

Predicting financial performance of Agro Based (Tea & Coffee) Industries in India: An empirical study Using Altman Z-Score Multivariate Model

Authors

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Abstract

Globalization has changed India's economy from agrarian to service based economy. Domestic companies are getting tough competition from foreign companies. The ratio of financial sickness/ distress has increased in last few years which attracted researchers to study and predict the company performance on the basis of their financial statements. The present paper aims to predict the financial stability of Agro & allied based (Coffee & tea) Producers companies those are listed on National Stock Exchange (NSE) over the period of 2014-2018. To achieve the objective of the study, through multiple discriminant Analysis (Altman z score) model to predict the stability of the companies. The study is an attempt to analyze the sustainability and prediction of the financial stability of agro based listed companies in India. The Altman's Z score calculation method to analyses the financial health of top five agro based companies through the use of SPSS statistical software package. These companies are selected on the basis of largest market capitalization value. Thus, the finding of the study is unique and it would not only help to managers but it would provide further direction of policy formation to policy makers. The study also indicates the insolvency status in the near future. The study would help to companies to take an active stop to restructure the financial performances.

Key words: Financial health, Altman's Z score, Agro based industries, India, Tea & Coffee.

1. Introduction

Tea & coffee are most popular low cost beverage which consumed by large number of people. India is among the top tea producer countries in the world and it consumed around 70 percent of own produced tea (Majumder et al. 2010). All the economic issues related to tea production, marketing and trade activities are controlled by the Tea Board of India. According to UN Food and Agriculture Organization report of global production of tea and coffee from 1993 to 2013, India remains at second place even in 2017 (Ministry of Agriculture, 2018). Indian coffee contributed around 4.5 percent in the global production in 2009. India exports 80 percent coffee to the world (Majumder et al. 2010). There is a very high demand of Indian coffee in European economics, USA and UK etc. Indian coffees are grown in shade thus it avoids direct sunlight which makes it differ from the other coffee of the world (Neilson & Pritchard, 2010). The Indian tea and coffee industry has flourished with the induction of various technologies, quality seeds and environmental advantages from time to time (Aerts et al., 2010). Tea is most popular drink among working class whereas Coffee has high demand in elite groups thus various companies has initiated to produce tea and coffee in India. There are various reasons such as climate changes, lack of technological edge, trained worker; government supports, product demand in global markets, packaging and the net profit of companies etc. are responsible for financial distress of the company (Chattopadhyay, 2015).

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The financial health of any company or the industry at their current scenario is very important for their future business decision perspectives and the growth of the industry depends on the financial health of various companies of that industry. The slowdown in financial health is an alarming stage for the company to change their financial decision to compete and secure their business in future.

Although India is at second place in terms of tea production at world level but still the net profit of the top 20 tea producer companies are not up to the mark. Among the top five tea and coffee producing companies in terms of their market capitalization in India only first company Tata Global beverages has recorded 534.32 Rs. Cr. Net profit in 2017-18 while the Bombay Burmah beverages which is second highest in term of market capitalization with 9,712.25 crore rupees and its 207.90 crore rupees sales turn over having negative (-25.83 Rs. Cr.) net profit in 2017-18. (NSE India, 2018).

The stakeholders and investors have a great concern with the financial health of the company. In the prima facie, on the basis of net profit of the tea and coffee producing companies in India in 2017-18, it looks that various companies has facing various financial and non-financial obstacles for their growth and development. Thus there is a need to analyze the financial health and profitability of such companies so that necessary measure can be took by the competent authority to avoid the financial distress of the company.

There are various studies are available on the same methodology in academic domain but after carefully exploring various literature there is no any specific study is found which is based on the prediction of financial health of tea and coffee producing companies in India.

The present study is limited to use of only z-score analyses techniques given by Altman (Altman, 1968). There are various advance techniques for analyzing financial health more accurately can be used to further authenticate the finding of the study. The present study is based on the top six companies according to their market capital at National Stock Exchange (NSEs). This study has used the data sets from 2014 to 2018 thus the extended data sets can give clearer picture.

