

## Financial Performance of Selected Dairy Co-operatives in Punjab (India): An Analysis with Z Score Model

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### Abstract

White Revolution (Operation Flood), played an important role to make India self-sufficient in milk. The cooperative system considered as main contributor, around 190 thousand dairy cooperative associations were existed in India and the maximum i.e more than 66 thousand—were located in the north. Which is a remarkable accomplishment for the nation's north. Punjab ranks first in per capita availability of milk, with 1221 grammes per day in 2020–21, and is sixth in milk output. As a result, it is critical to assess the dairy cooperatives' current performance. The current study attempts to evaluate the growth and financial health of the selected dairy business in Punjab State for the years 2015–16 to 2020–21 using the Altman Z score model. The examination of the data shows that, during the research period, the dairy business shows an acceptable growth and this sector was either in the grey area or was almost in the safe area. Our study is intended to assist strategists in making wise investment choices by assisting them in aligning their business strategies with market dynamics.

**Keywords:** Financial performance, Growth, Punjab, Dairy Industry

### Introduction

Millions of individuals worldwide who work in the dairy value chain depend on milk and other dairy products for their livelihoods. In 2021, the amount of milk produced worldwide—roughly 81% cow milk, 15% buffalo milk, and 4% of goat, sheep, and camel milk combined—increased by 1.1% to reach 887 Mt. This increase was primarily caused by an increase in production in India and Pakistan, where rising dairy herd numbers and abundant fodder supplies were made possible by favourable monsoon rains. The India's milk production has increased from 16.07% of the world to 27.37%. This expansion shows that our nation's enormous potential has been greatly utilised over the past year by the dairy industry. It also demonstrates that as

India's participation has increased, the relevance of the dairy movement in India has increased in the Indian economy with the intention of lowering the cost of milk and its by-product.

The share of Punjab in India's milk production has increased during the year 2005-06 to 2020-21. it is raised from 9.18 percent to 63.81 percent which indicated a splendid growth. Finally, we can say that the share of Punjab in India's milk production has increased during the study period and further this provide an important contribution of the dairy industry in state as well as nation' economy (National Dairy Development Board).

**Table-1: Share of India in in milk production**

Country	2010	2015	2016	2017	2018	2019	2020	2021	2022
World	724.14	812.92	822.24	842.9	866.35	876.83	887	925	930
India	116.43	146.31	155.5	165.4	176.3	187.7	198	210	254.6
% share of India in global milk production	16.07	18.00	18.91	19.62	20.35	21.40	22.37	22.70	27.37

*Source: Compiled by Researcher*

Because of high potential of dairy industry in the state therefore an attempt was made to study the growth and financial performance of selected dairy industry in Punjab.

### Review of Literature

**Nema and Iyroudi (2022)** investigates the use of Solvency Forecasting models to assess a cooperative dairy firm's performance in comparison to the market leader in fresh milk, an other local dairy company with a comparable volume, and the dairy sector. **Grushniene (2016)** used Altman's Z-score model to the three publicly traded Lithuanian agricultural enterprises in order to predict insolvency. According to the study, the model accurately categorises businesses into "safe" and "grey" zones, providing the stakeholders with preliminary information. Additional research into the financial and nonfinancial components that make up Z-score may yield more data for predicting a firm's performance." **Chadha (2016)** gave information on Kuwait's degree of financial difficulty. The severity of the situation demonstrates that businesses need to undergo significant change and that their processes are not efficient. Laws governing bankruptcy are necessary for businesses that are struggling. This investigation paves the way for future study by identifying the most lucrative investment areas and forecasting the State of Kuwait's correct bankruptcy rates. **Fijorek and Grotowski (2012)** projected that businesses from European nations would fail. According to the report, European nations have given their corporations access to appropriate resources and cutting-edge technology, which has improved their

performance relative to South Asian nations. Numerous research suggest that businesses in South Asian nations are having financial difficulties.

### Methodology

In present research, 7 dairy units of Punjab Verka plant Amritsar, Verka Plant Ludhiana, Verka plant Gurdaspur, Verka plant Jalandhar, Verka plant Mohali, Verka plant Sangrur and Verka plant Patiala selected by using convenient sampling method. The study is based on secondary data which is collected from the published annual reports of the firms for period from 2015-16 to 2020-21. To study the performance of selected units of dairy industry Altman's Z score is calculated.

