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# The Potential of the Kida-1981 Model in Preventing Unexpected Bankruptcy in the Algerian Manufacturing Sector

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## Abstract:

This article critically examines the Kida-1981 model, a widely recognized bankruptcy forecasting tool, in the context of the Algerian manufacturing sector, a key player in Algeria's economic recovery. Given the sector's significance, a good forecasting tool is not just important but crucial to prevent unexpected bankruptcies. Our empirical study, based on some healthy and sick manufacturing companies in Algeria, reveals the limitations of the Kida-1981 model in predicting bankruptcy in this context. These findings significantly affect the sector, underlining the need for more accurate and context-specific forecasting tools.

**Keywords:** Kida-1981 Model, bankrupt, nonbankrupt, prediction, accuracy.

**Jel Classification Codes:** C53, L60.

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## **1. Introduction:**

The Algerian government has aimed to increase the industry's contribution to GDP to 15% in its post-COVID recovery plan, recognizing the importance of industrial enterprises (Zaghdar A., 2021). Assessing the risk of bankruptcy before it happens and fixing any difficulties leading to it becomes critical due to the economic climate downturn. Furthermore, the new investment code 2022 offers numerous incentives to support investment in Algeria, particularly in the industrial sector. However, these incentives must be accompanied by measures that can restore investor confidence. It would be beneficial, inter alia, to have a reliable tool to evaluate potential failure indicators for manufacturing companies. In the past two decades, Algeria was severely hit by several international failures, losing numerous early-stage businesses crucial to its economic development. Furthermore, the Kida-1981 model is among the most well-known prediction models; it was created in 1981 in the United States to divide businesses into two categories: those that would go bankrupt and those that would not. Nevertheless, some scholars have questioned the model's usefulness for other areas and periods, considering that it was established in the USA in 1981. This research examines how well the Kida model works to assist Algerian industrial enterprises avoid unanticipated failure, a potential threat to the sector's stability.

**1.1. Research problematic:** This study aims to answer the following question:

**Can the Kida-1981 Model identify the companies at risk of bankruptcy in the Algerian industrial sector?**

**1.2. Research Hypothesis:** The Kida-1981 Model is a solid instrument for anticipating distress for enterprises worldwide, and so it is mainly for the Algerian setting as a whole and the manufacturing area.

## **2. Scoring model to predict bankruptcy**

This section provides a comprehensive overview of scoring-based models for anticipating business distress. The objectives are twofold: to define bankruptcy and introduce the scoring models developed to identify companies at risk. These models, including the Kida-1981 model, form the theoretical basis for our analysis. Understanding them is crucial for our research.

### **2.1. Corporate bankruptcy: a literature review**

- When a business cannot meet its financial commitments, it is said to have failed (Beaver, 1966, p. 71). Lenders and owners (investors) stand to lose much money if a business goes under.
- When a business periodically has insufficient cash on hand to pay its bills, this is known as periodic insolvency.
- According to Deakin (1972, p. 167), a firm is considered permanently insolvent when its liabilities surpass its total assets.
- A firm is deemed bankrupt when its entire assets exceed its whole liabilities (Beaver, 1966, p. 71). Another indicator of impending bankruptcy is when a business has three straight losses. The negative net value of a

business is known as economic bankruptcy, while a formal declaration of bankruptcy in a civil court is known as official bankruptcy. (Altman I. et al., 2006, p. and Watson, J. et al., 1993, p. 37) in terms of research

## 2.2. Scoring-based models to predict failure. Z-score Models- The development of the scoring models for failure prediction

Using statistical techniques and financial criteria, failure prediction scoring models revolutionized financial research by accurately anticipating bankruptcy before it happens. However, discussing scoring methods without acknowledging the influential Altman pioneering model is impossible. The Altman Model owes its existence to the pioneering work of Tamari (1964) and later Beaver in 1966. These efforts laid the groundwork for the development of failure forecasting scoring models. In 1996, Beaver conducted empirical research in the USA, analyzing the financial ratios of 79 firms. The study's first goal was to identify the key ratios explaining bankruptcy (Beaver H., 1966, p. 71). This research has shown that the cash flow to total debt ratio is highly effective in differentiating between bankrupt and nonbankrupt enterprises. It effectively categorized 87% of the companies into their respective categories one year before bankruptcy and achieved a 77% accuracy rate three years before failure. (Refait C.; 2011, p. 134). Altman expressed dissatisfaction with Beaver's approach to analyzing the failure, highlighting its reliance on a single variable analysis. In 1968, Altman conducted a survey to predict potential failure using the method of multiple-variable discriminant analysis. He created a discriminant linear equation that he thought would accurately differentiate bankrupt and nonbankrupt companies (Refait C., 2011, p. 135). Altman discovered that only five financial ratios had a significant impact on the construction of his model, as explained below:

$$var1 = \frac{\textit{short term assets} - \textit{short term liabilities}}{\textit{total assets}}$$

