

Predicting Financial Health Using Altman Z Score: An Evidence from Indian Logistics Sector

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Abstract

All corporate and business houses aspire to exhibit sound financial performance, thereby achieving financial stability. It is greatly impacted by technical innovations, market trends, demand, and economic and political conditions prevailing in the country. Companies with precarious financial conditions tend to face bankruptcy.

Logistics are backbone to the industrial growth and hence vital to the economy. This research study tries to evaluate the financial performance of the selected Logistic companies in India. This sector has witnessed an incredible expansion during the last ten years. Currently valued at \$200 billion USD, the Indian logistics sector is anticipated to expand at a compound annual growth rate of 10.50%.

The Altman Z model and Modified Altman Z" model is used to analyse the data of selected logistics companies (five publicly traded) for a period of five years. SPSS has been used to perform statistical analysis of the variables. Secondary data has been used for the study which is collected using CMIE Prowess IQ database and the yearly financial reports of the companies under the study.

Keywords: Financial Performance, Economy, Growth, Logistics Companies, Altman Z Model

Introduction

For the stakeholders, one of the most essential characteristics of the firm is its financial stability. In order to maintain their interest within the company, they all want to know if the organisation will perform better in future. The primary reason for measuring financial health is to demonstrate that the company is profitable and not at immediate risk of going out of business. The most helpful method for precisely assessing the company's long-term viability and financial health is ratio analysis. Other methods include vertical analysis and horizontal analysis. Frequent analysis of financial statements and the company position will provide a true and real picture of its financial status.

Z score has emerged as the most efficient technique for determining a firm's financial health throughout the year. For each stakeholder or investor, it is the tool that is the simplest to use. It offers a simple framework for evaluating and understanding the company's financial status. It was published by Edward I Altman in the year 1968. The Altman z model is primarily made to gauge a firm's financial stability in terms of potential bankruptcy or financial difficulties. Initially, only publicly traded manufacturing businesses could use this strategy. Though, later on, this model was revised so that it could also be used by other businesses.

In order to determine the likelihood that a company would fail, the original Z score methodology employed five financial ratios to generate a single Z score. The Z-score was applied by Altman to develop a model for forecasting bankruptcy, and he decided on a cut point to discriminate between healthy and distressed businesses. The findings show that the Z-score model performed well in predicting financial trouble one and two years in advance, but that it performed poorly in predicting financial hardship three to five years in advance. Following Altman's lead, several authors used the Z-score model in various marketplaces, historical contexts and different sectors all over the world for instance, for Pakistan; (Abbas & Ahmad, 2012) for USA (Barreda et al., 2017), for India (Nimbalkar & Nagendra, 2022); for Indonesia (Prabowo, 2019). In this research study, an effort has been made to apply Edward Altman's Z score to get insight into the analysis of the Indian logistics industry's financial health.

This sector has seen tremendous growth in the last decade. Logistics is the lifeline of a nation's industry and economy. The Indian logistics industry is presently valued at US \$200 billion and is poised to grow at a compounded annual growth rate of 10.50%. The total spending on this sector is 14% of the GDP. This sector provides employment to 2.2 crore people in India. According to World Bank's Logistics Performance Index, India's rank has improved from 54th in 2014 to 35th in 2016. Indian logistics industry share is only 3.2% of global logistics industry, which means the huge potential to expand.

Literature Review

Abundant of research has been conducted on financial health analysis using Altman Z score all over the world.

Cındık et al., (2021) used four different methods, in order to predict financial distress in 80 Turkish companies, the Altman Z score, the Revised Altman Z Score (Linear Discriminant Analysis), the Quadratic Discriminant Analysis and the Random Forest Machine Learning Model. They found that the Random Forest model, which uses the Altman variables,

performed 95% better than the other three models.

Prasetyani & Sofyan, (2020) used two methods; Altman Z score and Springate's method to analyze bankruptcy in six Indonesian listed Retail Trading Companies and concluded that one of the companies had high probability of going into bankruptcy using Altman Z score. Surprisingly, the two methods used gave different results.

