DEVELOPMENT OF FINANCIAL DISTRESS PREDICTOR MODEL FOR INDIAN AVIATION INDUSTRY

A Thesis submitted to the

UPES

For the Award of

Doctor of Philosophy

In

Aviation Management

By

DEBJYOTI GOSWAMI

December, 2024

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Dehradun- 248007: Uttarakhand

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DECLARATION

I declare that the thesis entitled "**DEVELOPMENT OF FINANCIAL DISTRESS PREDICTOR MODEL FOR INDIAN AVIATION INDUSTRY**" has been prepared by me under the guidance of **Prof** (**Dr.) Sumeet Gupta,** Professor & Cluster Head - Global Economics and Finance Cluster, School of Business (SoB), UPES. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

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CERTIFICATE

I certify that **Mr. Debjyoti Goswami** has prepared his thesis entitled **"DEVELOPMENT OF FINANCIAL DISTRESS PREDICTOR MODEL FOR INDIAN AVIATION INDUSTRY",** for the award of DOCTOR OF PHILOSOPHY in Aviation Management of the UPES (University of Petroleum & Energy Studies), under my guidance. He has carried out the work at School of Business (SoB), UPES, Dehradun.

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ABSTRACT

The Indian aviation sector, a linchpin for economic progress and global connectivity, finds itself perpetually navigating turbulent financial skies. Unlike their counterparts in developed markets, Indian airlines contend with a unique set of challenges – intense competition, high capital intensity, and susceptibility to external shocks. This precarious environment makes them particularly vulnerable to financial distress, with some carriers succumbing to bankruptcy and others clinging precariously to profitability.

Existing financial distress prediction models, often heavily reliant on financial ratios, fail to capture the nuances of the Indian aviation landscape. These models might provide a limited snapshot of an airline's health, neglecting crucial non-financial factors that significantly influence financial performance. Here's where this research seeks to bridge the gap.

This study takes a multifaceted approach, employing a wider lens to examine the intricate web of factors impacting Indian airline finances. The study has delved beyond traditional financial metrics, incorporating internal operational and performance variables like capacity utilization, fleet management strategies, and route profitability. Additionally, we explore the influence of external forces such as:

- Economic Conditions: Fluctuations in economic growth, fuel costs, and exchange rates can significantly impact airline profitability.

- Market Dynamics: Intense competition, evolving consumer preferences, and seasonality all play a role in shaping financial health.

- Government Regulations: Policy changes, infrastructure development, and taxation structures can create both opportunities and challenges.

- Political Landscape: Geopolitical tensions and government stability can disrupt travel patterns and impact airline revenues.

This research takes a comprehensive approach to understanding the financial well-being of Indian airlines. By analyzing the complex interplay of internal and external factors, the study aims to achieve three key objectives:

- Identifying Key Influences: Pinpoint the critical financial and non-financial factors using Exploratory and Confirmatory Factor Analysis that have the most significant impact on the financial health of Indian airlines. This will provide valuable insights into areas where airlines can focus their efforts for improvement.

- Understanding the Cash Flow Connection: Decipher the intricate relationship between internal operations, external forces, and their combined influence on airline cash flows by using Regression Analysis. This aligns with the principles of the Liquid Asset Theory, where cash flow management is paramount for financial stability. By understanding these dynamics, airlines can make data-driven decisions to optimize cash flow and mitigate financial risks.

- Building a Predictive Model: Develop a robust and comprehensive model specifically designed to predict financial distress in the Indian aviation industry using Conditional Probability approach. This tailor-made model will be a valuable tool for airlines, allowing them to proactively identify

potential financial challenges and take timely corrective actions to ensure long-term success.

This model, incorporating a broader range of variables, will empower Indian airlines to navigate the complexities of their financial landscape. Early detection of potential financial distress using the model will equip airlines to make well-informed decisions, implement proactive financial management strategies, and ultimately achieve long-term stability and success. This research not only contributes to the development of a practical tool for Indian airlines, but also fosters a deeper understanding of financial distress in this dynamic and ever-evolving sector.

This study contributes to the body of knowledge surrounding the Liquid Asset Theory by examining the combined influence of financial and non-financial factors on the cash flow of scheduled airlines in India. It establishes a nuanced understanding of the relationship between cash flow and a comprehensive set of variables, encompassing both financial and non-financial aspects that significantly impact a company's financial performance.

The research identifies a range of factors with statistically significant relationships to cash flow, categorized based on the direction of their coefficient. The findings emphasize the importance of proactive cash flow forecasting, a core principle of the Liquid Asset Theory. By accurately predicting future cash inflows and outflows, airlines can anticipate their liquidity needs and adjust their liquid asset reserves accordingly.

Overall, this research provides a comprehensive and data-driven approach to understanding airline cash flow in the Indian context. It empowers stakeholders across the industry to navigate the complexities of the market and make informed decisions that promote financial resilience and long-term success.

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1 INTRODUCTION

1.1 Aviation Industry Overview

The aviation sector is characterized by significant capital requirements and occupies a pivotal role in both worldwide tourism and supply chain management. This sector serves as a significant generator of jobs and plays a major role in fostering global economic growth, as highlighted by Fung, Law, and Ng (2006).

Figure 1: Aviation Industry Attributes

Aviation industry globally is susceptible to numerous inherent and external risk factors. These typically encompass economic instability across regions, fluctuations in oil prices, changing exchange rates, infrastructure impediments, protectionist measures, conflicts, and political unrest, among other factors.

Figure 2: Airline Industry Risks

Source: *Air Transport Action Group Report 2020*

After 1978, once the US airline industry was deregulated, a significant transformation unfolded in aviation market. The expansion into new markets and potential routes ushered in intense competition, alongside a low-cost environment fostered by emerging point-to-point business models. Airlines business, marked by substantial capital expenditure, cyclical demand fluctuations, and susceptibility to unforeseen external disruptions, usually functions with narrow profit margins. Additionally, it confronts further susceptibilities including adverse weather, terrorist incidents, and natural calamities, contributing to notable fluctuations in the wafer-thin profitability. Intense cost pressures and fierce competition have compelled major airlines globally to take significant actions, including filing for bankruptcy, ceasing operations, or restructuring while under bankruptcy protection in previous instances.

In a free market economy, increased competition is an inherent outcome. The core principle is that some firms may falter, while the more efficient ones thrive, thereby allowing room for new entrants. Hence, prioritizing cost efficiency becomes essential according to Lukic (2014).

As per economic theory, an established airline can succeed provided it operates and manages its affairs efficiently. In the event of failure, a more efficient alternative is poised to emerge. Consequently, having an early warning system for financial distress becomes critical in this context. Warren Buffett famously labeled this industry as a "death trap" for most of the investors. Today we have 1,165 commercial airlines globally, but 206 US carriers failed after 1979, till the onset of Covid in early 2020, and eventually filed for bankruptcy, with many of them ceasing complete operations. The year 2020 witnessed more than 40 airlines globally failing and facing severe financial crunch.

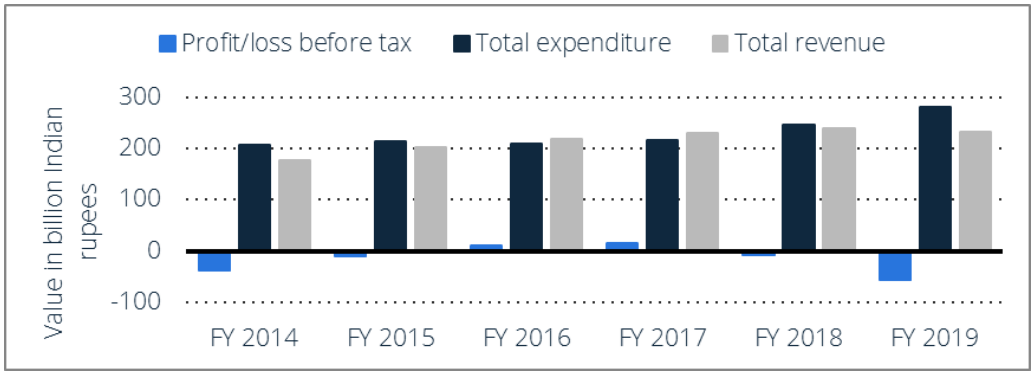
The Indian aviation industry, characterized by fierce competition, has exhibited substantial growth potential, particularly in the domestic market. With a booming

domestic civil aviation market currently ranking third globally, India is projected to claim the third position in the global air passenger market by end of 2024. The industry's competitive environment constrains the ability of various airlines to significantly increase fares, often resulting in price cuts to attract customers.

As noted by Jayaraman & Srinivasan (2014), a balanced approach to profitability is paramount in the aviation sector. Maximizing revenue generation is equally important as cost minimization strategies for achieving long-term financial sustainability. Profitability serves as the cornerstone of any industry's growth and viability, and airlines must continuously adapt and develop strategies to maintain a healthy financial position within this dynamic market. Within this dynamic landscape, there exists a notable risk of financial distress, ultimately culminating in financial insolvencies.

Numerous instances of financial strain have been witnessed among Indian carriers throughout the past decade. For instance, in 2012, Kingfisher Airlines halted operations due to an inability to meet its financial obligations. In 2014, SpiceJet, burdened by significant accumulated losses, was forced to cancel over 2,000 flights. Their recovery hinged on securing additional funding from its founders (promoters). Similarly, in 2014, SpiceJet, burdened by significant accumulated losses, was forced to cancel over 2,000 flights. Their recovery hinged on securing additional funding from its founders (promoters). Similarly, Air Asia's aggressive expansion strategy formulated in 2016 was abruptly halted due to a severe liquidity crisis. In 2017, another carrier, Air Pegasus declared bankruptcy, while both Air Carnival and Air Costa ceased operations in the same year. Financial struggles forced Jet Airways to halt operations in 2019, as evidenced by the declining profitability trend in the following graph.

