

# ALTMAN Z SCORE ANALYSIS OF INDIAN AVIATION SECTOR

**Dr. M. Gowri**

*Associate Professor, PSG College of Arts & Science.*

**Dr. S. Gnana Sugirtham**

*Assistant Professor, PSG College of Arts & Science.*

**P. Asmitha**

*B.A.(Hindi), B.Com, CMA (Inter)*

## ABSRTACT

Indian Aviation industry is one of the fast-growing industries in India over recent years which has a significant growth prospects on various parameters like passenger traffic, freight traffic, aircraft movements and number of airports and so on. The primary objective of the study is to analyse the financial strength of the three companies (Indigo, SpiceJet and Global Vectra) in Indian Aviation Industry. This study uses the Altman Z Score Analysis to assess the financial stability of the companies in the Indian Aviation sector.

**Keywords:** Altman Z Score, Financial stability, Bankruptcy and Distress & Grey Zone.

## 1. INTRODUCTION

India is the third largest and fast-growing aviation industry in the world. The aviation sector contributes more than 5% to Gross Domestic Product (GDP). The aviation sector of our country directly and indirectly contributing to the country's economy, helps in generating economic growth, providing employment opportunities and also increasing revenues from taxes. As of 2019, the Aviation sector contributes nearly \$72 billion to the GDP. The aviation sector has grown at an average rate of 16% in the last decade. The launch of UDAN also helped the sector in improving rural air network by restoration of 31 underserved airports across different places in India. This added 128 new air routes. The National Aviation Policy in 2016 also promotes aeronautical Make in India.

Before COVID 19, as of 2018-19 survey it was expected that in the next 4 upcoming years the aviation sector of India will get boost of around 35000 crores as an investment package. The government has allowed 100% Foreign Direct Investment in India as a result many popular companies were in search of business in India. And also, before COVID 19 there were 19 new projects in various states and 11 Firm Promoters to develop this industry. In

December 2019, Airports Authority of India (AAI) set up the India's first three water aerodromes in Andaman & Nicobar. As of December 2019, Safran group was getting to invest \$ 150 million in Maintenance, Repair and Overhaul (MRO) unit. MRO service providers are completely exempted from customs tax as per the union budget.

During COVID 19 IATA stated that Indian Aviation lost 29 lakh jobs in April 2020. The revenue fall by \$ 11221 million compared to 2019; passengers demand also fallen by 47%. Indian Finance Ministry has provided 3 big beneficial packages to this sector.

1. World class Airport through Public Private Partnership (PPP).
2. Depletion in flying costs of Rs.1000 crores as efficient Airspace Management for Civil Aviation in India to become the global hub for Maintenance, Repair and Overhaul (MRO).
3. As a result, maintenance cost will get declined and more job opportunities will be created.

This article attempts to identify the financial health of the select aviation companies and also depicts the financial fitness of the Companies in the nearest future.

## 2. OBJECTIVES

- To determine the financial health of the companies in the aviation sector and screen for bankruptcy.
- To assess whether the Indian aviation sector has the ability to sustain its growth rates in the upcoming future.
- To examine the disputes facing the industry today and how these can reflect on the future problems.
- To assess whether Indian aviation industry is capable of handling pandemic situation.

## 3. REVIEW OF THE LITERATURE

Study of bankruptcy is based on the empirical evidence which aims to spot out the financial characteristics of the companies that are likely to file for bankruptcy. The goal of developing such bankruptcy prediction models is to predict which companies will have a higher probability of filing for bankruptcy. The models that predict bankruptcy have been developed based on financial ratios derived from companies' financial statements like balance sheet and profit and loss statement.

One of the earlier studies of bankruptcy prediction was conducted in 1932 by Paul J. Fitzpatrick. He published his article on prediction of bankruptcy titled Fitzpatrick 1932 during which he examined 20 matched pairs of firms, one bankrupt and one non-bankrupt and interpreted financial ratios indicative of bankruptcy. The data presented included 13 accounting ratios computed for 40 companies for three years.

In the period of 1960s two types of models were developed. The early attempts which made research on bankruptcy were based on the univariate model which analyses the relation between a particular financial ratio and bankruptcy.

