

Developing an early prediction model of bankruptcy in the UAE construction industry

Mahmoud Shehata, mhs10@hw.ac.uk
Heriot Watt University, UAE

Karima Hamani, karima.hamani@hw.ac.uk
Heriot Watt University, UAE

Abstract

The aim of this research is to develop an early prediction model of bankruptcy providing the UAE construction companies with practices to avoid the threat of insolvency and its related consequences on individuals and the economy. The methodology used to achieve the aim of the research is by collecting data from literature review contributing to develop a survey and semi-structured interview questions. The focus of the research methodology is to identify the reasons for bankruptcy, understand organizational strategies during financial crises and pandemics, rating the challenges facing the developed model, and evaluating the developed model of bankruptcy. The outcome from the survey and interviews is that the main reasons for organisations bankruptcy are due to cash flow management, payment delays, and false cost reporting which is justifying the data in the literature review. Moreover, there is no prime reason for bankruptcy as much as it is a series of poor decisions. Another finding is that the level of knowledge and awareness about bankruptcy has increased especially during the current pandemic contemporary with the evaluation of the developed prediction model that is designed specifically for the UAE construction industry. The evaluation of the developed model by participants is good for being accurate, suitable, efficient, and realistic. This research provides a framework for the companies to predict the future risk of insolvency. Moreover, assisting the researcher to investigate and improve the developed model which is lacking transparency and published data on selecting the most important criteria and variables for the model.

Keywords

bankruptcy prediction model, construction industry, UAE.

1 Introduction

The strength of any market is affected by the quality and performance of the economic and behaviour towards the current and future challenges to maintain stable and strong market economy. For instance, the global financial crisis had a crucial effect on the global businesses resulting of economic recession as in the report by (Jakóvik, 2018). The main problems affecting the business environment, performance and quality as mentions in the study by (Daniela, Mária and Lucia, 2016) are the level of consumption and debt risk which is caused by delayed or unpaid invoices. Therefore, the development of the studies of early predictions of bankruptcy in the construction industry are significantly increased. The study by (Jakóvik, 2018) mentions that the benefit of developing an early prediction model of bankruptcy will assist the companies to predict future insolvency depending on financial and performance indicators.

The aim of this research is to develop an early prediction model of bankruptcy to provide the UAE construction companies with practices to avoid the threat of insolvency and its related consequences

on individuals and the economy. This will be done by identifying the causes of bankruptcy in the construction companies, reviewing the current tools, method, and criteria for successful prediction model in other industries and their applicability in the construction companies, investigating the current framework of bankruptcy prediction in the UAE market.

The methodology used to achieve the aim of the research is by collecting data from literature review contributing on developing a survey and semi-structured interview questions. The key focus in the research is to identify the reasons of bankruptcy, understand organizational strategies during financial crisis and pandemic, rating the challenges facing the developed model and evaluating the developed model of bankruptcy. The outcome from the survey and interviews is that the main reasons of bankruptcy are due to cashflow management, payment delays and false cost reporting which is justifying the data in the literature review. Another finding is that level of knowledge and awareness about bankruptcy has increased especially during the current pandemic contemporary. The evaluation of the developed model is fair for being accurate, suitable, efficient, and realistic.

2 The importance of construction industry to the economy

The construction industry is significantly considered as vital sector in developing the economy of any country. The strength of the construction industry relies on the supply chain serving the purpose and the need of building materials consumption rate such as glass, wood, tiles, etcetera which will increase the demand of manufacturing and producing more building materials. As a result, the construction industry will be improved and it will help the growth of the economy by solving the social problems of job opportunities and expanding on government projects by improving the infrastructure, utility projects and local residential/commercial projects by increasing the demand of building material variety. (Hosein and Lewis, 2005).

The importance of the construction industry is having a high contribution to the GDP with a percentage of 8 - 10 % in comparison to other industries. However, the industry is recognized for being competitive in bidding that sometimes the clients aim to award the contract to the lowest bidders, while overlooking the importance and the effect of such behaviour on the long-fragmented supply chain. The failure of one business in the construction industry supply chain can lead to failure of other businesses who relies on payments to finance their work on site.

