the construction project, the fuzzy artificial neural network is used to construct the mathematical model, and the information is distributed. The model is divided into four levels. Generally, the artificial neural network system and the fuzzy system a method of series connection is expressed by the nodes of the artificial neural network system as fuzzy system signals, and the nodes implied by the artificial neural network system represent the fuzzy rules [2]. The fuzzy artificial neural network model is the input layer, the fuzzy layer, the fuzzy reasoning layer and the output layer, and the input layer mainly uses the number of nodes as the input variable number, which is an exact value. The fuzzy Layer is fuzzy on the input variables; fuzzy reasoning is the artificial neural network fuzzy reasoning; output layer is the number of nodes as the number of output variables. To improve the accuracy of the model, it is necessary to clarify the weight of the index according to the analytic hierarchy process (AHP), to make the index weight as a model input index and to fuzzify the data. The data is regarded as the fuzzy reasoning layer input in order to achieve from the input variable to the output variable fuzzy value mapping.

The Risk Prediction Method in Construction Section of Construction Project

In the construction project of the construction project risk prediction, the two methods are mainly used, one is fuzzy artificial neural network method and the other is the investigation and expert scoring method. The essence of the fuzzy artificial neural network is to distribute the information in

a distributed way. It is a mathematical model which simulates the sensor process of the animal's neural response system and is widely used in the process of risk prediction and evaluation of the project construction project. Compared with the regression model, there are obvious advantages, which can overcome the drawbacks of the regression model in a number of aspects. In the risk prediction management of the construction project, the application of the fuzzy artificial neural network has opened a new chapter [3]. The survey and expert scoring method is a commonly used method in the risk forecasting work of the project construction project. It is widely used in the risk forecast management work. Its essence is that the engineering experts through the relevant professional knowledge and practical experience of the project construction project the risk of construction in the risk of scoring, and risk-based issues in-depth analysis. In the construction project, the risk early warning system has some complexity, so it is necessary to collect and judge the experts in a number of related fields. Generally, this method is combined with the fuzzy artificial neural network system, so as to construct the project in the construction process in the potential risk to provide specific data indicators, the project quantitative or qualitative assessment of the analysis.

Risk Prediction of Construction Section of Engineering Construction Project Based on Fuzzy Artificial Neural Network Model

Analysis of Risk Factors. Take a project as an example. The construction project is a highway project of the city. The length of the road is 10km and the width of the roadbed is 26m. The construction section is constructed according to the relevant standard requirements of the expressway. It contains three separate interchange, Structures, etc., the investment of the project funds larger [4]. In order to ensure the smooth construction of the highway construction project and the construction of a successful risk prediction and early warning system, it is necessary to analyze the risk factors of the construction section in depth. It is understood that in the construction project of the risk factors in the identification of the need to combine with the characteristics of their own construction projects, the project construction project risk factors have six points: First, the duration of the delay; Second, the quality of the project Non-compliance; third, the project cost is high; fourth, the proportion of engineering revenue decline; Fifth, the construction of environmental issues; sixth, sustainable development. Due to the construction project of the highway project, the main part of the construction is long, and it is necessary to go through many villages in the construction process. The terrain is very complicated, so it is difficult to evaluate the risk of the project construction project [5]. Therefore, it is necessary to analyze and identify the risk factors of highway engineering construction projects, and need to combine with the characteristics of highway engineering and engineering construction projects, and comprehensively analyze the actual situation of construction and construction.

Determination of Risk Early Warning System in Construction Project. In the process of risk prediction of the construction section of highway engineering construction project, this paper combines the various relevant engineering materials and draws on the in-depth research and analysis with reference to the engineering practice experience, and draws on the characteristics of the research and analysis of the relevant experts. The highway construction project to build a risk prediction and early warning system [6]. According to the above six factors in the highway construction project to establish the risk forecasting index of highway engineering construction project, four experts are invited to evaluate the risk forecasting index, and according to the risk forecasting index system of highway engineering construction project Analysis, the six risk factors to score the situation as shown in Table 1 below:

Table 1: Risk prediction and early warning model Risk factors

Serial number	Duration of work	The quality of the project is not up to standard	Project cost is high	The proportion of project income declined	Environ mental protecti on of construc tion	sustaina ble develop ment	Predict the alert state	Forecast level
1	17.9	19.4	15.4	18.5	14.7	10.6	0.64	Yellow
2	16.6	16.4	17.5	16.5	15.6	13.4	0.81	Orange
3	13.5	15.6	12.6	12.3	16.2	19.5	0.35	Green
4	15.4	12.5	16.2	11.6	18.1	17.3	0.41	Green

The Risk Prediction Level of the Construction Section of the Construction Machine Based on the Fuzzy Artificial Neural Network Model. The risk forecast of the construction section of the construction project is to qualitatively analyze the potential risks that may occur in the construction of the project, the objective evaluation of the risk warning level, the probability of the risk occurrence and the occurrence of the risk May cause the loss of the overall evaluation. The risk factors of the project construction project are analyzed and calculated, and the quantitative analysis is carried out to determine the influence of different risk factors on the project construction project. According to the risk forecasting and evaluation of the construction section of the previous construction project It is only to assess the quality of the project, the risk level is only qualified and unqualified two levels, with a certain one-sided [7]. Based on the fuzzy artificial neural network, the risk factors of the project construction project are distributed and processed. The influence of each risk factor on the project is determined, that is to say, the fuzzy artificial neural network model is used to construct the complicated engineering risk model, the risk variables are calculated by fuzzy variables and output variables implied in the fuzzy artificial neural network, and the risk rating is obtained. The risk level is divided into five grades, followed by very low risk level, Risk level, moderate risk level, higher risk level, very high risk level. And marked with different colors of color, according to the above level of risk levels are marked in blue, green, yellow, orange, red.

