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Chief Editor

Prof. (Dr.) Pavnesh Kumar

Editors

Dr. Alka Lalhall
Dr. Svati Kumari
Mr. Kamlesh Kumar

Department of Management Sciences
Mahatma Gandhi Central University Bihar

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Prof. (Dr.) Sanjeev Kumar Sharma
Honourable Vice Chancellor,
Mahatma Gandhi Central University,
Motihari, Bihar

MESSAGE

In present era, organizations have faced several new challenges that they had not encountered earlier. The management as a discipline of study has become more important than ever. Several factors have been significantly influencing management practices today; such as pace of change in technology adaption, human resource practices and change in global business scenario. How can management practices and principles manage these new challenges in the changed organizational and business environment?

We must understand that society, politics, economy and technology are changing at an unprecedented rate. The current situation presents a unique challenge for management professionals. At one place, managers need predictability and stability to develop and implement plans/strategies effectively. However on the other, they need adaptability and flexibility to respond to challenges and opportunities.

One of the major factors driving the change is the widespread use of computers and information technology in almost every area of application and human interface. It has been predicted that robots will perform almost half of the present jobs in the next twenty years.

I take immense proud in sharing that the Department of Management Sciences of Mahatma Gandhi Central University (MGCU), Motihari, East Champaran, Bihar is taking substantial and significant initiatives in reflecting on the advances in Business, Management and Technology in the form of this E-conference. I am delighted to know that a conference proceeding is being published for this e-conference.

I must congratulate the faculty members of Department of Management Sciences for taking this initiative and being the part of this grand exercise of extreme academic significance. I am sure such initiatives will immensely be helpful in conceptualizing and strategizing for the new world shaping up after the pandemic and will help in transforming India into a formidable force and into the hallowed position of "Vishwa Guru".

My sincere good wishes to all the academicians attended this event. I hope this literary event becomes a grand success.

Foreword

The twenty first century is a knowledge driven with the Blend of information & technology, where the knowledge is the only power and its use is the only way to lead the world. Any institution is known by the knowledge it creates and how it disseminates the same among the students and society.

It should therefore be the role of any university, institution or college to cultivate the culture of exploring various dimensions of knowledge and its application by assisting the students to apply their learning to solve the problems of the society where they reside. Any such idea, theory, product or exercise has to be tested in the field and the results so obtained, verified, analyzed and interpreted to create new paradigm of knowledge as an application, if the field trial is successful, or else it must be assessed why the trial has failed getting to the bottom of the resons of failure and what learning can be derived from the same. Failure is the best and most important step to success- if we know why we failed, and then resolve to correct them and once again attempt to try our experiment. This is the only way forward, for progress, growth and development.

I am happy to share that Department of Management Sciences, MGCUB is providing a high-level interactive platform through "NCABMT-2021" for the wide range of topics to create a multi-disciplinary, multi-speciality and multi-dimensional interaction space for the researchers, academicians, industry expert and specialist mentors.

My sincere greetings to the organizers, authors, editors, and publisher for making this endeavour of "NCAMBT-2021" successful as a knowledge gatherings sharing and documenting event to be cherished and treasured by the scholars, students and researchers.

Chief Editor

Acknowledgement

About the Conference

This two days National E-Conference through virtual mode on "Advances in Business Management & Technology" aims to bring together the academicians, professionals students, researchers and other stake holders from Management, Commerce & Economics field to share their expertise and experiences in providing a series of focused research achievements that will benefit the academic world and industry services. It will also facilitate discussion on business and organizational environment that will expedite nation's growth and stability. It will help to bridge the gap between academic wisdom and practical knowledge. Furthermore, with the advent of new normal and focus on FDI reforms, and innovations in information & technology, there has been a significant increase in international mobility of human capital, knowledge, technology and materials. Globalisation, economic and monetary integration as well as global financial crisis are the prominent factors affecting macro as well as microeconomic business environment. As the world habituates itself with the 'new normal', there may be some of the unexplored avenues of innovation in the field of management and its allied practices that will help in generating the necessary momentum and propel an equitable and sustainable growth? The conference will also be a platform to share the innovative practices in the pre and post COVID-19 era.