Figure 3: **Financial Snapshot of Jet Airways Ltd. from FY 2014-19**



Source: *Jet Airways Financials 2018-19*

The repetitive occurrence of financial strain and subsequent bankruptcies among various Indian carriers has sparked a significant interest in investigating the underlying factors impacting the financial well-being of airlines in this country. This interest extends to the development of a financial distress predictor model aimed at anticipating and averting potential bankruptcies in the foreseeable future. The creation of such a model is deemed crucial for providing valuable insights to a diverse range of stakeholders, including customers, investors, suppliers, banks, and financial institutions.

The ability to predict financial distress serves as a vital tool, offering foresight into the financial health of airlines and enabling stakeholders to make informed decisions. Customers can assess the stability of the airlines they choose, investors can gauge risks and opportunities, suppliers can adjust strategies based on the financial health of their airline clients, and financial institutions can make well-informed lending decisions. Predictive models aim to serve as a proactive measure to mitigate financial risks and enhance operational stability with proactive risk management and strategic decision-making.

1.2 History of Indian Commercial Aviation

India's aviation sector is experiencing extraordinary growth, currently ranking as the fastest-growing market globally and holding the third position in terms of size, following the United States and China. However, this dynamic sector's trajectory remains intricately intertwined with the long history of Air India, a national carrier established in the 1930s. This historical connection presents both opportunities and challenges for India's future aviation landscape.

1.2.1 Pre-Independence Era

The initiation of the world's first airmail service marked a significant milestone in the history of Indian aviation. This groundbreaking event took place on 18th Feb, 1911, in Allahabad when Henry Piquet carried 6,500 mails and cards to Naini using a Humber biplane, flying 8.2 kilometers.

The seeds of Indian aviation were sown in the pre-independence era, with the formal inauguration of the industry in 1912. This landmark event involved the inaugural flight from Karachi to Delhi, a collaborative effort undertaken by the Indian State Air Services and first long-haul British carrier, Imperial Airways.

However, the true inception of Indian aviation took place in October 1932 when J.R.D Tata established the first airline, Tata Air Services. The new entity initially began airmail operations in India under a contract with British carrier, Imperial Airways. Its maiden trip from Karachi to Mumbai, marked the outset of its journey. As time passed, from an airmail operator, it became a full-fledged Indian commercial carrier. In 1938, Tata Air Services was rebranded as Tata Airlines thus expanding its services to various Indian cities. During the Second World War, Tata Airlines played a crucial role in transporting troops and supplies for Britain.

1.2.2 Post-Independence Era

Buoyed by the euphoria of India's independence in 1947, Tata Airways embarked on a new chapter. In a significant move, the airline was rechristened Air India, marking a symbolic shift towards a national identity. To reflect this change, the Government of India acquired a 49% stake in the carrier. Wasting no time, Air India set its sights on international expansion. The very next year, the airline took to the skies for its maiden international voyage, a Lockheed Constellation flight connecting Mumbai to London. This momentous occasion ushered in the birth of Air India, destined to become the national flag carrier of India.

In the dynamic decade following India's independence, the 1950s saw the rise of several regional airlines catering to the diverse needs of a vast country. Deccan Airways, headquartered in Hyderabad, carved a niche in the south-central region, while Kalinga Airlines, based in Kolkata, focused on connecting eastern India. These regional players emerged to bridge domestic connectivity gaps and cater to specific local demands. However, Air India, the national carrier established in 1948, remained the dominant force in Indian aviation. With its government backing and a focus on both domestic and international routes, Air India played a crucial role in not only connecting different parts of India but also establishing the country's presence on the global aviation map. This co-existence of regional airlines meeting local needs and Air India acting as the national flag carrier with a broader reach set the stage for the future growth of Indian aviation.

In 1953, the Indian government made a bold move to reshape the country's aviation landscape by nationalizing the domestic airline industry. This decision, driven by a desire for greater control and potential economic benefits, marked a significant shift from the previous landscape of several independent airlines operating across different regions.

The nationalization initiative resulted in a major consolidation effort. Eight major airlines, including established players like Deccan Airways and Kalinga Airlines, were merged into two distinct government-owned entities. Air India, already established as the national carrier in 1948, retained its focus on international routes. A new entity, Indian Airlines, was created specifically to manage domestic passenger travel, aiming to establish a more unified and potentially more efficient network across the vast Indian geography.

This streamlining aimed to achieve several goals. By bringing all major airlines under central government control, the nationalization policy sought to exert greater influence on the aviation sector's development. Additionally, proponents of the move believed it could lead to increased efficiency in managing airlines. Streamlining operations, consolidating resources, and potentially eliminating redundancies across previously independent airlines could lead to cost savings and a more strategic approach to route planning and fleet management. However, the nationalization policy also sparked debate, with some questioning its impact on competition and innovation within the industry.

Nationalization in 1953 positioned Air India International as the new national flag carrier of India. Under the continued leadership of J.R.D. Tata, Air India swiftly established itself as a prominent player in the international aviation arena. Its commitment to exceptional service and a financially sound business model propelled it to profitability and international recognition. Notably, Air India positioned itself at the forefront of technological innovation by being an early adopter of the iconic Boeing 747, solidifying its image as a premier airline.

However, the idyllic journey encountered headwinds in the 1970s. Geopolitical conflicts and domestic challenges presented significant operational hurdles for both the national carriers. Unlike its competitors, Indian Airlines grappled with the dual

constraints of an aging aircraft fleet and a network of routes that failed to turn a profit.

A brief foray into private aviation occurred in the late 1970s with Pushpaka Aviation, which operated scheduled international passenger flights from Mumbai to Sharjah as an Air India associate. However, this experiment proved to be a temporary deviation from the prevailing policy of nationalization.

India's economic landscape underwent a significant transformation in the 1990s in response to a period of financial hardship. A cornerstone of this transformation was the deregulation of the civil aviation business. Recognizing the potential for increased efficiency and growth fostered by competition, the government strategically implemented policies to facilitate the entry of private airlines. This marked a seismic shift in the Indian aviation industry, ushering in an era of diversification and competition.

1.2.3 Deregulation in Indian Aviation Industry

East-West Airlines occupies a pivotal position in the annals of Indian aviation history. The airline seized the opportunity presented by the historic deregulation of 1991, becoming a frontrunner in the newly established private domestic airline sector. This deregulation marked a paradigm shift, dismantling the long-held monopoly of state-owned airlines and fostering a more competitive landscape.

Initially, the government adopted a measured approach, implementing the 'Air Taxi' Scheme. This scheme cautiously granted private entities, including East-West Airlines, licenses to operate charter and non-scheduled flights. This phase served as a strategic testing ground, allowing authorities to assess the viability and potential of private airlines before fully liberalizing the market.

By 1994, India embraced a more comprehensive deregulation strategy. The abolition of the Air Corporation Act, a piece of legislation that previously restricted the aviation industry, opened the door for the entry of private airlines into the scheduled passenger service market. East-West Airlines, along with other innovative entrants like Jet Airways and ModiLuft, capitalized on this opportunity, establishing themselves as significant forces within the domestic aviation market.

The deregulation triggered a wave of new airline formations. Air Sahara, Damania Airways, and NEPC Airlines all entered the fray, offering domestic services and contributing to the foundation of the robust and dynamic Indian aviation industry we recognize today.

Following the landmark deregulation reforms of 1994, the Indian aviation sector experienced a period of significant transformation. This policy shift dismantled the longstanding monopoly of state-owned airlines, paving the way for the emergence of a vibrant private sector. While established players like Air India and Indian Airlines continued operations, they now faced direct competition from agile new entrants. Notably, Jet Airways and Air Sahara emerged as prominent challengers, aggressively seeking to establish their market presence and disrupt the existing landscape.

The deregulation wave also extended an invitation to foreign participation. This resulted in a joint venture airline, ModiLuft, established with investment from the international giant Lufthansa. While ModiLuft encountered initial challenges, its story took an unexpected turn. The carrier ultimately underwent a metamorphosis, transforming into SpiceJet, a low-cost carrier that has become a major force within the contemporary Indian aviation market.

1.2.4 Aviation Boom in India

The turn of the millennium ushered in a golden age for Indian aviation. This era, fondly remembered as the "aviation boom," was fueled by the rise of budget carriers, also termed as LCCs (Low-Cost Carriers). These LCCs with their focus on efficiency and no-frills service, slashed ticket prices dramatically. This made air travel, previously considered a luxury, a viable option for millions of middle-class Indians. The LCCs' aggressive pricing strategies challenged the established dominance of full-service airlines like Air India and Jet Airways, forcing them to adapt and innovate to survive in the new competitive landscape. This price war ultimately democratized air travel in India, making it an integral part of the nation's growing economy.

The decade between 2004 and 2014 witnessed a period of remarkable dynamism in the Indian aviation sector, characterized by a surge in low-cost carriers (LCCs) followed by a phase of strategic consolidation. The mid-2000s were marked by a significant influx of LCCs such as Air Deccan, Indigo, SpiceJet, GoAir and Paramount Airways.

The LCCs, with their focus on operational efficiency and streamlined service offerings, significantly reduced airfare, transforming air travel from a luxury into an accessible option for the burgeoning middle class. These agile and cost-conscious entrants challenged the dominance of established full-service commercial carriers, like Air India, Air Sahara, Jet Airways and Kingfisher Airlines, by offering budget-friendly travel options and disrupting traditional airline pricing models.

