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Applied of Altman Z Score Model (1993) to Insurance Companies in Jordan

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Abstract: The study aimed to predict financial failure and assess the effectiveness of applying the Altman model to insurance companies in Jordan. The research was conducted on 17 insurance companies listed in the Amman Stock Market, utilizing the modified Altman Z Score model (1993).The study concluded that the Altman Z Score (1993) can be relied upon as a tool for evaluating the financial stability of companies. It found that the financial situation of the sample companies is stable, with the exception of three companies that are financially unstable and at risk of failure.

Keywords: *Altman Z Score (1993), financial failure, predicting financial failure.*

Introduction:

Insurance companies are among the most prominent financial institutions due to their social and economic importance. They differ from other financial institutions in that they are exposed to the risk of financial failure because of their dual role in providing insurance services and managing risks for policyholders in exchange for insurance premiums.(Al-Rawashdeh F, Al Singlawi, 2016)Insurance companies provide coverage for a specified period and reinvest those premiums to achieve certain returns, which makes them susceptible to insolvency risk that could lead to financial failure. According to the report on the performance of the Jordanian insurance market for the fiscal year 2017 issued by the Ministry of Industry and Trade, the insurance sector is suffering from a severe crisis in performance decline. The importance of insurance companies lies in their ability to compensate policyholders for some of the risks they face, making them one of the most important economic sectors in the current era. Insurance is considered a means to confront risks that threaten individuals in their existence or their assets during their lives, and it seeks to mitigate their impacts through cooperation among individuals exposed to the same risks. The financial instability of companies represents a state of uncertainty, which raises the level of doubt among shareholders, investors, and depositors, making it difficult for them to distinguish between companies in terms of their financial control and the likelihood of financial distress, which can lead to financial failure (Burca & McNamara, 2014). In light of the importance of the sustainability of these companies and the need to maintain their presence due to legislative failures and the inflation and falsification of claims, there is a need to develop and implement some financial failure prediction models for insurance sector companies to assist managers and investors in detecting financial failure before it occurs. This allows for the necessary measures to be taken to address it, thereby reducing the bankruptcy and exit of some insurance companies from the Jordanian market, given their significance in the markets, especially in light of the scarcity of Jordanian studies specifically in this field. Predicting financial failure for companies is a matter of interest in developed countries, especially with the presence of strong competition in the contemporary environment. The interest of companies in predicting financial failure plays a fundamental role in maintaining their survival in the market and their growth. Through reviewing financial failure analysis models, it has been established that the use of financial ratios has achieved notable success in predicting financial failure for companies before it occurs over various periods. Financial ratios occupy an important position as they significantly contribute to advancing financial analysis towards more important methods and models in this field. However, the more important issue

is formulating the ratios in a way that maximizes their benefit towards modern methods in financial analysis, providing the best advantage in terms of effort and time consumed in reaching an accurate result. Here, the adopted model of the (Altman Z Score) has been able to predict the likelihood of failure, allowing insurance companies to avoid failure and continue to advance in providing services in financial markets. It has also become important to use such models to predict financial failure for insurance companies listed on the Amman Stock Exchange, as this is a matter that deserves more attention to help companies grow and achieve their desired goals, and to assist investors in understanding the fate of these companies before they risk investing in companies that may incur significant losses.

Study problem:

Given that the insurance sector in Jordan has experienced a noticeable decline, according to the annual financial reports of the Jordanian Insurance Federation and the Amman Stock Exchange, due to the distress of some companies and the losses of others, leading to their exit from the Jordanian financial market, and in order to limit the increasing number of these companies that have faced financial failure, and consequently reduce the exposure of the Jordanian economy to financial losses related to the insurance sector, this study has been conducted to complement the efforts made by researchers in this field and to provide further analysis of the insurance sector to identify its strengths and weaknesses. This will be achieved by employing specialized financial models in this area to predict financial failure and insolvency before they occur.

