

BANKRUPTCY PREDICTION ON FIRM PERFORMANCE IN PRE - DURING COVID -19 PANDEMIC: SPECIAL REFERENCE TO LISTED MAINBOARD HOTEL COMPANIES IN SRI LANKA

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ABSTRACT

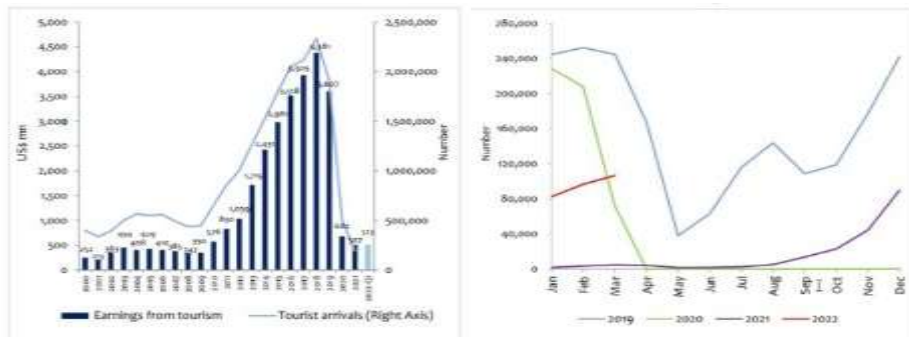
The influence of corporate bankruptcy on the economy is considerable as it encompasses shareholders, financial lenders, operational lenders, and the government. It is necessary to do a bankruptcy evaluation so the businesses can receive early bankruptcy warning signs. The earlier signs of insolvency are identified, the better for management because they can take immediate action to correct the issue. This paper aims to investigate the impact of bankruptcy prediction on firm performance with involving COVID -19 pandemic with a focus on listed mainboard-hotel companies in Sri Lanka while referring current Sri Lanka's economic crisis. When there is a financial crisis, it is crucial to choose a model for bankruptcy prediction. The study uses semi-annual secondary data to examine a sample of 12 mainboard-hotel companies listed on the Colombo Stock Exchange from year 2016 to 2022. Altman's and Kida Z-scores are the bankruptcy prediction models used to measure bankruptcy. According to the findings, there are seven safe zone hotel companies, three hotel companies are in grey zone and two are recognized as distressed. Return on equity, return on assets and employee productivity were used to construct independent variables. The study also discovered that the profitability and liquidity ratios could foretell the insolvency of mainboard-hotel companies listed on the Colombo Stock Exchange. The findings of the study examined the comparison between model estimations of the study and the actual status of the firms. The study showed the Altman's and Kida Z-scores classification models have 89.6% and 69.5% accuracy for the average predictive ability of business discontinuation, respectively. Overall Altman's Z-score is better than the Kida model as most of the hypotheses have been proved and prediction rates are in a good position. The variables have a statistically significant association between bankruptcy risk. Therefore, all objectives have been achieved in the study.

Keywords: *Altman's Z-score, Bankruptcy Prediction, Colombo Stock Exchange, Kida Model, Mainboard Hotel Companies.*

1. INTRODUCTION

1.1. Background Study

The primary goal for most organizations is to maximize profits as part of their survival strategy. To fulfill its goal of maximizing profits, the company requires both strong internal and external support. The earlier signs of insolvency are identified, the better for management because they can take immediate action to correct the issue. The Kida and Altman Z-score models are well-liked techniques for identifying financial distress. This study compares the financial distress circumstances in the mainboard-listed hotel companies on Colombo Stock Exchange (CSE) before and during the COVID-19 pandemic.



Source: Central Bank of Sri Lanka & Sri Lankan Tourism Development

Figure 1: Arrivals and Earnings and Monthly Arrival

Pre-COVID-19 tourism provided 15.9% of Sri Lanka's overall foreign exchange revenues in 2018. 70.8% of tourist arrivals have been declined during the Easter Sunday bombings in April 2019 compared to the previous years. In Sri Lanka, the coronavirus pandemic period was terrible. There were no signs of a recovery at that time and arrivals were decreased until the government lifted all quarantine restrictions for visitors who were fully immunized in November 2021. The tourist arrivals dropped by 70.8% and hotels, restaurants, tourist shops and similar establishments were also faced shortcomings (Samarathunga, 2020). Lately, the subject of bankruptcy forecasting has grown into a significant corporate finance research area during the past five decades (Balcaen & Ooghe, 2006). The bankruptcy prediction models development has been the primary objective of the research on bankruptcy prediction, which has been carried out in both industrialized and developing nations worldwide. Mostly Bankruptcy prediction models are not much discussed in Sri Lanka. but the most recent study is ‘Predicting bankruptcy of selected manufacturing companies listed in Colombo Stock Exchange: Applying Altman's Z-Score’ (Anandasayanan & Subramaniam, 2017). There are not many studies carried out for CSE-listed hotel companies related to financial distress pre-during COVID -19 pandemic. The research is focused on current Financial Crisis in Sri Lanka since it has not much explored in recent research studies. The study period is from year 2016 to 2022 using semiannual data to focus on Sri Lanka’s current Financial Crisis. As

a methodology gap, this study is the first to analyze evidence from mainboard-listed hotel companies on the Colombo Stock Exchange which prior researchers did not use, and the study predicts the risk of hotel bankruptcy before and during the COVID-19 pandemic and financial crisis using two bankruptcy models. Moreover, the models for evaluating the dependent variable, or bankruptcy risk, play a crucial part in the study. Further the study is discussing control variables such as financial risk, hotel size, and liquidity to prove the relationship between variables. Results from earlier studies have demonstrated Sri Lanka's early financial situation and before the pandemic. When taking the overall study, this is the first Sri Lankan research based on predicting the hotel bankruptcy risk using Altman's and Kida bankruptcy models in the period of pre- during COVID-19. This study aims to close the gaps after considering the above elements (Diakomihalis, 2012; Sucheran, 2021; Sfakianakis, 2021; Khalid & Ahmad, 2011; Samarathunga, 2020; Anandasayanan & Subramaniam, 2017).

1.2. Statement of Problem

The bankruptcy of Sri Lanka poses a significant economic challenge that needs to be addressed. Despite its importance, there is a lack of comprehensive studies and predictive models specifically tailored to forecast bankruptcy in the Sri Lankan context. Previous researchers demonstrated that all hotels, except for a few are currently in a distressed state and have a higher probability of filing for bankruptcy (Nanayakkara & Azzez, 2013). According to SLTDA estimates, Sri Lanka's tourism arrivals decreased by 18% in 2019 and 2020 compared to 2018, primarily because of the fallout from the Easter Sunday attacks and the COVID-19 pandemic. Sri Lanka is currently having a financial crisis and has been declared a bankrupt country. Without accurate bankruptcy prediction models, Sri Lanka faces difficulties in implementing timely intervention measures, protecting investors, and ensuring the stability of the hotel sector. Therefore, there is an urgent need to investigate and develop robust bankruptcy prediction models that can enhance the country's ability to identify and prevent bankruptcy cases, ultimately contributing to the sustainable economic development of Sri Lanka.

1.3. Research Questions

To assist with achieving the primary objective, there are several research questions developed.