$$var2 = \frac{\textit{Retained Earning}}{\textit{total assets}}$$

$$var3 = \frac{\textit{Profit before interest and taxes}}{\textit{total assets}}$$

$$var4 = \frac{\textit{Market capitalization}}{\textit{total Liabilities}}$$

$$var5 = \frac{\textit{sales Revenues}}{\textit{total assets}}$$

The formula for Z is  $Z = 1.2 \textit{ var1} + 1.4 \textit{ var2} + 3.3 \textit{ var3} + 0.6 \textit{ var4} + \textit{ var5}$ . The cutoff value for Z is 2.6. If a company's Z-score is lower than the cutoff, it is considered a bankrupt corporation. (Altman, 1968, p. 600). Given that the Altman Model was created for a specific context, researchers have begun to develop scoring systems for their areas using local companies' data. One such study, conducted by Rashid and Abbas in 2011, aimed to create a failure prediction scoring model specifically for Pakistan. Before proceeding, they needed to ascertain the most crucial financial parameters to predict the purpose of predicting failure. To do this, the researchers thoroughly

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examined a subset of 52 enterprises that experienced financial failure between 1996 and 2006. They used discriminant analysis to identify a Z-score; they identified a Z-score with [the](#) three [significant](#) ratios from 24 ones, as follows:

$$Z = 1.147 \times \text{var1} + 0.701 \times X2 - 0.732 \times \text{var3}$$

Where:

$$\text{var1} = \frac{\text{sales Revenues}}{\text{total assets}}$$

$$\text{var2} = \frac{\text{EBIT}}{\text{short term liabilities}}$$

$$\text{var3} = \frac{\text{operating cash - flow}}{\text{short - term liabilities}}$$

This Pakistani scoring model reached an accuracy rate of 76.9%. (Rashid A. et al. (2011), pp.1-20.

### ❖ The Kida-1981 Model

Kida developed in the USA in 1981 another essential scoring-based model for predicting corporate financial failure based on five financial ratios:

$$\text{Var1} = \frac{\text{Net Profit}}{\text{total assets}}$$

$$\text{Var2} = \frac{\text{shareholders' Equity}}{\text{total liabilities}}$$

$$\text{var3} = \frac{\text{Short Term Assets}}{\text{Short term Liabilities}}$$

$$\text{Var 4} = \frac{\text{sales Revenues}}{\text{total assets}}$$

$$\text{Var5} = \frac{\text{cash}}{\text{total assets}}$$

Kida formulated his model as follows:  $Z = 1.042 \text{ var1} + 0.427 \text{ var2} + 0.461 \text{ var3} + 0.463 \text{ var4} + 0.271 \text{ var5}$   
Kida believes that when the Z-score is negative, the probability of failure is high, whereas companies with a positive Z-score are considered safe from failure. It is worth noting that this model has demonstrated a 90% predictive ability for financial failure one year before insolvency. (Babela I. et al, 2016, p. 39).

### 3. The Empirical Study

This investigation is carried out through a three-step process. First, we will select 12 industrial enterprises at random. Seven of these companies are nonbankrupt, while the remaining five are bankrupt. A corporation is considered bankrupt if it has experienced losses for three years. On the other hand, a company is considered nonbankrupt if it has been profitable for three years in the 2016–2020 period. Then, we will collect those companies' core financial statements; income statements, and balance sheets from the database maintained by

the National Commercial Registry Centre. In the following step, we will calculate the financial ratios of Kida's (1981) model for each company in the sample. To acquire the Z-score, we will multiply the ratios of each firm by their respective weights. Last, we will determine the Z-score by starting with a cutoff of "0." When the Z-score of a company is negative, it indicates that the company is bankrupt; however, when the Z-score is positive, it indicates that the company is not considered bankrupt. Following that, we will determine the model's accuracy for our study.

### 3.1. Presenting the research data

The sample comprises twelve Algerian manufacturing companies, five of which are bankrupt and seven of which are nonbankrupt. The following table represents these companies.

**Table N°1: Presenting the research sample**

Company	Bankrupt/ nonbankrupt
Arome	Nonbankrupt
Building trust	Nonbankrupt
Chenoua	Nonbankrupt
Liftal	Nonbankrupt
Mono Electric	Nonbankrupt
Prochima Sigma	Nonbankrupt
Sonaric	Nonbankrupt
Eniem	Bankrupt
ENOR	Bankrupt
Poval	Bankrupt
SIDER	Bankrupt
AVAR	Bankrupt

Source: prepared by theauthor

### 3.2. Nonbankrupt company data applied to the Kida model

❖ **Arome:**

Z	a1	V1	a2	V2	a3	V3	a4	V4	a5
0,41	1,04	0,03	0,43	0,11	0,46	0,32	0,46	0,38	0,27

❖ **Building trust:**

Z	a1	V1	a2	V2	a3	V3	a4	Var4	a5	V5
3,272	1,042	0,197	0,43	2,6957	0,46	2,955	0,46	0,98	0,27	0,36