Study Questions:

1. The Effectiveness of the Altman Z-Score Model in Predicting Financial Failure for Insurance Companies?

2. The Application of the Altman Z-Score Model in the Insurance Sector?

Importance of the study:

Insurance companies represent a vital sector that all economic sectors rely on, and they have a direct impact on the gross domestic product (GDP). The importance of this study stems from the significance of the sector, which plays a crucial role in the national economy. Consequently, the distress, failure, and bankruptcy of some companies can significantly affect the overall economic system. This study aims to research and predict financial failure to alert managers before it occurs. Such studies are of utmost importance to everyone working in this sector, including financial managers, economic analysts, and representatives of other companies that receive services from this sector. Additionally, researchers in financial markets and those preparing periodic reports in financial markets have a significant interest in reviewing such studies.

Objectives of the study:

The main objective of the study is to arrive at answers that can explain the causes of financial distress and, consequently, the financial failure that some insurance companies may face. This will be achieved through the application of the Altman Z-Score model. Several specific objectives arise from this main goal, which are:

1. To determine the effectiveness of the Altman Z-Score model in predicting financial failure for insurance companies.

2. To assess the extent to which the Altman Z-Score model is applied in the insurance sector.

Hypotheses of the study:

The study hypotheses were selected based on some previous studies that utilized the Altman Z-Score model, and the hypotheses were formulated in light of that. They are as follows:

H01: The Altman Z-Score model of 1993 is unable to predict financial failure for insurance companies in Jordan.
H02: The Altman Z-Score model of 1993 cannot be applied to all financial and service sectors.

Procedural definitions:

Financial Failure: Financial failure can be defined based on various studies that have addressed this topic. As defined by Beaver (1966), it refers to a company's inability to meet its financial obligations on time; a company is classified as financially distressed if it exhibits any of the following risks: inability to fulfill obligations, resorting to overdrafts, or inability to pay dividends (Quraishi, 2017).

Prediction: Prediction is a technique that involves using data as inputs to make predictive estimates that identify future trends, utilizing advanced and specialized financial and statistical models (Al-Ammar et al., 2015).

Introduction to the theoretical framework:

Financial failure is one of the greatest concerns facing investors across all sectors, as the modern investment environment is filled with high-level risks that require action to identify their sources and extent. As a result of the global financial crisis (2007-2008) that swept through financial markets, there were numerous bankruptcy cases among large companies in global markets, including the mortgage crisis in 2008, which affected the fortunes of many insurance companies and banks worldwide.

The concept of financial failure:

Financial failure can be defined as "an event indicating the inability of an institution to repay its debts on time" (Al-Tabeeb, 2017). It is also defined as "a situation in which the management of the institution is unable to meet its obligations on time" (Ben Omar, 2013). Additionally, it is defined as "the failure to achieve a sufficient return on invested capital that is commensurate with the expected risks" (Al-Hamdani and Al-Qattan, 2013). Based on the previous definitions, financial failure can be summarized as a decline in the level of financing below the acceptable threshold concerning liquidity in the company's financial policy, resulting in a deterioration of the company's financial situation. This leads to the company's inability to meet its obligations, indicating that the company is financially distressed, which means that it is on the path to declaring bankruptcy.

Symptoms of financial failure (Mahmoud, 2021) and (Zabda, 2021):

Financial Symptoms: These include a decrease in the return on invested capital, which can be tracked through the following factors: an increase in consecutive losses alongside a decline in profits, a decrease in assets compared to the level of financial obligations, a drop in sales levels, current liabilities exceeding current assets, a reduction in dividends distributed on shares, and an increase in the volume of loans.

Non-Financial Symptoms: These may relate to management weaknesses and the inability to take appropriate actions in a timely manner. They can be expressed through several issues, such as ineffective savings policies, the inability to achieve the company's goals and desired growth, the dismissal of some employees in a manner that does not align with business needs, failure to keep up with technological advancements, and an inability to compete.

Causes of financial failure:

The causes of financial failure are divided into two categories: internal causes and external causes.

Internal Causes: These include factors related to human resources, financial and accounting aspects, and issues related to production organization and strategic management within the company. Examples include:

Factors related to the company's human resources (Mrekhi, 2010), Administrative issues (Hajag and Ben Omar, 2020), Financial and accounting factors within the company (Mrekhi, 2010) and Marketing issues (Majdoub and Hawaas, 2021).