List of Contributors

Farida Siddiqui	Professor, Department of Economics, Maulana Azad National Urdu University, Hyderabad, Telangana
Saumya Jain	Assistant Professor, Shaheed Sukhdev College of Business Studies, University of Delhi, Delhi
Prof. C.P. Gupta	Professor, Department of Finance & Business Economics, University of Delhi, Delhi
Priyanka Naik	Assistant Professor, Goa Business School, Goa University, Taleigao Plateau, Goa
Y.V. Reddy	Senior Professor, Goa Business School, Goa University, Taleigao Plateau, Goa
Dr. Himanshu Agarwal	Associate Professor, Faculty of Commerce and Business Administration, Deva Nagri College, Meerut, U.P.
Rashid	Research Scholar (JRF), Faculty of Commerce and Business Administration, Deva Nagri College, Meerut, U.P.
Dr. Shobhit	Assistant Professor, Amity University, Tashkent
Shashank Srivastav	JRF in commerce, M.com (Finance), DAV P.G. College, Banaras Hindu University, Varanasi, U.P.
Dr. Anoop Pandey	Professor, Hemvati Nandan Bahuguna Garhwal University, BGR Campus, Pauri, Uttarakhand
Ms. Anupama Gupta	Research Scholar and Faculty, Bharati Vidyapeeth Institute of Management and Research, New Delhi
Dr. Jaya Chawla	Assistant Professor, Government Mahamaya College, Ratanpur, C.G.
Dr. Shishir Pandey	Director, Bhavdiya Institute of Management, Ayodhya, U.P.
Dr. Awadhesh Kumar Verma	Professor, Bhavdiya Institute of Business Management, Ayodhya, U. P.
Dr Sangeet Ranguwal	Department of Economics and Sociology, PAU, Ludhiana, Punjab
Dr. Parminder Kaur	Department of Economics and Sociology, PAU, Ludhiana, Punjab
Hardita P. Dhamelia	Assistant Professor, R.K. University,Rajkot, Gujarat
Smita Dikshit	Research Scholar, University of Allahabad, Allahabad, U. P.
Dr. A.C. Pandey	Assistant Professor, University of Allahabad, Allahabad, U. P.
Mr. Ashok Kumar Meena	Research Scholar, Central University of Rajasthan, Ajmer, Rajasthan

Dr. Sushila Soriya	Assistant Professor, Central University of Rajasthan, Ajmer, Rajasthan
Dr. Divya Deep Singh	Assistant Professor, Faculty of Management & Business Studies, Dr. K.N. Modi University, Newai, Tonk, Rajasthan
Dr. Shishir Kumar Jha	Associate Professor, Ramjas College, University of Delhi, Delhi
Diksha Jha	Ph.D. Scholar, Shiv Nadar University, Greater Noida, U.P.
Ms. Gurleen Kaur	Ph.D. Scholar, IKG Punjab Technical University, Kapurthala, Punjab
Dr. Sanjeev Bansal	Assistant Professor, IKG Punjab Technical University, Kapurthala, Punjab
Dr. Pavnesh Kumar	Professor & Dean, Pandit Madan Mohan Malaviya School of Commerce & Management Sciences, Mahatma Gandhi Central University, Bihar
Mr. Siddhartha Ghosh	Ph.D. Research Scholar, Dept. of Management Sciences, Mahatma Gandhi Central University, Bihar
Mr. A. Appu	Assistant Professor, MEASI Institute of Management, Chennai, Tamil Nadu
Dr. S.G. Balaji	Associate Professor, MEASI Institute of Management, Chennai, Tamil Nadu
Anitabh Kakoty	Research Scholar, Department of Commerce, Nagaland University, Kohima Campus, Nagaland
Dr. Ratan Kaurinta	Associate Professor, Department of Commerce, Nagaland University, Kohima Campus, Nagaland
Dr. Rashmita Ray	Assistant Professor, Department of Social Work, Mahatma Gandhi Central University, Motihari Bihar
Prof. Asutosh Pradhan	Professor, Department of Social Work, Central University of Himachal Pradesh, Dharamshala, H. P.
Ms. Swaroopa Mahapatra	PG Student, Vasanta College for Women, Banaras Hindu University, Varanasi, U.P.
Ms. Anusha Bhagawatula	Manager – HRBP, Cultfit Healthcare Pvt Ltd, Hyderabad, Telangana
Ravindra Kumar	Ph.D Scholar, Department of Management Sciences, Mahatma Gandhi Central University, Motihari, Bihar
Arun Kumar	Assistant Professor, Department of Management Sciences, Mahatma Gandhi Central University. Motihari, Bihar
Mrs. S. Sumiya	Assistant Professor, MEASI Institute of Management , Chennai, Tamil Nadu
Ms. S. Jasmine Monisha	Second Year MBA Department, MEASI Institute of Management , Chennai, Tamil Nadu
Dr. Preeti Tanna Taunk	Assistant Professor (Commerce), Govt. Paluram Dhananiya Commerce and Arts College, Raigarh, Chhattisgarh
Dr. Sachin Kumar	Assistant Professor, Department of Electronics & Communication Engineering, Amity School of Engineering & Technology, Amity University, Lucknow Campus, U.P.
Dr. Pooja Khanna	Assistant Professor, Department of Computer Science Engineering, Amity School of Engineering & Technology, Amity University, Lucknow Campus, U.P.
Dr. Pragya	Assistant Professor, Department of Chemistry, MVPG College, Lucknow University, U.P.
Anshu Kesharwani	Research Scholar, Department of Commerce, Nehru Gram Bharti (Deemed to be University), Kotwa -Jamunipur, Dubawal, Prayagraj, U.P.
Dr. Rajesh Kesari	Professor, Department of Commerce, Nehru Gram Bharti (Deemed to be University), Kotwa -Jamunipur, Dubawal, Prayagraj, U.P.