- How pre and during the COVID-19 period in Sri Lanka affect the hotel bankruptcy risk?
- To what extent are the Altman model and Kida model able to predict hotel bankruptcy using financial and non-financial performances?
- What is the most preferred bankruptcy model to evaluate financial distress?

1.4. Objectives of the Study

To assist with achieving the primary objective, several accompanying sub-objectives have been established.

Primary Objective:

- To determine how pre and during the COVID-19 period in Sri Lanka affect hotel bankruptcy risk.
- To find how accurate the Altman model and Kida model are able to predict hotel bankruptcy using financial and non-financial performances.
- To find what is the most preferred bankruptcy model to evaluate financial distress.

Secondary Objectives:

- Examine the most appropriate bankruptcy models between the two models.
- Examine a comparison between the results of actual status of the firms and the model estimations.

This study also highlights the importance of control variables in helping businesses identify their distress risk. This study satisfies the acknowledged need to forecast the probability of insolvency among mainboard-listed hotel companies in the distress zone. According to the analysis, these businesses will most likely declare bankruptcy very quickly. It serves as a warning to the company's stakeholders that banks, financial institutions, and suppliers will not conduct any more financial transactions with them to protect firms (Khalid & Ahmad, 2011).

2. LITERATURE REVIEW

Many ratios identified in bankruptcy literature were important in predicting bankruptcy. According to the 'Prediction of Bank Failure' book by Meyer & Pifer, (1970), the researchers' goal was to utilize financial parameters to forecast bank failure. A model was created two years before the failure, it had an 80% success rate in correctly predicting bank failure. Before that period, though the model was unable to do so. According to the 'A Discriminant Analysis of Predictors of Business Failure' by Deakin, (1972), he created different models with prediction errors ranging from 3% to 4.5% in the first three years and 21% and 17% in the fourth and fifth years, respectively. In addition, the model was tested with samples from various companies, of which 44 failed and 23 succeeded. According to the 'A Multivariate Statistical analysis of the Characteristics of Problem Banks' by Sinkey, Jr., & Joseph, F, (1975), he examined 10 financial variables, including efficiency ratios, liquidity, and capital sufficiency. The accuracy of the Altman's model created from the research was anticipated to be 73.18%.

The problem of financial failure is extremely significant to all parties involved in the business. Altman 1968 and Kida 1980 are the most well-known and effective in predicting financial failures based on financial statements to evaluate the firm's future financial position. Altman's Z-score is one of the most appropriate models to measure corporate bankruptcy that can be anticipated with the greatest accuracy (Balasundaram, 2009). With an average predictive ability of 93.8% before the bankruptcy, Altman's model surpasses Kida's model in terms of predicting firm bankruptcy, as opposed to Kida's model's 69% average predictive ability (Khalid & Ahmad, 2011). The Kida Model is for the predictability of firm financial failure by creating a prediction model based on a step-by-step discrimination. The findings of the models' study related to the findings of the Altman study conducted between 1974 and 1975 in ratios that potentially indicate financial failure. Five financial ratios with a high prediction of up to 90% were used in the study to create the model. Saida, (2021) claimed that four studies that examined how much the Kida model predicted the collapse of Algerian insurers' financial standing were based on actual data from financial statements. The study found the Kida model can accurately forecast the financial bankruptcy of Algerian insurers. These Z-scores have contributed to the development of financial distress prediction models and have become a benchmark for evaluating the performance of alternative bankruptcy prediction approaches. Therefore, it is best to use at least one of these very accurate models for predicting company bankruptcy.

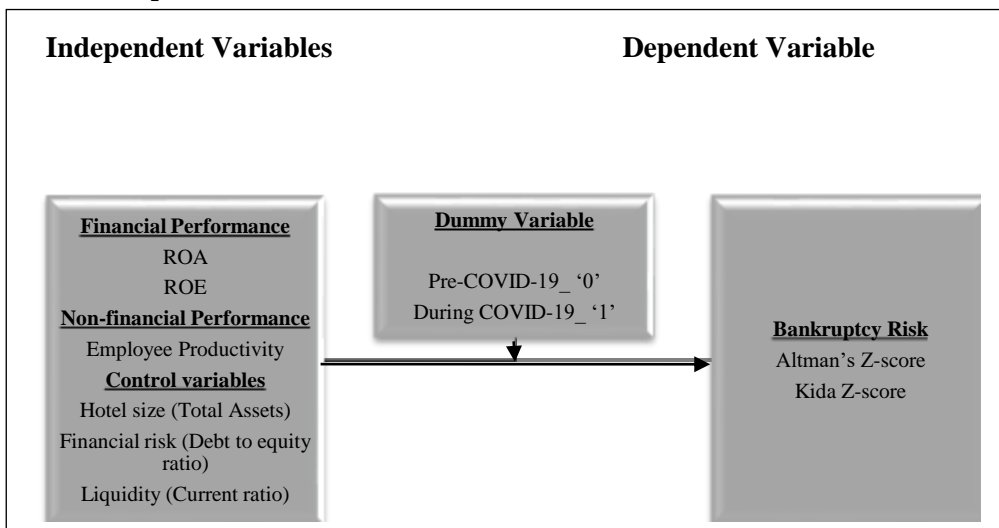
Gunathilake, (2014) examined the bankruptcy models and independent variables, using the Altman and Springate Z-score models. He investigated the financial distress of 82 companies from various industries that were listed on the CSE. Samples were gathered between 2008 and 2012, and regression analysis was used to examine them using firm size (total assets), liquidity, and profitability variables. Although the outcomes were the same, Altman's Z-score was better at foreseeing the financial difficulty of the chosen Sri Lankan firms at least a year in advance. Lakshan. A. & Wijekoon. N., (2013) conducted a study on the application of financial indicators in forecasts of Sri Lankan corporate failure. 15 ratios were employed as predictive variables for business failure. One year before failure, they found that the models' forecast accuracy was 77.86%. Furthermore, for the three years before failure, the model's prediction accuracy was 72.14%. Saida, (2021) claimed that four studies that examined how much the Kida model predicted the collapse of Algerian insurers' financial standing were based on actual data from those financial statements. conducted using a representative insurance provider from Algeria. 2014-2019. Hence, the Kida model can accurately forecast the financial bankruptcy of Algerian insurers. According to Alaeddine & Abderrezzak, (2020), the study was a comparison of Altman, Kida, and Sherrod models in predicting financial collapse on the listed companies of Amman Stock Exchange (ASE). The Kida model is thought to be the best for predicting the failure of ASE listed public firms for the three years preceding to failure, with a score accuracy of 66.67%. Research over the past three years has found that the COVID-19 pandemic has

a negative impact on the hotel industry. According to Diakomihalis, (2012) study is based on three versions of Altman's models used to estimate bankruptcy prediction using current ratio, ROA, and ROE between distressed listed hotel firms. The overall conclusion that can be identified from the results is that the Altman model can be used to successfully predict the failure of hotel businesses. One-quarter of all businesses in the bankruptcy risk zone was shown to file for bankruptcy. Sucheran, (2021) described the COVID-19 pandemic's early economic effects on the South African hotel sector. The study by Stefan et al., (2020), examined how the COVID-19 crisis affected a sample of 100 hotel companies' profitability of filing for bankruptcy using the current ratio, profitability ratio, liquidity ratio, ROA, and ROE, and how this affected the Republic of Serbia's hotel industry. In comparison to the period before and during COVID-19, the probability of bankruptcy will remain high, making the businesses that survive more vulnerable to future external developments.