Toly et al., (2020) explored the potential for financial distress in manufacturing-related Indonesian Public Listed Companies. The Altman Z-Score model with four variables was the test instrument used to predict bankruptcy. This study included 139 companies as samples during 2016-2018, and it found that the Altman Z-Score model had a beneficial impact on financial distress. The ratio of retained earnings to total assets and the ratio of earnings EBIT to total assets had the most substantial impacts.

Rahman & Acharya, (2022) examined the financial health of Indian passenger automobile makers for a period from 2015-16 to 2019-20 using Altman's Z Score and it is evident that General Motors Company, Mahindra & Mahindra Ltd, and Ford Motor have very poor scores out of five companies.

Divekar & Sukhari, (2021) attempted a study on selected Indian Aviation Companies to find reasons for financial disaster. Altman's Z Score Model and Pilarski's P -Score Model was used and resulted that Kingfisher Airlines is now history, while Jet Airways has nearly been forced to the ground permanently.

Kukreja et al., (2020) discovered that as contrast to the Altman Z-score, the Beneish M-score is less reliable in the identification of fraud. The study's findings did not support the Beneish model's ability to identify fake financial statements.

Woo et al., (2020) used Altman's Z-score and Ohlson's O-score models to evaluate variables influencing the credit risk of international shipping and logistics enterprises. According to the study's findings, the average credit risk for the shipping and logistics sectors is comparable; however, the fluctuation of credit risk in the shipping sector is significantly larger than that in the logistics sector.

Elia et al., (2021) validated The Altman Z''-score model to predict financial difficulty in Lebanese Alpha banks between 2009 and 2018. Most of the 10 Alpha Banks had values that were below the cutoff of 1.1, which indicated that they were in difficulty between 2009 and 2018. According to the study, the Z''-score model is a crucial, instrumental signal for any external or internal use of bank financial statements, such as auditors, financial managers, investors, and lenders, to make the right choices if these institutions

are in a financial crisis or fail.

Karim et al., (2021) used liquidity ratios in order to assess the banks' liquidity. To assess the banks' financial health, they used a revised version of Altman's Z-Score Model for non-manufacturing companies. Their results showed that listed Islamic banks had worse financial health than listed Commercial Banks, and that all banks were in the red in all four quarters.

Swalih et al., (2021) used Altman Z score for measuring the Indian automobile industry's financial soundness and suggested that the NSE- listed companies in the sector are financially stable. According to the study's findings, the Indian auto industry is strong and stable, and the automobile companies are not likely to experience financial trouble or insolvency any-time soon.

Objectives of study

1. To examine the financial health of selected logistics company in India using Altman Z score.
2. To assist the investors in recognizing economically sound logistics companies in India through Altman Z score.

Hypothesis of study:

H_0 : There is no significant difference in the financial health of selected logistics company in India, as assessed by Altman Z score.

H_1 : There is a significant difference in the financial health of selected logistics company in India, as assessed by Altman Z score.

Theoretical Framework

The Altman Z-Score is a widely used measure with wide applicability. One of the strongest models for evaluating a company's financial soundness is Altman's Z-score model, which has gained widespread acceptance in the management community. This model created by Altman is a fantastic tool for accessing credit risk. The Z-score model is based on the statistical technique of MDA, which are frequently utilized by academics, government entities and business division for theoretically recognizing bankruptcy (Mason and Harris, 1979).

In 1968 Edward I. Altman published the Z-score model. This tool can be used to predict the possibility that a firm will declare bankruptcy during the next two years. The Z score analyses a variety of financial statements metrics to gauge a company's financial health. However, since its debut, the Z-Score has grown to be among the most reliable measures of insolvency. This strategy can aid investors in their decision-making over the purchase of a stock or the sale of some of their existing holdings. Z score is

calculated using the following formula:

$$Z \text{ Score} = 1.2 A + 1.4 B + 3.3 C + 0.6 D + 1 E$$

Where,

A= Working Capital/ Total Assets

B= Retained Earnings / Total Assets

C=EBIT/ Total Assets

D= Market value of Equity / Total Liabilities

E= Sales/ Total Assets

In 1983, Altman modified the Z score model for private companies and known as Z' model. Variable D in this model substituted market value for book value of equity. Value of variable differs slightly from Z-Score model.