However, the Indian aviation sector encountered unforeseen challenges during this period. A global economic slowdown, coupled with rising fuel prices and increasing operational costs, exerted immense pressure on the financial

sustainability of these new airlines. This period necessitated strategic restructuring within the industry, leading to a wave of mergers, acquisitions, and unfortunately, some airline closures. In response to these economic pressures, the industry witnessed strategic consolidation. In 2007, Jet Airways acquired Air Sahara, while Kingfisher Airlines merged with Air Deccan. Paramount Airways exited the market in 2010, foreshadowing a similar fate for Kingfisher Airlines in 2012.

However, amidst these closures, new players also emerged on the scene. AirAsia India's arrival in 2014, a collaboration between Air Asia and Tata Sons, solidified the enduring appeal of the low-cost carrier market in India. Additionally, Vistara, a premium airline also took flight in 2014, catering to a different segment of the market seeking a more luxurious travel experience.

By 2014, the Indian aviation landscape had undergone a significant metamorphosis. The initial boom of LCCs had been tempered by economic realities, leading to a period of consolidation and the emergence of new players with diverse business models. This period of unprecedented growth and strategic restructuring laid the groundwork for the robust and competitive aviation industry. This surge in airline options, coupled with consistently competitive fares, has propelled India to become the powerhouse in domestic air travel currently ranked third in size globally. However, to accommodate this surge, substantial infrastructure expansion is crucial. Meeting this demand will necessitate the acquisition of huge number of new aircrafts in the coming years.

The extraordinary growth in Indian aviation has also gained attention of global players. Recognizing the immense potential of this market, several foreign airlines have established a robust presence like Emirates, Qatar Airways, etc. offering extensive connectivity to numerous global cities and capturing a significant share of the Indian international travel market. This influx of foreign airlines further

strengthens India's aviation sector by enhancing overall connectivity and bolstering its competitiveness in the global aviation landscape.

1.2.5 Evolution of Indian Civil Aviation: A Chronological Overview

Table 1: Chronology of Key Events in Indian Civil Aviation

Year	Key Events
1911, Feb 18	The world's first official airmail service using an airplane took place in India on February 18, 1911. French pilot Henri Pequet flew a Humber biplane carrying around 6,000 letters and cards over a distance of about 8.2 kilometers (5 miles) from Allahabad to Naini.
1912, Dec	The first domestic air route between Karachi and Delhi was established by the Indian State Air Services in collaboration with Imperial Airways, UK.
1915	Tata Sons Ltd. initiated the first Indian airline, introducing regular airmail services between Karachi and Madras without government patronage.
1920, Jan 24	The Royal Airforce commenced regular airmail services between Karachi and Bombay.
1924	Civil airport construction began in Dum Dum (Calcutta), Bamrauli (Allahabad), and Gilbert Hill (Bombay).
1927, Apr	The Department of Civil Aviation was established, along with the Aero Club of India.
1932	Tata Airlines, a division of Tata Sons Limited, started Air Mail services on various routes.
Between 1933-34	Several Indian airlines – Indian Trans-Continental Airways, Madras Air Taxi Services, Indian National Airways etc. commenced operations.
1937	The Indian Aircraft Act was promulgated.
1940	Hindustan Aeronautics Limited (HAL) was established by Walchand Hirachand in association with the Mysore Government.

1941, Jul	India's first aircraft, the Harlow trainer, was rolled out for a test flight.
1945	Deccan Airways, jointly owned by the Nizam of Hyderabad and Tatas, was founded.
1946	Tata Airlines changed its name to 'Air India.'
1947	Nine Air Transport Companies were operational at the time of Independence. Later Orient Airways shifted its base to Pakistan while Tata Airlines, Indian National Airways, Air Service of India, Deccan Airways, Ambica Airways, Bharat Airways, and Mistry Airways continued carrying both air cargo and passengers.
1948	Air India signed an agreement with the Government to operate international services under the name Air India International Ltd.
1953, Mar	The Air Corporations Act, of 1953, was passed, leading to the nationalization of the entire airline industry, with the creation of Indian Airlines and Air India International.
1953	Civil Helicopter Services were introduced in the country
1972	The International Airports Authority of India (IAAI) was constituted.
1981	Vayudoot Airlines, a government-owned airline, started operations.
1985	Pawan Hans Helicopters Limited (PHHL) and Indira Gandhi Rashtriya Uran Academy (IGRUA) were established.
1986	The National Airports Authority was constituted.
1987	The Bureau of Civil Aviation Security was established.
1990, Apr	The government adopted an Open-sky policy, allowing air taxi operators to operate flights from any airport.
1991, Sep 20	Sahara Airlines started its operations.
1993, May	Jet Airways started its operations.

1994, Mar 1	The Air Corporations Act, of 1953, was repealed, enabling private operators to operate scheduled services like Jet Airways, Air Sahara, Modiluft Airlines, Damania Airways, NEPC Airlines, and East West Airlines.
1995	India's six private airlines accounted for more than 10% of domestic traffic. Many foreign airlines started providing international services. In 1995, 42 airlines operated air services to, from, and through India.
1995, Apr 1	The Airport Authority of India was constituted by merging the International Airport Authority of India with the National Airports Authority.
1997	Policy on Airport Infrastructure of India was developed for the use and development of airport infrastructure.
1999, Jun 10	CIAL Airport was the first airport in India built with public-private participation.
2000, Oct 2	Sahara Airlines was rebranded as Air Sahara.
2003	Entry of low-cost carriers was started with Air Deccan
2004	The government approved the setting up of private Greenfield airports at Hyderabad and Bangalore.
2004, Jun	Low-Cost Carrier – GoAir started it operations.
2004, Dec	Indian Scheduled carriers with a minimum of 5 years of continuous operations and a minimum fleet size of 20 aircraft, were permitted to operate scheduled services to international destinations.
2005	Indian Airlines was rebranded as "Indian". The Government designated Air India, Indian Airlines, Jet Airways, and Air Sahara were allowed to operate international services.
2005, May	Kingfisher Airlines (Full-Service Carrier) and Spice Jet (Low-Cost Carrier) commenced operations.
2006, Aug	Low-Cost Carrier – Indigo started its operations.

2006	The government approved the restructuring and modernization of Mumbai and Delhi brownfield airports through the public-private partnership model.
2007	The Regional Airlines Policy was announced wherein licenses were given for the operation of airlines within a particular region. MDLR Airlines commenced operations on 14th Mar 2007
2007	Indian aviation saw three mergers, including AI-IA, Jet Airways-Air Sahara, and Kingfisher Airlines-Air Deccan.
2008, Apr 24	The Greenfield Airport Policy of the Government was announced.
2008, Aug	Simplify Deccan was renamed "Kingfisher Red".
2009, May 12	AERA was established to regulate the economic aspects of airports (an autonomous body set up by an Act of Parliament)
2009, Nov 5	MDLR Airlines suspended flight operations
2010	The Airport Economic Regulatory Authority Appellate Tribunal (AERAAT) was established.
2010	Paramount Airways ceased operations
2012	Kingfisher Airlines ceased operations on October 20, 2012, after DGCA suspended its flying license
2014	AirAsia India (a joint venture between Air Asia and Tata Sons) and Air Costa started operations.
2015	Vistara (a joint venture between Tata Sons and Singapore Airlines), Air Pegasus, and TruJet commenced operations.
2016	UDAN-RCS, UDAN (Ude Desh ka Aam Naagrik) is a regional airport development and "Regional Connectivity Scheme" (RCS) of the Government of India was launched on October 21, 2016,
2017, Feb 15	Zoom Air, a full-service airline, started its daily scheduled operations

2019, Jan	Star Air, an Indian commuter airline based at Kempegowda International Airport in Bangalore, Karnataka commenced operations
2019, Apr 17	Jet Airways suspended both domestic and international operations
2021, Jan 3	Fly Big started its commercial operations in Indore
2021, Jun 22	The National Company Law Tribunal (NCLT) approved the revival plan for grounded airline Jet Airways
2021, Oct 11	Tata Group acquired Air India and Air India Express.
2021, Oct 11	Akasa Air, an ultra-low-cost carrier (ULCC) received a No-Objection Certificate (NOC) from the Ministry of Civil Aviation (MoCA)
2022, Jan 27	Tata Group took over the operations of Air India.
2022, Aug 7	Akasa Air started its first commercial operations
2023, Apr 26	The New Indian airline, Fly91 Airlines, is in the phase to launch its operations in late 2023.
2023, May 03	Go First ceased operations and filed for bankruptcy

Sources:

1. *Reports & Position Papers*, *http://www.apaoindia.com/*
2. *Economic Times*
3. *Internal Research*

1.3 A Snapshot of Indian Civil Aviation Sector

The Indian aviation sector has witnessed phenomenal growth over the past three years, and emerged as the fastest-growing aviation market in the world. Industry forecasts from the International Air Transport Association (IATA) indicate that India's aviation market will climb to the third position globally by 2024, surpassing the United Kingdom and solidifying its place as a major player in the international

air passenger market. Currently there are 12 scheduled operators in India with 11 of them are private players.