### Estimation of Z score formula

To thrive in the sector, the units' financial standing is crucial. It is also used to determine the units' financial standing. Edward I. Altman (1968) developed the "Z" score analysis to assess the overall trend of an enterprise's financial health over time. Five typical business ratios are combined linearly and weighted by coefficients to create the Z-score. The coefficients were calculated by selecting a group of companies that had filed for bankruptcy, then selecting a sample of companies that had survived that was matched by industry and approximate size (assets). Altman used a dataset of publicly traded manufacturers to use the statistical technique of discriminant analysis. Originally based on information from publicly traded manufacturers, the estimation has recently been updated using additional datasets for private manufacturing, non-manufacturing, and service firms.

In this paper, the financial health of the co-operative dairy units has been measured with the help of following equation.

$$Z = 0.012X_1 + 0.014X_2 + 0.33X_3 + 0.006X_4 + .999X_5$$

Whereas

Z indicated Overall index

X1 = The ratio of Working Capital to Total Assets Ratio

X2 = The ratio of Net profit to Sales Ratio

X3 = The ratio of Net Profit to Total Assets Ratio

X4 = The ratio of Equity to Debt Ratio

X5 = The ratio of Sales to Total Assets Ratio

The criteria set forth by Altman can be used to categorise businesses as being insolvent or financially sound. Altman's healthy zone recommendations.

Possible Situation Z Score Zones as follow;

- I. Z score Below 1.8 Bankruptcy zone and its failure is Certain
- II. Z score lies between 1.8 to 3.0 Healthy zone which meant that situation is uncertain to predict
- III. And where Z score is 3.0 and above, indicated that units are in too healthy zone and not to fall

## Data Analysis and Results

**Table-2: Altman's Ratios of Verka Plant Amritsar**

Year	WC/TA ratio	NP/Sale Ratio	NP/TA Ratio	EQ/Debt Ratio	Sales/TA Ratio
2015-16	-0.58	0.01	0.01	0.19	3.25
2016-17	0.02	0.01	0.01	0.12	2.01
2017-18	0.48	0.00	0.00	0.92	0.73
2018-19	-0.32	0.01	0.01	1.36	1.11
2019-20	-0.41	0.01	0.01	1.26	0.97
2020-21	-0.34	0.01	0.01	1.33	1.12

*Compiled by researcher*

It is clear from the above table that the working capital total assets ratio is increasing but in negative figures and net profit to total assets ratio and net profit to sales ratios not showing satisfactory results which indicated poor profitability of Amritsar verka plant. Further equity debt ratio is improving in the last years of study whereas sales to total assets ratio show fluctuating results during the study period. Thus the overall growth of the Amritsar plant is declining during the period of the study and its ratios are also show very poor performance so they need to take corrective action for the improvement of their financial performances

For Verka plant, Amritsar the ratio is calculated and presented with the Zones as per the Altman's model as under:

**Table-3: Altman's Z Score for Verka plant, Amritsar**

Year	Z score
2015-16	3.25
2016-17	2.01
2017-18	0.74
2018-19	1.11
2019-20	0.98
2020-21	1.12
S.D	0.48
Variance	0.23

*Source: Compiled by Researcher*

It is clear from the above table that the performance of the **Verka plant, Amritsar** is not good as the Score of the firm is in red zone for 4 out of 6 years and in grey zone for period 2016-17. Although its performance was in green zone in the year 2015-16 but this dairy unit was unable to keep the same level of their financial performances for further years of the study. The Altman's Z score is fluctuating for the dairy unit during the study period and it need to improve it.

In case of verka plant, Gurdaspur the following table shows that the working capital total assets ratio is declining from positive to negative and in case of net profit to sales an improvement was observed from negative to positive whereas in case net profit to total assets ratios there is stability during the study period but have positive results. Equity to debt ratio also showing stable result from 2015-16 to 2018-19 but after that increase during last two years, sales to total assets ratio first decrease but later it is increasing. The overall growth of the Verka Plant Gurdaspur is improving during the last period of the study.

**Table-4: Altman's Ratios of Verka Plant Gurdaspur**

Year	WC/TA ratio	NP/Sale Ratio	NP/TA Ratio	EQ/Debt Ratio	Sales/TA Ratio
2015-16	0.47	-0.05	0.01	0.01	2.98
2016-17	0.35	-0.07	0.01	0.01	1.99
2017-18	0.15	-0.07	0.01	0.01	2.63
2018-19	-0.18	0.00	0.01	0.01	2.97
2019-20	-0.16	0.00	0.01	0.03	2.33
2020-21	-0.46	0.00	0.01	0.04	2.79

*Compiled by researcher*

For Verka plant, Gurdaspur the ratio is calculated and presented with the Zones as per the Altman's model as under:

**Table-5: Altman's Z Score for Verka plant, Gurdaspur**

Year	Z score
2015-16	2.98
2016-17	2.00
2017-18	2.63
2018-19	2.97
2019-20	2.33
2020-21	2.79
S.D	0.38
Variance	0.15

*Compiled by researcher*

Further its observed from the above table that the performance of verka plant, Gurdaspur was not too good during the study period because it fall into grey zone during the whole study period with S.D 0.38 and variance 0.15 but the trend of the Z score showing an improvement almost in maximum years i.e. Altman Z score improving during the last years and it need to improve it by corrective measures.

