A Pattern for the Success of Agricultural Investment Projects

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Extended Abstract

Introduction

Agriculture still constitutes the backbone of the rural economy and is an engine of rural household income growth in developing countries. According to the evidence, agriculture sector has an important role also in rural economy in Islamic Republic of Iran. Thus, in order to promote rural economy, rural development programs and policies have been focused on agricultural investments. Although the focus was on agriculture, investment in agriculture has not been completely successful and has been faced with challenges in recent years. In particular, in Zanjan Province, most agricultural investments have been from Small and Medium Agricultural Enterprises (SMAEs) development over the period of 2005-2010. The facts indicate that SMAEs development has not been completely successful, and so, alongside favored SMAEs projects, there are some unsuccessful SMAEs projects. Therefore, there are two groups of investment projects (successful, failed). Failure is resulted in losses of resources and it has high costs for the firm, the society and finally the country's economy, so, in order to prevent losses of resources and for the best resource allocation, Success/failure projects should be recognized and separated beforehand. This study aims to introduce a pattern for recognizing and predicting failure of agricultural enterprise projects by classifying failed projects from non-failed projects based on predictors' variables. Therefore, there is a binary classification problem in this research. Neural Network (NN) has been widely used to investigate classification problems, and NN presents several advantages compared to traditional methods such as logic and discriminate analysis. Among NN models, Multi-layer Perceptron (MLP) is the most common neural network for binary classification problems like failure/success project prediction. In addition, based on a review of the literature, Investment Climate (IC), project properties, and individual characteristic of investor are effective factors on enterprise growth, therefore they can be used as predictors of each project's failure/success.

Methodology

This study used literature survey methods to investigate the key predictive variables that affect performance and survival of agricultural enterprises and can be used to identify causes and develop models to predict project failure. Area of this study is the rural areas of Zanjan province, which is one of the 31 provinces in Iran and is located in the western-north part of the national territory. The data set of this study consists of a sample size of 231 agricultural

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investment projects that are situated in rural area; in addition, owners of the projects were introduced to receive loans from banks. The data sources are Statistical Center of Iran and Former Ministry of Labour and Social Affairs. Based on a review of the literature, we used Multilayer Perceptron Neural Network based on Back Propagation algorithm with one hidden layer, for building forecasting model. Inputs of Network is finalized of 16 predictors/ independent variables and network output is a categorical variable that classifies projects into two groups (success=1, failure =0). To implement network, the Neural Network Toolbox in Matlab was used in this paper. In order to implement and evaluate the network, 231 sample cases (projects) were divided into four subsets: 139 cases for Network Training, 46 for Testing, 46 for Validation, and 31 cases as New Input/Data in the real world. The training approach selected was the Batch updating method and optimized algorithm of SCG. The activation functions were selected to be sigmoid. Efficiency of the NN was identified by using MSE, ROC curve, and, the error percentage, measured as the percentage of wrongly classified cases.

Results

Findings, based on a review of the literature, indicate that Multilayer Perceptron NN with Back Propagation algorithm and one hidden layer is an appropriate tool for pattern recognition in binary classification problems. As a result, the network topology that was determined through trial and error experiments, and based on prediction accuracy and MSE criteria, the optimal network architecture has been identified in an iterated training process, including: an input layer with 16 nodes, a hidden layer with 24 nodes, and an output layer with 2 nodes. Results show that the overall accuracy is 77.5% with Type I and Type II errors recorded at 20.8% and 25%, respectively. Therefore, the acquired model can classify the failed projects better than the non-failed projects, with 79.2% against 75% accuracy rate. So, we can conclude that the model accuracy rate for bank and financial institute's managers, and, rural & agricultural policy makers is 79.2% and 75%, respectively. Furthermore, in order to further examine the developed model's predictive ability in the real world, we evaluated the network ability by using 31 new samples via the Batch method. The results indicate that the overall accuracy rate of the model's classification decreased to 64.5% when it was used for the new samples in the real world.

Conclusion

As we did, an NN model can estimate and produce the failure probability of each project based on predictors, and then it can help decision-makers to separate proper projects from improper projects and to allocate loans for projects whose success probability is high. So, we can conclude, not only for the knowledge and experiment of decision-makers, an NN tool can also be a useful tool for capital resources allocation in order for rural and agricultural development.

Keywords: Capital, Classification, Feed forward, Enterprise, ROC.

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