The main objective of the study is to analyze the financial health of top six teas and coffee production and manufacturer companies of India. The study has helped to check the financial condition of these companies. The objective of the study to check financial stability of Agro based (Coffee & tea) Producers companies in India, and provide a positive information to shareholders policy makers, promoters, and investors to take affirmative action.

The structure of the study is ordered as follows. Section 2 discusses the review of previous research studies and Section 3 discusses the research methodology part of the paper and Section 4 discusses the empirical findings of the study and finally Section 5 discusses the conclusion of the study

Table.1: Profile of Indian Tea and Coffee Producers

Company	Market Cap.(Rs.Cr.)	Sales Turnover(Rs. Cr.)	Net Profit (Rs. Cr.)	Total Assets
Tata Global Beverages	13,742.85	3,217.32	534.32	4,297.60
Bombay Burmah Trading	9,712.25	207.90	-25.83	639.26
CCL Products Ltd	3,459.39	824.66	97.76	903.03
Tata Coffee Ltd	1,812.61	705.43	62.76	1,016.14
McLeod Russel Ltd	1,446.04	1,596.34	67.26	2,653.62
Rossell Tea Limited	308.62	198.38	0.24	261.93

Sources: National Stock Exchange

2. Review of Literature

The mid of the 1960 onwards the after collapse of the multiple companies throughout the world, several studies had been developed the model to predict the financial performance of the corporate to identify the failure or distress (Bever, 1966; Altman 1968; Deikin 1972, Haldeman& Narayanan (1977), Gupta (1983), Ohlson(1980); Taffler, (1983), Shirata, (1998); Mohammed et al., (2012).

Bever (1966) framed the Uni-variate discriminate model by applying 29 financial ratios on 79 insolvency firms with 79 non-failed companies. He was selected 5 different ratios from 29 financial ratios to predict the insolvency in the company. In later stage Altman (1968) develop Zeta (Z score) model with the help of 33 failed and 33 non failed companies. The Z score model was developed through multivariate discriminant analysis to select five most important determinants to predict the failure of the companies, In 1983 L.C. Gupta develop a new model with the help of univariate and multivariate model. In 1980, Ohlson develop O- Score model used logit analysis to generate one-year prediction model.

In past three or four decade Z-score models were used as the prediction of bankruptcy risks in strategic planning (Calandro, 2007), investment decision (Sudarsanam& Lai, 2001), assets planning (Griffin & Lemmon, 2002), capital structure , credit risk evaluation (Allayannis et al., 2003; Jayadev, 2006), financial distress (Altman, 2002) and other area of research (Taffler et al., 2004).

The Contributors to informational inputs used in models predicting bankruptcy is shown in Table 2. Many Studies found better performance of Altman z-model for manufacturing companies (Grice and Ingram: 2001; Christopoulos et al. 2007). Over the past decade, the Z-score models were used as a proxy for bankruptcy risks in such areas as strategic planning (Calandro, 2007), investment decisions (Sudarsanam and Lai, 2001; Lawson, 2008), asset pricing (Griffin and Lemmon, 2002; Ferguson and Shockley, 2003), capital structure(Allayannis et al., 2003; Molina, 2005), credit risk pricing (Kao, 2000; Jayadev, 2006), distressed securities (Altman, 2002: ch. 22; Marchesini et al., 2004) and going-concern research (Citron and Taffler, 2004; Taffler et al., 2004).

The studies of predicting the financial distress by various authors are summarized in the Table:2.1

Table 2.1 :Literature Review

Author	Sample/ Country	Model	Result
Al Zaabi &Obaid (2011)	UAE context 2004 to 2007	Altman Z score	They found that Z-score model is a suitable model to measure Islamic banks' performance and the factors used in computing Z-score can be considered to give precious instrumental indicators
Lyudmila Lugovskay (2009)	Russian SMEs (2000-04)	linear discriminant analysis (LDA)	Liquidity and profitability turned out to be the key factors in predicting default. The resulting models have high predictive accuracy and have the potential to be of practical use in Russian SME lending
Kiani&Vedd (2008)	Jordan, Marketing durable goods (2002-2004)	Altman z-score Model	They have explained that the firm has increased its debt and will be facing bankruptcy in the near future. They predict that higher index leads towards higher survival, and vice-versa.
Jayaraman (2010)	Indian Steel Companies (2006-2010)	Altman z-score Model	Study revealed that all the steel companies are financially sound during the period.
Alkhaib and	Jordan, 16 non-financial and	Altman & Kida	According to their result Altman Model had advantage