$$Z' = 0.71A + 0.847B + 3.107C + 0.420D + 0.998E$$

Another revision was made over original Z score model and a new model called Z'' or Modified Altman Model, was developed for both manufacturing and non-manufacturing companies and also for private and public firms, excluding one variable E as this ratio varies widely in different firms with different assets sizes and with changed coefficients of all other variables.

$$Z'' = 6.56A + 3.26B + 6.72C + 1.05D$$

The Calculation Matrix for using the Altman Z-Score and Modified Altman Z-Score Method:

Table 1: Calculation matrix

Type of Zone	Z value	Z'' value	Probability for filing bankruptcy	Financial health	Investor decision
Safe Zone	$Z > 2.99$	$Z > 2.9$	Negligible	Strong	Buy a stock
Grey Zone	$1.81 < Z < 2.99$	$1.23 < Z < 2.9$	Moderate/low	Good	Indifferent
Distress Zone	$Z < 1.81$	$Z < 1.23$	High	Very poor	Sell the stock

Source: Author's own work

Research Methodology

Data Collection and Data Type

This paper applies cross-time series and cross-sectional or panel data (pooled data) to assist in determining the results and test the hypothesis and accomplish the study's objectives. The financial health was anal-

used using the quantitative descriptive analysis method and the Altman Z Score criteria. This analysis is based on secondary data that was acquired from Centre for Monitoring Indian Economy (CMIE prowess IQ), Bombay Stock Exchange (BSE), National Stock Exchange (NSE) and annual financial statements of selected companies for the time period of 5 years 2017-18 to 2021-22.

Sample and Sampling Technique

Since logistics sector plays a significant role in almost every industry, the research paper in question examines five major representative companies on the basis of market capitalisation: Aegis Logistics Ltd., All Cargo Logistics Ltd., Blue Dart Express Ltd., Mahindra Logistics Ltd., and T C I Express Ltd.

The sample was chosen using the following standards:

- a. Logistics companies that are listed on the BSE and NSE.
- b. Logistics firms released a comprehensive financial statement covering the years 2017-18 to 2021-22.

Variables used to calculate Altman Z score

The five variables used in this research were:

- A. Net Working Capital to Total Assets** - This variable of Z score model is used to measure company's liquidity and ability to pay their obligations. Working capital is the difference between current assets and current liabilities. This ratio is considered as one of the best indicators for discontinuance of firms (Altman, 1983). Higher the ratio indicates good liquidity position of the company.
- B. Retained Earnings to Total Assets**- This ratio used to measure the firm's capacity to produce cumulative retained earnings from the total assets as an indicator of efficient management in terms of sales, production and other areas. Retained Earnings were that part of total earnings that were not distributed among the shareholders and reinvested over companies' entire life. Given that this ratio combines the firm's lifetime reinvested earnings and losses, the age of a firm is implicitly taken into account. Relatively young companies probably show a low ratio as compared to old one. High ratio signifies that firms have financed their assets through retained earnings instead of debt.
- C. EBIT to Total Assets** - This ratio can be used to determine the profitability and productivity of an organization. This ratio measures the efficiency with which a company's assets are used to generate income, net of taxes and interest. The ability of a company's assets to generate

income is essential to its survival. This ratio has been given the most weight possible by Altman.

- D. Book Value or Market Value of Equity to Total Liabilities-** This ratio explore the market perception. This ratio is based on market capitalization and outside liabilities. The ratio reveals the degree to which market capitalization can diminish before the liabilities exceed the assets. Book value of equity instead of market value of equity is used for a non- manufacturing company.
- E. Total Sales to Total Assets-** this variable is another important ratio that measures the overall management ability to generate sales. This ratio emphasizes the usage of all assets, including current assets, intangible fixed assets, and physical fixed assets, to generate the greatest amount of sales. A private, non-manufacturing company's Z-Score does not take this ratio into account.