2.1 The culture in the UAE construction industry

The UAE construction industry has its own culture and behaviour compared to other countries due to constantly updated government vision for a smart and flexible city. Also, exhibition of Expo 2020 increased the delivery of fast-track projects. For instance, (Al-Malkawi and Pillai, 2013) mentions the characteristics of the UAE construction industry being in the frontline of the news depending on oil treasure as the strength of the country. However, despite being a leading developed country the global crisis of the pandemic succeeded to cripple the UAE market. Therefore, real estate and construction industry was severely damaged causing a declining in profitability, and liquidity.

In the report by (Ayoub *et al.*, 2017) mentions that due to the global crisis in 2008 the UAE government had introduced rescue culture by forcing new bankruptcy law to the UAE market called “Liabilities of directors”. The law has introduced comprehensive procedure to be followed. The new law defined the liability for the directors and managers towards insolvency in case they commit any criminal action of hiding or damage any company records or company assets. In the report by (Mulla, 2019) mentions that there was an improvement in the UAE law towards business environment which involved amendment in bankruptcy law, anti-money laundry and certain

business ownership.. In the report by (Alton, 2019) explains the procedure in a framework to avoid the future risk.

In the study by (Umar *et al.*, 2020) mentions that the majority of project delays in the UAE construction is due to a combination of negative factors such as time overrun, cost overrun, payment delays by clients, bankrupted companies, disputes, arbitration and litigations. In the study by (Alameri, Rahman and Nasaruddin, 2020) mentions that the UAE construction culture is having a diverse group nationalities, languages, ethics, religions, beliefs and cultural backgrounds. Therefore, it will require project managers to overcome the risk of any conflicts, communications, and differences by embracing and adapting the change to act positively towards project success.

3 Bankruptcy

There are several definitions of bankruptcy as in the research by (Horváthová and Mokrišová, 2018) mentions that bankruptcy occurs in several forms such as the liabilities of the companies exceeds the value of their assets, deficient use of the company resources, inability to survive the competition in the market due to failure of decision making in project bidding and management, the reduction in sales and inefficient of managing the project activities. To simplify the meaning of insolvency is that value of the company liabilities or debt is more than the value of the company assets. Thereof, at that stage the company should start searching for solutions to overcome the debts such as finding new funding resources, restructuring the company, and appointing a liquidator.

3.1 Construction bankruptcy

The complexity of construction industry involving various different stakeholders with lack of communications is placing the industry in major risks of failure as in the research by (Arain, 2008) mentions that construction industry is associated with a lot of risk and uncertainties such as the constant failure of projects delivery on time and cost, projects disputes and change of design due to lack of management and communications during design stage. Additionally, contractors are forced to take all the risks and be able to maintain short and long financing terms. For instance, the contractor will have on the short term to finance the capital cost of projects, stock and procure the materials while on the long term to maintain retained profit and equity investment. Therefore, the number of bankrupted contractors in the construction industry tremendously increased.

3.2 Reasons of bankruptcy

The contractor's managerial role is under the influence of internal and external factors affecting decision making. Organization structure and dealing with stakeholders, competitive market and inflation can place the company in making a strategic decision that is associated with risks and uncertainties leading to insolvency. In the article by (Rice, 2013) mentions that there are many influences affecting the contractor failures in the construction industry from making wrong strategic decision such as; selecting poor projects, entering new markets and the need of increasing the volume and expansion. On the other side, from organizational decisions such as poor operation management, insufficient profit, poor performance due to the lack of experience, the lack of leadership skills and poor contract practices.