Al Bzour (2011)	industrial companies (1990-2006)	Model	over the Kida Model with higher predictive ability. They suggested that Jordanian listed companies at least apply one of the models to predict corporate creditability of corporate bankruptcy.
Bahaaeddin Alareeni & Joel Branson (2013)	Jordan, 71 failed and 71 non failed companies (1989-2008)	Altman Z score	The model is generalizable in the Jordanian assessing failed industrial companies. However, the authors found that the Altman models could not provide strong indicators to differentiate between failed and non-failed companies.
Yu-Chiang & Ansell (2005)	USA, Europe and Japan, from 2000 to 2004	5 Major Financial Ratio	They used Total Assets as Scale Measure and results that results showed that the Z Score model had sound prediction performance one year and two years before financial distress and Has constructed a model based which proved to have sound classification performance
Chandana Gunathilaka (2014)	Sri Lanka, 82 firms listed in Colombo Stock Exchange, 2008-2012	Altman's and Springate's Z-score models	The study signifies that Altman Z- model shows a higher degree of discrimination in identifying financial distress. The study indicates the level of care required in solvency test-based decision making
Ijaz et.al (2013)	Data From Karachi Stock Exchange, 2009-2010	Altman's Z-Score and current ratio	The results of the study showed that current ratio and Altman's Z-Score are the reliable tool of assessing financial health of sugar sector listed companies of Karachi stock exchange. This study further explores that there are financially distressed companies among sugar sector listed companies.
Aziz & Dar (2006)	Reviewed 89 studies on prediction of bankruptcy between 1968-2003	Various Ratio	They found that the multivariable models (Z-Score) and logit were the most popular in the 89 studies.
Chung et al. (2008)	ten failed finance companies during 2006-2007 in New Zealand	insolvency predictive ability of different financial ratios	They found that four of the five Altman (1968) ratios, one year prior to failure, were superior to other financial ratios for predicting corporate insolvency
Prakash & Rajput (2017)	India, Hospitality Companies NSE, 2013-2017	Altman Z score	Implication of Z score to predict the financial distress in hospitality industry in India
Panayotis Alexakis	Greece Stock Exchange (1995-2006), Construction companies	Altman Z score	The result concluded that Altman Z score model had higher accuracy ratio to predict the financial distress among the companies.
Eden & Meir (2007)	Shamir Salads (which collapsed in 2005) data for 2003 and 2004	Various Ratio	Prove that the Altman indicators clearly show that the companies are in financial distress.
Odipo & Itai (2011)	10 failed firms of Kenyan market	90% successful prediction of the model.	10 non-failed firms analyzed, 9 of them proved that Edward Altman's financial distress prediction model was successful indicating a 90% validity of the model
Gerantonis, Vergos & Christopoulos (2009)	373 companies out of which 45 were bankrupted, listed on the Athens Stock exchange, period of 1999-2006	Various Ratio	They investigated whether Zscore models can predict bankruptcies for a period up to three years earlier and show that Altman model performs well in predicting failures.
Vergos & Christopoulos et al (2006)	Greek telecom company failures	Altman Z score	Something that leads to incorporation of probability of failure in company prices, and respective company Altman z-score that are affected by market price of shares, well before the company will declare bankruptcy. Altman is useful in predicting
Hillegeist et al. (2002)	516 bankruptcy filings between 1979 to 1997	Altman Z score	Altman's Z-Score by introducing a unique discrete hazard methodology and compared the risk-neutral default probability
Back et al. (1996)	11 papers to reexamine 31 financial ratios	Logit regression and neural networks.	No consensus has been built on the best technique and the most significant explanatory variables.
Altman & Narayanan (1971)	identify financially stressed companies	Various Ratios	No statistical method was consistently dominant
Smith & Winakor (1935)	183 failed firms from a variety of industries	Various Ratio	Working Capital to Total Assets was a far better predictor of financial problems

