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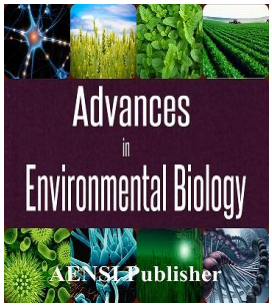

Assessing Stakeholder's Credit Risk using Data Mining in Construction Project

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ABSTRACT

Nowadays, the rapid growth of national and global economic demands an efficient, innovative and cost effective for building and infrastructure project. Partnering in construction projects are complex in nature due to human and non-human factors variable. For instance, credit capacity is a common attribute from client's perspectives when selecting partners in their construction project. However, the assessment of the credit risk capacity of partners (such as project manager, quantity surveyor, consultant, and contractor) is neglected particularly involving design build projects in Malaysia. Due to unforeseen risk associated to credit capacity, project delay and cost overrun occur frequently in Malaysian construction industry. Thus, this research aims to develop a framework for accessing credit risk using data mining for design build project. This study will employ case study approach in order to gather information, develop data mining model and validation with real case projects involving public clients. The framework will enable public client to select appropriate partners for their construction project with minimal risk. It is anticipated that this study will yield an efficient artifact to improve the existing government procurement system such as e-Perolehan and e-Perunding.

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INTRODUCTION

The main role of fund provider is to collect deposits of real and legal persons and also allocate them to borrowers and investors. Banks as one of the financial institutions are responsible for relationship between lenders and borrowers. Generally, evaluations of loan applications are based on a loan officer's subjective assessment. Such judgement is inefficient, inconsistent, and non-uniform. Therefore, a knowledge discovery tool is needed to assist in decision making regarding the application. Financial system efficiency and level of financial improvement play an important role in economic development of countries. The better the fund providers act, the more economic development occurs.Fund providers face problems such as the probability of non-repayment of received loans at the due date or non-repayment that are called "credit risk". Credit risk is widely studied topic in bank lending decisions and profitability [1]. Borrowers usually have better information about the projects to be financed, but lenders usually don't have sufficient information about those projects [2]. If a bank faces good customers, it will definitely have more power in lending loans and thus, increasing in profit will occur. But if bank faces bad customers who don't repay loans in due date, it will likely go bankrupt.

Risk analysis in today's financial markets is one of important factor that could be applied with neural networks [3]. Data mining play an increasingly important role in financial applications for such tasks as pattern recognition, classification, and time series forecasting. Factors affecting the presence and upsurge of credit risk are divided into two groups which is within the organization and outside the organization. The factors outside the organization cannot be controlled by bank management teams and are considered exogenous for bank such as political changes, natural disastersand war. The factors within the organization are those which bank management teams could take the matter under their control. These are called endogenous factors.In this research, we are trying to figure out the endogenous factors affecting credit risk within an organization. The main purpose of this research is to develop a new framework for accessing credit risk using automated data

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mining for design build project. This research can estimate the credit risk of each customer and helps to make the right decision toward granting of loan to customers. Using data mining techniques, we planned to sift through the sample data (information about the loan such as amount, payment size, lending date and purpose) and extract the patterns and characteristics common in problem loans.

Related work:

Risk is everywhere. Risk components have been increased dramatically in the recent years, especially in the case of health and safety issues, it is also true in the case of financial products, for example, credit risk [4]. And this credit risk develops from the probability that the borrowers may be unwilling or unable to fulfill their contractual obligations [5]. The most important tool for the assessment of credit risk is credit scoring and credit scoring attempts to summarize a borrower's credit history by using credit scoring model [6]. Credit scoring models are decision support systems that take a set of predictor variables as input and provide a score as output and creditors use these models to justify who will get credit and who will not [7]. The fundamental of all credit scoring models are same, similar types of borrowers will behave in a similar way and sophisticated tools are used to identify similar categories of borrowers and thus predict credit performance [6]. The prescription of credit scoring is to recognize patterns in the population based on the similarities.

Four approaches are most widely used on the application of data mining to credit assessment problem, and those are Neural Network, Logistic Regression, K-nearest Neighbor Classifier, Genetic Algorithm and Support Vector Machine Classifier [8]. All of these algorithms have one similarity, all of them include parameters that are defined by the variables and the variables can be obtained from a credit report or an application form. The variables can be different types, for example credit history, income, outstanding debt among others, those are explained in detail in the next chapter of this study. On the other hand, some of these methods have severe limitations (statistical restrictions). For example, in regression, assumption of normality, assumption of linearity and assumption of homogeneity of variance have to be satisfied and violation of these assumptions may stimulate problems in the reliable estimation [9]. It has been noted that neural networks are capable of separating the classes (good and bad credit risk) in a better way [10]. For an example, Hecht-Nielson Co. developed a credit scoring system using neural network that was able to increase the profitability by 27% by separating good credit risks and bad credit risks in an effective way [4].

Methodology:

The way credit scoring works is simple theoretically. According to [7], the basic working procedure can be explained in the following way, the dependent variable (Y) represents credit risk (the probability of repayment). The independent variables (predictor variables or X_i) are used to explain the dependent variable. The list and the value of the independent variables are extracted from the "Application Form" generally, or sometimes from the credit report (available in the USA especially). The list of independent variables may be like payment history, number of accounts, types of accounts with other things. Then the performance of a specific customer is decided based on the performance of the similar types of customers by using credit scoring system, credit scoring system awards points on every possible factor to calculate the probability of repayment. After adding these awarded points, credit score comes up. Normally, the higher the achieved points, the lower the risk is. Figure 1 shows aframework for accessing credit risk using data mining for design build project.