External Causes: These are a set of problems imposed on the company from outside, which are difficult to control and may lead the company to financial failure (Al-Saidi and Al-Daraji, 2020). Examples include:

An increase in the inflation rate, An increase in exchange rates and A rise in the costs of materials used in the production process (repair and maintenance).

Stages of financial failure:

A company goes through several stages that analysts and researchers in the financial field have classified as steps preceding the company's collapse and declaration of bankruptcy, followed by liquidation. These stages can be outlined as follows:

Incubation or Emergence Period (Brody, 2020), Distress or Insolvency Period (Abu Shahab, 2018), Partial Insolvency Period (Brody, 2020), Total Insolvency Period (Al-Murshidi, 2018) and Bankruptcy Declaration Period (Al-Murshidi, 2018)

Ways to deal with financial failures:

Financial failure can be addressed through several methods, including:

Central Bank Procedures (Arab Monetary Fund, 2022), Restructuring (Mohammed, 2022), Internal Bailout Mechanisms (Arab Monetary Fund, 2020), Change of Legal Structure (Aydin & Büşra, 2022), Merger Process (Al-Janabi, 2018), Leasing (Al-Janabi, 2018) and (Mabrouki, 2021), Bridge Company (Al-Janabi, 2018) and (Ibrahim, 2021) and Liquidation (Mohammed, 2019)

Prediction of financial failure:

The importance of predicting financial failure:

Predicting financial failure has garnered interest from various parties in order to find a method that helps forecast the likelihood of financial failure in companies and banks before it occurs. This allows for the prompt implementation of necessary measures to mitigate risks in a timely manner and establishes a warning system to monitor distress through certain indicators.

Entities interested in forecasting financial failure:

First: Banks and Companies: The importance of loan defaults and predicting financial failure is significant due to its impact on the following (Matar, 2010):

Existing loans, Loans under consideration, Loan terms and interest rates, The ability to collaborate with debtors to address existing issues and Identifying the right time to withdraw from the market.

Second: Depositors and Bond Investors: Evaluating the financial health and stability of the bank, as well as its ability to invest and generate returns on bank deposits, is one of the most important criteria for investors. This assessment reflects the bank's capability to manage bank deposits and generate returns commensurate with the level of risk, while also considering the goal of maintaining a sufficient quick liquidity ratio to meet potential withdrawal requests.

Third: Regulatory Authorities: Through central banks and financial supervisory authorities, the aim is to protect the funds of depositors and shareholders and to avoid the possibility of a comprehensive banking crisis.

Previous studies:

Study by Habi, Mohamed Shawqi (2023): Titled "Predicting Financial Failure of Medium and Small Companies Listed on the Stock Exchange Using the Altman Model: A Study Sample from Malaysia", this study aimed to predict the financial failure of medium and small enterprises listed on the stock exchange using the Altman model. The results indicated that two institutions were far from financial failure, while two others were initially distant from financial failure but entered the gray area in 2021. One institution remained in the gray area for most periods, while the other was at risk of financial failure.

The study by Farjani, Ibrahim Masoud. (2022). “Utilizing the Altman Model to Predict Financial Distress Among Libyan Insurance Companies”, focuses on utilizing the Altman model to predict financial distress among Libyan insurance companies. It aims to assess the financial health of these firms and identify potential risks of distress, contributing valuable insights to the field of financial analysis in Libya.

The study by Mabruki, Marwa (2021) investigates the application of the Altman Zeta model to forecast financial failure among institutions listed in the Qatari stock market. It emphasizes the model's effectiveness in

identifying financial distress indicators, contributing to better risk management practices in the region.–The study aimed to assess the effectiveness of the Altman and Sherrod models in predicting financial failure for the Ruisseau Company in Algeria during the period from 2015 to 2019. The goal was to provide an early warning system for detecting the likelihood of bankruptcy.

Study by Rahiš and Talakhukh Saida (2021): Titled "The Effectiveness of the Altman Model in Predicting Financial Failure in Algerian Insurance Companies: A Field Study," this research aimed to assess the effectiveness of the Altman model in predicting financial failure among Algerian insurance companies. The findings were as follows:- The financial statements published by the companies under study do not accurately reflect their financial condition. -The Altman model is ineffective in determining the success or failure of Algerian insurance companies due to differences in the environment and the time period in which the model was developed.