Sources: Various Authors

3. Research Methodology and Data Source

The first multivariate quantitative model for predict the financial distress/bankruptcy is Altman Z score mode, developed in 1968 (Altman, 1968). He has used a set of 22 financial ratio in multivariate concern finally came up with 5 that had the best result, when applied together. The model was modified in the later stage, 1993, 2000, and 2002. Altman's Z-Score model used multivariate discriminant analysis to select the five most significant variables for measuring the financial distress of firms.

The discriminant function is as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

Where:

X_1 = Working Capital/Total Assets

X_2 = Retained Earnings/Total Assets

X_3 = EBIT/Total Assets

X_4 = Market Value of Equity/Total Liabilities

X_5 = Sales/Total assets

Definition

- **Working capital to total assets ratio (X_1)**, which measures a company's ability to cover its short-term obligations. An increasing working capital to total assets ratio is a positive sign of improvement in company's liquidity over time, whereas a decreasing ratio is a negative sign indicating that the company is not having enough working capital relative to total liabilities. Insolvent firms generally have a negative working capital and that poses great danger because any cash coming into the business will be utilized to pay off debts, which reduce the availability of funds to carry out day-to-day operations of the business.
- **Retained earnings to total assets ratio (X_2)**, is calculated to assess the ability of the company to accumulate earnings relative to its total assets. Over time, the retained earnings to total assets ratio of the company should increase revealing that the company is successful in continually retaining the earnings. On the other hand, if it is showing a decreasing trend over the years then the company is not in a position to retain earnings, which is a negative sign. The retained earnings of a company are protection against losses but usually insolvent firms will not have this protection because they have accumulated losses.
- **Return on total assets ratio (X_3)**, shows the earnings of the company before interest and tax against the total assets of the company. This ratio is an indicator of how effectively the company is able to generate the earnings by utilizing its assets before the obligations are paid off. Generally, insolvent firms will have a negative Return on total assets ratio.

- **Market value of equity to Book value of total debt(X_4)**, measures how much the assets of the company may reduce in value but still leave the firm in a position to cover the debts. It indicates the extent to which the debt is covered.
- **Assets turnover ratio(X_5)**, helps in understanding efficiency of the company is deploying its assets for generating revenue. A higher ratio shows that the company is performing well in deploying its assets for generating revenue. If the ratio is decreasing, it is not good sign.

The value Z Altman established a guideline Z score which can be used to classify firms as either financially sounds – if a score above 2.99. If the score in between 1.81 to 2.99 known as grey zones indicate that companies moving/ headed towards bankruptcy. If the Z scores are below 1.81 the company falls in distress zone. The lower the score, the greater is the likelihood of bankruptcy and vice-versa. Based on the Scores Altman divided the study units into Zones of “SAFE”, “ GREY”, and „DISTRESS” zones

3.1 Data Source

The Annual financial data has been used for the period of 2014-18. The company values are depicted on 31st March on every financial year. The data and statement pertained from the National Stock Exchange (NSE), India. The selected on the basis of the market capital of the coffee and tea producing companies listed on the NSEs.

4. Data analysis and interpretation

Table: 4.1; Descriptive Analysis

	X_1	X_2	X_3	X_4	X_5	Z
Maximum	.24406	.12569	.201101	3.82889	.9977	3.7736
Minimum	-.01084	-.01525	.030642	.76660	.3827	.90907
Mean	.0991	.06182	.10733	2.1204	.6531	2.4844
Std. Dev.	.10086	.05500	.06369	1.1221	.2075686	1.13104
Skewness	.375	-.265	.351	.338	.617	-.299
Kurtosis	-1.662	-1.760	-1.137	-.379	1.241	-1.801

X1: WCTA; X2: RE/TA; X3: EBIT/TA; X4: MC/TL

The Table No 1 depicted the arithmetic mean of the independent variables of the study, such as X_1 (Working capital/Total assets), X_2 (Retained Earnings/Total Assets), X_3 (Earnings before Interest and Taxes/Total Assets), X_4 (Market value of Equity/Total Liabilities) and X_5 (Sales/Total Assets) means respectively are (.0991, .06182, .10733, 2.1204 and .6531) respectively and standard deviation of that variables are (.10086, .05500, .06369, 1.1221 and .2075). The dependent variable Z (Altman z- score) mean is 2.4844 and standard deviation is

1.1310. The minimum and maximum ranges show that there are the differences in liquidity, profitability and performance of the companies within the study period.