3. METHODOLOGY

The methodology section describes the research design, population samples, conceptual model, hypotheses development, collection of data using different procedures to analysis the data and evaluating the components that affected the bankruptcy value of the Altman’s Z-score model and Kida model for listed hotel companies in Sri Lanka.

3.1. Conceptual Framework



Source: Author Constructed

Figure 2: Conceptual Framework

3.2. Operationalization

Table 1: Operationalization

INDICATORS	DEFINITION	RATIO
Return on Asset (ROA)	A ratio shows the entire earnings from the average total assets.	Net income after tax / Average total asset
Return on Equity (ROE)	An indicator of profitability relative to equity.	Net Income/ Equity
Productivity per Employee	Contribution of employees to sales	Net sales / Number of employees
X1	Measure the level of the liquidity	Working capital / Total assets
X2	Earnings of the company	Retained earnings / Total assets
X3	Concern about capital	EBIT /Total Assets
X4	Measure the debt to equity	MV of equity /BV of Liabilities
X5 / Y4	Measure the volatility of the sales	Sales /Total assets
Y1	A ratio indicates the total revenue from all assets	Net profit / total assets.
Y2	Reflects the equity from total debt	Equity / total debt.
Y3	Measure the liquidity level	liquid assets / current liabilities.
Hotel size	Increase in the number of total assets of the firm	Total asset
Financial risk	To measure the leverage of the company	Debt to equity ratio
Liquidity	Measure the liquidity level	Current ratio

Source: Author Constructed

3.3. Population and Sample Selection

The study analyzed the value movement of Kida and Altman's Z-score models for Sri Lankan hotel enterprises. The Colombo stock exchange serves as the fundamental idea for identifying the study's population. The 37 listed hotel companies are the population of the study. The sample consists of 12 mainboard- hotel businesses having shares that are main board listed in the consumer services category on the Colombo Stock Exchange. The source of data in this study is the following secondary data,

- Web sites
- Annual reports

3.3.1 Sample Size

Table 2: Sample Size

COMPANY NAME	TRADE SYMBOL
AITKEN SPENCE HOTEL HOLDINGS PLC	AHUN.N0000
HAYLEYS LEISURE PLC	CONN.N0000
CEYLON HOTELS CORPORATION PLC	CHOT.N0000

TANGERINE BEACH HOTELS PLC	TANG.N0000
CITRUS LEISURE PLC	REEF.N0000
SIGIRIYA VILLAGE HOTELS PLC	SIGV.N0000
DOLPHIN HOTELS PLC	STAF.N0000
THE KINGSBURY PLC	SERV.N0000
THE KANDY HOTELS COMPANY (1938) PLC	KHC.N0000
HOTEL SIGIRIYA PLC	HSIG.N0000
RENUKA CITY HOTEL PLC	RENU.N0000
ASIAN HOTELS & PROPERTIES PLC	AHPL.N0000

Source: Author Constructed

3.4. Data Collection Method

3.4.1 Modelling Methodologies

The function of the bankruptcy prediction analysis's binary classification is as follows:

$$A < L + SC \quad \text{Net Assets} < SC$$

$$Z = W_1 X_1 + W_2 X_2 + \dots + W_n X_n \quad \rightarrow \quad (1)$$

The study was mainly focused on achieving objectives. Before investigating the first objective, the study interpreted the descriptive statistics to examine mean, median, mode and other characteristics. The results of Z-score models' formulas and variables from year 2016-2022 to find the Z-value of the successful or distress companies. The Each models have separate way to identify the successful and distress firms.

Altman Z-Score

The model is described in its original version as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.06X_4 + 1X_5 \quad \rightarrow \quad (2)$$

$Z < 1.88$ as financial distress or bankruptcy is expected.

$1.88 < Z < 2.99$ as grey zone $Z > 2.99$ as safe zone

Kida Model Z-Score

$$Z = -1.042Y_1 - 0.427Y_2 - 0.461Y_3 - 0.463Y_4 + 0.271Y_5 \quad \rightarrow \quad (3)$$

Where:

The Kida model has a negative Z-score that implies a financial problem in a firm or financial distress zone, whereas a positive Z-score implies a safe zone (Kida.T, 1980).

Further, the study investigated the regression, correlation and unit root analysis were conducted to determine how explanatory variables and Pre-During COVID-19 dummy variables affected the dependent variable and to identify

whether these variables are stationary or not. The regression analysis and unit root test were used to analyze the hypotheses. By analyzing all, the study was able to prove that two objectives that Pre-During COVID-19 in Sri Lanka has affected to hotel bankruptcy risk by using the explanatory variables and how the Altman model and Kida model are able to predict hotel bankruptcy using financial and non-financial performances.

The study used a comparison between the actual status of the firms and the model estimations to achieve the remaining objectives. Additionally, a comparison of the forecast performance of the variables with the Kida and Altman models for bankruptcy prediction. The study's conclusion demonstrated the ability of business liquidation years before bankruptcy to achieve the stated objectives by obtaining accurate prediction rates for models and identifying the most appropriate bankruptcy model.

3.5. Hypotheses Developments

H₁: There is a significant positive relationship between financial performance and bankruptcy risk.

Foo, (2015) examined the connection between the financial performance and the bankruptcy risk of manufacturing firms listed on the Singapore and Hong Kong stock exchanges from 2000 to 2013. In both stock exchanges, the study's findings showed a positive correlation between statistically significant bankruptcy risk and financial performance.

- H_{1(a)}: There is a significant positive relationship between ROA and bankruptcy risk.

A study by Hillar et al., (2018), investigated into how financial distress affected to the Return on Assets (ROA) of industrial companies listed on Kenya's Nairobi Stock Exchange. The study concentrated on the years 2011 to 2015. The ROA and ROE were used as variables against bankruptcy risk. The study's conclusions showed a significant positive relationship between ROA and bankruptcy risk.

- H_{1(b)}: There is a significant positive relationship between ROE and bankruptcy risk.

In a study conducted by Liang & Pathak., (2018a), the researchers investigated the correlation between Return on Equity (ROE) and bankruptcy risk among industrial companies listed on the Shanghai Stock Exchange. The study focused on the period from 2013 to 2017. The researchers discovered a statistically significant positive correlation between ROE and bankruptcy risk.

H₂: There is a significant positive relationship between non-financial performance and bankruptcy risk.

Williams, L. & Brown, R, (2017), examined the relationship between non-financial performance and bankruptcy risk in the US manufacturing industry. The authors utilized a sample of manufacturing firms and analyzed various non-

financial performance indicators, such as customer satisfaction, product quality, and employee productivity, in relation to bankruptcy risk. The findings suggested a significant positive relationship between non-financial performance and bankruptcy risk.

- There is a significant positive relationship between employee productivity and bankruptcy risk.

Johnson, C., Thompson, S., & Rodriguez, M., (2016), explored the impact of non-financial performance on bankruptcy risk in the retail industry. The study revealed a significant positive relationship between employee productivity and bankruptcy risk in the retail industry.

