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Financial efficiency analysis using Altman Z score model for selected seed and fertilizer companies in India

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Abstract
To be able to feed the expanding populations in our nation and the rest of the world, fertilisers and seeds are needed in ever-increasing amounts. Huge investments in the input industry have been planned and approved by the Indian government. Input businesses are numerous and active in India. Profitability is one of the key requirements for any firm looking to stay in business. The value of the company will be maximised and its overall risk will be reduced by careful research of the financial stability of companies. With the help of the data that are now accessible on the four Indian seed and four fertiliser firms that were chosen, an effort has been made in the current study to assess the financial risk involved with the company. Indian seed company of choice. specifically, Kaveri Seed Company Ltd.(KSCL), JK Agri Genetics Ltd.(JKAGL), Shree Ganesh Biotech Ltd.(SGBL), Mangalam Seeds Ltd.(MSL) and Indian fertilisers company of choice. Specifically, National Fertilisers Ltd.(NFL), Coromandel International Ltd.(COROMANDEL), Chambal Fertilisers and Chemicals Ltd.(CHAMBLFERT), Deepak Fertilisers and Petrochemicals Corporation Ltd.(DFPCL). The information was gathered during a ten-year period, from the financial years 2011–12 to 2020–21.This paper aims to investigate the reliability of Altman Z-score model in predicating the possibility of financial failure that threaten agriculture input industry in India, at least a year before its occurrence. To figure out the financial efficiency of the various seed and fertilizers companies, Altman Z score model was used for the study. The study revealed that in seed companies three companies were in safe zone and one company was in grey zone. In fertilizer companies it was found that three companies were in grey zone and one company was in distress zone. The financial health of the companies was analysed.

Keywords: Fertilizer, seeds, agriculture, financial, Altman Z score, profitability, financial health

1. Introduction
The most fundamental and important component of sustainable agriculture is seed. The quality of the seeds has a significant impact on how the other inputs respond. Depending on the crop, it is estimated that the direct contribution of high-quality seed to overall production is between 15 and 20 percent, with the potential to increase to up to 45 percent with effective management of other inputs. The Indian Fertilizer Industry has experienced enormous expansion over the past 50 years and currently holds the third-place position globally. After China, India is the country that uses the most fertiliser. India also comes in at number two for the production of phosphatic fertilisers and number three for nitrogenous fertilisers, but it imports most of the potash it needs because its stocks are so little. Urea, DAP, and MOP are the principal imports into India.

The research problem of this study states that compared to other areas of the country's economy, agriculture poses much higher risks. In order to eliminate these risks and sustain as well as improve their competitiveness, agricultural holdings must accurately diagnose critical aspects and monitor the growth of particular financial indicators. Assessing the financial condition of agriculture input companies and diagnosing critical situation through effective models like Altman Z score helps in determining the bankruptcy situation in the earlier stages and addressing them using diverged options. Accurate and timely diagnosis of agricultural companies will improve the financial health and eliminate the negative effects. There are factors that are similar to those in other sectors, such as a high level of corporate indebtedness and the associated high interest rates, the lower level of profitability in the recession phase, etc. However, specific factors include those that have adverse environmental effects (droughts, floods, frost, etc.)

As it relates to the financial stability or health of business entities, bankruptcy is one of the most crucial topics in the field of corporate finance. (Taffler, 1983) [10]. Financial report analysis can be used to anticipate a company's "survival" opportunity to provide early warnings about financial difficulty or bankruptcy risk. The bankruptcy risk was one of the topics that attracted a lot of attention starting in the 1960s. Verifying the bankruptcy risk analysis has been a major topic of numerous studies conducted globally. (Vikash, 2018).

Different Z-score calculations are made to accommodate various enterprise features. In this study, the authors evaluated the bankruptcy risk of multidisciplinary enterprises and by business types using the Z-score index. The elements influencing the firms' risk of bankruptcy were estimated by the study through the assessment. The research's findings were anticipated to reveal the factors that influence bankruptcy risk, assist businesses in making decisions, and offer a solid foundation for governmental organisations looking to implement business assistance regulations.

Review of Literature

Sanesh (2016) [9] attempted to evaluate the NIFTY 50 companies, excluding banks and financial companies, based on the Altman Z-score.The score uses the company's most recent financial facts to attempt to predict the likelihood that a company would default due to financial difficulties.

Based on Z score research, Vikas Tyagi (2014) [12] looked into the logistic industry's financial health in India. It demonstrates how thriving the Indian logistics sector was. It is encouraging that the average Z score increased from 2.54 to 3.01 between 2006 and 2010, when the global recession impacted India's economy. This shows that the Indian logistics industry performed well overall.