Research Technique

The Altman Z-Score and Modified Altman Z''- score was used to achieve the objectives of this research with the help of following:

The original formula developed for public manufacturing companies is as follows;

$$Z \text{ Score} = 1.2 * A + 1.4 * B + 3.3 * C + 0.6 * D + 1 * E$$

and The Modified Z''-score model for emerging markets was also computed for a more precise assessment of the industry's financial health. The model has four variables and a constant. The equation reads as follows:

$$Z'' = 6.56A + 3.26B + 6.72C + 1.05D$$

Result and Discussion

To achieve the objectives of this paper Altman Z score and Modified Altman Z'' score was used which is based on five and four ratios respectively.

Descriptive Analysis

The empirical part starts with a descriptive analysis. The calculated Altman Z-scores and modified Z'' score was entered on SPSS and the table below is extracted showing the measures of central tendency, the mean, the maximum, minimum, and standard deviation. Also, the table shows the Skewness and Kurtosis.

Table 2: Descriptives

	Z score	WC to TA	RE to TA	EBIT to TA	MV to TL	S to TA	BV to TL	Z'' score
Mean	4.40	0.07	0.06	0.13	3.93	1.46	0.77	2.30
Maximum	9.03	0.29	0.17	0.30	9.94	3.48	1.56	5.05
minimum	1.21	-0.15	-0.03	-0.01	0.47	0.33	0.31	-0.01
Std. Dev.	2.18	0.14	0.06	0.09	2.31	0.93	0.36	1.55
Skewness	0.46	0.26	0.46	0.60	0.65	0.60	1.06	0.47
Kurtosis	-0.50	-1.05	-0.72	-0.65	0.29	-0.55	-0.13	-0.98

Source: Author's own work

The mean for the Altman Z score is 4.40 which is above the maximum cut off of 2.99, this shows that financial health of selected five companies was very strong and probability of filing bankruptcy was negligible. Altman Z''-scores is 2.30 which is below the maximum cut-off of 2.9 and above the minimum cut off of 1.3. This evidence that there was a moderate level of probability that the five selected logistics companies might face financial distress. Mean and standard deviation of working capital to assets ratio is 0.07 and 0.14 respectively with a negative minimum value of -0.15 and maximum value of 0.29. Likewise, retained earnings to total assets and earnings before interest and taxes to total assets also have negative minimum value with mean 0.06 and 0.13 respectively. Mean and standard deviation of market value of equity/ total liabilities (3.93, 2.31 respectively) have the maximum value among all variables. While mean and standard deviation of book value of equity to total liabilities is 0.77 and 0.36 respectively.

Data of five Indian Logistics Companies

Table 3: Five years' data of Aegis Logistics LTD.

(Values in crore)

Year	Net working capita	Retained profits	EBIT	Market value of equity	Book Value of Equity	Total Sales	Total assets	Total liabilities
2018	-194.59	70.37	123.65	8645.59	760.18	501.25	1264.11	1264.11
2019	-158.5	41.6	150.53	6778.53	820.30	707.06	1263.66	1263.66
2020	-176.99	-22.86	23.71	4736.65	1005.41	859.71	1766.1	1766.1
2021	-202.29	114.53	199.15	10482.61	1219.72	706.41	2133.58	2133.58
2022	-78.84	311.5	545.11	7214.8	1531.06	1230.34	2479.84	2479.84

Source: Author's own work

Table 4: Five years' data of All Cargo Logistics Ltd.

(Values in crore)

Year	Net working capita	Re-tained profits	EBIT	Market value of equity	Book Value of Equity	Total Sales	Total assets	Total liabilities
2018	86	-25.82	55.65	3630.15	1425.52	1198.41	2034.86	2034.86
2019	49.96	57.6	261.65	2814.44	1353.78	1528.93	2285.36	2285.36
2020	-57.65	130.91	332.16	1436.09	1471.96	1619.68	3041.38	3041.38
2021	-320.02	142.35	262.75	3031.88	1616.67	1801.76	3323.5	3323.5
2022	-8.68	292.74	485.43	8805.73	1915.93	3435.61	3622.13	3622.13

Source: Author's own work

Table 5: Five years' data of Blue Dart Ltd.