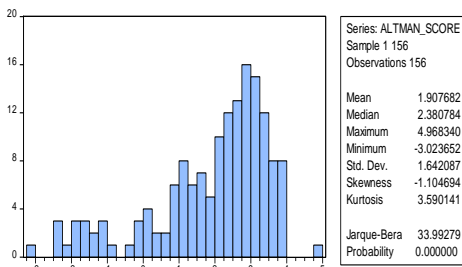
4. FINDINGS AND DISCUSSION

4.1. Analysis of Descriptive Statistics

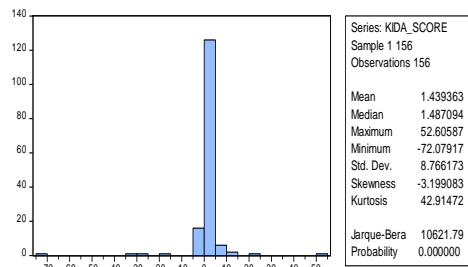
Table 3: Descriptive Statistics

	LIQUID	FINAN_RISK	HOTEL_SIZE	ROA	ROE	EMPL_PROD
Mean	5.149	0.138	0.128	-0.005	0.092	1.926
Median	0.846	0.016	0.020	-0.004	-0.005	0.056
Maximum	175.617	1.677	1.677	0.182	1.677	7.879
Minimum	0.0013	0.0009	-0.138	-0.070	-0.191	0.119
Std. Dev	17.776	0.290	0.294	0.027	0.294	0.294
Skewness	6.996	3.262	3.141	2.296	3.420	2.206
Kurtosis	60.398	14.762	14.258	18.712	15.831	13.741
Jarque-Bera	22687.21	1176.01	1080.4	1741.9	1374.37	1054.53
Probability	0.000	0.000	0.000	0.000	0.000	0.000
Sum	803.297	21.540	20.073	-0.822	14.455	5.452
Sum Sq. Dev	48978.75	13.080	13.421	0.114	13.413	4.330

Source: Author Constructed



Source: Author Constructed
Figure 3: Descriptive Statistics of Altman Z-Score



Source: Author Constructed
Figure 4: Descriptive Statistics of Kida Z-Score

The mean Z-score of Altman’s is comparatively higher than Kida models’ mean value. However, jarque bera of both models have a greater score, indicating that the data is highly reliable with a 0% probability. Additionally, skewness is negative, indicating that the histogram's right tail is shorter than average, and kurtosis, at 3.59 and 42.91, respectively. whereas the positive kurtosis results in a greater lapto kurtosis because the value should be positive.

4.2. Interpretation of Results of Z-score models' formulas and variables to find the Z-Value

Table 4: Z-score models Values

Company Code	Z-Score	2016 Q1	2016 Q2	2017 Q1	2017 Q2	2018 Q1	2018 Q2	2019 Q1
AHUN.N0000	Altman	3.54	3.26	2.95	2.92	2.90	3.25	3.77
	Kida	1.62	1.35	0.81	0.82	0.66	1.97	1.10
CHOT.N0000	Altman	-0.06	-0.47	1.36	1.57	3.48	3.21	2.07
	Kida	0.83	1.57	1.31	1.13	3.20	1.82	1.67
CHOT.N0000	Altman	2.00	1.37	-0.87	-1.00	-1.24	-1.09	-1.60
	Kida	0.38	-0.49	-0.32	-0.04	-0.33	-0.25	-0.25
TANG.N0000	Altman	1.56	2.75	2.86	3.03	2.57	2.70	2.47
	Kida	3.27	2.74	2.78	2.27	2.50	2.86	3.28
REEF.N0000	Altman	3.53	3.12	2.71	2.17	2.37	2.10	3.97
	Kida	1.57	2.80	0.83	0.79	3.94	1.92	0.82
SIGV.N0000	Altman	2.79	2.41	1.36	2.04	2.04	2.59	2.94
	Kida	0.95	1.04	0.87	0.90	0.82	0.71	1.20
STAF.N0000	Altman	1.90	1.60	1.77	2.10	2.22	2.66	3.15
	Kida	0.72	0.90	0.72	0.62	0.42	0.51	0.83
SERV.N0000	Altman	1.06	0.65	0.23	0.22	-0.04	0.47	-0.06
	Kida	0.94	2.67	2.69	2.21	2.96	3.09	3.25
KHC.N0000	Altman	0.95	1.01	0.93	0.97	0.96	1.06	0.27
	Kida	0.92	3.50	3.42	4.43	4.04	0.69	0.59
HSIG.N0000	Altman	3.32	2.30	2.00	2.67	2.12	2.66	2.50
	Kida	2.32	1.73	3.12	-1.32	9.15	-3.18	5.84
RENU.N0000	Altman	3.70	4.97	3.04	3.00	3.34	2.99	3.21
	Kida	1.17	1.31	0.99	4.51	1.72	2.22	3.30
AHPL.N0000	Altman	3.28	2.30	2.79	3.12	3.53	3.21	2.95
	Kida	2.19	3.15	3.29	3.99	4.10	2.35	5.16
AHUN.N0000	Altman	3.89	3.87	3.68	3.30	3.28	3.62	3.89
	Kida	2.62	2.39	2.87	0.63	1.10	0.51	2.62
CHOT.N0000	Altman	1.65	2.57	0.67	-2.39	-2.17	0.24	1.65
	Kida	0.72	3.19	0.59	0.81	0.70	3.90	0.72
CHOT.N0000	Altman	-1.78	-1.37	-1.54	-1.77	-1.94	1.77	-1.78
	Kida	-0.31	-0.34	-0.36	-0.28	-0.32	-0.32	-0.31
TANG.N0000	Altman	2.60	2.60	2.46	2.36	2.31	2.39	2.60
	Kida	3.90	4.33	1.62	1.04	3.70	2.66	3.90
REEF.N0000	Altman	4.00	3.04	3.04	3.91	3.71	3.94	4.00
	Kida	3.59	2.13	1.30	1.45	1.14	4.08	3.59
SIGV.N0000	Altman	2.84	2.35	2.14	2.86	3.11	3.32	2.84
	Kida	0.68	0.90	1.53	1.71	1.41	1.43	0.68
STAF.N0000	Altman	3.32	1.59	1.69	3.45	3.00	2.56	3.32
	Kida	0.60	2.05	0.95	0.07	1.04	2.61	0.60
SERV.N0000	Altman	0.20	1.42	1.70	2.45	2.37	3.02	0.20
	Kida	0.97	0.85	4.72	2.31	2.05	0.95	0.97
KHC.N0000	Altman	1.14	0.95	1.06	1.04	1.13	0.89	1.14
	Kida	0.70	1.06	8.10	2.66	1.98	1.19	0.70
HSIG.N0000	Altman	2.84	1.68	1.47	1.99	1.23	1.34	1.64
	Kida	-2.49	-1.99	-2.08	0.97	-2.70	-3.15	-2.49
RENU.N000	Altman	3.01	2.89	2.99	3.13	3.55	3.89	3.01
	Kida	2.02	2.21	9.92	1.49	1.73	1.91	2.02
AHPL.N0000	Altman	2.95	1.47	2.50	2.35	2.86	3.30	2.95
	Kida	3.24	3.10	4.06	8.72	4.52	4.06	3.24

Source: Author Constructed

Among the hotel companies studied, the following were identified as safe zone companies: Aitken Spence Hotel Holdings PLC, Citrus Leisure PLC, Sigiriya Village Hotels PLC, Dolphin Hotels PLC, The Kingsbury PLC, Renuka City Hotel PLC, and Asian Hotels & Properties PLC. From identified Grey Zone Hotel Companies as Hayleys Leisure PLC, Tangerine Beach Hotels PLC, and The Kandy Hotels Company (1938) PLC. There are two recognized distressed firms. according to Altman and Kida Models such as Ceylon Hotels Corporation PLC and Hotel Sigiriya PLC.