One among the well-known researchers on bankruptcy employing a univariate model was William Beaver (1966) who examined 29 financial ratios over the five-year period before bankruptcy based on the sample of 79 bankrupt and 79 non-bankrupt companies and attempted to find out the financial ratios that had a discriminating power between those two groups and ascertain the years prior to bankruptcy during which those ratios begin to vary from each other. William Beaver identified the best discriminating six financial ratios:

- a. Net income plus depreciation and amortization / total liabilities,
- b. Net income/total assets,
- c. Total debt/total assets,
- d. Net working capital /total assets,
- e. Current assets/ current liabilities, and
- f. Cash, short-term investments, accounts receivable/ operating expenses excluding depreciation and amortization.

These ratios listed above analyse profitability, long-term solvency risk and short-term liquidity risk. Among those six financial ratios, the ratio of net income (plus depreciation and amortization expenses) to total liabilities best predicts the potential bankruptcy in Beaver's analysis. According to William Beaver's study, the accuracy of predicting the bankruptcy using the ratio of net income plus depreciation and amortization expenses to total liabilities was 87% one year prior to the filing for bankruptcy and 78% five years before the filing. The Type I error rate (a firm is assessed as non-bankrupt but eventually files for bankruptcy) was 22% one year before bankruptcy and 42% five years prior to bankruptcy whereas the sort II error rate (a firm is assessed as bankrupt but doesn't go bankrupt) was 5% one year before bankruptcy and 4% five years prior to bankruptcy.

In 1993 the five-variable model of Altman Z Score was revised as a four-variable model. Hanson in 2003 used the revised Altman Z Score model and this prediction model gave the accurate results by classifying bankrupt companies to the extent of 92% in the first year, 69% in the second year and 54% in the third year.

Most of the researches have focussed on applying Z score and modified Z" score to selected companies belonging to various sectors including aviation industry and other industries. Various researches and articles were made from time to time by various researchers and authors to predict the bankruptcy potential by using the univariate model and Altman Z Score model, to improve the models existing already and to come up with new models in the future to get accurate results. Some of those researches are:

Kumar and Anand in their article in 2013, used both Altman Z score and modified Z score to assess the financial health of Kingfisher Airlines using data from the FYs 2005-06 to 2011-12. The results showed up the poor financial health of the Kingfisher Airlines. Vasantha made another study in 2013 on selected companies within the Indian aviation sector using original and other variants of Z score model and also confirmed that Kingfisher airline was on the verge of bankruptcy. In another study of calculating the Altman Z score for bankruptcy prediction for the airline industry in India, it had been concluded that the whole aviation sector in India is in financial distress excluding only Indigo which is in the safe zone in the year 2018. In the article of Samik SHOME and Sushma VERMA in 2020 used various methods (Altman Z

Score, P-Score, Fuzzy logic model, Kroeze Model to assess the financial health of the Indian aviation sector for the period 2015-2018. He concluded that except Indigo, all the other airlines have been under Distress zone from 2015-2018.

#### 4. SAMPLE OF THE STUDY

The sector chosen for the study is the Aviation sector. The companies which are listed both on NSE and BSE are selected. And the companies that have been taken are InterGlobe Aviation Limited (INDIGO), SpiceJet and Global Vectra Helicopter Limited (GVHL).

#### 5. TOOLS

##### ALTMAN Z SCORE ANALYSIS

Altman Z Score analysis is an instrument that is used to predict the chances of business going bankrupt in the next 2 years. The model was developed by an American Finance Professor EDWARD ALTMAN in 1968 to measure the financial stability of the company. It is considered as one of the best and effective analysis to predict the financial stability of the company using the company's Balance sheet values and income statement values. This model was started and developed at the time of Great Depression when the businesses experienced the huge decline.

$$\text{Z-SCORE} = 1.2Z1 + 1.4Z2 + 3.3Z3 + 0.6Z4 + 0.999Z5$$

Where:

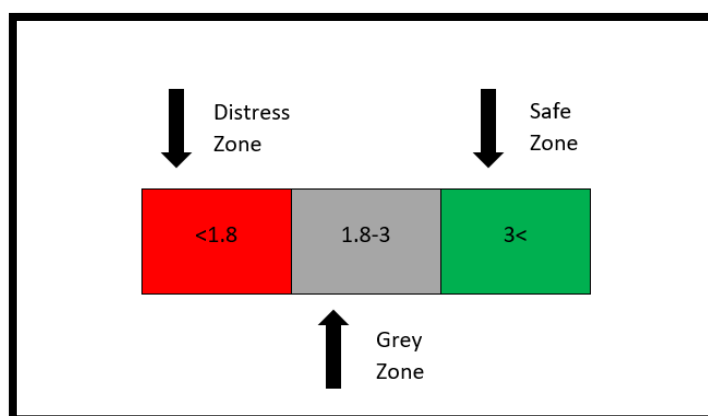
$Z1 = \text{Working Capital} / \text{Total Assets}$