Table 2: List of Indian Scheduled Airlines (Passengers)

Nos.	Carrier Name	Ownership	No. of Aircrafts
1	AirAsia India	Private	34
2	Air India	Private	121
3	Alliance Air	National	19
4	Air India Express	Private	24
5	Air Taxi	Private	1
6	FlyBig	Private	1
7	Go First	Private	56
8	Indigo	Private	256
9	Spice Jet	Private	81
10	Star Air	Private	5
11	Tru Jet	Private	4
12	Vistara	Private	48

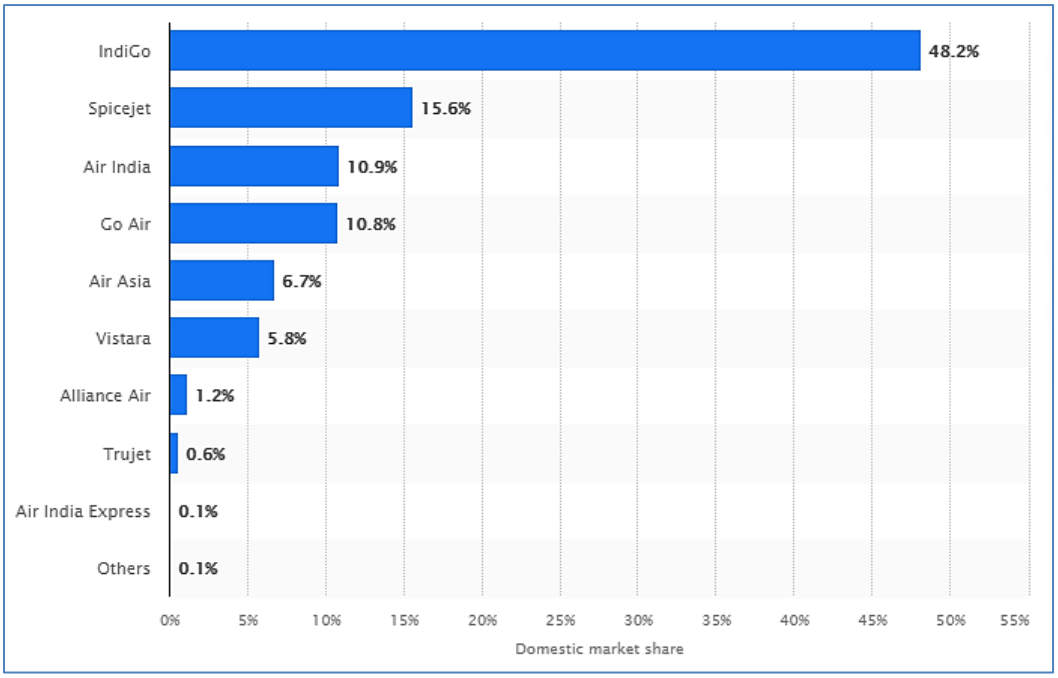
Source – *Director General of Civil Aviation, India, Feb, 2023*

Multiple factors have fueled this remarkable aviation industry growth, with a key driver being the emergence of budget-friendly low-cost carriers (LCCs) making air travel more accessible, a burgeoning middle class with increasing disposable income, and government policies promoting regional connectivity. However, the industry still faces challenges such as infrastructure limitations at some airports,

fluctuating fuel costs, and the need for a skilled workforce to keep pace with expansion. Despite these challenges, the future of Indian aviation appears bright.

The Indian aviation market caters to more than just price-sensitive flyers. Recognizing the diverse needs of the travel population, a new breed of emerging full-service competitors has taken flight. These airlines offer additional amenities and a focus on passenger comfort, catering to business travelers and those seeking a more traditional travel experience. This spectrum of options ensures that every air traveler finds a carrier that aligns with their needs and preferences.

Figure 4: Market Indian Domestic Airline Market Share by Passengers Flown (FY 2020)



Source: *Statista, 2021*

The intense competition within the Indian aviation market isn't merely a consequence of its growth; it's a crucial factor fueling its continued success. Airlines are constantly innovating and adapting their strategies to stay ahead of the

curve. This competitive environment pushes carriers to offer the best possible fares, invest in modern and fuel-efficient aircraft, and implement new technologies to enhance the passenger experience. Ultimately, the beneficiaries of this competitive spirit are the Indian air travelers themselves, who enjoy a wider range of choices, competitive prices, and a continuously improving travel experience.

With potential advancements in electric and hybrid aircraft technologies and the growing demand for both business and leisure travel, India's aviation sector is well-positioned for continued success.

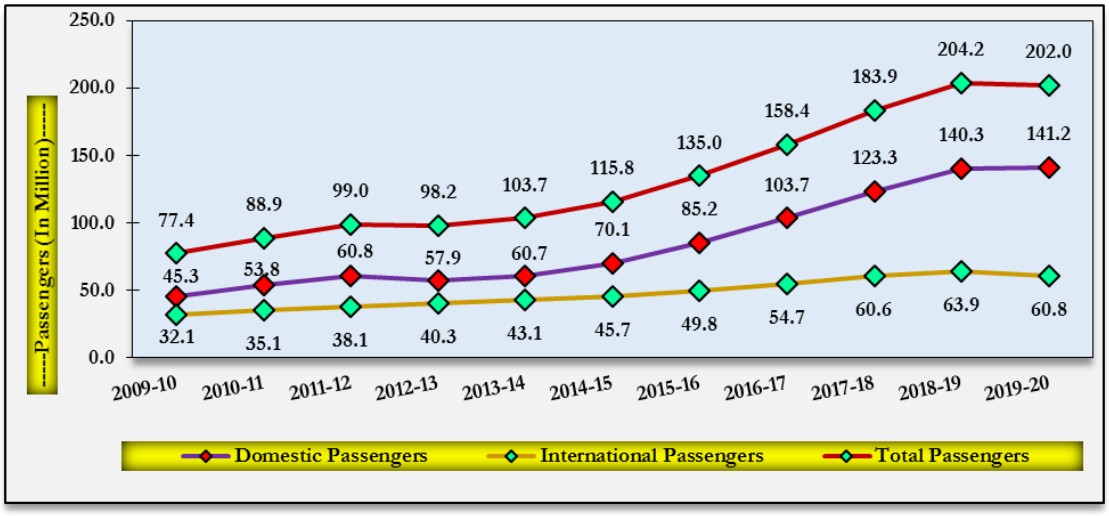
1.3.1 Airline Industry Market Outlook

The easing of travel restrictions following the COVID-19 pandemic, coupled with the steady rise in monthly passenger traffic, has contributed to an improvement in the passenger load factor (PLF) or occupancy rate for airlines.

Passenger traffic in the Indian aviation industry has witnessed a phenomenal rise, showcasing a remarkable growth trajectory. In just seven years, from 2010 to 2017, the number of passengers traveling to, from, or within India doubled, reaching 158.4 million from 77.4 million. Looking ahead, projections paint an even brighter picture, with a potential tripling of passenger volume by 2037, reaching a staggering 520 million. This exponential growth underscores the robust health of the Indian aviation sector.

Fueled by this surge in demand for air travel, the industry is poised for sustained expansion and development. Airlines are likely to invest in expanding their fleets, adding new routes, and improving infrastructure to accommodate the growing number of passengers. This growth will not only enhance connectivity but also create significant job opportunities, contributing positively to the Indian economy.

Figure 5: Scheduled Airline Passenger Traffic Data (2010 - 2020)



Source – *Director General of Civil Aviation, India, 2021*

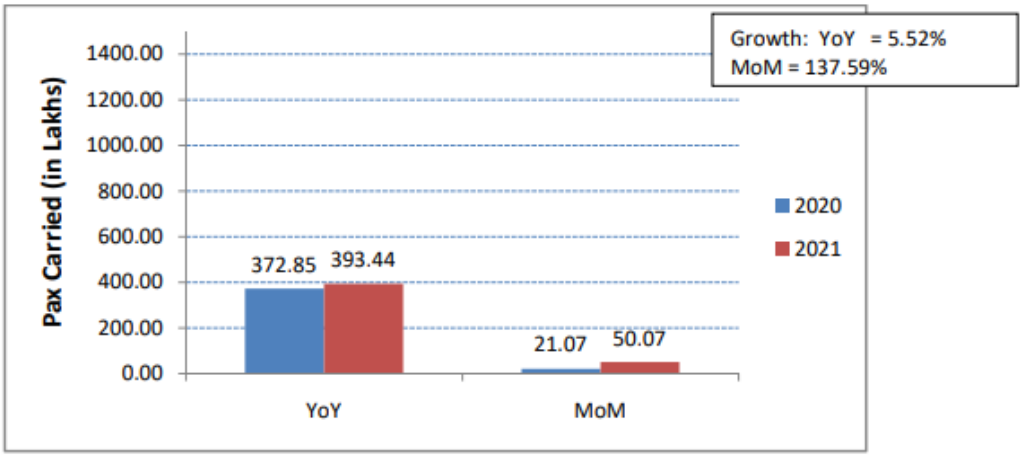
India's domestic aviation industry has witnessed a phenomenal surge in passenger traffic, boasting a remarkable average annual growth rate of over 12% between FY10 and FY20. This surge reflects a significant and sustained increase in demand for air travel within the country over the past decade. Factors contributing to this growth likely include a burgeoning middle class with rising disposable income, the proliferation of low-cost carriers offering affordable fares, and government initiatives promoting regional connectivity.

Simultaneously, the international passenger traffic also experienced notable growth, albeit at a slightly lower rate, with a CAGR of 6.59% during the same period. This indicates sustained interest and demand for international air travel among Indian passengers.

The divergent growth rates between domestic and international segments showcase the unique dynamics and preferences within the Indian aviation market. The

industry's ability to cater to both domestic and international travel needs has contributed to the overall expansion and development of the sector.

Figure 6: Passenger Traffic Growth



Source – *Director General of Civil Aviation, India, 2022*

During January to July 2021, domestic airlines in India carried 393.44 lakhs (39.34 million) Domestic air travel in India is experiencing a strong resurgence, overcoming the setbacks of the COVID-19 pandemic. During the first seven months of 2021 (January-July), airlines carried 39.34 million passengers, reflecting a 5.52% increase compared to the same period in 2020 (37.29 million). This growth is even more impressive when considering the monthly figures. Compared to the previous year, monthly passenger volume has surged by a remarkable 137.59%. These statistics paint a promising picture for the Indian aviation industry, indicating a significant rebound in domestic air travel and a potential return to pre-pandemic levels in the near future.