4.3. Correlation Analysis

The relationship between independent variables and Altman Z-score, ROA, ROE, employee productivity, hotel size, liquidity, and financial risk have positive correlation. The correlations are 0.159, 0.121, 0.076, 0.44, 0.203, and 0.154, respectively. Since all variables have positive correlation, all variables tend to rise with each other. Among the variables, the strongest positive correlation is between liquidity and Altman’s Z-Score. The Correlation between the variables and Kida Z-score have a positive correlation since all values are between 0 to +1. The Values of ROA, ROE, employee productivity, hotel size, liquidity, and financial risk are 0.196, 0.47, 0.75, 0.005 ,0.17, and 0.002, respectively. When considering Kida models’ values and the independent variables have comparatively significant association between variables. ROA, ROE, employee productivity correlation is greater than the values of Altman’s Z-Score. The control variables have a less values than the Altman’s Z-score. Even though all the variables have positive correlation.

Table 5: Correlation Analysis

		Emp	ROA	ROE	Hotel size	Liquid	Fina	Altma	Kida
		productivity					risk	score	score
Emploproduct ivity	Pearson Cor	1	0.001	0.085	0.042	0.053	0.109	0.076	0.075
	Sig. (2-tailed)		0.994	0.294	0.602	0.514	0.174	0.0012	0.0252
ROA	Pearson Cor	-0.001	1	-0.01	0.094	.260**	0.082	.159*	.196*
	Sig. (2-tailed)		0.994	0.896	0.241	0.001	0.307	0.0052	0.0113
ROE	Pearson Cor	-0.085	-0.01	1	.311**	-0.016	-0.15	0.121	0.047
	Sig. (2-tailed)		0.294	0.896	0	0.842	0.052	0.0032	0.068
Hotel size	Pearson Cor	-0.042	0.094	.311**	1	-0.034	-.18*	0.044	-0.005
	Sig. (2-tailed)		0.602	0.241	0	0.673	0.019	0.0459	0.955
Liquid	Pearson Cor	-0.053	.260**	-0.02	-0.034	1	-0.12	.203*	0.017
	Sig. (2-tailed)		0.514	0.001	0.842	0.673	0.135	0	0.831
Finan risk	Pearson Cor	-0.109	0.082	-0.16	-.188*	-0.12	1	0.154	0.002
	Sig. (2-tailed)		0.174	0.307	0.052	0.019	0.135	0.001	0.054
Altman score	Pearson Cor	0.076	.159*	0.121	0.044	.203*	0.154	1	0.108
	Sig. (2-tailed)		0.0012	0.005	0.003	0.0459	0	0.001	0.178
Kida score	Pearson Cor	0.075	.196*	0.047	0.005	0.017	0.002	0.108	1
	Sig. (2-tailed)		0.0252	0.011	0.068	0.0773	0.058	0.089	0.178

Source: Author Constructed

4.4. Results of Independent Sample P-Test using regression analysis

In financial Performance, the p-values of ROA and ROE have 0.005 and 0.003 respectively. Both ROA and ROE have p-values that are less than 5 % and When considering T statistics, both ROA and ROE are statistically significant because the T-test values are greater than 2. Therefore, can accept the alternative hypotheses which is there is a relationship between ROE, ROA, and Altman score bankruptcy values. Both standard errors are higher comparatively

than other variables. In non-financial performance, employee productivity has a positive relationship with the Altman Z-score. The identified p-value is 0.001 which is less than 5%. Employee productivity has a 3.299 statistically significant T- test value.

Financial risk, hotel size and liquidity are recognized as control variables in the study. When considering p-values are 0.001, 0.045, and 0.000 respectively. all variables have statistically significant T statistic values. Therefore, these variables significantly impact independent variables. The R- squared is 0.587 which is lower than the adjusted R-squared. A value that is closer to 1 is fitting to the model.

Table 6: The relationship between independent variables and Altman score

Sample: 2016S1 2022S2

Variable	Coefficient	Std. Error	T-Statistic	Prob.
EMPLOYEE_PRODUCTIVITY	0.000	0.000	3.299	0.001
FINANCIAL_RISK	0.001	0.000	3.347	0.001
HOTEL_SIZE	0.001	0.001	2.013	0.046
LIQUIDITY	0.000	0.000	4.621	0.000
ROA	0.001	0.000	2.118	0.005
ROE	0.004	0.000	2.998	0.003
PRE_COVID = 0	0.010	0.003	5.138	0.000
DURING_COVID = 1	0.000	0.000	10.336	0.000
R-squared	0.588	Mean dependent var		1.908
Adjusted R-squared	0.641	S.D. dependent var		1.642
S.E. of regression	2.103	Akaike info criterion		4.363
Sum squared resid	663.545	Schwarz criterion		4.480
Log likelihood	334.278	Hannan-Quinn criter.		4.410
Durbin-Watson stat	0.537			

Source: Author Constructed

Table 7: The relationship between independent variables and Kida model

Sample: 2016S1 2022S2

Variable	Coefficient	Std. Error	T-Statistic	Prob.
LIQUIDITY	0.025	0.005	1.588	0.058
EMPLOYEE_PRODUCTIVITY	0.005	0.002	2.987	0.025
HOTEL_SIZE	0.050	0.006	0.959	0.077
ROA	0.008	0.000	2.566	0.011
ROE	0.071	0.070	0.572	0.068
FINANCIAL_RISK	0.433	0.106	0.140	0.089
PRE_COVID=0	0.072	0.042	2.275	0.024
DURING_COVID=1	0.056	0.001	2.812	0.048
R-squared	0.511	Mean dependent var		1.739
Adjusted R-squared	0.570	S.D. dependent var		1.466
S.E. of regression	2.741	Akaike info criterion		4.224
Sum squared resid	777.379	Schwarz criterion		4.380
Log likelihood	235.456	Hannan-Quinn criter.		4.287
Durbin-Watson stat	0.730			

Source: Author Constructed

4.5. Unit root test

4.5.1. Financial Performance -ROA & ROE

Table 8: Unit root test

Augmented Dickey-Fuller test statistic		
Variables	T-Statistic	Prob.*
ROA	-5.357	0.0001
ROE	-9.896	0.0000
Test critical values:	1% level	-4.019
	5% level	-3.439
	10% level	-3.144

*MacKinnon (1996) one-sided p-values.

Source: Author Constructed

According to the Augmented Dickey–Fuller test statistics, the ROA and ROE have unit root. The probability of ROA and ROE have 0.0001 and 0.0000 respectively which are less than 5%. Therefore, we can accept the alternative. the critical values are less than the Augmented Dickey–Fuller test statistics. From all these, can recognize that these series are stationary.