$Z2 = \text{Retained Earnings} / \text{Total Assets}$

$Z3 = \text{Earnings before Interests and Taxes} / \text{Total Assets}$

$Z4 = \text{Market value of Equities} / \text{Total Liabilities}$

$Z5 = \text{Sales} / \text{Total Assets}$



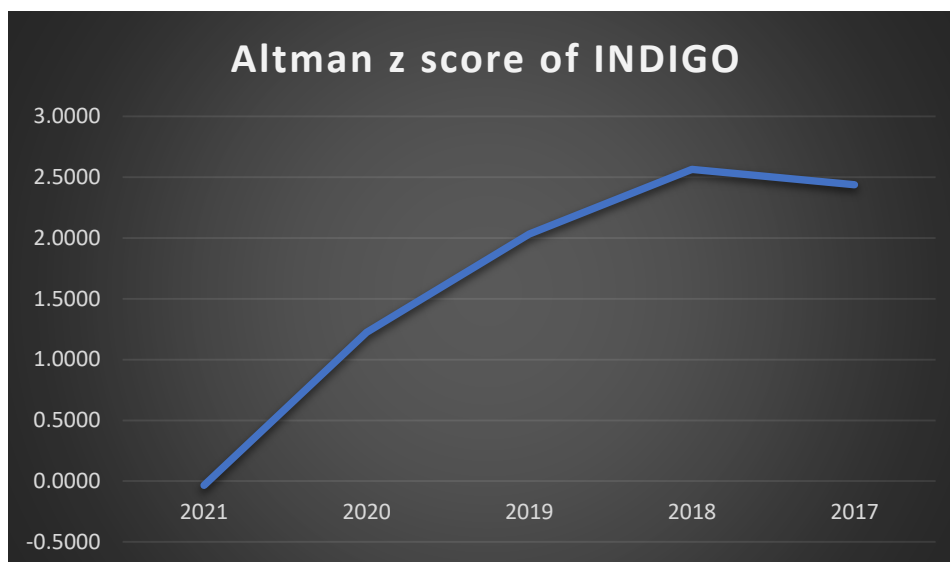
The lower the Z Score the higher the company is headed to bankruptcy. When the Z Score is lower than 1.8, then the company is in the state of financial distress and with a high probability of bankrupt. When the Z Score is between 1.8 – 3, then the company is in grey zone and with a moderate chance of filing bankrupt. A Z Score of higher than 3 is in safe zone and is unlikely to file for bankrupt.

## 6. ANALYSIS & DISCUSSION

### i. INTERGLOBE AVIATION

InterGlobe (IndiGo) Aviation was found in 2005 as a private company by Rahul Bhatia and Rakesh Gangwal. IndiGo is headquartered in Gurugram, Haryana, India. InterGlobe Aviation is listed in both the exchanges NSE and BSE with a market cap of about ₹32,709.61 Cr as of March 2020. InterGlobe Aviation is a low-cost and the largest airline in India by passengers carried and fleet size. It has 60.4% of Domestic market share as of July 2020. IndiGo operates 1,500 flights everyday to 87 destinations (63 domestic and 24 international). IndiGo has its primary hub situated at Indira Gandhi International Airport, Delhi. It provides various services like aviation management, air and cruise transport management services, including passenger and cargo, route, destination, charter requirement and cruise brands management, travel related services, travel distribution services (such as itineraries and domestic) and hotel management and development services. In January 2020 IndiGo become the first Indian airlines to have 250 planes & to operate 1500 flights per day.