Gerantonis Vergos and Christopoulos (2009) [5] looked at whether Z-score models might forecast bankruptcies up to three years in advance. The outcomes demonstrated that the Altman model did a good job of forecasting failures. They came to the conclusion that the findings may be used by regulatory agencies, portfolio managers, and firm management in making financial decisions.

To assess each share's risk of financial hardship, Chowdhury and Barua (2009) [4] applied the Z score model to the Z category shares traded on the DSE. To compute Z-score, they used data from 53 companies between the years 2000 and 2005. They said that although the Altman's Z score model may not be entirely applicable for businesses in Bangladesh, it nevertheless demonstrates its strong validity and accuracy in predicting the distressed condition of Z category companies.

In a study using the Altman and Kida models, Alkhatib and Al Bzour (2011) [3] investigated the role of financial ratios in predicting insolvency in Jordanian listed companies. They recommended that one of these highly credible models for predicting corporate insolvency should at least be used by the Jordanian listed companies.

(Nuryanah *et al*., 2021) [8] The study specifically examined the financial performance of the agricultural businesses from a microeconomics point of view. The results of a quantitative analysis that looked at Indonesian listed firms from 2003 to 2018 reveal that the majority of those agricultural companies were not sustained because they were in the bankruptcy zone. They discovered that effective corporate governance practises and financial literacy are crucial for managers of agricultural sectors to maintain the sustainability of agriculture.

Leonardo and Jaime (2003) concluded that the Z-score index had good predictability of bankruptcy risk of Italian manufacturing enterprises.

Seven commercial companies in Sri Lanka had their bankruptcy risk predicted using the Z-score using data collected over a five-year period between 2010 and 2014. (Niresh & Pratheepan, 2015) [7].

Apoorva, Curpod, and Namratha (2019) [2] demonstrated that in India the capacity of Z-score to predict the failure of firms three years in advance.

Zheng Gu and Luyuan Gao (2011) in their study generated a multivariate discriminating model for forecasting the failure of hospitality firms. In classifying the in-sample firms into bankrupt and non-bankrupt firms, the model has a 93% accuracy rate. According to the model, financially struggling businesses with debt—especially short-term debt—are more likely to file for bankruptcy. These companies' rapid rise in sales and expansion may make them more likely to file for bankruptcy.

Research Objective

To determine the financial efficiency of seed and fertilizer companies in India using Altman Z score model.

Data and Research Methodology

Secondary data was collected from various sources like www.nseindia.com, www.moneycontrol.com, www.bseindia.com, and financial statements of the respective companies. Time series data was taken for nine years from 2012-13 to 2020-21.

Altman Z score model was used to estimate the financial efficiency of the few selected Agri input companies.

Altman Z Score model

A numerical statistic called Altman's Z-Score is used to forecast a company's likelihood of declaring bankruptcy during the next two years. In order to assess the financial stability of businesses, American finance professor Edward Altman created the model in 1968.Besides, the Z model has become simplicity in the calculation, transparency and accuracy consistently over the years, the Z model has been verified and compared to a large number of studies interms of accuracy of classification and prediction and practice in finance and accounting for over fifty years.The Z model has advantages over other models due to its use for all industrial, manufacturing and non-manufacturers. In addition, the Z model also uses bankruptcy risk prediction for enterprises that are not publicly listed firms and there is no big difference between firms operating in different industries due to no consideration to sales/total assets (Altman, 2018).

$$Z = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E$$

Where

A = working capital / total assets

B = retained earnings / total assets

C = earnings before interest and tax / total assets

D = market value of equity / total liabilities

E = sales / total assets

Zones classification

$Z > 2.90$ = safe zone

$1.23 < Z < 2.90$ = grey zone

$Z < 1.23$ = distress zone

Result and Discussion

Table 1: Z scores of Agri input companies

Agri Input Companies	Nameof Companies	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Average
Seed	KSCL	2.48	3.11	4.98	6.04	3.70	3.45	3.83	3.47	3.21	3.81
	JKAGL	1.86	1.36	1.93	2.18	1.92	2.02	2.42	2.26	1.74	1.97
	SGBL	1.49	1.63	1.68	1.63	2.02	4.93	10.8	2.35	2.32	3.21
	MSL	2.08	1.72	2.27	7.67	5.25	6.42	4.41	3.35	2.76	3.99
Fertilizer	CORO	2.49	2.12	2.36	2.32	2.05	2.51	2.82	3.10	3.60	2.60
	CHAMB	1.99	1.55	1.74	2.12	1.76	1.99	1.96	1.56	1.82	1.83
	DFPCL	2.45	2.20	2.65	2.27	1.29	1.94	2.19	2.08	1.66	2.08
	NFL	1.10	0.45	0.36	0.41	0.58	0.88	0.96	0.80	1.11	0.74