4.5.2. Non-Financial Performance – Employee productivity

Table 9: Unit root- Employee productivity

Augmented Dickey-Fuller test statistic		
Variable	T-Statistic	Prob.*
Employee productivity	-24.079	0.0000
Test critical values:	1% level	-4.019
	5% level	-3.439
	10% level	-3.144

*MacKinnon (1996) one-sided p-values.

Source: Author Constructed

According to the Augmented Dickey–Fuller test statistics, employee productivity has 1st difference unit root. The probability is 0.0000 which is less than 5%. Therefore, reject the null hypotheses and accept the alternative. The critical values are less than Augmented Dickey–Fuller test statistics. The employee productivity variable is stationary.

4.6. The comparison between Model Estimations and the Actual Status of the Firms which Going Concern Ability (t).

This section will explain the model estimation results and the actual status of the firms which assist with going concern ability (t) according to the company's annual statements and auditors' reports. Actual status might be as Auditors' Modified Opinion, Underutilized Assets Act, Trading Suspended: Ref, Declared Liquidation, etc.

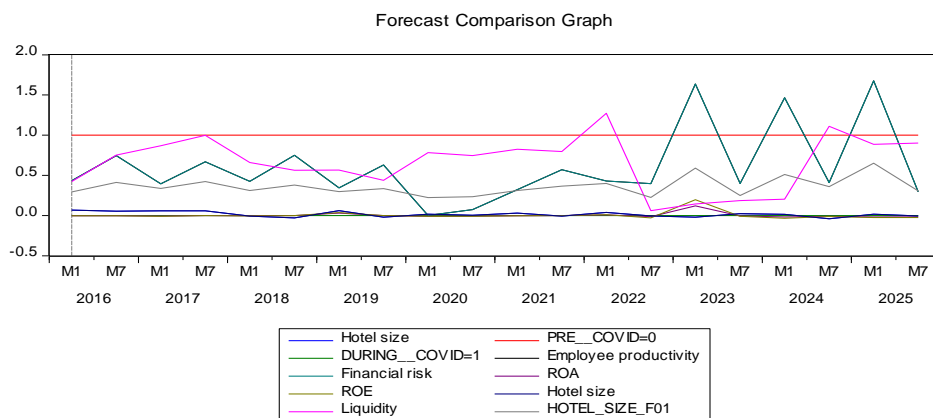
Table 10: Model Estimations and the Actual Status

Company Name	Model Estimation	Actual Status
Aitken Spence Hotel Holdings PLC	Safe zone	Good in performance
Hayleys Leisure PLC	Grey zone	Good in performance
Ceylon Hotels Corporation PLC	Distressed zone	Moderate in performance
Tangerine Beach Hotels PLC	Grey zone	Moderate in performance
Citrus Leisure PLC	Safe zone	Good in performance
Sigiriya Village Hotels PLC	Safe zone	Good in performance
Dolphin Hotels PLC	Safe zone	Good in performance
The Kingsbury PLC	Safe zone	Good in performance
The Kandy Hotels (1938) PLC	Grey zone	Moderate in performance
Hotel Sigiriya PLC	Distressed zone	Good in performance
Renuka City Hotel PLC	Safe zone	Moderate in performance
Asian Hotels & Properties PLC	Safe zone	Good in performance

Source: Author Constructed

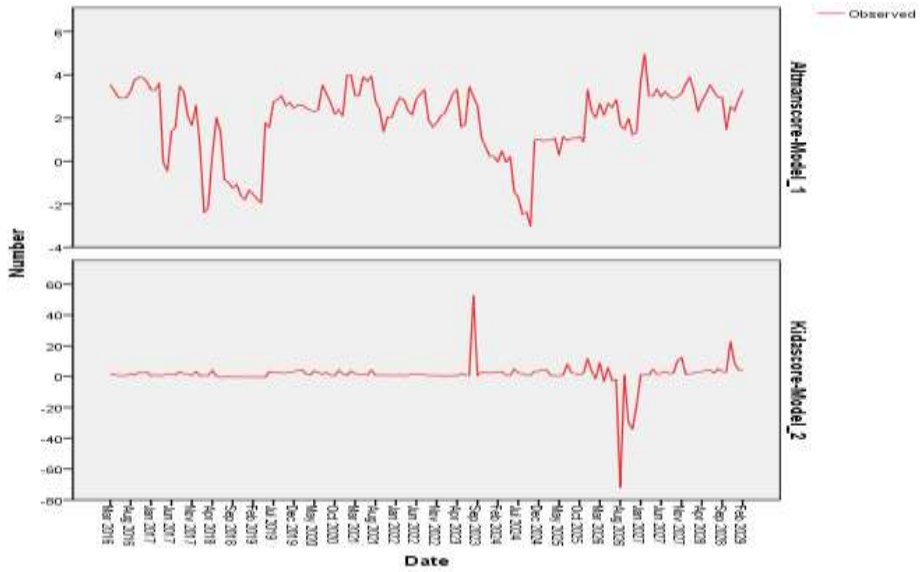
4.7. Comparative results of Altman and Kida models in terms of bankruptcy predictive ability.

The graph below shows the variables’ movement between the years 2016- 2025. From the year 2023-2025, shows the forecast prediction on each variable. The Financial risk is recognized as the debt-to-equity ratio and hotel size means the increasement of total assets. The graph predicts that liquidity will increase than 1.00 in the year 2024. In the graph shows variable movement between the years 2016- 2025. The year 2023-2025 shows the forecast prediction for each variable. The graph shows that there is an upwards and downward in financial risk and hotel size. The financial risk here is recognized as a debt-to-equity ratio and hotel size means the Increment in total assets. The graph predicts that liquidity will increase by more than 1.00 in the year 2024. The models’ summary predicts how the hotel companies will perform until the year 2029. In Altman Z- score, there is a downward slop in the year 2024 and continuous upward slop onwards. The Kida’s model graph predicts that hotel companies will have a downward slope in the year 2026.



Source: Author Constructed

Figure 5: Forecast comparison graph



Source: Author Constructed

Figure 6: Prediction on Z-score Models

Table 11: Comparative results of the Z-score models

Statement	Altman Z-Score		Kida Z-Score	
	Number of prediction times (frequency)	prediction rate	Number of prediction times (frequency)	prediction rate
Predictive ability of business discontinuation five years prior (t-5)	13	73.5%	6	65%
Predictive ability of business discontinuation three years prior(t-3)	14	85%	9	69%
Predictive ability of business discontinuation two years prior (t-2)	14	100%	7	69%
Predictive ability of business discontinuation one year prior (t-1)	12	100%	7	75%
Average predictive ability of business discontinuation five years	-	89.6%	-	69.5 %

Source: Author Constructed

The prediction rates are derived by dividing the total number of trials in a real experiment by the frequency of a single event, the capacity to predict business cessation five years before the bankruptcy is 73.5%. The probability of bankruptcy three years out is 85%. The average business discontinuance five years before bankruptcy has an 89.6% probability of going bankrupt. The Kida Z-scores' prediction rates for five years before the bankruptcy is 65%. The probability of bankruptcy three years out is 69%. The probability of a business closing two and one years before bankruptcy is 75%. A bankruptcy has a 69.5% chance of occurring on average five years before the firm terminates operations.