Next in case of verka plant, Jalandhar, all ratios showing improvement in last years which indicated that overall growth is improving of this dairy unit but in case of working capital which is moving from positive to negative need more attention as compare to other component of Altman's ratios.

**Table-6: Altman's Ratios of Verka Plant, Jalandhar**

Year	WC/TA ratio	NP/Sale Ratio	NP/TA Ratio	EQ/Debt Ratio	Sales/TA Ratio
2015-16	0.475	0.013	0.039	0.098	6.848
2016-17	0.349	0.011	0.028	0.149	4.850
2017-18	0.154	0.006	0.009	1.315	1.626
2018-19	-0.177	0.009	0.008	1.026	1.586
2019-20	-0.165	0.007	0.008	0.921	1.755
2020-21	-0.458	0.009	0.013	3.751	3.068

*Compiled by researcher*

For Verka plant, Jalandhar the ratio is calculated and presented with the Zones as per the Altman's model as under:

**Table-7: Altman's Z Score for Verka plant, Jalandhar**

Year	Z score
2015-16	6.86
2016-17	4.86
2017-18	1.64
2018-19	1.59
2019-20	1.76
2020-21	3.09
S.D	1.41
Variance	1.99

*Compiled by researcher*

It is clear from the above table that the performance of the verka plant, Jalandhar is not good as the Score of the plant is in Red zone for 3 out of 6 years. Even its performance was in green zone in the year 2015-16 ,2016-17 and again after red zone in last year its in green zone but S.D and variance of this plant is higher thus there is need to take corrective measures to improve and maintain the balanced performance level.

The following table showing results of verka plant, Ludhiana. Ludhiana which is a hub of industry in Punjab but its observed from the following results that the overall growth of this dairy unit in Ludhiana is not good because all component of Altman's ratio indicating lower results and even in case of Altman's Z score in initial two year of the study, the unit was in green zone and after this for next three years it totally fall into red zone. Although, in the last year of study this unit showing an improvement but at a lower rate than initial years with very high S.D 3.12 and variance 9.76 which indicate that the situation of this unit is not stable. First in order to improve the performance we need to stabilise the unit.

**Table-8: Altman's Ratios of Verka Plant, Ludhiana**

Year	WC/TA ratio	NP/Sale Ratio	NP/TA Ratio	EQ/Debt Ratio	Sales/TA Ratio
2015-16	0.67	0.01	0.05	1.03	4.10
2016-17	-2.38	0.01	0.03	0.75	8.60
2017-18	0.63	0.01	0.01	4.79	1.31
2018-19	0.64	0.01	0.01	4.09	1.32
2019-20	0.07	0.00	0.02	3.18	1.75
2020-21	-0.39	0.01	0.02	2.44	2.02

*Compiled by researcher*

For Verka plant, Ludhiana the ratio is calculated and presented with the Zones as per the Altman's model as under:

**Table-9: Altman's Z Score for Verka plant, Ludhiana**

Year	Z score
2015-16	4.13
2016-17	8.58
2017-18	1.35
2018-19	1.36
2019-20	1.77
2020-21	2.04
S.D	3.12
Variance	9.76

*Compiled by researcher*

It is clear from the following table that the overall ratios of Altman' is showing improvement in whole study period and almost all components showing improvement either at increasing or decreasing rate. The overall growth of the verka plant, Mohali is better than other Verka plants in Punjab.

**Table-10: Altman's Ratios of Verka Plant, Mohali**

Year	WC/TA ratio	NP/Sale Ratio	NP/TA Ratio	EQ/Debt Ratio	Sales/TA Ratio
2015-16	0.13	0.01	0.04	0.33	4.96
2016-17	0.11	0.01	0.05	0.65	6.64
2017-18	-0.11	0.01	0.02	1.15	3.29
2018-19	0.09	0.01	0.02	1.18	3.01
2019-20	0.14	0.01	0.02	1.12	3.27
2020-21	0.19	0.01	0.02	1.36	3.35

*Compiled by researcher*

For Verka plant, Mohali the ratio is calculated and presented with the Zones as per the Altman's model as under:

**Table-11: Altman's Z Score for Verka plant, Mohali**

Year	Z score
2015-16	4.97
2016-17	6.66
2017-18	3.30
2018-19	3.02
2019-20	3.29
2020-21	3.37
S.D	1.53
Variance	2.34

*Compiled by researcher*

Further from the above table its observed that for the whole period of study this plant is in green zone but not at stable rate i.e Altman's score is declining after 2015-16 and 2016-17 and S.D and variance was 1.53 and 2.34 respectively which is an alarming point for the higher authority.