Study by Louay Ali Mahmoud (2021): Titled "Predicting Financial Failure of Companies: An Applied Study of Several Qatari Companies for the Period (2015-2019)", this study aimed to identify the key roles that financial failure prediction models can play, specifically the Altman model, the Kida model, and the Sherrod model, and to assess their reliability in determining the likelihood of financial failure in the studied economic institutions. The results of the predictions provide a clear picture of the financial condition of the institutions; It is possible to rely on accounting information, such as the balance sheet, to assist in the process of predicting financial failure

Study by Wahiba Dhaman (2020): Titled "Using the Modified Altman Model to Predict Financial Failure: An Applied Study on Industrial Institutions Listed on the Kuwait Stock Exchange", this study focused on identifying the future likelihood of financial failure among industrial institutions. This was achieved by applying the modified Altman model specifically designed for industrial companies listed on the Kuwait Stock Exchange during the period from 2014 to 2018. The results of the study revealed a high predictive capability of this model in forecasting financial failure before it occurs in these institutions.

Study by Djoudi, Nariman and Belhamrio, Kheira. (2023). Titled "Predicting Financial Failure Using the Altman and Sherrod Models: A Study of the Sidal Institution in Medea Province from 2017 to 2020", This study aimed to highlight the importance and effectiveness of using the Altman and Sherrod models in forecasting the financial failure of the Sidal institution during the period from 2017 to 2020, providing an early warning for the potential risk of bankruptcy. To achieve the study's objectives, both models were applied based on the financial data of the institution and key financial indicators. The study concluded that both models are effective in predicting future financial failure for the Sidal institution during the studied period, with an accuracy rate of 100%.

Study by Elsayed, Nehad Hosny Yusuf. (2023). Titled "Financial Translation of Using the Kida Model in Predicting Financial Failure in Egyptian Companies", This study aims to bridge the knowledge gap regarding financial failures faced by many listed Egyptian companies in recent years, despite governmental and professional initiatives to mitigate financial distress in Egypt. The current study employs the Kida model to forecast financial failure in Egyptian companies, analyzing various financial indicators and their implications for corporate health. According to the results, the Kida model is deemed sufficient for predicting financial failure among Egyptian companies, which has been negative for most years of the companies studied.

Study by Elewa, May Mahmoud. (2022). Titled "Using Altman Z-score Models for Predicting Financial Destress for Companies – The Case of Egypt panel data analysis ", This study aimed to determine the impact of using Altman Z-Score models in predicting financial distress in Egypt. The results of this study are expected to be beneficial for investors, non-financial enterprises, and regulatory bodies, providing valuable insights for decision-making and risk management in the financial landscape.

Study by Benhamed, Abdelghani and Houas, Abderrezzak. (2021). Titled "Application and Comparison of Altman Models for Predicting Financial Failure of Companies", This study aimed to conduct a comparative analytical study between the original Altman model and its second revised version in predicting financial failure for companies. The findings highlight the importance of selecting the appropriate model for financial prediction, suggesting that the revised model may provide more accurate assessments for companies at risk of failure.

Study by Medjoub, Abderrezzak and Houas, Alaeddine. (2022). Titled "Comparative Study Between the Altman, Kida, and Sherrod Models in Predicting Financial Failure of Companies Listed on the Amman Stock Exchange", This study aimed to conduct a comparative analytical study between the Altman, Kida, and Sherrod models in predicting financial failure three years prior to its occurrence. The findings highlight the effectiveness of the Kida model in financial distress prediction, suggesting that it may be a valuable tool for investors and stakeholders in assessing the financial health of companies.