Dr. Vasudha Kumar	Assistant Professor, Institute of Management Sciences, University of Lucknow, Lucknow, U. P.
Ms. Shruti Aurora	Institute of Management Sciences, University of Lucknow, Lucknow , U. P.
Chandel Saumya	Research Scholar, Babasaheb Bhimrao Ambedkar University, (A Central University), Lucknow, U. P.
Prof. Khan M.S	Dean, School of Management and Commerce, Babasaheb Bhimrao Ambedkar University, (A Central University), Lucknow, U. P.
Dr. Bharat Pareek	Assistant Professor, Department of Business Administration, S.S. Jain Subodh P.G. (Autonomous) College, Jaipur, Rajasthan
Ms. Ankita Kumari	Research Scholar, Department of Management Sciences, Mahatma Gandhi Central University, Motihari, Bihar
Rohit Gupta	Ph.D. Scholar, Department of Management Sciences, Mahatma Gandhi Central University, Motihari, Bihar
Prof. Sudhir Kr Sahu	Head, Department of Management sciences, Mahatma Gandhi, Central University,Motihari, Bihar

◤CHAPTER11

A Study of Performance Analysis of Selected Airways Companies Using Z-Score and Zmijewski Model

Hardita P. Dhamelia

Assistant Professor, R.K. University, Rajkot, Gujarat

ABSTRACT

The financial position of the company depends on the adequate availability of the funds and proper utilization of the funds which helps the company to progress. Financial Analysis and Financial Statements are the two main tools which can help to plan the future availability and utilization of the firm. The present research report is based on the financial performance analysis of selected Airways companies with the help of Z-Score Model and Zmijewski Model. The Z-Score Model was developed by Edward Altman in 1968 and Zmijewski Model was developed by Mark E Zmijewski. The researcher has used the model to analyze the solvency status of the of the selected Airways Companies. Mainly The present research is based considering the Secondary Data of the companies. The data had been collected from financial statements of the companies and from different websites like moneycontrol.com, rediffmoney.com and annual reports of the selected companies. In present study the companies from Airways Industry have been considered by the researcher. The companies were selected by Lottery Method by the researcher. The researcher will apply two independent Sample T -Test. The researcher found that models help and guide a lot in knowing the solvency status of the companies. The researcher also concluded that models could help a lot to the management in taking various decisions.