To meet the increasing and projected demand for commercial air travel, Indian airlines have made substantial aircraft orders. The nation's aircraft fleet is anticipated to quadruple, reaching approximately 2500 airplanes by the year 2038.

As of now, India boasts 128 operational airports, categorized as 29 international, 89 domestic, and 10 custom facilities. While this network has served the nation well, its capacity is nearing its limit. Several major airports, particularly those in metropolitan cities like Delhi and Mumbai, are already experiencing congestion and delays. This not only impacts the passenger experience but also hinders the industry's potential for further growth.

Recognizing this challenge, the Indian government has prioritized infrastructure expansion as a critical area of focus. Several initiatives are underway, including the development of greenfield airports in promising locations and the modernization of existing facilities. These efforts aim to increase capacity, improve passenger processing times, and enhance overall operational efficiency.

An analysis of key performance indicators (KPIs) paints a promising picture of the Indian domestic aviation market in fiscal year 2019-20. Positive momentum characterized this period, with a notable rise in both capacity (Available Seat Kilometers) and passenger traffic (Revenue Passenger Kilometers), leading to a healthy Passenger Load Factor.

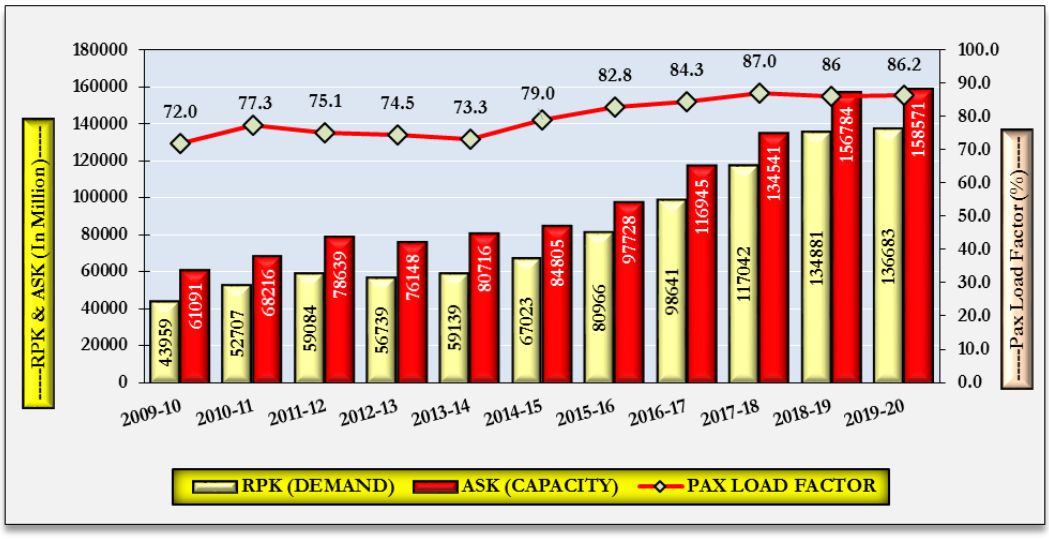
- ASK - Available Seat Kilometers acts as a gauge for the total number of seats airlines offer on domestic flights. A rising ASK indicates airlines are expanding their capacity to meet the growing demand for air travel.

- RPK - Revenue Passenger Kilometers represents the total distance traveled by fare-paying passengers. Growth in RPK indicates that not only is demand increasing, but airlines are also successfully translating that demand into revenue-generating passenger journeys.

- PLF - Passenger Load Factor expressed as a percentage, represents the capacity utilization of airlines on domestic routes. A healthy PLF indicates

that airlines are efficiently filling their available seats, maximizing revenue and profitability.

Figure 7: Capacity Expansion and Passenger Demand in the Indian Domestic Airline Industry (2010 - 2020)



Source – *Director General of Civil Aviation, India, 2021*

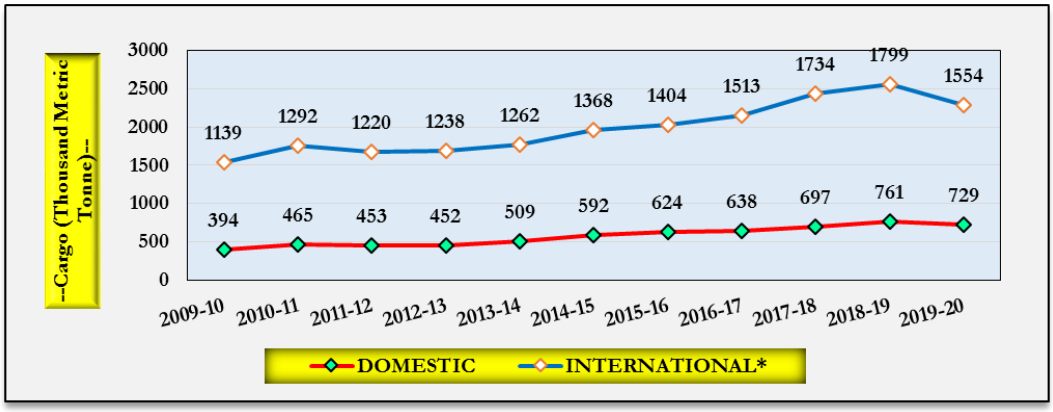
The positive growth observed in all three KPIs during FY 2019-20 signifies a robust and expanding domestic aviation market in India. Several key trends have underpinned the remarkable growth trajectory of the Indian aviation market. These include the rise of budget-friendly low-cost carriers (LCCs), a growing middle class with disposable income, and government initiatives promoting regional connectivity. These positive trends not only highlight the resilience of the Indian aviation sector but also point towards its immense potential for future growth.

Over the decade from 2009-10 to 2019-20, the domestic cargo traffic in the Indian aviation sector demonstrated a solid compound annual growth rate (CAGR) of 6.4%. This signifies consistent growth in the transportation of cargo within the country.

Simultaneously, the international cargo traffic also experienced growth, albeit at a slightly lower rate, with a CAGR of 3.2% during the same period. This indicates an upward trend in the movement of cargo on international routes.

The positive growth rates in both domestic and international cargo traffic underscore the significance of air transport in facilitating the movement of goods and commodities, contributing to the overall economic activity in India. The growth in cargo traffic reflects the evolving dynamics and demands of the logistics and supply chain industries in the country.

Figure 8: Scheduled Airline Cargo Traffic Data (2010-2020)



Source – *Director General of Civil Aviation, India, 2021*

1.3.2 Airline Industry Market Size

In FY21, the domestic air travel market recorded a passenger volume of 115.37 million. However, this figure reflects a significant slowdown compared to previous years. While the overall numbers show a decline, it's crucial to understand the underlying reasons.

The substantial decrease in passenger traffic can be directly attributed to the COVID-19 pandemic. Strict travel restrictions and lockdowns implemented during fiscal year 2020-21 severely curtailed air travel demand. This resulted in an annual

decline of (9.02) % for domestic traffic and a steeper decline of (28.64) % for international traffic compared to the period between fiscal year 2015-16 and 2020-21.

The COVID-19 pandemic undoubtedly crippled global air travel, and India's aviation sector was no exception. Analyzing key FY21 statistics paints a clear picture of the disruption caused by the pandemic while also revealing underlying trends that hint at a potential rebound.

The most striking statistics lie in passenger traffic figures. Domestic travel, the backbone of the Indian aviation industry, plummeted by a staggering 61.7% year-on-year (YoY) in FY21, with approximately 105.2 million passengers. International travel fared even worse, experiencing a brutal 84.8% YoY decline, with around 10.1 million passengers. These figures highlight the severe impact of travel restrictions and lockdowns on air travel demand.

While passenger traffic witnessed a significant decline, the story for freight traffic is somewhat different. Cargo transportation demonstrated a surprising level of resilience, with an annual decline of only (1.77) % from FY16 to FY21. This suggests that the demand for air cargo remained relatively stable despite the pandemic, and the potential for future growth appears promising. Industry experts project that freight traffic on Indian airports could reach a staggering 17 million tonnes by FY40, indicating a significant expansion in the air cargo segment.

The decline in passenger and cargo traffic naturally translated into a decrease in aircraft movements. Overall aircraft movements in India experienced a CAGR decline of (7.79) % from FY16 to FY21. Here, a closer look reveals a trend: domestic aircraft movements declined at a slower rate (-6.44% CAGR) compared to international movements (-18.52% CAGR). This could be attributed to the fact

that domestic travel restrictions were relaxed to a certain extent earlier compared to international travel, leading to a faster resumption of domestic flights.

Despite the significant challenges posed by the pandemic, the long-term outlook for the Indian aviation sector appears cautiously optimistic. The growing disposable income of Indian travelers is a positive indicator. This, coupled with the anticipated growth in freight traffic, suggests a potential rebound for the Indian aviation industry in the coming years.

The road to recovery will necessitate strategic measures from stakeholders. Investments in infrastructure development, alongside initiatives to enhance operational efficiency, will be crucial. Embracing new technologies and capitalizing on the growing demand for domestic and regional travel will be key factors in propelling the Indian aviation sector to even greater heights in the post-pandemic era.

India's aviation industry is experiencing a significant surge, driven by a rising middle class and increasing disposable income. To accommodate this growth, the government is actively expanding airport infrastructure. As of 2020, there were 153 operational airports, with an ambitious plan to increase this number to 190-200 by FY40. This expansion will be crucial to handle the anticipated rise in air traffic.