(Values in crore)

Year	Net working capita	Re-tained profits	EBIT	Market value of equity	Book Value of Equity	Total Sales	Total assets	Total liabilities
2018	155.39	99.26	240.88	8962.04	2918.96	2790.85	1867.82	1867.82
2019	161.82	51.84	145.56	8500.77	3088.8	3166.29	2055.55	2055.55
2020	-71.27	-74.05	-15.06	5217.89	2704.9	3167.16	2246.26	2246.26
2021	70.2	96.31	162.83	13226.78	3148.42	3279.89	2552.27	2552.27
2022	76.64	281.53	527.82	16282.7	4426.51	4409.07	2876.92	2876.92

Source: Author's own work

Table 6: Five years' data of Mahindra Logistics Ltd.

(Values in crore)

Year	Net working capita	Re-tained profits	EBIT	Market value of equity	Book Value of Equity	Total Sales	Total assets	Total liabilities
2018	255.67	62.19	97.68	3448.25	1188.193	3220.11	926.31	926.31
2019	292.48	71.58	130.56	3736.36	468.8153	3665.51	1137.34	1137.34
2020	216.57	39.64	95.21	1621.39	544.8223	3260.9	1348.04	1348.04
2021	247.07	13.25	49.77	4155.09	564.8214	2959.11	1605.66	1605.66
2022	108.78	6.5	58.86	3626.64	574.2616	3631.08	1869.35	1869.35

Source: Author's own work

Table 7: Five years data of T C I Express Ltd.

(Values in crore)

Year	Net working capita	Re-tained profits	EBIT	Market value of equity	Book Value of Equity	Total Sales	Total assets	Total liabilities
2018	39.56	45.5	87.3	1786.17	193.70	886.78	346.04	346.04
2019	81.43	59.45	115.65	2812.96	246.80	1026.28	381.08	381.08
2020	126.93	67.81	117.88	2096.51	337.16	1034.55	435.32	435.32
2021	154.06	92.91	134.23	3638.98	433.62	846.58	549.64	549.64
2022	188.08	98.05	172.92	6568.23	535.93	1084.08	660.23	660.23

Source: Author's own work

Following table shows the value of Altman Z score based on five ratios A, B, C, D and E for five selected logistics companies.

Table 8: Value of Altman Z score

COMPANY	YEAR	A	B	C	D	E	Z
Aegis Logistics Ltd.	2018	-0.18472	0.077935	0.322792	4.103562	0.396524	4.72
	2019	-0.15052	0.046088	0.393103	3.218522	0.559533	4.07
	2020	-0.12026	-0.01812	0.044303	1.60919	0.486784	2.00
	2021	-0.11377	0.075152	0.308025	2.947893	0.331091	3.55
	2022	-0.03815	0.175858	0.725395	1.745629	0.496137	3.10
Allcargo Logistics Ltd.	2018	0.050716	-0.01776	0.090249	1.070388	0.58894	1.78
	2019	0.026233	0.035285	0.377816	0.738905	0.669011	1.85
	2020	-0.02275	0.06026	0.360405	0.28331	0.532548	1.21
	2021	-0.11555	0.059964	0.260892	0.547353	0.542127	1.29
	2022	-0.00288	0.113148	0.442259	1.458655	0.948505	2.96
Blue Dart Express Ltd.	2018	0.099832	0.074399	0.425578	2.878877	1.494175	4.97
	2019	0.094468	0.035307	0.233683	2.481313	1.540361	4.39
	2020	-0.03807	-0.04615	-0.02212	1.393754	1.40997	2.70
	2021	0.033006	0.052829	0.210534	3.109416	1.285087	4.69
	2022	0.031968	0.137001	0.605441	3.395861	1.532566	5.70