Study by Abu Jalalah, Mohannad Abdul Razak Ahmed. (2019).Titled "Predicting Corporate Distress of Palestinian Listed Companies Using Altman and Kida Models: Analytical Study for the Period "2005 to 2017"" The study aimed to find out if Altman and Kida models have the validity and the ability to predict the financial distress of the Palestinian listed companies at least two years before the distress occurrence, the classification criteria of distressed and non-distressed companies was according to if any firm sustain losses for two sequence years. The results also showed the ability of Altman, 1968 and 1983 models in predicting distress before two years of its occurrence for industry companies listed on Palestine Exchange with an advantage to Altman 1983 model in prediction accuracy. The study results also showed a poor aceuracy for Kida model in predieting distress before two years of its occurrence for investment, service, and industry companies listed on Palestine Exchange.

Study by Medjdoub, Alaeddine. (2020). Titled "Study the Altman model for predicting the financial failure of companies by applying to ASE listed companies", This study aimed to mesure the effectiveness of the credit model ((z-score) for predieting financial failure on the companies listed on the Amman Stock Exchange, The study concluded that the Altman model was inclined to predict financial failure, and that it can be relied upon to judge the financial position of companies, but not by a large percentage.

Study of Ibrahim Bogalkha. (2021). "Measuring the Financial Stability of Islamic and Conventional Banks in Malaysia Using the Altman Z-Score Model: 2008-2015", This study aims to measure the financial stability of Islamic banks and commercial banks in Malaysia during the period 2008-2015, and the research found that the average Z score for Islamic banks in the gray area during the study period, with the exception of only one bank in the area of financial instability, and these values took a downward trend during this period. As for the average Z score for commercial banks in Malaysia, they are all located in the financial stability zone, but there is only one bank in the grey zone.

A study conducted by Tatiana Dolincic and Tatiana Kovač. (2024). entitled "Application of the Altman Model for Predicting Financial Distress in the Case of Slovenian Companies". In order to verify the applicability and accuracy of the Altman Model in the case of Slovenian companies. This model is well-known among financial experts and analysts. The study showed that the two groups of companies where bankrupt companies had a lower value for this indicator than non-bankrupt companies

A study by Todas, Kanellos. (2024). titled "Forecasting Models of Corporate Bankruptcy: A Comparative Study of the Construction Sector in Greece" focused on the Altman, Olson, Zmijewski model of bankruptcy. The results showed that the main Altman predictive model as well as the revised models have generally low predictability for all three years before bankruptcy.

Methodology:

This section presents an analytical description of the study on predicting financial failure in insurance companies in Jordan, focusing on the methodologies used to forecast financial failure for the study sample, how the variables were measured, the study sample and its population, as well as the statistical methods and procedures that were followed to process and analyze the data. The following is an overview of this methodology.

(Altman Z score 1993)

$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + .999X_5$

To define the financial ratios used in this model, they can be described as follows:

X1 = Net Working Capital / Total Assets

X2 = Retained Earnings / Total Assets

X3 = Earnings After Tax / Total Assets

X4 = Market Value of Equity / Book Value of Total Debt

X5 = Total Sales / Total Assets

According to this model, companies are classified into three categories based on their ability to continue operations, which are:

- Successful Companies: These have a Z value of 2.99 or higher.
- Companies with Doubtful Continuity: These are at risk of bankruptcy, with a Z value greater than 1.81 and less than 2.99.
- Failed Companies: These have a Z value of less than 1.81.

Measurement of study variables:

This study included a detailed description of the Altman Z-Score model (1993) for measuring a company's financial failure. The financial ratios that constitute this model were measured to obtain a financial indicator of failure according to this model, which relies on assessing the financial ratios as illustrated in the table.

Table of measurement methods:

Symbol	Financial Ratio	measurement
X1	Activity	Net Working Capital / Total Assets
X2	Profitability	Retained Earnings / Total Assets
X3	Profitability	Net Income After Tax / Total Assets
X4	Market	Market Value of Equity / Book Value of Total Debt
X5	Activity	Total Sales / Total Assets

Source: Prepared by the researcher

X1 (Activity): This ratio measures the efficiency of a company in utilizing its current assets to generate revenue. A higher ratio indicates better liquidity and operational efficiency.

X2 (Profitability): This ratio assesses the retained earnings relative to total assets, indicating how effectively a company is using its assets to generate profits.

X3 (Profitability): This ratio evaluates the net income after tax as a proportion of total assets, reflecting the overall profitability of the company in relation to its asset base.