4.8. Findings and Interpretation

4.8.1. Hypotheses Testing

Table 12: Hypotheses Testing

Hypotheses	P-value (0.05)		Result	
	Altman Z-score	Kida Z-score	Altman Z-score	Kida Z-score
H1a: There is a significant positive relationship between the ROA and bankruptcy risk	0.0052	0.0113	Accept H1a There is a significant positive relationship between the ROA and bankruptcy risk	Accept H1a There is a significant positive relationship between the ROA and bankruptcy risk
H1 b: There is a significant positive relationship between the ROE and bankruptcy risk	0.0032	0.0680	Accept H1b There is a significant positive relationship between the ROE and bankruptcy risk	Reject H1b There is no significant positive relationship between the ROE and bankruptcy risk
H2: There is a significant positive relationship between the employee productivity and bankruptcy risk	0.0012	0.0252	Accept H2 There is a significant positive relationship between the employee productivity and bankruptcy risk	Accept H2 There is significant positive relationship between the employee productivity and bankruptcy risk

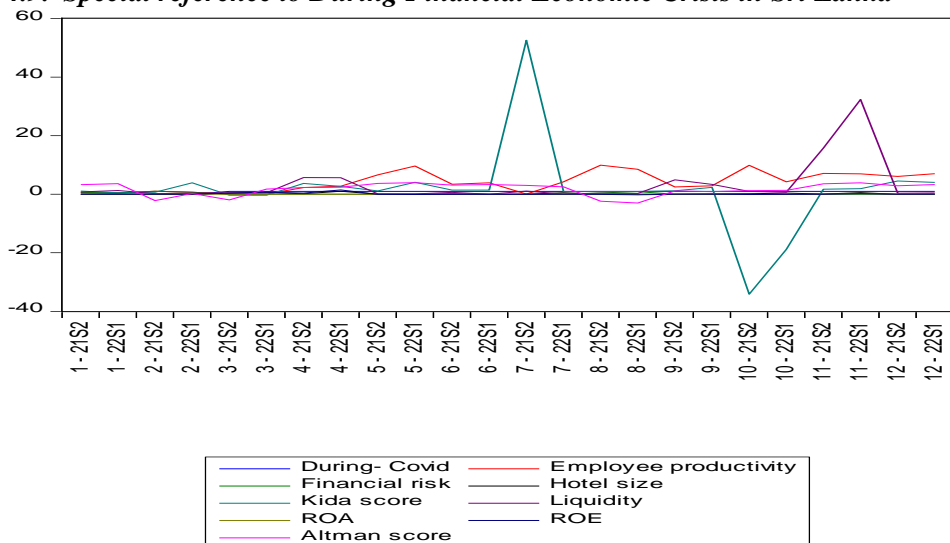
Source: Author Constructed

When analyzing the table, ROA has an impact on bankruptcy risk. According to regression analysis on both bankruptcy models, the outcome demonstrates that there is a statistically positive significant relationship between ROA and bankruptcy risk ($p = 0.0052 < 0.05$). Because the significance value is less than 0.05, the first (H1 a) hypotheses is accepted. According to Altman Z-score

regression analysis, there is a connection between ROE and bankruptcy risk ($p = 0.0032 < 0.05$). Because the significance value is less than 0.5, the first (H1 b) hypotheses is accepted. According to Altman Z-score regression research, there is a relationship (connection) between employee productivity and bankruptcy risk ($p = 0.0012 < 0.05$). Because the significance value is less than 0.05, the second (H2) hypotheses is accepted. Similar findings were made by Gunathilake, (2014), who discovered that the Altman model compares the result to more substantial and reliable outcomes when identifying financial distress. The results of study support the assertions made by Nanayakkara & Azzez, (2013) and Samarakoon & Hasan (2003) that the Altman Z-score model can be used to predict the profitability of bankruptcy for Sri Lankan businesses.

But Kida model regression analysis is different than Altman analysis. There is a statistically significant association Between ROA and bankruptcy risk ($p = 0.0113 < 0.05$). Because the significance value is less than 0.05, the first (H1 a) hypotheses is accepted. But Kida’s model Z-score regression analysis reveals no positive relationship between ROE and bankruptcy risk ($p = 0.0680 > 0.05$), the first hypotheses (H1 b) is eliminated. According to the Kida model regression analysis, there is a positive significant (Critical) relationship between employee productivity and bankruptcy risk ($p=0.0252 < 0.05$), which means the significance value is less than 0.05. As a result, the second hypotheses (H2) are accepted. Similar findings were made by Salim Sallal Rahi & AL-Hisnawy, (2017) by using Kida model to forecast the financial distress of investment companies registered on the Iraq Stock Exchange. Stock (EPS). The study used both a regression model and a descriptive statistical approach to evaluate the data and test hypotheses. The several independent factors, including as ROA, ROE, profitability ratios, leverage and liquidity were included in the model.

4.9. Special reference to During Financial Economic Crisis in Sri Lanka



Source: Author Constructed

Figure 7: Performances during the Financial Crisis

The above diagram shows the 12 mainboard-companies' performances during Financial Crisis from June 2021 to June 2022 with reference to During COVID-19 dummy variable. Most hotel companies do not have much fluctuation during the period. But hotel Sigiriya PLC has a negative Kida Z-score value as it is recognized as the hotel company has problems during financial crisis. According to these findings, for predicting company insolvency in the five years before the liquidation. The findings from the gathering of secondary data also demonstrate that several mainboard-listed hotel companies have an issue with the financial disclosure provided in the quarter reports. This may be the result of several factors, including tax evasion, a reluctance to disclose net income, and the need to safeguard businesses' financial health and competitive positioning in local and regional markets. Even if all these businesses may be soundly financed, the statistics that have been seen coming from quarter reports rather than annual reports.

5. CONCLUSION

The conclusion of the study discovered that the Altman Z-Score's rates and prediction frequencies are superior to Kida's Z-Score. The study additionally revealed that Kida's Z-score of 69.5% fell short of attaining the level of accuracy in forecasting bankruptcy. This can be because, when compared to those in wealthy nations, credit, and financial analysts lack experience, and hotel corporations lack financial management expertise. Most hotel companies struggled greatly during the COVID-19 and financial crisis. The survey also revealed that certain companies' annual reports lacked sufficient financial disclosure to draw in local and international investors.

This study concentrated on the difficulties investors and managers encountered while selecting companies before the release of the Kida and Altman models. They specifically had trouble identifying the genuine state of the companies and the bankrupt ones beforehand. Altman created the Z-score model, which emphasized five aspects of an organization, as a remedy. More specifically, the study discovered that by utilizing the Altman Z-score model rather than the Kida model, there is a substantial positive relationship between bankruptcy risk and financial performance and non-financial performance. Those conclusions were reached at a 5% level of significance and had a very satisfactory coefficient of determination. In addition, using the Kida model, this study shows a negative but substantial correlation between non-financial performance and bankruptcy level in mainboard-listed hotel firms. The COVID-19 and the Sri Lankan economic crisis was mostly to blame for the dismal results. The goal of this study was to use Z-score models to examine the predictability of bankruptcy for mainboard-listed hotel companies on the Colombo Stock Exchange. Sample hotels that were liquidated between 2016 to 2022 and were listed on the Colombo Stock Exchange were included in the study. The study achieved the objective to find most appropriate Z-score model. According to findings, Altman's Z-score is most effective in foretelling bankruptcy.