Keywords: Solvency, Financial Analysis, Financial Statements, Z-Score Model, Zmijewski Model

INTRODUCTION

The success of any company depends on effective financial practices which starts from proper procurement of funds and ends by proper utilization of funds, this is possible when the financial activities of the firms are analyzed. Thus, financial planning, financial analysis and financial statements helps the firms to know the strength and weakness of the companies. So, after financial planning, financial analysis is the crucial step for a company to be successful. The main tool for financial analysis is the financial statements of the companies. Financial Analysis is a process, combination and summarization of financial and operational data represented in the financial statements with a view to get an insight into the operational activities of a business concern. As per Helfert Erich A. "The main purpose of financial analysis is to provide reasonable clues and answers to specific questions posed by problems of interest to analyst. It cannot be over emphasized that financial analysis is not an automatic or standardized process, rather it is flexible approach tailored to suit the needs of the specific

situations." Financial Statement is an original collection of data arranged according to logical and consistent accounting principles. Financial statements are prepared from the accounting records maintained by the firms. Financial statements are the end products of the financial accounting process.

INTRODUCTION TO Z-SCORE MODEL

Z-Score Model has been established by Edward Altman in the 1960s, he was an assistant professor of finance at New York university during that period. The model was prepared by Altman based on the research work done by considering the data of banks and have provided the bankruptcy model. In his study he considered 22 ratios and finally stated or formed the model considering 5 ratios which help to measure bankruptcy of the firms. This model helps to evaluate the general trend in the financial health of an enterprise over a period. Many accounting ratios are used to know financial health of the enterprise. Edward Altman established Z-Score model, he combined many accounting ratios (liquidity, leverage, activity and profitability) to form an index of profitability. A lower score of Z-Score Models depicts higher odds of bankruptcy. The model helps to analyze the financial solvency status of the firms and helps to take correct decisions regarding not entering the solvency Zone or Distress Zone, with the help of parameters given by Edward Altman.

Edward has developed different Models for Different Business and Firms.

The original model was developed further to know the financial soundness and financial solvency status of the private firms.

Table- 1

Model	Parameters	Description
Z- Score Estimated for Private Firms **$Z= 0.717 X_1 + 0.847 X_2 + 3.107 X_3 + 0.420 X_4 + 0.998 X_5$**	**Z > 2.9 Safe Zone** **1.23 < Z < 2.9 Grey Zone** **Z<1.23 Distress Zone**	X_1 = Working Capital / Total Assets X_2 = Retained Earnings / Total Assets X_3 = Earnings Before Interest and Tax / Total Assets X_4 = Book Value of Equity / Total Liabilities X_5 = Sales / Total Assets

INTRODUCTION TO ZMIJEWSKI MODEL

This model is a probit model adopted by Zmijewski in 1984 by using 40 bankrupt and 800 non-bankrupt industrial firm's data for the period from 1972 to 1978. It is a model used to predict firm's bankruptcy in 2 years.

Zmijewski Model = $-4.336 – 4.513X1 + 5.679X2 + 0.004X3$

X1 = Net Income / Total Assets

X2 = Total Liabilities / Total Assets

X3 = Current Assets / Total Liabilities

If the Score is greater than or equal to 0.5 than company is considered as bankrupt or financially distressed.

If the Score is less than 0.5 than company is considered as Solvent.

LITERATURE REVIEW

Altman, E. (1968) has studied the theory of Traditional Ratio Analysis and Multiple Discriminant Analysis with the help of this method the researcher has developed Z-Score Model combining the ratios. The researcher has taken into consideration 66 corporations with 33 firms in each group. The researcher has analyzed the several factors which affect the firms. To measure the financial soundness the researcher has derived Z-Score Model. The researcher has reached the conclusion that discriminant ratio model proved to be accurate in predicting bankruptcy perfect in 94% of the sample of 1st 33 units and 95% of all firms in the bankrupt and non-bankrupt groups assigned to their actual group classification. The researcher also suggested the practical and theoretical implications of model. The researcher also told that the subject need to further researched and investigate the problems and even the model.