Altman z score of INDIGO						
	coefficient	2021	2020	2019	2018	2017
Z1	1.2	0.9230	0.1430	0.4038	0.4027	0.3065
Z2	1.4	-0.0064	0.1301	0.2603	0.3168	0.2247
Z3	3.3	-0.1351	-0.0061	-0.0059	0.1480	0.1410
Z4	0.6	0.0090	0.0106	0.0213	0.0274	0.0316
Z5	0.999	0.3642	0.8858	1.1916	1.1343	1.2735
Z Score		1.0219	1.2249	2.0327	2.5646	2.4388
Zone		Distress	Distress	Grey	Grey	Grey



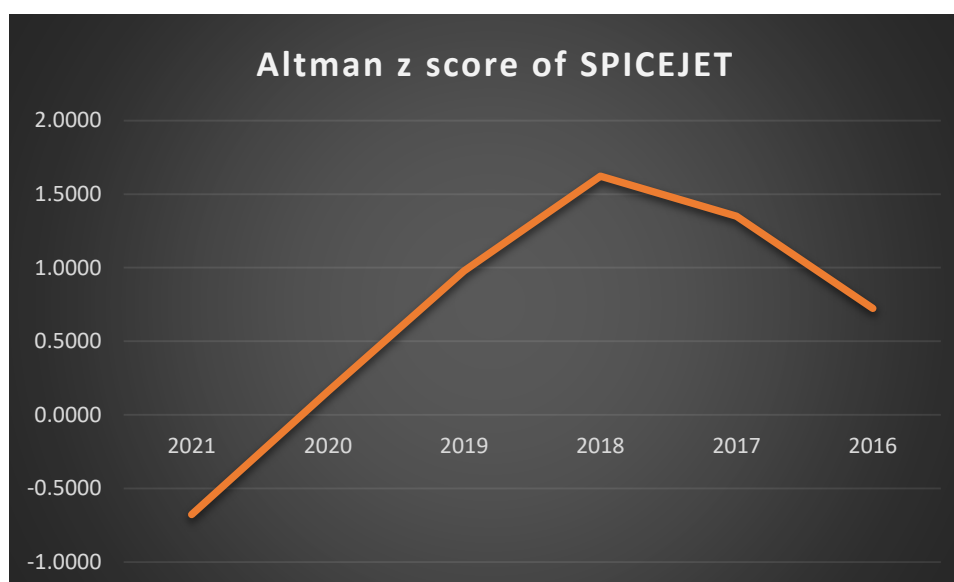
According to the above table, we can be able to find out the predicative ability of Z Score model of IndiGo company. In the last 5 years of analysis, the Z Score for FY 2020-21 and FY 2019-20 is less than 1.8 and therefore in distress zone. The Z Score for the previous 3 FY 2018-19, 2017-18 and 2016-17 is between 1.8 and 3.00, therefore they are in grey zone. In the FY 2020-21 and FY 2019-20, the company was in distress zone i.e. with high probability of bankruptcy. In the FY 2018-19, 2017-18 and 2016-17, the company was in grey zone i.e. with moderate chance of filing bankrupt. From the FY 2016-17 to 2020-2021, its clear that the Z Scores are getting lower and lower. This clearly shows that the company has a weaker financial stability and a high probability of filing bankrupt.

Also, the report of CEO of InterGlobe Aviation, Ronojoy Dutta states that the IndiGo will not expect to be profitable in the next 18 months. Since January 2020, IndiGo was the first Indian airlines to have 250 planes & to operate 1500 flights per day. But then during this pandemic, the airline is flying at about 32% of capacity. These are due to the cost cuts, workers lay-off 10% of workforce, reducing fleets and the total collapse in the period of COVID 19.

## ii. SPICEJET

SpiceJet is also a low-cost airline in India. SpiceJet was first established as an air taxi provider by ModiLuft in 1994. Later on, the company was acquired by an Indian Entrepreneur Ajay Singh and renamed it as SpiceJet. SpiceJet is the second largest Indian airline by passengers carried and fleet size. It has a market share of 13.6%. the airline operates 630 flights to 64 designations (including 54 domestic and 15 international designations). Its hubs were Indira Gandhi International Airport, Delhi and Rajiv Gandhi International Airport, Hyderabad. SpiceJet was listed in both NSE and BSE with a market capitalisation of about Rs.2214.28 crores as of April 2020. Its subsidiary is SpiceXpress which is an air cargo division of SpiceJet and was launched in September 2018.