❖ **Chenoua**

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
2,34	1,04	0,05 -	0,43	0,39 -	0,46	5,16	0,46	0,05	0,27	0,56

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### ❖ Lifal

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
2,19	1,04	0,06	0,43	1,13	0,46	2,60	0,46	0,62	0,27	0,59

### ❖ Mono electric

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
0,65	1,04	0,05	0,43	0,21	0,46	0,26	0,46	0,85	0,27	-

### ❖ Prochima Sigma

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
2,59	1,04	0,08	0,43	1,33		2,63	0,46	1,49	0,27	0,13

### ❖ Sonaric

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
7,94	1,04	0,02	0,43	3,58	0,46	13,16	0,46	0,59	0,27	0,18

### 3.3. Applying bankrupt-company data to the Kida model

#### ❖ ENIEM

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
0,66	1,04	-0,11	0,43	-0,32	0,46	1,72	0,46	0,15	0,27	0,15

#### ❖ ENOR

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
1,62	1,04	-0,15	0,43	1,00	0,46	2,74	0,46	0,17	0,27	0,02

#### ❖ XEOR

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
0,29	1,04	-0,07	0,43	0,23	0,46	0,38	0,46	0,18	0,27	0,00

#### ❖ Poval

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
0,83	1,04	0,00	0,43	0,63	0,46	1,04	0,46	0,17	0,27	0,02

#### ❖ Sider

Z	a1	var1	a2	var2	a3	var3	a4	var4	a5	var5
0,66	1,04	-0,11	0,43	-0,32	0,46	1,72	0,46	0,15	0,27	0,15

**4.Results and discussion**

One year before bankruptcy, the Kida-1981 Model accurately forecasted the safety of all sample nonbankrupt firms, a task it handled with 100 percent accuracy. However, it faced a significant challenge in predicting the insolvency of bankrupt companies, with an accuracy rate of 0% and a 100 % error rate.

**4.1.A summary of the findings**

The table summarises the accuracy of classifying nonbankrupt and bankrupt companies and general classification accuracy. It also includes the error rate for classifying nonbankrupt companies and failing companies and the overall error rate in classification

❖ **Classification accuracy:**

Nonbankruptcompanies	$(5 \times 100)/5 = 100\%$
Bankruptcompanies	$(0 \times 100)/5 = 0\%$
Overall classification accuracy	$(100\% + 0\%)/2 = 50\%$

❖ **Error rate:**

Non-failingcompanies	$(0 \times 100)/5 = 0\%$
Failingcompanies	$(5 \times 100)/5 = 100\%$
Overall classification accuracy	$(100\% + 0\%)/2 = 50\%$

The overall error rate is high, reaching 50%. Therefore, we deem the Kida model ineffective.

**4.2.Discussion**

Our empirical investigation demonstrated Kida's ability to classify healthy enterprises accurately. However, the aforementioned method's usefulness in identifying organizations that subsequently faced financial difficulties was found to be insufficient. This limitation can be attributed to a multitude of potential factors:

**-The model ratios:**

The methodology employed by Kida involves using discriminant analysis to investigate the complex interplay between financial indicators and the incidence of failure. To develop the model, the initial step involves identifying the financial measures that are most likely to shed light on the failure. Kida, the subject of investigation, exhibited a propensity for selecting a subset of five ratios from a vast array of available alternatives. The bankruptcy issue experienced by American corporations in the 1980s, commonly known as the series of insolvencies, can be attributed to the aforementioned ratios. Therefore, a comprehensive reevaluation of the framework of the Algerian context is imperative, as the aforementioned proportions may not accurately reflect the insolvency status of Algerian industrial enterprises.

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**The financial statements of the companies under examination may not be reliable in terms of providing comprehensive information about these companies:**

The Algerian situation is characterized by a significant reliance on creative accounting, resulting in financial ratios that may not fully capture the company's true economic state. Financial statement manipulation is a widely observed phenomenon in which accounting records and financial statements are intentionally falsified to minimize tax liabilities, inflate assets, and enhance the prospects of obtaining bank loans.

### 5. Conclusion

This research focused on Algeria's manufacturing sector because of its importance to the country's economic recovery and the many incentives it provides to potential investors. Providing a predictive bankruptcy tool is crucial for manufacturing firms to enhance fundraising and boost their development. Investors and lenders are more inclined to invest in companies less likely to encounter difficulties. After the Kida-1981 Model showed its dependability in the United States in 1981 and many other areas, we wanted to see whether it could predict when Algerian manufacturing enterprises would go bankrupt. Based on our research, the Kida model could have accurately identified nonbankrupt companies. It had a perfect track record for incorrectly categorising bankrupt enterprises. While the Kida model does an excellent job of forecasting successful companies, it fails miserably when predicting which Algerian industrial firms would fail.

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