Pakdaman, H. (2018), the researcher in the paper titled "Investigating the ability of Altman and Springate and Zmijewski and Grover Bankruptcy Prediction Models in Tehran Stock Exchange" has researched with a motive to know which prediction model among Altman, Springate, Zmijewski or Grover will be best to predict the financial conditions of the companies listed in Tehran Stock Exchange. The researcher even wanted to know the financial status of the company and issue of the continuity of their activities. The research was also undertaken

so that it can help the stakeholders to take better decisions. The researcher has taken into consideration the data of 35 companies from textile and ceramic industry group which have been listed on the Tehran Stock Exchange. The researcher has taken into consideration the data of 5 years to study and find the results which test will be best to prove the financial crises of the company. The researcher has considered the time period between 2011-2016 for the study. The researcher has collected the data from the financial statements of the company. The researcher has framed 8 hypotheses to further know which model can help to predict the financial crises of the companies. The researcher has used Correlation test to examine the significance of each bankruptcy Model and further have used multiple Linear Regression to find out the best fit Model. The researcher found that Grover Model was the best Model for forecasting financial crises in Tehran Stock Exchange. The researcher also suggested that Stock Exchange should be organized in order to provide the data as per Grover Bankruptcy Pattern and even auditors can use this model in predicting and commenting for the future continuity of the companies listed on Tehran Stock Exchange.

Panigrahi, A. (2019) the researcher in the paper titled "Validity of Altman Z Score Model is predicting financial distress of Pharmaceutical Companies" aims to examine the financial distress status and financial health of some selected pharmaceutical companies using Altman Z- Score Model. The researcher has taken into consideration the data of 4 pharmaceutical companies for the study i.e. Aurobindo Pharma, Lupin Pharma, Dr. Reddy's Laboratories and Sun Pharma. The researcher has taken the data of 5 years for the study i.e. 2012-13 to 2016-17. The researcher has collected the data from annual reports and from the website moneycontrol.com. The researcher has used Z-Score Model to analyze the data. The researcher has done calculations as per Altman's Z-Score test for solvency Analysis. The researcher has even calculated average of the industry calculating upon 5 ratios that are considered in Z-Score Model. The researcher has calculated the average Z-Score of the pharmaceutical industry which shows that pharmaceutical industry is financially sound. The researcher also concluded saying that the highest average was of Dr. Reddy's followed by Lupin Pharma, Sun Pharma and lastly Aurobindo Pharma. The researcher also concluded that study shows Aurobindo Pharma was found in Distress Zone in 2013-14 than probably they were able to reach the safe zone by 2016-17. The researcher has also said that this research would be helpful to investors in making certain decisions on which they can decide the current and future position of the company. The researcher in the concluding remarks added that if the risk of default and bankruptcy increases when a firm adopts more aggressive working capital policies which shows that company may be facing bankruptcy and serious financial crisis.

Yadav, C. and Pallapothu, V. (2015) the researcher in the paper titled "Predicting Bankruptcy: An Empirical Study Using Multiple Discriminant Analysis Models" have researched on predicting the best MDA model which accurately predicts the bankruptcy. The researcher has analyzed the data using 2 MDA models – Altman Z-Score Model and Springate Model. The researcher also aims to find and help the users to make the right choice among the model to find the solvency status of the companies. The research was also undertaken with an objective to the analyze the dimension and to get an idea in which area improvement is needed. The researcher also wanted to find out whether healthy companies are performing significantly as compared to non-healthy companies using statistical tools. The researcher has considered a sample of 45 companies for the study. The researcher has collected the data from the financial statements of the companies. The researcher has considered the data of 5 years for the study. The researcher has used T-test to analyze the data. The researcher has performed T-Test on the values of Z-Score and Springate Score of healthy and Distress companies. The researcher concluded that Altman Z-Score is more conservative in nature.

OBJECTIVES OF THE STUDY

1) To study the solvency status of companies using Z-Score and Zmijewski Model
2) To compare the performance of Selected Sample units by comparing Z-Score and Zmijewski(X-SCORE)

RESEARCH METHODOLOGY

Hypothesis of the study

The following Hypothesis were formulated for the study.

H_0 – There is no significant difference in the variances.

H_0 – There is no significant difference in Z-Score of Spice Jet and Jet Airways

H_0 – There is no significant difference in the variances.