**Table-12: Altman's Ratios of Verka Plant, Patiala**

Year	WC/TA ratio	NP/Sale Ratio	NP/TA Ratio	EQ/Debt Ratio	Sales/TA Ratio
2015-16	0.76	0.01	0.01	0.32	2.32
2016-17	0.07	0.01	0.02	0.69	6.32
2017-18	-0.01	0.00	0.00	0.18	1.09
2018-19	0.00	0.00	0.00	0.19	1.09
2019-20	0.02	0.00	0.01	0.33	1.76
2020-21	0.00	0.00	0.01	0.28	1.39

*Compiled by researcher*

The above table showing results of Verka Plant, Patiala, its observed from the table figures that all Altman's ratios not showing an impressive result and overall growth is declining as the ratios showing falling trend.



For Verka plant, Patiala the ratio is calculated and presented with the Zones as per the Altman's model as under:

**Table-13: Altman's Z Score for Verka plant, Patiala**

Year	Z score
2015-16	2.33
2016-17	6.33
2017-18	1.09
2018-19	1.10
2019-20	1.76
2020-21	1.39
S.D	2.25
Variance	5.06

*Compiled by researcher*

Further, it is clear from the above table that the performance of the verka plant, Patiala is very poor as the Score of the unit is in red zone for 4 out of 6 years and in grey for 1 year with S.D 2.25 and variance 5.06 . Even its performance was in green zone in the year 2016-17 but it was unable to keep the same level of their financial performances for next years. Thus, the Altman's Z score is indicating that for the survival of this unit the higher required to take corrective measures for the survival of this unit.

**Table-14: Altman's Ratios of Verka Plant, Sangrur**

Year	WC/TA ratio	NP/Sale Ratio	NP/TA Ratio	EQ/Debt Ratio	Sales/TA Ratio
2015-16	-1.30	0.01	0.02	0.02	3.59
2016-17	-0.28	0.00	0.01	0.01	1.24
2017-18	-0.46	0.00	0.01	0.53	1.31
2018-19	-1.10	0.00	0.01	0.88	1.62
2019-20	-1.14	-0.04	0.01	0.76	1.63
2020-21	-1.53	-0.09	0.01	0.60	1.67

*Compiled by researcher*

In case of Sangrur verka plant, again the situation is not good as observed from the above table because all indicators either showing negative or declining trend. Thus, its conclude that the overall growth is declining during selected study period. Further as shown in the table the Altman Z score also pointing that the performance of this unit is worst so its necessary for the policy makers and higher authority to take corrective measures for the survival of this unit in the future.

For Verka plant, Sangrur the ratio is calculated and presented with the Zones as per the Altman's model as under:

**Table-15: Altman's Z Score for Verka plant, Sangrur**

Year	Z score
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2015-16	3.58
2016-17	1.24
2017-18	1.31
2018-19	1.61
2019-20	1.62
2020-21	1.65
S.D	0.19
Variance	0.03

*Compiled by researcher*

## Conclusion

It is concluded that the financial health of the selected units except Verka plant, Mohali was not good. Almost all the selected units fell either in red or in grey zone as per Altman's score. Although the state has a strong base of dairy but due to weak base in processing, the value addition is low in the state. Kaur, H, et. al., (2022) investigated in their study that the maximum quantity i.e. 31.39 litres per day per farm (69.39 per cent) was sold as liquid milk; however, about 8.16 litres (18.04 per cent) of the milk was used for manufacturing of milk products. Thus, for the better utilisation of raw milk, the dairy industry especially the cooperative sector should be strong. But from the above analysis, it is observed that the cooperative sector in Punjab is not performing farer financially. As we know that milk is a perishable product, it needs more care and to increase its shelf life requires high technology and fully automated units which can be possible only if units are financially strong and receive full support from the Government of the day and other stakeholders. Thus, the dairy co-operatives sector of Punjab being the backbone of milk sector in Punjab need to improve financial health for its bright future as well as that of overall food processing industry.

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