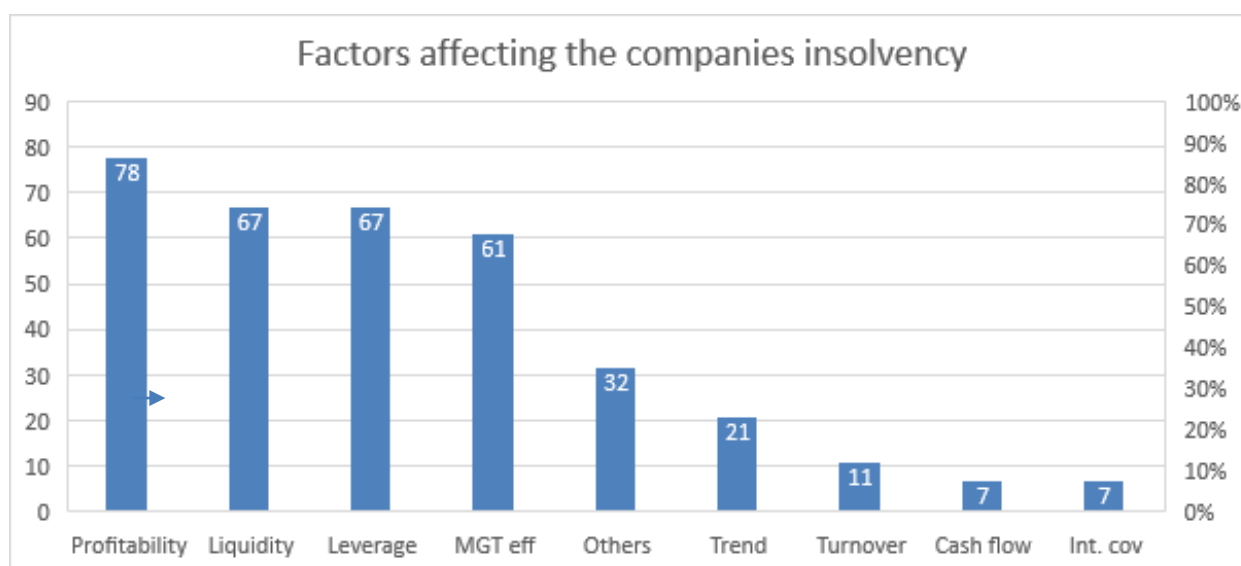


Figure 1. The most common factors affecting the company's insolvency

4 Bankruptcy prediction models

4.1 Development of bankruptcy prediction models

Bankruptcy prediction models have been developed over the years as by (Kuběnka, 2016) explores the progress development of bankruptcy prediction models. In the early beginning of the 20th century the importance of bankruptcy prediction has been increased. The initial approach distinguished comparison between companies' insolvency status depending on single indicators or financial parameters. However, the revolution of bankruptcy prediction models appeared by Altman in 1968. He developed a measurement method of bankruptcy by Z-scoring through simulation of different indicator impacts on the financial situation of companies. Later, Altman developed the most popular technique called 'Multivariate Linear Discriminant Analysis' to forecast companies' bankruptcy.

4.2 Bankruptcy prediction in construction

The culture of the construction industry associated with different type of stakeholders, decision making, type of organization structure and long fragmented supply chain that depends on regular payments. Financing system and investment in the construction industry is completely different from other industries. Therefore, the tools and criteria to be applied in other industries will not be effectively applicable for margining and evaluating the financial risk in the construction industry as in the report by (Sun, Liao and Li, 2013). Moreover, the study by (Kuběnka, 2016) and (Spicka, 2013) states that what appears to be failure of companies in the construction industry is related to shortage of cash especially in the short term, and low rate of labour productivity.

5 Creating a bankruptcy model for the UAE industry

The first step in the proposed bankruptcy prediction model will be based on large data analytic that will consist of collecting financial data of UAE construction companies. Then, to be converted to key value pair structure and presented in the process of big data analytic database "Apache Mahout with LML" and "HBase" as per (Hafiz *et al.*, 2015) study refer to figure no.2. However, (Saeed *et al.*, 2020) mentions that UAE construction industry disadvantage lack of published data, low transparency in financial information, unknown average market earn value, volume of the total market share and limited historical shared data by the companies in the construction industry.