Table: 4.2; Pearson Correlation Matrix

	X ₁	X ₂	X ₃	X ₄	X ₅	Z
X ₁	1					
X ₂	.896	1				
X ₃	.853	.978	1			
X ₄	.702	.770	.651	1		
X ₅	.620	.853	.901	.398	1	
Z	.858	.961	.896	.917	.712	1

X1: WC/TA; X2: RE/TA; X3: EBIT/TA; X4: MC/TL.

The correlation between variables of the model were depicted in the table 2, there is strong positive correlation between dependent variable Z and independent variables X₁ (r=0.858), X₂ (.961), X₃ (.896), X₄ (.917) and X₅ (.712).

4.1 Financial Ratio Analysis

The calculation of the variables with year wise and all companies are mentioned in the Table 4.3

Table: 4.3; Financial Ratio Result

Tata Global Beverage							
Year	X ₁	X ₂	X ₃	X ₄	X ₅	Z	Zone
2013-14	0.088015	0.120997	0.169107	2.295905	0.706515	2.916418	Grey
2014-15	0.106328	0.079055	0.104834	2.166651	0.765305	2.648753	Grey
2015-16	0.090922	0.138667	0.169888	2.477203	0.734206	3.083663	safe
2016-17	0.11905	0.062507	0.098581	5.997797	0.676563	4.830252	safe
2017-18	0.313002	0.109219	0.150673	6.206874	0.640141	5.389358	safe
Average	0.143463	0.102089	0.138617	3.828886	0.704546	3.773689	Safe
Bombay Bumrah							
2013-14	0.095699	0.009993	0.055982	1.074849	0.520511	1.478469	Distress
2014-15	-0.02876	0.010437	0.054885	0.620594	0.346264	0.879499	Distress
2015-16	-0.09596	-0.05523	-0.00043	0.563374	0.393804	0.537541	Distress
2016-17	-0.00328	-0.00453	0.042632	0.862324	0.361156	1.008593	Distress
2017-18	-0.0219	-0.03693	0.000143	0.71188	0.291919	0.641242	Distress
Average	-0.01084	-0.01525	0.030642	0.766605	0.382731	0.909069	Distress
CCL Products							
2013-14	0.120867	0.134284	0.211691	1.855139	1.084464	3.22808	Safe
2014-15	0.16388	0.125208	0.201043	2.113786	1.08256	3.385138	Safe
2015-16	0.120248	0.128985	0.205519	2.368882	1.049019	3.472387	Safe
2016-17	0.237609	0.140409	0.226885	3.211555	0.972366	4.128749	Safe
2017-18	0.196126	0.09957	0.160365	1.535954	0.800299	2.625027	Grey
Average	0.167746	0.125691	0.201101	2.217063	0.997742	3.367876	Safe
Tata Coffee							
2013-14	0.23056	0.12064	0.173359	2.160876	0.703646	3.017121	Safe
2014-15	0.208773	0.107243	0.159301	2.525463	0.678884	3.119845	Safe
2015-16	0.230364	0.097234	0.140368	2.556991	0.656399	3.065715	Safe
2016-17	0.301281	0.118878	0.162628	3.275545	0.632958	3.66229	Safe
2017-18	0.249334	0.052384	0.07366	3.311	0.559416	3.161075	Safe