H_0 – There is no significant difference in X-Score of Spice Jet and Jet Airways.

Title of the Study

The title of the study is as under

A study of performance analysis of selected airways companies using Z-Score and Zmijewski model

Sample Size

The study is undertaken by considering the data of different companies associated with Airways Industry. The study includes Spice Jet and Jet Airways companies.

Method of Data Collection

The researcher has used secondary data for the analysis. The details of different ratios are taken from www.moneycontrol.com. The details have been collected from the Annual Reports of the company. The researcher has considered the data of last 5 years for the study from 2014 to 2018.

Tools and Techniques

The researcher has used statistical tools for analysis and interpretation of calculated Z-Score and Zmijewski of 2 Airways companies. The researcher has used T-Test to analyze the difference and to test the hypothesis.

Limitations of Present Research Paper

The main limitations of the present research project are.

1) The method of data collection is secondary, so the analysis has been done from the data that has been available in the financial statements of the company.
2) The data has been collected for 5 years only so the result is not applicable for coming years.
3) The outcomes are only available for the above companies and not the other companies.

Analysis and Interpretation

Z-SCORE ANALYSIS

TABLE – 2: A table showing calculation of Z-Score of Spice Jet

Z Score = $0.717X_1+0.847X_2+3.107X_3+ 0.420X_4+ 0.998X_5$					
Year	$0.717X_1$	$0.847X_2$	$3.107X_3$	$0.420X_4$	$0.998X_5$	Z Score
2014	-0.513	-0.458	-0.933	0.057	2.107	0.260
2015	-0.527	-0.720	-0.708	0.065	1.977	0.087
2016	-0.490	-0.487	0.541	0.065	1.750	1.378
2017	-0.425	-0.342	0.461	0.070	2.023	1.786
2018	-0.378	-0.132	0.485	0.060	1.859	1.894

TABLE – 3: A table showing calculation of Z-Score of Jet Airways Limited

Z Score = $0.717X_1+0.847X_2+3.107X_3+ 0.420X_4+ 0.998X_5$					
Year	$0.717X_1$	$0.847X_2$	$3.107X_3$	$0.420X_4$	$0.998X_5$	Z Score
2014	-0.7780	-0.2576	-0.7321	0.0023	1.8276	0.0622
2015	-0.7084	-0.3988	-0.1027	0.0021	1.8761	0.6683
2016	-0.5906	-0.2817	0.5461	0.0022	1.8853	1.5612
2017	-0.4931	-0.6084	0.3843	0.0025	2.1481	1.4335
2018	-0.4086	-0.4995	-0.0529	0.0024	1.7820	0.8234

Table – 4: A Table Showing Overall Interpretation of Z- Score

Year	2018	2017	2016	2015	2014
SpiceJet Airways	1.894 **(Grey Zone)**	1.786 **(Grey Zone)**	1.378 **(Grey Zone)**	0.087 **(Distress Zone)**	0.260 **(Distress Zone)**
Jet Airways Ltd.	0.823 **(Distress Zone)**	1.433 **(Grey Zone)**	1.561 **(Grey Zone)**	0.668 **(Distress Zone)**	0.062 **(Distress Zone)**

DESCRIPTIVE ANALYSIS

Table – 5: A Table showing Descriptive Statistics.

COMPANY		N	Mean	Std. Deviation	Std. Error Mean
Z-SCORE	Spice Jet	5	1.081	0.853	0.381
	Jet Airways	5	0.909	0.609	0.272

The above table 4 shows the mean, standard deviation, standard Error Mean values of the selected Airways Companies. The Table shows different means of the companies based on the Z-Score calculated by the researcher, among the 2 selected companies Spice Jet shows the highest mean as compared to Jet Airways.

STATISTICAL ANALYSIS

Table – 6: A Table showing results of T-Test.

		Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F	2.013	
	Sig.	0.194	
T-test for Equality of Means	T	0.366	0.366
	Degree of freedom	8	7.237
	Sig (2-tailed)	0.724	0.725
	Mean Difference	0.1716000	0.1716000
	Std. Error Difference	0.4685534	0.4685534
	Lower	-0.9088860	-0.9290397
Interval	Upper	1.2520860	1.2722397

H$_0$ – There is no significant difference in the variances.