Mahindra Logistics Ltd.	2018	0.331211	0.093992	0.347987	2.23354	3.476277	6.48
	2019	0.308594	0.088111	0.378821	1.971105	3.22288	5.97
	2020	0.192787	0.041168	0.233074	0.721666	2.418994	3.61
	2021	0.184649	0.011553	0.102289	1.552666	1.842924	3.69
	2022	0.06983	0.004868	0.103907	1.164032	1.942429	3.29
T C I Express Ltd.	2018	0.137186	0.184083	0.832534	3.097047	2.562652	6.81
	2019	0.256419	0.218406	1.001483	4.428928	2.693083	8.60
	2020	0.349894	0.218079	0.893605	2.889612	2.376528	6.73
	2021	0.336351	0.236653	0.805908	3.972396	1.540245	6.89
	2022	0.341845	0.207912	0.864299	5.969038	1.641973	9.03

Source: Author's own work

Following table shows the value of Altman Z'' score based on four ratios A, B, C and D for five selected logistics companies.

Table 9: Value of Altman Z'' score

Company name	Year	A	B	C	D	Z''
Aegis Logistics Ltd.	2018	-1.01	0.181476	0.657323	0.631427	0.46
	2019	-0.82	0.10732	0.800501	0.681607	0.77
	2020	-0.66	-0.0422	0.090216	0.597749	-0.01
	2021	-0.62	0.174996	0.62725	0.600264	0.78
	2022	-0.21	0.409498	1.477168	0.648274	2.33
All cargo Logistics Ltd.	2018	0.28	-0.04137	0.183781	0.73558	1.16
	2019	0.14	0.082165	0.76937	0.62199	1.62
	2020	-0.12	0.14032	0.733915	0.508177	1.26
	2021	-0.63	0.13963	0.531271	0.51076	0.55
	2022	-0.02	0.263473	0.9006	0.5554	1.70
Blue Dart Express Ltd.	2018	0.55	0.173243	0.866633	1.640901	3.23
	2019	0.52	0.082216	0.475864	1.577797	2.65
	2020	-0.21	-0.10747	-0.04505	1.264388	0.90
	2021	0.18	0.123016	0.428723	1.295255	2.03
	2022	0.17	0.319017	1.232899	1.61556	3.34

Mahindra Logistics Ltd.	2018	1.81	0.218868	0.708628	1.346853	4.08
	2019	1.69	0.205172	0.771417	0.432814	3.10
	2020	1.05	0.095862	0.474623	0.424367	2.05
	2021	1.01	0.026902	0.208297	0.369357	1.61
	2022	0.38	0.011335	0.211592	0.322558	0.93
T C I Express Ltd.	2018	0.75	0.42865	1.695342	0.587758	3.46
	2019	1.40	0.508573	2.039383	0.680015	4.63
	2020	1.91	0.507812	1.819704	0.813238	5.05
	2021	1.84	0.551064	1.641121	0.828373	4.86
	2022	1.87	0.484139	1.760027	0.852331	4.97

Source: Author's own work

Following table represents the average value of five selected logistics companies.

Table 10: Average Z value

Company name	Z score 2017-18	Z score 2018-19	Z score 2019-20	Z score 2020-21	Z score 2021-22	Average Z score value
Aegis Logistics Ltd.	4.72	4.07	2.00	3.55	3.10	3.49
All cargo Logistics Ltd.	1.78	1.85	1.21	1.29	2.96	1.82
Blue Dart Express Ltd.	4.97	4.39	2.70	4.69	5.70	4.49
Mahindra Logistics Ltd.	6.48	5.97	3.61	3.69	3.29	4.61
T C I Express Ltd.	6.81	8.60	6.73	6.89	9.03	7.61

Source: Author's own work



Source: Author's own work

Figure 1: Altman Z score of five selected Logistics Companies

It was observed from the above graph that according to Z score value Aegis Logistics Ltd. was in safe zone in all financial year under study except only in the 2019-20 in which the company went into grey zone because of covid- 19. All cargo Logistics Ltd. was floating in the distress zone in the financial year 2017-18, 2019-20 and 2020-21 but in the other two financial years it was in grey zone. Blue Dart Express Ltd. was financially very strong in the time period under study except 2019-20, when it was gone into grey zone because of the same reason covid 19. Mahindra Logistics Ltd. was strong company as its Z value always crossed the maximum limit of 2.99 and covid 19 did not affected the company's performance. In all five years it was in safe zone. TCI Express Ltd. was the strongest company in all under study as its average Z score value if highest in all which showed that it was in safe zone always.