Calculate Based on Fuzzy Artificial Neural Network to Determine the Risk Level the Project Construction Project. According to the six risk factors of the project construction project, the risk prediction index of the construction project in the construction process is constructed, and the early warning index of the risk influencing factor is used as the variable of the fuzzy artificial neural network model input layer in the project construction project. The fuzzy artificial neural network model is defined as 6 at the input layer, and the numerical calculation of the risk warning state is carried out. The calculated result is taken as the output value of the fuzzy artificial neural network model for the highway engineering construction project. For the state of risk warning The value of the general set out of 1 points, the gap between the different economies of 0.2, known to the four experts on the construction project in the construction of the risk factors for the impact of the situation, the project in the fuzzy artificial neural network model And the input layer is calculated. The known warning state value is 0.4131. The corresponding data under the warning

state value is the largest, and according to the index of different risk level, the alarm level corresponding to the warning state value For the green, that is to say the project construction project risk level is lower, that is, lower risk level [8]. So for the highway construction project in the construction section of the emergencies need to be taken seriously.

Early Warning Response Mechanism. The corresponding warning mechanism is based on the risk forecasting and early warning system at any time to show the results of the risk rating evaluation, and give some response measures, that is, according to the risk prediction level of the different results predicted, take appropriate protective measures and countermeasures, Risk control, this method is the construction of the project in the risk of quantitative classification of the control method, the project construction projects in the different risks and different risk factors, in the construction process may be The impact of the project construction projects and may cause damage to the project to varying degrees, to take some preventive measures and the corresponding response measures, so as to avoid the extent of the impact of risk enhancement and expansion. The risk prediction model is based on the risk early warning index system, a variety of risk factors to quantify, and its one or two fuzzy calculation, according to the results to determine the risk of the forecast level, the risk of engineering projects root causes of the problem, according to the root causes of risk to control the construction area of the risk of the project construction projects in the risk caused by the loss or impact and to a minimum. In the highway engineering construction project, the calculation result of the hidden layer and the input layer in the fuzzy artificial neural network model shows that the risk of the construction section is low, the risk level is green, combined with the measures that should be taken for the lower risk, combined with the construction of the incident, to determine the root causes of risk, to take a certain response to timely correction. After the actual investigation of the project, it is found that the risk forecasting and early warning system in the project is the result of the risk calculation, and the project construction is completed after the comparison of the real results, the two are more in line between the highway construction project The fuzzy artificial neural network model is used to predict the risk of the construction section. It is feasible and strong. The fuzzy artificial neural network model is used to monitor and forecast the risk status of the construction section in the construction project. The overall risk of the state, in the construction process can be a potential risk crisis to take preventive measures for timely processing, construction projects in the construction of a certain reference value.

Conclusion

All in all, risk forecasting research based on the fuzzy artificial neural network model in the construction project in the construction section is conducive to solve the risk prediction problem in the construction and improve the accuracy of risk prediction. However, due to the fuzzy artificial neural network model is a new prediction model method, there are still many problems and shortcomings in the actual operation, it also needs to further develop and improve, so give full play to its application value and reference value in the construction project risk prediction study and take some preventive measures to help protect the construction project construction safety.

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References

[1] Gao Ying. Risk prediction and management in the construction of the project - Taking Lu Shang · Phoenix project as an example [J]. Small and Medium Enterprises Management and Technology (Late Journal), 2014, (10): 40-41.

[2] Sun Weijing. On Bayesian method in the construction project risk analysis of the implementation of the problem[J]. Management Manager, 2014, (28): 307.

[3] Hou Yuxin. Risk prediction in the construction safety management role[J]. Xinjiang Nonferrous Metals, 2013, (S2): 251-252.

[4] Yu Tian, Ye Qing.CIM Risk Assessment Model for Lifecycle Cost of Construction Project [J]. Journal of Huaqiao University (Natural Science Edition), 2013, (03): 329-333.

[5] Shi Huiqing. Talking about the risk forecast and decision in the bidding of construction project[J]. Modern Economic Information, 2012, (02): 303-304.

[6] Zhang Fusheng, Wang Hongpo, Yang Yang, Tu Xuyan. A Bayesian Network-based Risk Assessment Method for Construction Project [J]. Computer Simulation, 2010, (07): 296-298.

[7] Lü Tiesheng.Study on Project Cost Forecast in Bidding Price Stage under New List Valuation Model[J]. Journal of Railway Engineering Society, 2009,

[8] Qian Qihu, Rong Xiaoli. China's underground engineering safety risk management of the status quo, problems and related recommendations [J]. Journal of Rock Mechanics and Engineering, 2008, (04): 649-655.