The study demonstrated the Altman Z-score model's high rates of 73.5% for the fifth year, 85% for the fourth year, and 100% and the average rate is 89.6% for mainboard-hotel firms during the five years before the bankruptcy.

5.1. Implications of the Study

Numerous stakeholders will profit in various ways from the study's findings. Investors and current shareholders can easily locate the top hotel firms to invest in by using their annual reports and quarterly annual reports. Additionally, managers and directors can use ratios to assess and forecast the state of their firm and, if necessary, can take the appropriate remedial actions. The Z-Scores formulas are relatively straightforward, making it accessible to financial analysts, researchers, and practitioners. It does not require extensive data or complex calculations, which adds to its practicality and popularity in bankruptcy prediction. Further, companies may inform the public about these connections, and this knowledge and prompt problem-solving will guarantee the stability of the economy.

5.2. Limitations

It is apparent from the research conducted by Sandin, A. & Porporato, M. (2008), that the approach of ratio analysis is dubious and contains some confusing elements. While the hotel may be secure and the annual data may be strong, the quarterly data is not. To forecast bankruptcy behavior and hence produce better conclusions in the future, it is crucial to apply a variety of models. It is important to note that while the Z-score models have been widely adopted and proven effective, it is not infallible. The Z-score models were developed based on historical data and assumes that past patterns will continue to hold true. It may not capture sudden changes or unique circumstances that could impact a company's financial situation. Therefore, it is always advisable to consider other factors and perform a comprehensive analysis when evaluating the financial health and risk of bankruptcy for companies.

5.3. Suggestions for Future Research

Alternative time series and source data may be used in this area's future study to test the model's applicability. Future research can be conducted by adding more qualitative components to the model that effects the identification of the bankruptcy level because the data from the annual reports is insufficient for decision-making on firms in the current Sri Lankan economy. Further future researchers can continue the research for other sectors since the research is based on hotel sector using other bankruptcy models.

REFERENCES

- Alaeddine. M. & Abderrezzak, H. (2020), A comparative study between Altman Kida and Sherrod's Model in predicting the financial failure of listed companies in Amman Stock Exchange, 14, pp.87-106.

- Altman, E.I., (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy, *The Journal of Finance*, 23, pp.589-609.
- Anandasayanan, S & Subramaniam, V.A., (2017), Predicting bankruptcy of selected manufacturing companies listed in Colombo Stock Exchange: Applying Altman's Z-Score, *International Journal of Research*, 5 (2), 313-315.
- Balasundaram, N. (2009). An investigation of financial soundness of listed manufacturing companies in Sri Lanka: An application of Altman's Model, *Economic science series*, LXI (4), pp.19-25.
- Balcaen, S. and Ooghe, H. (2006), 35 Years of studies on business failure: An overview of the classic statistical methodologies and their related problems, *The British Accounting Review*, 38, pp.63-93.
- Beaver, W. H. (1966). Financial ratios as predictors of failures, *Journal of Accounting Research*, 4, pp.71-111.
- Brown, R. & Williams, L., (2017), The Non-financial performance indicators and bankruptcy risk: Evidence from the manufacturing sector, *International Journal of Business and Economics Research*, 6(3), pp.107-118.
- Coelho, M., (2014). Predicting corporate failure: An application of Altman's Z-score and Altman's EMS Models to the JSE Alternative, 1, pp. 1-11.
- Deakin. (1972), A discriminant analysis of predictors of business failure, *Journal of Accounting Research*, 10 (1), pp.167-179.
- Diakomihalis. (2012). The accuracy of Altman's Models in predicting hotel bankruptcy, *International Journal of Accounting and Financial Reporting*, 2, pp.96-113.
- Foo, (2015), Financial health & corporate performance of listed manufacturing companies in Hong Kong & Singapore: A comparative study of the two Asian tigers, *Asian Journal of Business and Management*, 3(2), pp.148-154.
- Gunathilake. (2014), Financial distress prediction: A comparative study of solvency test and Z-score Models with reference to Sri Lanka, *IUP Journal of Financial Risk Management*, 3, pp.39-51.
- Hillary et al., (2018), Effects of financial distress on financial performance of manufacturing firms listed in Nairobi securities exchange, *International Journals of Academics & Research*, 1(1), pp. 211-220.
- Johnson, C., Thompson, S., & Rodriguez, M., (2016), The relationship between non-financial performance measures and bankruptcy risk: Empirical evidence from the retail industry, *Journal of Financial Management*, 45(2), pp.231-245.

- Khalid. & Ahmad. (2011), Predicting corporate bankruptcy of Jordanian Listed Companies: Using Altman and Kida Models, *International Journal of Business and Management*, 6, pp. 208-211.
- Kida, T. (1980), An investigation into auditors' continuity and related qualification judgments, *Journal of Accounting Research*, China, 123, pp. 589-609.
- Lakshan, A., & Wijekoon, N. (2013). The use of financial ratios in predicting corporate failure in Sri Lanka, *GSTF Journal of Business Review*, 2(4), pp. 37-47.
- Liang, F. S., & Pathak, S. (2018a), Financial health & corporate performance: a comparison of manufacturing companies in China, *Journal of Asian Development*, 4(2), pp.123-132.
- Meyer. & Pifer. (1970), Prediction of bank failures, *The Journal of Finance*, 25(4), pp. 853-868.
- Nanayakkara, K., & Azeez, A. (2013), Predicting financial distress of quoted public companies in Sri Lanka; Special reference to Z score model, *Conference proceedings of International Conference on Business & Information*, 5(3), pp. 41-51.
- Saida. (2021), The effectiveness of Kida Model for predicting financial failure of insurance companies in Algeria, *Journal of Economic Growth, and Entrepreneurship*, 4 (5), pp.19-27.
- Salim Sallal Rahi & AL-Hisnawy, (2017), Predicting financial distress of investment companies using financial ratios of Kida Model and its impact on EPS: A study in Iraq Stock Exchange, *International Journal of Innovation and Applied Studies*, 20 (3), pp. 752 -761.
- Samarakoon, L.P., & Hasan, T. (2003). Altman's Z-score models of predicting corporate distress: Evidence from the emerging Sri Lankan stock market, *Journal of the Academy of Finance*, pp. 1, 119-125.
- Samarathunga, (2020). Post-COVID19 challenges and way forward for Sri Lanka Tourism. *SSRN Electronic Journal*, pp. 3-12.
- Sandin, A. & Porporato, M. (2008), Corporate bankruptcy models applied to emerging economies: Evidence from Argentina in the year 1991-1998, *International Journal of Commerce and Management*, 17 (4), pp. 295-311.
- Sfakianakis. E. (2021), Bankruptcy prediction model for listed companies in Greece, *Investment Management and Financial Innovations*, 18(2), pp. 166-180.
- Sinkey.Jr., & Joseph. F., (1975), A Multivariate statistical analysis of the characteristics of problem banks, *The Journal of Finance*, 30(1), pp. 21-36.

Stefan et al., (2020). Firm age dynamics and causes of corporate bankruptcy: age dependent explanations for business failure. *Review of Managerial Science*. 14, pp. 633–661.

Sucheran. (2021), Preliminary economic impacts of the COVID-19 pandemic on the hotel sector in South Africa, 39 (1), pp. 35-50.