The growth isn't limited to airports. The number of airplanes operating in India is also expected to take off, reaching a projected 1,100 planes by 2027. This substantial increase in both infrastructure and fleet size underscores the government's commitment to fostering a robust and thriving aviation sector in India.

1.3.3 Pandemic Impact on Indian Aviation Industry

The aviation industry, while a relatively small slice of the GDP pie, acts as a strong driver for global economic development. Airlines, Airports, Aircraft manufacturers and MROs function like a well-oiled machine, connecting businesses and people across continents, fueling trade, tourism, and investment. However, the COVID-19 pandemic dealt a devastating blow to this critical sector, triggering a perfect storm that grounded flights and sent the industry into a tailspin.

The impact of the pandemic rippled throughout the aviation ecosystem. Airlines, burdened by a significant portion of variable costs like fuel and maintenance, found themselves with grounded fleets and dwindling cash reserves.

April 2020 witnessed a staggering 90% year-on-year drop in passenger air travel (RPKs) according to IATA. This decline, coupled with global travel restrictions, grounded fleets, and uncertainties around travel schedules, created an unprecedented crisis. Ticket liabilities and high cash burn rates further exacerbated the financial woes of airlines.

The challenges went beyond just travel restrictions. Airlines faced additional hurdles like bans on flights to specific destinations due to outbreaks, visa restrictions imposed by various countries, lockdowns on inbound travel to contain the virus, and targeted restrictions on travelers from countries with high infection rates. These factors, combined with job losses within the industry itself, reduced income across the board, and lingering fear of travel due to health concerns, resulted in a severe and sustained contraction in demand.

The grounding of airplanes and the decline in passenger traffic had a domino effect throughout the aviation industry. Airlines were forced to furlough or lay off

employees, impacting not just pilots and cabin crew, but also maintenance staff, ground handling personnel, and administrative positions. This translated to a significant loss of jobs and a ripple effect on the broader economy.

The disruption in air cargo movement also had unforeseen consequences. Strict border controls and limitations on passenger flights hampered the flow of essential goods and medical supplies, hindering global supply chains. This not only disrupted the delivery of critical medical equipment during the height of the pandemic but also caused delays and shortages in other sectors reliant on-air freight.

The COVID-19 pandemic has been a relentless storm for India's aviation industry, grounding flights and pushing major airlines into deep financial straits. IndiGo and SpiceJet, two of the country's leading carriers, exemplify this struggle. Both airlines reported significant net losses in the first two quarters of the fiscal year 2021, highlighting the immediate financial toll.

The Indian aviation industry provides a microcosm of the global crisis. Indian airlines are estimated to have incurred substantial losses – a staggering $4.1 billion in FY2021-22 and an additional $3.9 billion in the previous fiscal year. Similarly, airports in India witnessed a significant decline in operating income, with many reporting net losses due to a 66% year-on-year plunge in passenger numbers due to travel restrictions during COVID. These financial losses not only threatened the immediate survival of airlines and airport operators, but also jeopardized future investments in infrastructure development and technological advancements.

The unprecedented impact of COVID on the aviation sector globally underscores the immediate need for strategic measures and robust support systems to ensure its recovery and long-term sustainability. As the industry navigates the path to recovery, collaboration between stakeholders, innovative solutions, and a laser

focus on passenger safety will be paramount. Governments are poised to play a pivotal role in providing financial assistance to airlines and airports, while also expediting the vaccination process and implementing clear guidelines for safe travel protocols. Airlines will need to adapt their business models to address the evolving needs of passengers, potentially by offering greater flexibility in booking and cancellation policies, and prioritizing hygiene measures to restore confidence in air travel. Embracing technological advancements, such as contactless check-in procedures, touchless security systems, and improved ventilation systems on board aircraft, will be crucial for creating a smooth and safe travel experience. By weathering this storm and implementing strategic measures, the aviation sector can reclaim its position as a vital catalyst for global economic growth and re-emerge as a symbol of global connectivity.

1.4 Market Share of Indian Carriers

The Indian domestic aviation market boasts a vibrant ecosystem, with several airlines vying for dominance. IndiGo reigns supreme with an unmatched 54% market share in FY21, a position solidified by a robust fleet of 256 aircraft. Primarily consisting of Airbus A320neos and A321neos, these fuel-efficient workhorses connect passengers across a vast network of 63 domestic destinations and 24 international destinations (pre-pandemic). Their strategic partnership with Airbus, making them the largest customer for ordered aircraft, further strengthens their leadership. Interestingly, unlike some global markets where the pandemic reshuffled the deck, IndiGo has only tightened its grip on the domestic market. Since domestic flights resumed in late May 2020, they've grown their market share from 40-45% to the current 50-55% range, demonstrating remarkable resilience.

SpiceJet, holds a 12.8% market share with a distinct strategy. Their fleet boasts a mix of Boeing 737s for mainline routes and Bombardier Q400s, ideally suited for serving regional destinations. This focus on regional connectivity, coupled with a

growing freighter aircraft fleet, positions them as a significant player catering to the diverse needs of the Indian aviation sector. Notably, SpiceJet is the largest operator of regional jets (Q400s) in India, a factor that significantly contributes to their consistently high load factors, reaching an impressive 71% (nearly 80% at the beginning of 2021). This focus on regional markets and efficient utilization of aircraft allows SpiceJet to carve out a profitable niche within the competitive Indian aviation landscape.

Air India, holds a 12% market share, trailing SpiceJet by a narrow margin of just 20,000 passengers. This legacy carrier boasts the most diverse fleet among Indian airlines, including the iconic wide-body Boeing 747s and 777s, alongside modern 787s for long-haul routes. However, on domestic routes, they primarily deploy A320 family aircraft (A319s, A320s, and A321s), serving nearly 100 destinations when combined with their subsidiary Alliance Air. Air India is currently at a crossroads, navigating the challenges of maintaining a legacy brand while competing with the aggressive pricing strategies of low-cost carriers.

Go First, previously known as GoAir, occupies the fourth position with a 9.6% market share. The Wadia Group-owned airline is currently undergoing a metamorphosis into an ultra-low-cost carrier (ULCC) to compete effectively in the budget-conscious Indian market. They operate an all-Airbus A320 fleet of 55 aircraft, aiming to provide the lowest fares possible. Despite facing recent challenges, Go First is planning a significant IPO to strengthen their financial position and solidify their place as a major contender in the dynamic Indian aviation market.

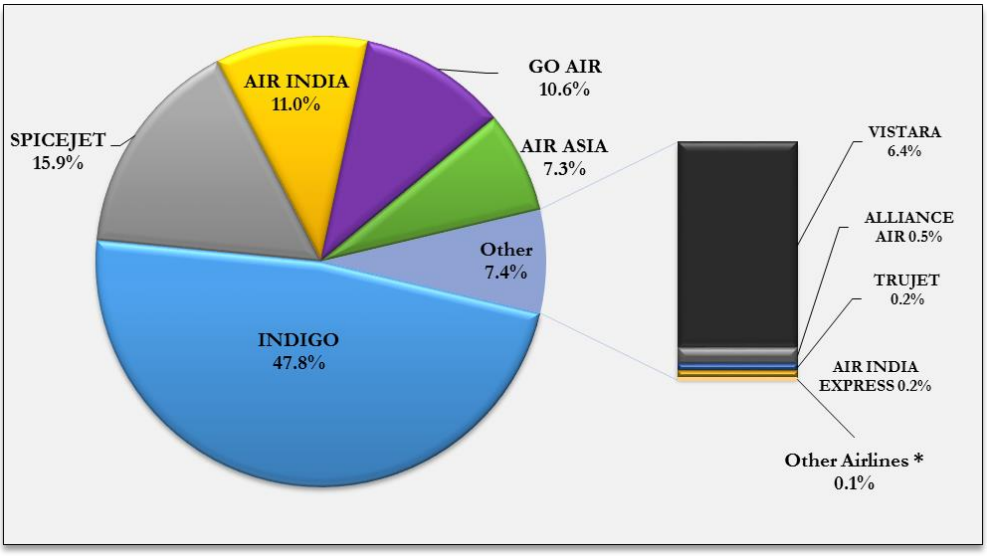
Tata Sons, a major Indian conglomerate, owns both AirAsia India and Vistara, which hold the fifth and sixth positions respectively, with market shares of 6.2% and 5.4% in April 2021. AirAsia India focuses on specific leisure routes,

capitalizing on the growing demand for domestic travel within India. Their fleet consists entirely of Airbus A320s, and they achieve a load factor of 64%.

Vistara, on the other hand, has carved out niches with a full-service approach, offering premium economy and business class cabins on their all-Airbus A320 fleet. However, their premium pricing strategy has faced challenges in the price-sensitive Indian market. Interestingly, Vistara has recently adopted a dual strategy. They've introduced Boeing 787-9s for long-haul international flights, becoming only the second Indian airline with wide-body aircraft, signaling their ambitions to expand beyond the domestic market.