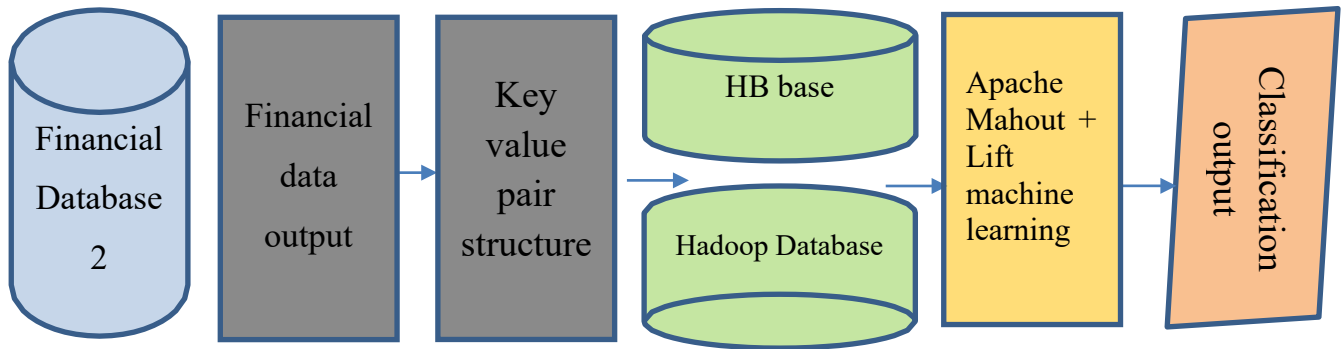


Figure 2. The flowchart of the big data analytic.

5.1 Criteria for creating a bankruptcy model

The research by (Karas and Reznakova, 2017) significantly explains that when deciding on creating a prediction model to distinguish the purpose of that prediction model for more successful prediction model. According to (Alaka et al., 2018) which used systemic review of previous studies to create a framework for companies to follow where they must achieve accuracy of bankruptcy prediction models by using suitable mechanism and serve the purpose of each company.

- **Accuracy:** Prediction classification with minimum error, Type I and II.
- **Result transparency:** Tools should be interpretable.
- **Sample size:** The approximate sample size suitable to tools and function optimally.
- **Variable selection:** Variable selection method required for optimum results.
- **Updatability:** Tools should be easy to update in case of any dynamic changes.

5.2 Selecting variables when creating the model

(du Jardin, 2009) divides variable that reflects a company's failure into three categories and it can be a result of one or more category. The first category focuses on financial documents (balance sheet and profit/loss account) and characteristic behaviour (strategy, management, and organization structure). The second category is a reflection on company business environment during lifetime (interest rate and growth). The third category is related to market evaluation of financial risks and status of the companies in the market. Also adding that researchers when developing a bankruptcy model tend to use two step methods to select the suitable and accurate variables in their model.

5.3 Model design

The design of LSTM RNN is consisting of input layers of selected variables suitable in the UAE market on the basis of time: current year time (t) previous years (t-n), hidden layers, a "SOFTMAX" layer and output layer as in the study by (Jang, Jeong and Cho, 2020) refer to Figure 3.