X4 (Market): This ratio compares the market value of a company's equity to its book value of total debt, providing insights into how the market perceives the company's financial health relative to its liabilities.

X5 (Activity): This ratio measures the total sales generated relative to total assets, indicating how efficiently a company is using its assets to produce sales revenue.

Descriptive statistics, relationships, and results

Table: Descriptive Statistics for the Factors of the Altman Z-Score Model (1993)

Variable	Obs	Mean	Std. Dev.	Min	Max
X1	95	-.0182421	.105714	-.18	.534
X2	95	.0183053	.0758964	-.255	.166
X3	95	.0133263	.0362821	-.181	.093
X4	95	1.437726	1.063219	.177	5.868
X5	95	.4457789	.1769243	.054	1.032

Source: Prepared by the researcher

We observe that the activity factor (X1) has a mean value of (-0.0182) and a standard deviation of (0.1057), with liquidity ratios ranging from (0.18 to -0.534). This indicates varying levels of short-term financial solvency across the companies.

Regarding profitability (X2), the mean value is (0.0183) with a standard deviation of (0.0759). The minimum observed profitability ratio is (-0.255), while the maximum ratio is (0.166), indicating varying levels of profitability across the sample.

For profitability (X3), the mean value is (0.0133) with a standard deviation of (0.036), and the profitability ratios range from (-0.181 to 0.093).

As for the market factor, which reflects the market value of the company compared to its book value, the average value is (1.4377) with a standard deviation of (1.0632). The market impact ratios range from (0.177 to 5.868), indicating varying degrees of market valuation efficiency.

Finally, the activity factor shows a mean value of (0.4458) with a standard deviation of (0.1769). The investment ratios range from (0.054 to 1.032).

In conclusion, the statistical analysis of the components of the Altman Z-Score provides valuable insights into the financial characteristics and bankruptcy risks of the observed companies, enabling financial analysts to make informed decisions regarding investment strategies, lending, and risk management.

Table: Relationships Between the Factors of the Altman Z-Score Model (1993)

Variable	X1	X2	X3	X4	X5
X1	1.0000				
X2	-0.1036	1.0000			
X3	-0.1588	0.5492	1.0000		
X4	-0.1639	0.1928	0.1747	1.0000	
X5	0.1115	-0.5321	-0.2520	-0.4453	1.0000

Source: Prepared by the researcher

It is clear that there is no issue of multicollinearity, as the correlation values among all variables were below (0.80). This indicator demonstrates the absence of such a problem

Table: Application of the Altman Z-Score Model (1993) on a Sample of Insurance Companies in Jordan

Code	Z (2018)	Z (2019)	Z (2020)	Z (2021)	Z (2022)
121002	2.083	2.215	2.329	2.330	2.456
121003	3.580	3.683	3.977	3.283	3.269
121004	3.333	3.253	3.397	2.946	3.016
121005	3.694	3.448	3.251	3.212	3.460
121006	2.946	3.200	3.398	3.171	3.429
121007	3.317	3.219	3.342	3.205	3.391
121008	3.356	3.581	3.513	3.026	3.158
121009	4.924	5.080	5.692	5.518	5.507
1210013	3.947	3.723	3.636	3.887	3.815
1210014	3.157	3.087	3.123	3.195	2.976
1210020	3.639	3.771	3.825	4.322	5.634
1210021	3.843	3.801	3.711	3.678	3.516
1210022	2.653	3.052	2.816	3.315	3.709
1210023	3.946	3.984	3.893	3.780	3.966
1210025	3.042	3.105	2.997	3.118	2.835
1210026	4.891	4.861	4.403	4.491	5.813
1210027	3.928	4.335	4.408	4.345	4.091
1210032	3.959	4.325	4.131	4.120	4.529

1210034	2.965	3.164	3.285	3.177	3.240

Source: Prepared by the researcher

The previous table illustrates the Z-Score values for all the insurance companies included in the study over the five-year period. It shows that in the final year, 2022, there are three companies classified as being at risk of failure, while the remaining companies fall under the category of successful companies

Discussion of the results:

To verify the accuracy of the Altman Z-Score (1993) results, a review of the financial data for the three companies revealed clear financial issues that justify this outcome. It was found that the current liabilities of these companies significantly exceed their current assets

Recommendations:

1. The Necessity of Applying Predictive Models by Investors**:** Investors should utilize predictive models to identify investments that are at risk of failure within a short period.