Altman z score of SPICEJET						
	coefficient	2021	2020	2019	2018	2017
<b>Z1</b>	<b>1.2</b>	<b>-0.4561</b>	<b>-0.3413</b>	<b>-0.4695</b>	<b>-0.5366</b>	<b>-0.5882</b>
<b>Z2</b>	<b>1.4</b>	<b>-0.2820</b>	<b>-0.1683</b>	<b>-0.1981</b>	<b>-0.1631</b>	<b>-0.4053</b>
<b>Z3</b>	<b>3.3</b>	<b>-0.0906</b>	<b>-0.0723</b>	<b>-0.0498</b>	<b>0.1386</b>	<b>0.1300</b>
<b>Z4</b>	<b>0.6</b>	<b>0.0430</b>	<b>0.0413</b>	<b>0.1166</b>	<b>0.1471</b>	<b>0.1664</b>
<b>Z5</b>	<b>0.999</b>	<b>0.5383</b>	<b>1.0193</b>	<b>1.9153</b>	<b>1.9505</b>	<b>2.0971</b>
<b>Z Score</b>		<b>-0.6774</b>	<b>0.1593</b>	<b>0.9781</b>	<b>1.6221</b>	<b>1.3504</b>
<b>Zone</b>		<b>Distress</b>	<b>Distress</b>	<b>Distress</b>	<b>Distress</b>	<b>Distress</b>

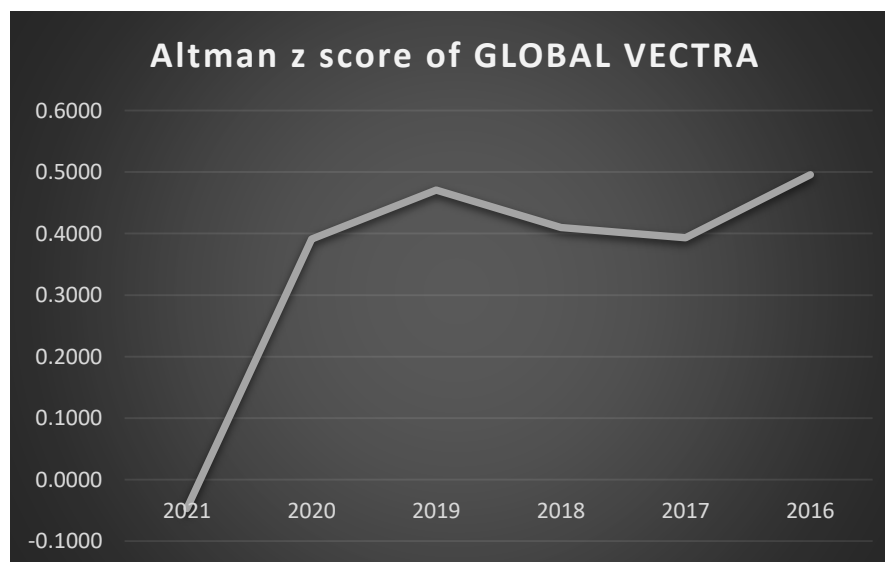


According to the table above, the Z Score of SpiceJet company for last 5 years is in distress zone. For the last 5 years of analysis, the Z Score for the FY 2020-21, 2019-20, 2018-19, 2017-18 and 2016-2017 is less than 1.8 and they are in distress zone. And the points are getting lower and lower for each year. In the FY 2019-20, the depreciation and amortization expenses were higher than the last years (13.75 times higher). So, this is one of the reasons that affects Earnings before interests and tax and that affects the Z Score level. The main factor that adversely impacted the performance and financial stability of the company in FY 2019-20 AND 2020-21 was the COVID 19 pandemic that started affecting demand adversely from mid-February 2020. Also, the grounding of Boeing 737 MAX after crashes of Ethiopian Airline and Lion Aircraft.

### iii. GLOBAL VECTRA HELICOPTER LIMITED

The company was established as Azal in 1997 and started off-shore operations with 3 helicopters in 1998. The Non-Resident Indian (NRI) businessman Ravi Rishi acquired the company in the year 2004 and the company went public in 2006. It is the largest private helicopter company in India. The company is headquartered at Juhu Aerodrome, Mumbai. The company is listed on both NSE and BSE with market capitalisation of about Rs.70.49 crores, having ISO 9001-2008, 14001-2004 and OHSAS 18001-2007 certifications for covering flight operations, engineering, safety, quality control and commercial systems. The company has fleet of 29 aircrafts (including Bell helicopters and Euro copters) ranging from small to medium-sized twin helicopters seating 4 to 15 passengers.