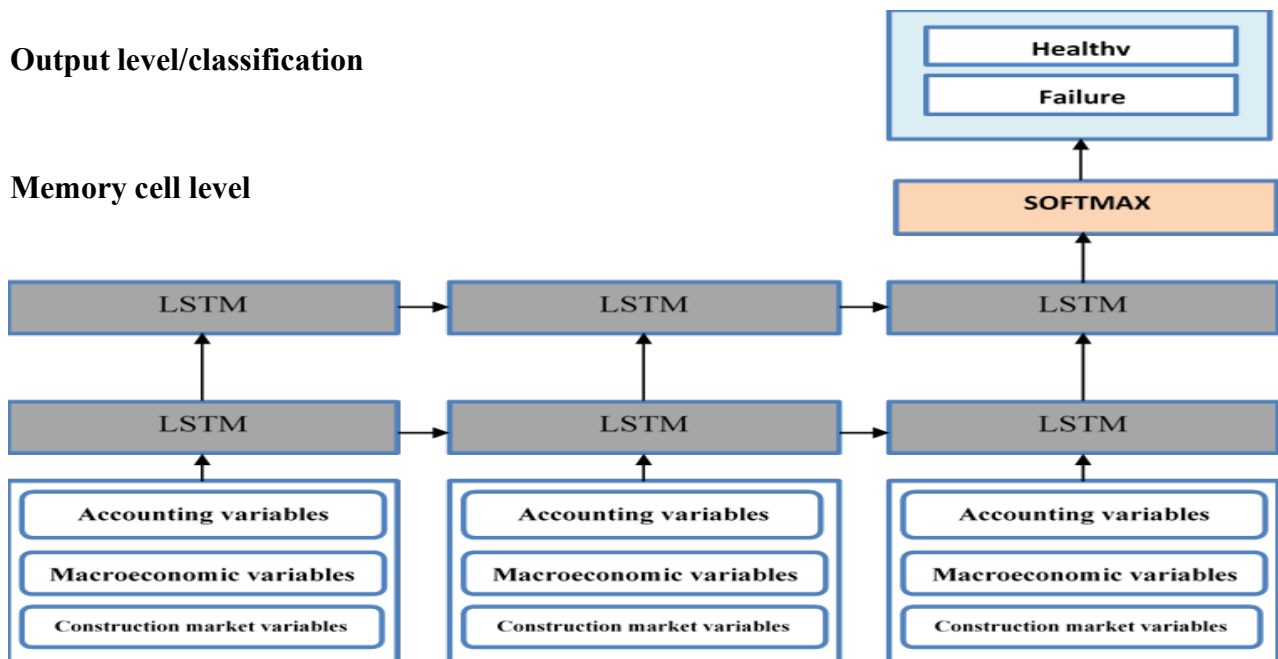


Figure 3. The developed flowchart for the prediction model of bankruptcy.

6 Research Methodology

The primary data was collected by a comprehensive review of vital role of the construction industry to the growth of the economy. Identifying most common reasons behind bankruptcy in the UAE construction industry. The selection of important criteria and variables when creating the bankruptcy prediction model based on each company visions, strategy, and requirements. Developing an early prediction model of bankruptcy based on the current research and the UAE market. The secondary data was recorded from articles, journal, conference papers and books.

Predefined set of closed-ended questions are prepared to collect information from various players in the UAE construction industry such as client, consultant, contractor, sub-contractor, and finance managers to achieve the objectives and aims through a critical quantitative analysis. The survey was designed in a way to measure suitable perdition models of bankruptcy.

Semi-structured interviews that include specific topics which are prepared in advance to collect the information from the interview. It will be sent to professionals and experts in the construction industry such as client, consultant, contractor, sub-contractor, and finance managers. The interviews were conducted online due to the current situation of covid-19 and its restrictions.

7 Findings and Discussion

7.1 The importance of the construction for economy growth

Most of the responded agreed with the study by (Miroshnikova and Taskaeva, 2018), (Omopariola *et al.*, 2019b) and (Durdyev, Omarov and Ismail, 2016) that the construction industry is highly important to the supply chain and considered as essential industry and resemble the main strength and economy growth of any country. All the interviewees expressed that family businesses and privately owned companies have the strength of diversity contribution to stability to the industry. All the interviewees agreed on the important role of stable companies for economic growth due to the demand of building materials as in the study by (Tse and Ganesan, 1997).

7.2 The main reasons of bankruptcy in the UAE

The majority responded that the main reason of bankruptcy in UAE construction industry is due to payment delays from clients affecting the supply chain and survival of the companies as in the study by (Mahamid, 2012). Most of the participants were from main contractor/subcontractor side that responded with familiar and fair knowledge on bankruptcy which impacted greatly on the findings and outcome of the survey which means there is high awareness of bankruptcy in the UAE construction industry. Also, means most of the failure happens on the lower level of the supply chain due to cash flow and payments delays from client's side.

Furthermore, force majeure such as financial crisis and global pandemic is having a huge impact on the stability of the market as in the study by (Kerr M., Ryburn D., 2013). Adding to this company procedures and strategies with bank loans interest rates, organization structure and culture is the third reason of bankruptcy. The outcome was good practice from client's side to mitigate risk and cash flow management however they ignored quality and risk of variations.