2. Companies at Risk of Failure: Companies that are at risk of failure should strive to identify the weaknesses that may lead to their downfall.

3. Reliability of the Altman Z-Score Model (1993): The Altman Z-Score (1993) model can be adopted as a reliable tool for predicting financial failure in financial institutions.

References :

[1] Abu Galala, Muhannad Abdel Razek Ahmed ،Abu Muammar ،Fares Mahmoud Mohamed, and Al-Ashi ، Mohammed Marwan. (2019). **"Predicting Corporate Distress of Palestinian Listed Companies Using Altman and Kida Models: Analytical Study".** Unpublished Master's Thesis, Islamic University. Gaza.

[2] Al-Rawashdeh Firas, Omar Al Singlawi, 2016, The Existence of Fraud Indicators in Insurance Industry: Case of Jordan, International Journal of Economics and Financial Issues, 6(S5) 168-176.

[3] Alaeddine, M. g Amine. G. M. (2020). Study the Altman Model for Predicting the Financial Failure of Companies by Applying to ASE Listed. **Journal of Financial and Business Economics**, vol. 3, N 4, 32-15.

[4] Al-Amar, Ridwan Walid, Al-Qusairi, Lubna Mohammed Ali Hussein. (2015). "Comparative Study of Financial Distress Prediction Models", **Tishreen University Journal for Scientific Research - Series of Economic and Legal Sciences**, Vol. 37, N 5, p 127-146.

[5] Al-Hamdani, Rafaa Ibrahim, Al-Qattan, Yassin Taha Yassin. (2013). "Using the Sherrod Model to Predict Financial Distress: An Applied Study in the General Company for Pharmaceutical Industries and Medical Supplies in Nineveh", **Al-Aniar University Journal for Economic and Administrative Sciences**, Vol. 5, N 10, p 457.

[6] Al-Janabi, Haider Abbas. (2018). "Predicting Financial Distress in Commercial Banks Using the Sherrod Model: An Applied Research on a Sample of Banks Listed in the Iraqi Market", **Journal of Management and Economics**, Vol. 7, N 28, p 72-73.

[7] Al-Rajabi, Mohammed Taysir Abdul Hakim. (2006). "Using Financial Ratios to Predict the Failure of Public Joint-Stock Companies in Jordan Using Discriminant Analysis and Logit Analysis**", Arab Journal of Administrative Sciences**, Vol. 13, N 2, p 149-173.

[8] Al-Saidi, Abdullah Kazem Hassan; and Al-Daraji, Yasser Balsam Mohammed. (2020). "Using the ALTMAN Model to Predict Financial Distress", **Journal of Sustainable Studies,** Vol. 2, N 8.

[9] Al-Zubda, Khaled Hassan. (2021). "Predicting Financial Distress Using Financial Indicators: An Applied Study on Service Sector Companies Listed on the Palestinian Stock Exchange", **Arab American University Research Journal**, Vol. 7, N 1, p 34-67.

[10] Arab Monetary Fund. The Banking Deposit Guarantee System in Arab Countries: Roles and Objectives, 2020.

[11] Arab Monetary Fund. The Banking Deposit Guarantee System in Arab Countries: Roles and Objectives, 2022, UAE.

[12] Aydın, Berna Z, & Büşra SÜSLER, (2022). "**Finansal başarısızlığın yapay sinir ağları ve çok değişkenli istatistiksel analiz teknikleri ile tahmin edilmesi: Borsa İstanbul'da bir uygulama**", Yüksek Lisans Tezi, BURSA ULUDAĞ ÜNİVERSİTESİ.

[13] Ben Omar, Khaled. (2013). "Integrating Financial Analysis and Discriminant Analysis to Develop Early Detection Procedures for Financial Distress", **Economic Studies**, 22, 120.