Step 1. Data Collection/Selection:

In this research work, data will be obtained from public agencies institution. Data will be collected through stratified random sampling method over the period 2006-2013, based on documents and records of applicants. The data will be comprised of design build related activities.

Step 2. Data Pre-Processing:

The data required to be preprocessed as the data collected may be anomalous, incorrect or missing. The main idea of data pre-processing is to ensure that data fed into the data mining phase is clean (high quality of data) and only appropriate data are selected.Data preparation is important before developing any predictive model. Data preparation allows identifying unusual cases, invalid cases, erroneous variables and the incorrect data values in the dataset. If the data is prepared properly, the models will be able to give better results because of the cleaned data and at the same time, right models will be created that represent the right scenarios.

Step 3. Developing credit scoring assessment based on data mining model:

An intelligent and efficient method is needed to digest and find hidden and useful information from a large volume of construction related data. Generally, the data mining process involves the application of certain methods that are capable of extracting information and reveal hitherto unknown patterns. In this phase, the predictive modeling and descriptive modeling techniques will be developed.

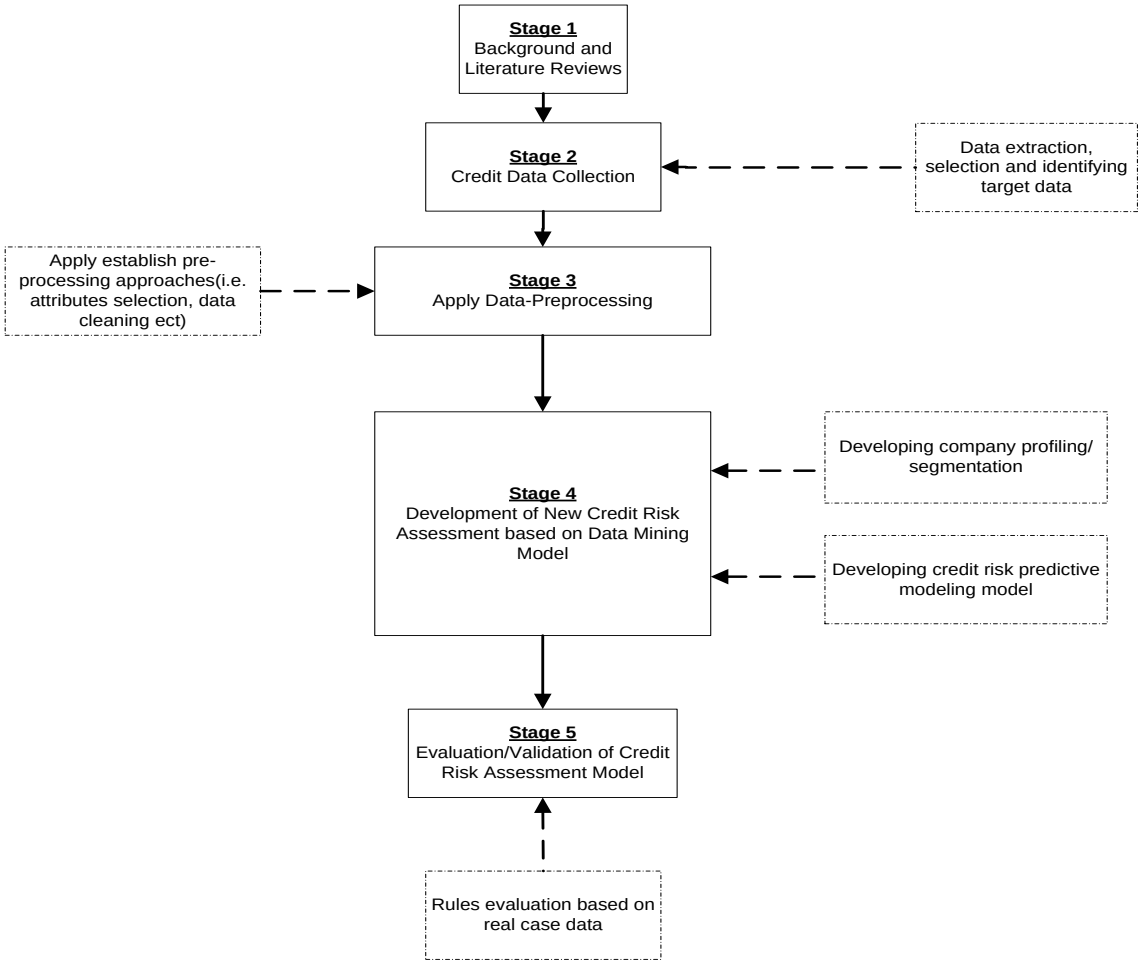

Fig. 1: Flow Chart of the framework

Step 4. Patten/Knowledge Evaluation:

The resulting model/pattern/rules will be validated by domain expertise. A real world case study will be used for model evaluation and verification.

Conclusion:

In this paper, a method that utilized data mining technique for accessing and improving credit risk in construction projects has been proposed. The proposed method is essential as several studies in Malaysia show that construction projects experience problems such as poor workmanship, delay and cost overrun.Thus, choosing the right construction project partners has been one of the most important decision problems that require delicate care. However, in current practice, the final decision in recruiting the stakeholders is often associated with risk that may resulted to unsuccesful project.This study highlights the data mining automation as an approach to assess credit risk among the stakeholders. Additionally, this paper provides a framework for new predictive model for credit risk assessment in public sector design build project.

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