Average	0.244062	0.099276	0.141863	2.765975	0.646261	3.205209	Safe
McLeod							
2013-14	-0.03464	0.083072	0.114798	3.278281	0.574934	2.994887	Safe
2014-15	0.005074	0.023826	0.045849	2.642675	0.525763	2.301589	Grey
2015-16	0.025647	0.00509	0.040605	1.902964	0.518069	1.831227	Grey
2016-17	0.010694	0.010108	0.043888	1.365059	0.461181	1.451568	Distress
2017-18	0.075254	0.020368	0.076965	1.214355	0.473556	1.574499	Distress
Average	0.016405	0.028492	0.064421	2.080667	0.510701	2.030754	Grey
Rosell India							
2013-14	-0.07231	0.096649	0.177844	1.505735	0.651921	2.190133	Grey
2014-15	-0.00419	0.020485	0.065218	1.333432	0.654376	1.69265	Distress
2015-16	0.036122	0.040637	0.080636	1.280673	0.670983	1.805052	Distress
2016-17	0.08236	-0.00542	-0.00828	0.57242	0.663892	1.070589	Distress
2017-18	0.127645	0.000917	0.021274	0.625459	0.744252	1.343445	Distress
Average	0.033925	0.030653	0.067338	1.063544	0.677085	1.620374	Distress

Source: Self Computation

Discussion:

On the basis of above financial output, the Altman Z score model has been calculated to find out the status of the company in the period 2014-2018. The Z scores between these periods was 2.91 to 5.38 and average Z score was 3.77 implicated that the Tata Global Beverage company financial position has been in safe zone. The safe zone indicates that the company's financial performance is safe and not has financial irregularities for the future. The all financial ratios are in the healthy condition; hence company is in the safe position.

The company Bombay Bumrah financial position has been in distress zone, the company Altman score 1.47 to 0.90 throughout the study period. The financial liquidity, retained earning position has been poor; the negative working capital leads to more liabilities rather than assets. The distress zone indicates that the company financial position is weak and may declare as bankrupt in near future.

The Company CCL product financial position in the safe zone throughout 2014-18 but in 2018 the weak liquidity and retained earning leads to company towards the grey zone, company must have to take immediate step and reduce the expenditures in future to include again in safe zone. The Company Tata Coffee Altman Z score is more than 3 which has shown than the strong financial position of the company throughout the 2014-18; hence company is in the safe position and strong liquidity and retained earning position. The company McLeod Altman score in 2014 was 2.99 and gradually reduced to 1.57 in 2018, from safe zone to distress zone. The company weak financial position leads to company move towards distress zone in 2017 & 2018. The company should take immediate step to reduce the financial burden before bankrupt. The Company Rosell India Altman Score was 2.19 in 2014 which reduced to 1.34 in 2018, weak and negative liquidity ratio leads to company to move towards the bankruptcy in recent years.

4.2 Consolidated status of the companies

After the analysis of the sampled tea & coffee companies in India, it has found that almost 50% companies in safe zone in 2014 but in 2018 only 33.33% of the companies in the safe zone while percentage of distress companies increased from 2014(16.66%) to 50% in 2018. We can conclude from the result that most of the companies headed towards the distress / bankrupt in the coming years.

Table 4.4; Result Summary

	2014		2015		2016		2017		2018	
Type of Zone	No	%	No	%	No	%	No	%	No	%
Safe	3	50	2	33.33	3	50	3	50	2	33.33
Grey	2	33.33	2	33.33	1	16.66	0	0	1	16.66
Distress	1	16.66	2	33.33	2	33.33	3	50	3	50

Source: Self Computation

5. Conclusion

The Altman Z score model is one the best and suitable measure to verify the credit risk management of companies throughout the world. This model is based on the empirical result and can be used for the prediction of companies insolvency position, as well as monitoring the financial position of the companies being risk managed. The Altman model can effectively and robustly reduce financial crunch of the companies. This study confined the prediction and measure the financial performance of the Agro based listed (tea & Coffee) companies in India. The study concludes that fifty percentages of the companies are in the position of financial distress, however some of them are in the grey and safe zone. According to the model, those companies in the distress zone need to apply for rehabilitation from sickness and manage their working capital expenditure through adopting various measures. The present model helps to shareholders, policymakers and management of the companies to take a corrective step to reduce the distress/bankruptcy position of the companies.

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