1. Kaveri Seed Company Ltd.(KSCL)
2. JK Agri Genetics Ltd.(JKAGL)
3. Shree Ganesh Biotech Ltd.(SGBL)
4. Mangalam Seeds Ltd.(MSL)
5. Coromandel International Ltd.(CORO)
6. Chambal Fertilisers and Chemicals Ltd.(CHAMB)
7. Deepak Fertilisers and Petrochemicals Corporation Ltd.(DFPCL)
8. National Fertilisers Ltd.(NFL).

From the table 1 we can see the z scores of 8 companies over the years. In seed companies three companies were in safe zone and one company was in distress zone. In seed companies MSL outperformed all the other three companies in terms of financial efficiency. An average z score of 3.99 shows how they handled their assets and liabilities efficiently. MSL performed the best from 2015 to 2019. The next company in seed sector which performed well is KSCL which shows that their financial health has been stable over the years. SGBL is another seed company whose average z score was about 3.21 over the past nine years. We get to see these best performing companies had poor performance and showed a poor ratio during 2020-21 below their average. It might be because of the pandemic the agriculture sector was hit badly due to covid restrictions on transportation, communication etc., JKAGL is a company which was in grey zone with an average z score of 1.97. This means that the company has a moderate chance of bankruptcy in the near future and it is a caution sign for the investors. The other three companies are in safe zone which means they are in healthy position with solid financial health and had very less likelihood of approaching bankruptcy in the next few years.

In fertilizer sector companies, among the four companies three companies were in grey zone and the other one company was in distress zone. CORO had an average z score of 2.60, DFPCL had an average z score of 2.08 and CHAMB had an average z score of 1.83.CORO had been performing better over the past three years as we can see from their z score and there might be no chances of bankruptcy in the next few years, their average is affected because of their poor performance in the earlier years. The DFPCL and CHAMB had been performing fairly for the past three years and are in grey zone. There are chances that there are moderate chances of bankruptcy. The poor performing company among the four was NFL whose average z score was about 0.74. The company was in distress zone over the past few years as we see all their z score are below 1.23. This company pose a large risk of heading towards bankruptcy in the next few years which shows their poor financial health.

Discussion

The study's findings are crucial for reducing financial and other corporate risks for both agricultural organisations and other institutions. The outcomes of these analyses allow for a wider correlation between empirical findings from practise and current scientific understanding of agricultural company financial situation predictions. In order to make a more thorough examination of the financial health of businesses in the agriculture sector in India, we advise processing data for a longer period of time in future studies. Additionally, attention should be given to additional factors that might be pertinent to the problem of disparate economic performances of agricultural input companies.

Conclusion

The fundamental financial health of a business firm is the main concern for the stakeholders. On the basis of the financial soundness, they take a decision regarding their possible involvement with a particular firm. The Altman Z score is the best measurement that can shape the decision of the stakeholders. Altman's model assessed the state of the financial health of the companies and categorized them into different zones and predicted their future chances of bankruptcy. The study revealed that in seed companies three companies were in safe zone and one company was in grey zone. In fertilizer companies it was found that three companies were in grey zone and one company was in distress zone. So, the findings of the study can be useful for the managers to take financial decision, the stockholders to choose investment options and others to look after their interest in the concern seed and fertilizer companies of the country

Future scope

It is possible to conduct more research on the study's components. The focus of the current study was only on bankruptcy models (Altman z score model). Further analysis can be made by comparing the altman mode with other models like Taffler model and Bonity index. By examining the effect of profitability and liquidity ratios on this model, research can be furthered. Only eight agricultural input firms that were the subject of the current study. By examining an industry's performance in light of the same factors as those examined in the current study, it is possible to conduct further research on the subject.

Application of Research: Helps the seed and fertilizer companies to improve their financial performance and get rid

of bankruptcy. And also for investors to make decisions about investing in particular companies.

Research Category: Finance

Abbreviations: Kaveri Seed Company Ltd.(KSCL), JK Agri Genetics Ltd.(JKAGL), Shree Ganesh Biotech Ltd.(SGBL), Mangalam Seeds Ltd.(MSL), Coromandel International Ltd.(CORO), Chambal Fertilisers and Chemicals Ltd.(CHAMB), Deepak Fertilisers and Petrochemicals Corporation Ltd.(DFPCL), National Fertilisers Ltd.(NFL).

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