7.3 The current strategies to mitigate the risk of bankruptcy in the market

All the interviewees are having their own procedures and strategies when it comes to mitigating the risk and maintaining a good cash flow. Moreover, they are adapting good contract practices in terms of applying back-to-back payments and focusing on cash collection. The interviewed organizations are cautiously keen on selecting clients with a good reputation in the market. However, the main reason of bankruptcy are payment delays and no payments at all.

7.4 The most important criteria when creating the bankruptcy model in the UAE

Most of respondents preferred that the model should be updated, flexible and specified in comparison to other criteria as in the study by (Alaka *et al.*, 2018). Most of respondents preferred that the model should consider current ratio variable which is (current assets/current liabilities) with 68 responding in comparison to other variables as agreed in the study by (Wang and Lee, 2008) and (Edum-Fotwe, Price and Thorpe, 1996) about the importance of the financial variables as indicators.

7.5 The role of implementing the bankruptcy model within the organization

The majority agreed that on a strategic level shareholder should import the developed model. Also, the implementation role to be assigned to general managers, power of authority remains between board members, shareholders, general managers, and directors. The responsibility relies between directors, project managers and account department. The role of monitoring will be assigned to accounting department, the role of practicing to be assigned to quantity surveyor and correction action to be with commercial managers. The majority responded that shareholders are the most to benefit in comparison to others with a total 69 responses.

7.6 The outcome from the developed model

The respondents stressed on increasing the awareness and importance of bankruptcy prediction models as in the study by (Al-Malkawi and Pillai, 2013). The majority agreed that developed model would be accurate, suitable, effective and realistic with 69 equal responds as in the study by (Sun, Liao and Li, 2013) and (Jang, Jeong and Cho, 2020). The outcome is very good to begin considering the development and implementation of such model within organizations to overcome the future risk of insolvency and maintaining a strong position in the UAE construction industry as in the study by (Karas and Režňáková, 2017).

7.7 The role of the UAE government towards stable market

The feedback received from the interviewees advocates the importance of the governmental role, law, and regulation to control payment delays from client side to support the flow of cash to the supply chain and maintain stability and solvency within the industry. The UAE government should monitor and implement new payment mechanisms to support main contractors and the supply chain in the construction industry. A notable important result was the critical the role of the government to support the companies for a stable economy.

8 Conclusions and Further Research

The outcome from literature review on exploring reasons behind bankruptcy was that there are different reasons of bankruptcy depending on which can be categorized into three groups related to economic conditions such as; liquidation, competitive market and inflation. Project management such as; organization structure, market entrants, poor operation managements, poor performance and poor contract practices. Financial position such as; insufficient profit, cashflow management, payment delays and no payments. Moreover, the outcome from the survey and the interviewees was that the main reasons of bankruptcy in the UAE construction industry is due to cash flow managements, payment delays, no payments from clients and false cost reporting.

The prediction models of bankruptcy should be specifically designed for the construction industry and the requirements of each organization. However, the interviewed organizations do not find that prediction models of bankruptcy viable since they adapt their own strategies and procedure. Moreover, when it comes to liquidation, profitability and cashflow management, they have strategic teams to act and produce alternative plans by being selective with their clients using available information of client background and reputations. When creating the model, there are specific criteria depending on the vision of each organization and their strategies.

The main concept of the model is to classify the financial position of the organizations based on an input layer of variables (construction, financial, macroeconomic) using processing layers and output layer with classification and results. The model designed on storing big data and selecting the required criteria and variables depending on each organization choice. Based on rating the developed prediction model and vision by storing the organizations previous data. The rating of the developed model is very good as it is accurate, suitable, effective, and realistic. Moreover, the participants encouraging on adapting future strategies to avoid bankruptcy.

The recommendation is the importance role of the UAE government to monitor organizations performance in the adapted framework. Adding to that, implementing new payment mechanisms to support the supply chain with attention to new market entrants and poor organizational culture. Moreover, construction culture adapted in the UAE needs to be improved by implementing new contract form replacing FIDIC that associated with conflict, disputes and not being collaborative.

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