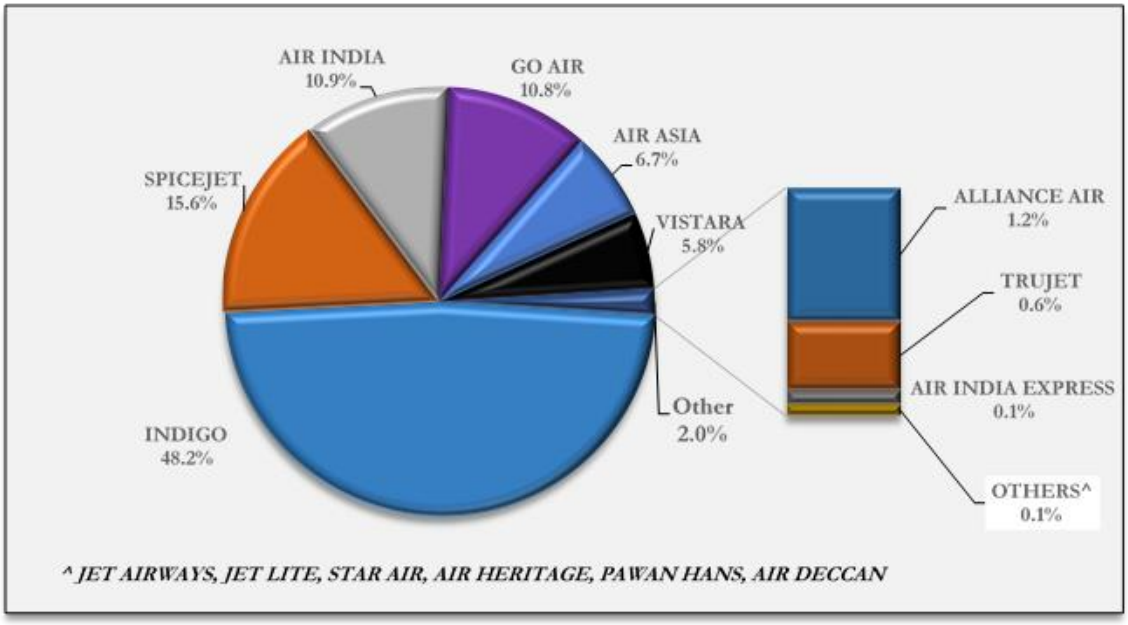
Overall, the Indian aviation market is poised for significant growth. The dominance of the top six airlines can be challenged by new entrants, technological advancements, and changing consumer preferences. However, established players can solidify their positions by adapting, innovating, and prioritizing passenger needs.

Figure 9: Domestic Traffic Share (Measured by RPK) (2019 - 2020)



Source – *Director General of Civil Aviation, India, 2021*

Figure 10: Domestic Traffic Share (Measured by Pax Carried) (2019-2020)



Source – *Director General of Civil Aviation, India, 2021*

In the dynamic world of Indian aviation, the fiscal year 2019-20 painted a fascinating picture of market dominance. By dissecting the data on domestic and international passenger traffic, we can identify the airlines that reigned supreme in their respective domains.

Within the confines of India, IndiGo emerged as the undisputed king of the domestic market. Their industry dominance was clearly reflected in data pertaining to both total passenger volume and Revenue Passenger Kilometers (RPKs). RPKs, a metric that considers both distance traveled and passengers on board, underscores IndiGo's ability to efficiently manage its fleet and cater to a wide range of domestic routes. This leadership reflects IndiGo's strategic approach, their substantial fleet size, and their focus on capturing a significant share of the ever-growing domestic travel market.

Following IndiGo's impressive performance, SpiceJet, Air India (now privatized), and Go Air (now rebranded as Go First) occupied the subsequent positions in the domestic market share rankings. These players, along with IndiGo, have shaped the landscape of domestic travel in India, offering a mix of budget-friendly options and established brand recognition.

India's international aviation sector presented a slightly different picture. While the domestic market witnessed a clear leader in IndiGo, the international scene was more fragmented. Here, 88 scheduled operators carved out a niche for themselves, catering to a diverse range of international routes and passenger preferences. Interestingly, the top 6 international operators collectively captured nearly half (50%) of the total international passenger traffic during that fiscal year. This indicates a moderately concentrated market where a handful of key players hold significant sway over international travel to and from India.

Among these international leaders, Air India emerged as the frontrunner, boasting a market share of 11.6%. This dominance can be attributed to Air India's legacy as the national carrier and its established network of international routes. IndiGo, however, presented a strong challenge, closely following Air India with a market share of 11.5%. This highlights IndiGo's ambitious foray into the international market, capitalizing on its strong brand presence and fuel-efficient fleet.

Being the top five international operators from India perspective, Emirates, SpiceJet and Air India, along with Air India and IndiGo, played a crucial role in connecting India to various global destinations, catering to a diverse range of travelers seeking business or leisure opportunities abroad.

The data explored offers a pre-pandemic perspective of the Indian aviation market. The COVID-19 crisis undoubtedly reshaped the industry landscape in the

years that followed. It will be intriguing to analyze how market share dynamics have evolved since then. Factors like the emergence of new budget carriers, the varying impact of the pandemic on different airlines, and potential shifts in passenger preferences will impact the future dominance of Indian aviation sector.

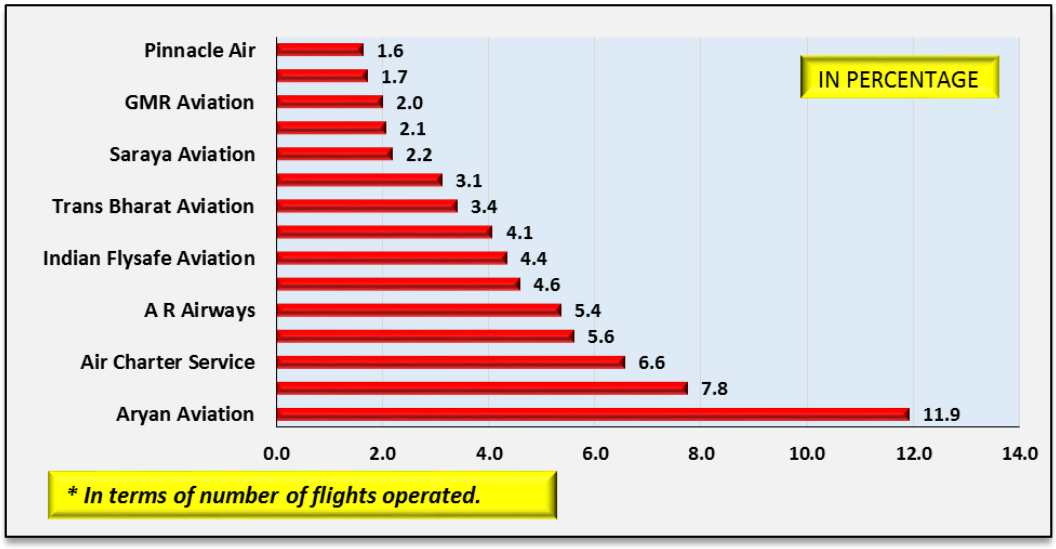
Table 3: Market Share Distribution of International Passengers on Scheduled Indian & Foreign carriers

S. No.	Year	Foreign Carriers	Indian Carriers
1.	2010-11	63.9	36.1
2.	2011-12	63.4	36.6
3.	2012-13	66.2	33.8
4.	2013-14	64.1	35.9
5.	2014-15	63.0	37.0
6.	2015-16	63.4	36.6
7.	2016-17	62.3	37.7
8.	2017-18	61.1	38.9
9.	2018-19	59.9	40.1
10.	2019-20	62.6	37.4

Source – *Director General of Civil Aviation, India, 2021*

In India, the aviation ecosystem is not limited to the major airlines that dominate the skies. There exists a vibrant ecosystem of Non-Scheduled Flight Operators (NSOPs) that cater to specialized needs and offer a unique service. While there was a total of 66 NSOPs operating in India during that period, the real story lies in the concentration of activity. The top 15 NSOPs, representing a mere fraction of the total number, surprisingly accounted for over 60% of the total domestic flights operated by NSOPs.

Figure 11: Top 15 NSOP-domestic operations (% share), (2019-2020)



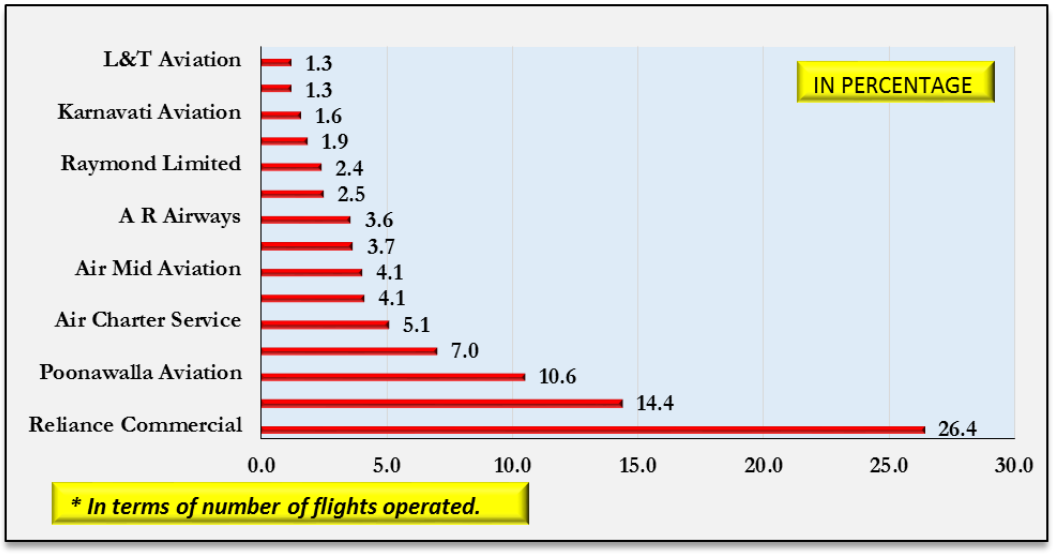
Source – *Director General of Civil Aviation, India, 2021*

In India, airline industry's dominance by a select few extends beyond domestic operations. Data from fiscal year 2019-20 reveals a similar trend within the niche market of Non-Scheduled International (NSI) flight operators.

While the total number of NSI operators in India during that period remains undisclosed, the available data paints a fascinating picture. The top 15 NSI operators, a small fraction of the total, were responsible for a staggering 90% of all international flights operated by NSI carriers. This statistic signifies an even higher level of concentration compared to the domestic NSOP market, where the top 15 accounted for "over 60%."