To check the equality of variances the researcher has used Levene's Test for Equality of Variances. As the F- Value is more than significant value, it shows that hypothesis is Accepted.

As the hypothesis is accepted researcher has used the result of equal variances assumed for checking the result of another hypothesis.

H$_0$ – There is no significant difference in Z-Score of Spice Jet and Jet Airways Company

As per the Levene's test for equality, the result shows no significant difference in the variances. Further results of T-test show significant value is more than T-Test, so the hypothesis is accepted. So, the result of T-test shows that there is no significant difference among the Z-Score of Spice Jet and Jet Airways Company

Zmijewski Score Analysis

TABLE – 7: A table showing calculation of X-Score of Spice Jet Airways

X Score = -4.3360 - 4.513X1 + 5.679 X2+ 0.004X3				
Year	X1	X2	X3	X-Score
2014	9.5295	7.6520	0.000467	-6.21
2015	18.8781	11.3642	0.000076	-11.85
2016	33.1031	15.5114	0.000013	-21.93
2017	67.0942	18.6702	0.000003	-52.76
2018	125.0018	18.8648	0.000001	-110.47

TABLE – 8: A table showing calculation of X-Score of Jet Airways Limited

X Score = -4.3360 - 4.513X1 + 5.679 X2+ 0.004X3				
Year	X1	X2	X3	X-Score
2014	8.2646	13.3922	0.0008	0.7924
2015	15.5364	32.0058	0.0002	12.1336
2016	29.3488	68.5566	0.0001	34.8718
2017	63.1718	143.5515	0.0000	76.0438
2018	112.7971	226.9004	0.0000	109.7673

From both the above tables it can be interpreted that X-Score value is more than 0.5 so both the companies are bankrupt and financially distressed.

DESCRIPTIVE ANALYSIS

Table – 9: A Table showing Descriptive Statistics.

Company		N	Mean	Std. Deviation	Std. Error Mean
X-SCORE	Spice Jet	5	-40.644800	42.9760502	19.2194739
	Jet Airways	5	46.721800	45.4993650	20.3479346

The above table 8 shows the mean, standard deviation, standard Errors X-Score values of the selected Airways Companies. The Table shows different means of the companies based on the X-Score calculated by the researcher, among the 2 selected companies Jet Airways shows the highest mean as compared to Spice Jet.

STATISTICAL ANALYSIS

Table – 10: A Table showing results of T-Test.

		Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F	0.100	
	Sig.	0.760	
T-test for Equality of Means	T	-3.121	-3.121
	Degree of freedom	8	7.974
	Sig (2-tailed)	0.014	0.014
	Mean Difference	-87.3666000	-87.3666000
	Std. Error Difference	27.9897592	27.9897592
Interval	Lower	-151.9111005	-151.9111005
	Upper	-22.8220995	-22.8220995

H_0 – **There is no significant difference in the variances.**

To check the equality of variances the researcher has used Levene's Test for Equality of Variances. As the F- Value is more than significant value, it shows that hypothesis is Accepted.

As the hypothesis is accepted researcher has used the result of equal variances assumed for checking the result of another hypothesis.

H_0 – **There is no significant difference in X-Score of Spice Jet and Jet Airways Company**

As per the Levene's test for equality, the result shows no significant difference in the variances. Further results of T-test show significant value is more than T-Test, so the hypothesis is accepted. So, the result of T-test shows that there is no significant difference among the Z-Score of Spice Jet and Jet Airways Company

FINDINGS

➢ From the present study the researcher found that among the 2 selected companies both companies lie distress zone and on the verge of Bankruptcy.

➢ It was found by the researcher that both companies are not financially sound

➢ It was found that with help of both model's solvency stage was found but Z-Score Model gave more precise results.

CONCLUSION

From the present research work we can conclude that there lies no difference in the Z-Score and X-score of the companies. Mainly it was found that Spice Jet and Jet Airways are financially distressed and almost bankrupt. Actually, they are bankrupt and models proved that they are bankrupt. The researcher found that both the models gave actual results of bankruptcy stage.

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