Altman z score of GLOBAL VECTRA						
	coefficient	2021	2020	2019	2018	2017
Z1	1.2	-0.3135	-0.2862	-0.3706	-0.2777	-0.3922
Z2	1.4	0.0481	0.0808	0.0820	0.0595	0.0653
Z3	3.3	-0.0645	0.0031	0.0081	-0.0015	0.0394
Z4	0.6	0.0213	0.0192	0.0245	0.0274	0.0249
Z5	0.999	0.4625	0.6000	0.7602	0.6488	0.6282
Z Score		-0.0471	0.3910	0.4710	0.4098	0.3931
Zone		Distress	Distress	Distress	Distress	Distress



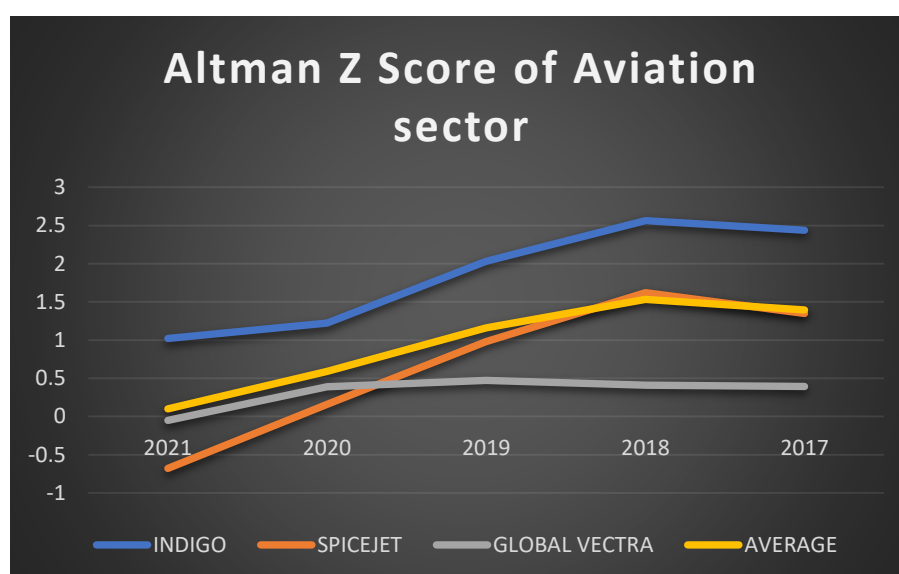
From the above table, the Z Score of the Global Vectra Helicopter Limited can be seen as in distress zone. From the analysis, it can be understood that there is no much impact on the performance and financial stability of the company due COVID 19. The Z Score for the 5 FY 2020-21, 2019-20, 2018-19, 2017-18 and 2016-17 is more or less in same points which are less



than 1.8 and are in distress zone i.e. with a higher probability of getting bankrupt. The company's revenue is getting decreased from quarter to quarter in the last 2 FYs. The company took pro-active measures to handle the COVID 19 pandemic situation also.

## INDUSTRIAL ANALYSIS

Z SCORE ANALYSIS OF AVIATION SECTOR								
YEAR	INDIGO		SPICEJET		GLOBAL VECTRA		AVERAGE	
2021	1.02	Distress	-0.68	Distress	-0.05	Distress	0.10	Distress
2020	1.22	Distress	0.16	Distress	0.39	Distress	0.59	Distress
2019	2.03	Grey	0.98	Distress	0.47	Distress	1.16	Distress
2018	2.56	Grey	1.62	Distress	0.41	Distress	1.53	Distress
2017	2.44	Grey	1.35	Distress	0.39	Distress	1.39	Distress



This table shows the Z Score Analysis of Aviation Sector (Indigo, Spicejet and Global Vectra). The Z Score for the last 5 FYs 2020-2021, 2019-2020, 2018-2019, 2017-18 and 2016-2017 of the Aviation Sector is almost in Distress and rarely in Grey zone.