[14] Benhamed. A. Houas. A. (2021). "Application and Comparison of alAltman Models to Predict Financial Failure of Companies". **Afaq Journal for Research and Studies**. Vol 4, n 1, p 42-67.

[15] Broudi, Naima. (2020). "A Comparative Study of Financial Distress Prediction Models: A Case Study of Saudi Ceramics Company During the Period" 2013 – 2019, **Shuaa Journal for Economic Studies**, Vol. 4, No. 2, p 95-114.

[16] Burca, A. M., & Batrinca, G., (2014). "The determinants of financial performance in the Romanian insurance market", **International Journal.**

[17] Djoudi. N. Belhamri. K. (2023). "Prediction of Financial Failure Using the Altman and Sherrod Study of Saidal Institution of Medea Province between 2017-2020". **International Journal of Economic Performance**. Vol 6, n 2, p 104-121.

[18] DOLINŠEK, T., KOVAČ, T. (2024). Application of the Altman Model for the Prediction of Financial Distress in the Case of Slovenian Companies, **Faculty of Commercial and Business Sciences**, Slovenia. Vol 57, n 2.

[19] Elewa, M. M. (2022). Using Altman Z-Score Models for Predicting Financial Distress for Companies – The Case of Egypt panel data analysis. **Alexandria Journal of Accounting Research**, 6, 1.

[20] Elsayd, N. H. Y., Aelasmer, S. Z. Ebrhime, R. S., Keedis, M. A., Mansour, H. M. (2023). Using Kida Model in Predicting Financial Failure in Egyptian Firms. **Journal Of Research in Finance and Accounting.** vol 8, 2, 696-711.

[21] Farjani, Ibrahim Masoud; and Al-Burghathi, Zakaria Ramadan. (2022). "Using the Altman Model to Predict Financial Distress in Libyan Insurance Companies", **Ibn Khaldun Journal for Studies and Research**, Vol. 2, N 4, p 842 – 867.

[22] Habi, Mohamed Shawqi; and Broudi, Naima. (2023). "Predicting Financial Distress in Medium and Small Enterprises Listed on the Stock Exchange Using the Altman Model: A Case Study from Malaysia"**, Journal of Economic Insights,** Vol. 9, N 2, p 151 – 166.

[23] Hajag, Mustafa, Ben Amour, Samir. (2020). "Using Financial Distress Prediction Models to Diagnose the Financial Situation of NCA Institution", **Arab Journal for Research and Studies in Humanities and Social Sciences**, Vol. 12, N 4, p 908.

[24] Ibrahim, Bougelkha. (2021). "Measuring the Financial Stability of Islamic and Conventional Banks in Malaysia During the Period 2008-2015: Using the Altman Z Score Model". **Al-Manhal Economic Journal**, Vol. 4, No. 1, pp. 405-422.

[25] Ibrahim, Lama Wahab. (2021). "The Mechanism of Bridge Banking", **Journal of the College of Basic Education for Educational and Human Sciences**, Vol. 13, N. 54.

[26] Mabrouki, Marwa. (2021). "Using the Altman Zeta Model to Predict Financial Distress in Economic Institutions Listed on the Qatar Stock Exchange", **Journal of Creativity**, Vol. 11, N 2.

[27] Majdoub, Alaa Al-Din; and Hawas, Abdul Razak. (2021). "A Study of the Kida Model for Predicting Financial Distress in Companies: An Application on Joint-Stock Companies in the Amman Stock Exchange",

[28] Medjoub. A. Houas. A. (2020). A Comparative Study between Altman, Kida and Sherrod's Model in Predicting the Financial Failure of Listed Companies in Amman Stock Exchange. **Journal of Economic and Managerial research**.vol 14, n 3, p 87-106.

[29] Ruhesh, Saida; and Talakhokh, Saida. (2021). "The Effectiveness of the Altman Model in Predicting Financial Distress in Algerian Insurance Companies: A Field Study"**, Journal of Economics and Sustainable Development**, Vol. 4, N 1, p 231 - 245.

[30] Toudas, K., Archontakis, S., Boufounou, P.. (2024). Corporate Bankruptcy Prediction Models: A Comparative Study for the Construction Sector in Greece, **journal of computational science and engineering.** Vol 12, n 9.