Table 11: Average Modified Altman Z'' Value

Company name	Z''score 2017-18	Z''score 2018-19	Z''score 2019-20	Z''score 2020-21	Z''score 2021-22	Average Z'' value
Aegis Logistics Ltd.	0.46	0.77	-0.01	0.78	2.33	0.87
Allcargo Logistics Ltd.	1.16	1.62	1.26	0.55	1.70	1.29
Blue Dart Express Ltd.	3.23	2.65	0.90	2.03	3.34	2.43

Mahindra Logistics Ltd.	4.08	3.10	2.05	1.61	0.93	2.35
T C I Express Ltd.	3.46	4.63	5.05	4.86	4.97	4.59

Source: Author's own work



Source: Author's own work

Figure 2: Altman Z'' Score of five selected Logistics Companies

The above chart shows the result of Modified Altman's Z'' score values five logistics companies for the five financial years. It shows that Aegis Logistics Ltd. was improved its Z score value in 2021-22 to grey zone otherwise it was suffering in distress zone. All cargo Logistics Ltd. was floating in the distress zone in the financial year 2017-18 and 2020-21 but in the other three financial years it was in grey zone. Blue Dart Express Ltd. was financially strong in the time period under study except 2019-20, when it was gone into distress zone otherwise it was in grey zone. Mahindra Logistics Ltd. went into distress zone in 2021-22 while it was in grey zone in all other years. TCI Express Ltd. was the strongest company in all under study as its average Z'' score value if highest in all which showed that it was in safest zone always.

Conclusion

The results and discussion are used to forecast the financial health of five selected listed logistics company in 2017-18 to 2021-22. According to the findings of data analysis, the conclusion was:

1. According to the result of Altman Z score model TCI Express ltd. was the strongest company as it was always in safe zone having a average Z score value of 7.61.
2. According to the result of Altman Z score model All Cargo Ltd. was the weakest company as it was at most in distress zone having an average Z score value of 1.82.
3. According to the result of modified Altman Z'' score model TCI Express ltd. was the strongest company as it was always in safe zone having a average Z'' score value of 4.59.
4. According to the result of Modified Altman Z'' score model Aegis Logistics ltd. was the weakest company as it was always in distress zone having an average Z'' score value of 0.87. This happened because of using book value in fourth indicator instead of market value.
5. Based on the results and subsequent discussion, it is recommended that potential investors consider investing in the shares of TCI Express Ltd. This recommendation stems from the company's outstanding financial position, as indicated by its remarkable Altman Z score value and Modified Altman Z'' score value which highlight its strength in the market. These metrics serve as compelling indicators of TCI Express Ltd.'s robust financial standing, making it a promising and prudent choice for potential investment.
6. In 2019-20 almost all logistics companies under study went into grey zone because of covid-19 and cross boarder activities all almost negligible.
7. Distress zone will provide a warning signal to both internal and external users of financial statement in planning and decision making. Z score model have the ability to assist them for making effective strategies and control system.

Suggestions and Scope for further studies

From the above results and discussion, except for TCI Express Ltd., Mahindra Logistics Ltd. and Blue Dart Ltd. during the study period of five years 2017-18 to 2021-22, remaining two companies did not maintain the Z scores properly. It is suggested in future to explore other industries such as real estate, banking, and other manufacturing companies as well using other methods for evaluating financial health like Ohlson and Springetti. A comparative analysis of firms from different markets at different time intervals could be pursued by future researchers to widen the scope of the present research findings.

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