In the Altman Z Score Model, the ratio of Working Capital to Total Assets, the ratio of Retained Earnings to Total Assets and the ratio of Earnings before Interests and Taxes to Total Assets have a significance importance in estimating the performance of the industry and the probability of getting into bankrupt. The ratio of Working Capital to Total Assets of the three companies are either in negative or very low point which implies that the three companies had liquidity issues for the past FYs. This results that the whole Aviation Sector had been in liquidity issue. Due to the pandemic, the reduction in the number of passengers had massively

reduced the revenue and the profit for the quarter Jan-Mar 2020. This ended up with a decline in the Retained Earnings to Total Assets ratio of the Sector in 2019-2020 compared to prior years. Next, the ratio of Earnings before Interests and Taxes to Total Assets reflects the profitability and the operating efficiency for a certain period. The profitability and the operating efficiency of the Aviation sector also been reducing to the lowest points and sometimes been negative which is mainly due to increase in the operating expenses of each of the company in the Sector. The ratio of Market value of Equities to Total Liabilities of the three companies are also declining from the past 5 FYs. The reason is due to fall in the Market value of the shares (especially for INDIGO and SPICEJET companies) and also the massive increase in the total liabilities of the three companies. The last ratio, Sales to Total Assets is almost more or less in equal points for the years 2018-2019, 2017-2018 and 2016-2017. But for the 2019-2020 FY and 2020-2021 FY, the revenue of the fourth quarter decreased due to COVID 19 pandemic. Hence, with the help of these ratios the Altman Z Score Analysis is prepared.

And also, the Average value of the Altman Z Score for the aviation sector (i.e. the average of the three companies - Indigo, Spicejet and Global Vectra) for the past 5 FYs 2020-2021, 2019-2020, 2018-2019, 2017-18 and 2016-2017 is below 1.8 points. This shows that the Aviation sector is in Distress zone for all the 5 FYs which has the higher probability of getting bankrupt. Because the companies in the Aviation sector was not performing good. This affects the sector as a whole. This Analysis shows up that the sector was with a higher probability of getting bankrupt since 2016-2017. And also, the COVID 19 pandemic is having an enormous impact in the Aviation sector. The sector is expected to be lower for years to come; the sector won't return to 2019 levels before 2024.

## 7.CONCLUSION

The Indian Aviation Sector for the last decade showed a significant growth in the economy but the performance of the individual company is not as impressive as the sector. The result of the Analysis showed that the Z Score for most of the periods have been below 1.8 for the 5 consecutive years. This implies that the higher risk of bankruptcy exists in the Aviation Sector. Indian Aviation Sector reported a loss of \$600 million for the January-March 2020 quarter. The Government of India and the companies in the sector is taking a pro-active measure and also rescue packages worth of Rs.120 Billion to handle the COVID 19 pandemic situation. The employment in the Aviation Sector has been reduced when compared to the last FY 2018-2019. Apart from the fall in employment, the revenues have been hit too badly. The COVID 19 crisis is the worst ever encountered in the history of the Aviation Industry. Researchers found that the Aviation Sector is estimated to take an average of 3 years to recover i.e.by 2024. Soon the Aviation Sector will boom and get back to its form as this sector is one of the most important and a leading sector in the economic development of the country.

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## AUTHOR PROFILE

**Dr. M.Gowri**, M.Com, M.Phil, MBA, PhD, NET, SET, CMA (Inter), Faculty, PSG College of Arts & Science has 15 years of Teaching experience both in Postgraduate and Undergraduate Level in Management and Commerce. She has secured Bharathiar University 1<sup>st</sup> Rank and Gold Medal in UG and University 5<sup>th</sup> Rank in PG. Her area of interest and specialization is Accounting and Finance. She has published articles in National and International Journals (Scopus and WOS). Her articles are widely cited and her h-index score is 4 and i-10 index score is 2. She has completed a Minor Research Project funded by UGC and acted as a reviewer for text books. She is an active member of the Research Committee of PSG College of Arts & Science.

**Dr.S. Gnana Sugirtham** M. Com, M.Phil, MBA, PhD, NET, Faculty, PSG College of Arts & Science, has 13 years of Teaching and Research Experience. She has secured Bharathidasan University 2<sup>nd</sup> Rank in PG. Her area of specialization is Finance. She has published many articles in Peered reviewed journals. Her thrust area of Research being Review of Various Government Policies.

**P.Asmitha**, B.A.(Hindi), B.Com, CMA (Inter) is pursuing CA (Inter), CMA (Final). She is strong in her academics and has secured the 2<sup>nd</sup> Rank in Higher Secondary Education-Pollachi, 1<sup>st</sup> Rank in B.com (CMA) and District 5<sup>th</sup> Rank (with exemption in 3 subjects) in CMA (Inter), Coimbatore Chapter. Her area of interest is Stock Trading. She is also pursuing NCCMP course on Stock Trading and being active in Stock market.