The future of the NSI market in India will be interesting to observe. As international trade and travel continue to grow, the demand for NSI flights might increase. This could lead to the emergence of new players or an expansion of operations by the existing top contenders. Additionally, Government regulations and policies have the potential to significantly influence the competitive landscape within this NSI sector.

Figure 12: Top 15* NSOP-international operations (% share), (2019-2020)



Source – *Director General of Civil Aviation, India, 2021*

1.5 Overview of Airline Performance Metrics

The airline industry is a complex ecosystem where success hinges on a delicate balance between capacity, revenue, and cost. To assess an airline's performance and efficiency, industry experts rely on a set of Key Performance Indicators (KPIs). Understanding these metrics is crucial for investors, analysts, and even curious travelers. Here's a breakdown of some key KPIs:

- Capacity and Utilization:
    - Available Seat Kilometer (ASK): constitutes a critical performance indicator (KPI) within the airline industry. reflects an airline's total carrying capacity (in terms of pax). It's calculated by multiplying the distance an airplane will travel and number of seats available on that airplane. An increasing ASK signifies a larger network and the ability to serve more passengers.

    - Revenue Passenger Kilometer (RPK): This KPI measures actual passenger traffic. It is estimated by multiplying total distance

covered by a flight with the number of passengers carried. A higher RPK indicates that the airline is successfully filling its seats.

- Load Factor: This metric reveals how efficiently an airline utilizes its available capacity. It's calculated by dividing RPK by ASK and expressed as a percentage. A higher load factor indicates better efficiency, as the airline is filling a greater proportion of its seats.

- Revenue Generation:
  - Total Revenue per ASK (RASK): This KPI provides insight into the airline's overall revenue generation capability per unit of capacity. It is estimated by calculating the quotient of its total operating revenue and total ASKs. A higher RASK suggests the airline is effectively converting its capacity into revenue.

  - Passenger Revenue per ASK (PRASK): This metric delves deeper into passenger revenue specifically. It considers both load factor and passenger yield (average fare per passenger) and is calculated by multiplying the load factor with the passenger yield. A higher PRASK indicates better performance in terms of passenger revenue generation.

  - Passenger Yield: This KPI gauges the average revenue earned per passenger kilometer. It's calculated by dividing the total passenger revenue by the total RPKs. Analyzing yield trends helps airlines understand pricing strategies and passenger behavior.

- Cost Management:
  - Total Costs and Expenses per ASK (CASK): This metric reflects the overall efficiency of an airline's cost management. It is estimated by

dividing total operating expenses of an airline by total ASKs. A lower CASK demonstrates better cost control and profitability.

- Total Costs and Expenses per ASK ex Fuel (CASK Ex Fuel): Similar to CASK, this metric excludes fuel costs, providing a clearer picture of the airline's efficiency in managing non-fuel-related expenses. This is important because fuel prices can fluctuate significantly, impacting overall CASK.

- Labor Cost per Air Kilometer Flown: This KPI focuses specifically on labor expenses. It's calculated by dividing the airline's total labor costs by the total distance flown (air kilometers). Analyzing this metric helps airlines assess staffing levels and optimize labor costs.

The airline industry thrives on efficiency and calculated decision-making. To navigate this competitive landscape, airlines rely on a robust framework of metrics (KPIs) that provides insights and guide strategic direction for achieving optimal performance. Monitoring these metrics empowers management to gain valuable insights into various aspects of their operations, from capacity utilization to revenue generation and cost control.

By closely scrutinizing KPIs like Load Factor, ASKs and RPKs, airlines can assess how effectively they're deploying their fleet. A low load factor, for instance, might indicate a need to adjust routes, schedules, or pricing strategies to better match passenger demand.

Similarly, KPIs like PRASK, RASK and Passenger Yield delve deeper into revenue generation. These metrics provide insights into how well airlines are converting their capacity into revenue. Analyzing them helps determine if the right balance is

being struck between ticket prices, passenger comfort, and attracting enough customers to fill seats.

Cost management is another crucial aspect, illuminated by KPIs like Total Costs and Expenses per ASK (CASK) and CASK excluding fuel. These metrics shed light on the efficiency of operations, allowing airlines to identify areas where expenses can be reduced. Optimizing staffing levels, negotiating fuel contracts, and streamlining maintenance procedures are just a few examples of cost-saving strategies informed by KPI analysis.

Table 4: Passenger Flow Statistics

Nos.	Traffic	Unit	2018-19	2019-20
1.	Domestic Passengers	Departing Passengers	140.3 million (13.8)	141.2 million (0.6)
2.	Domestic Airline Demand	Revenue Passenger Kilometers (RPK)	134.9 billion (15.2)	136.7 billion (1.3)
3.	Domestic Airline Capacity	Available Seat Kilometers (ASK)	156.8 billion (16.5)	158.6 billion (1.1)
4.	International Passengers	Departing and Arriving Passengers	63.9 million (5.4)	60.8 million (-4.9)
Total Passengers (Domestic & International)			**204.2 million (11.0)**	**202 million (-1.1)**

Source – *Director General of Civil Aviation, India, 2021*

Note: Figures in bracket denotes change in % with respect to last year

Within the dynamic world of airline operations, efficiency reigns supreme. One crucial metric that sheds light on an airline's ability to leverage its workforce effectively is Available Seat Kilometer (ASK) per Employee. This metric explores the critical correlation between an airline's capacity expansion strategy and the effectiveness of its workforce. An airline's workforce is the driving force behind its capacity creation. From pilots and cabin crew navigating the skies to ground staff ensuring smooth operations and maintenance personnel keeping the fleet airworthy, every employee plays a vital role. A higher ASK per employee indicates that the airline is effectively utilizing its workforce to create capacity.

An intriguing observation emerges from the data: Go Air (now rebranded as Go First) exhibits a particularly high Available Seat Kilometer (ASK) per employee ratio, even surpassing some national airlines. This suggests a noteworthy level of efficiency in managing both workforce and capacity. It's crucial to acknowledge that a high ASK per employee metric, while positive, doesn't necessarily equate to absolute performance excellence.

Figure 13: ASK per employee, (2018 - 2019)

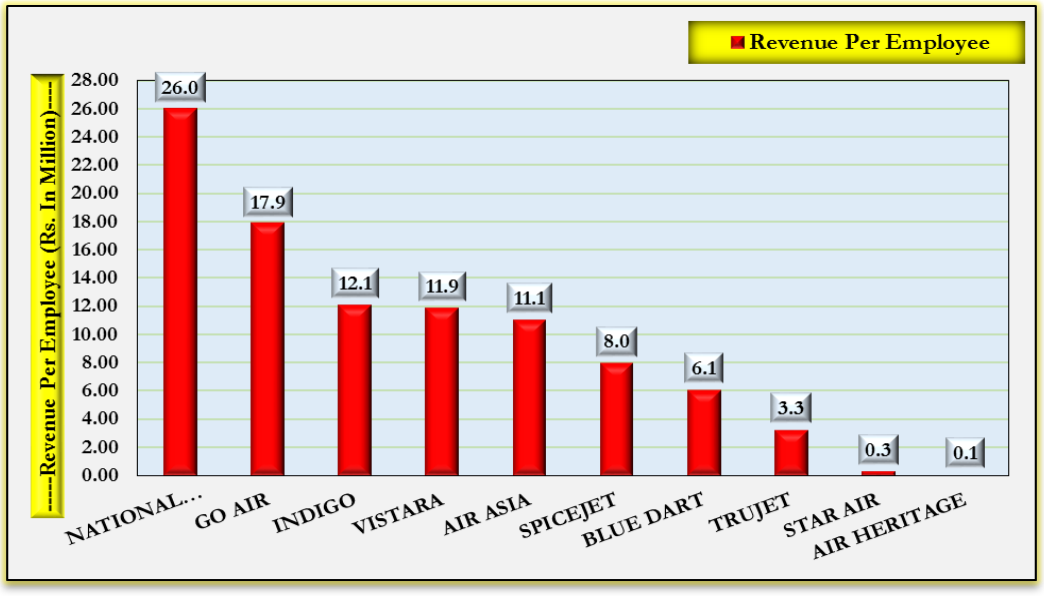
** National Airlines Includes Air India, Air India Express & Alliance Air*

Source – *Director General of Civil Aviation, India, 2021*

As competition within the airlines industry intensifies, airlines constantly strive to optimize their operations and maximize profitability. A crucial metric in this pursuit is Revenue per Employee (RPE), offering valuable insights into workforce productivity and efficiency. This metric essentially gauges the average revenue each employee contributes to the airline's overall revenue stream. It is estimated by dividing the total operating revenue of an airline by its total employee headcount. A higher Revenue per Employee indicates that the airline is successfully leveraging its manpower to improve income.

As per the past data, national carriers have the highest revenue per employee, followed by Go Air and Indigo, thus it suggests that national carriers are particularly effective in generating revenue relative to its workforce. Similarly, Go Air and Indigo are also identified as having strong employee productivity. A high Revenue per Employee achieved through optimized operations, strategic route planning, and a healthy passenger load factor is a positive indicator.

Figure 14: Carrier wise Revenue Per Employee (RPE), 2018-19



** National Airlines Includes Air India, Air India Express & Alliance Air*

Source – *Director General of Civil Aviation, India, 2021*

However, it's crucial to ensure this doesn't come at the expense of employee well-being, safety standards, or passenger satisfaction.

1.6 Financial Distress in Commercial Firms

1.6.1 Conceptualization of Financial Distress

Through the lens of financial theory, typically financial distress signifies a state of significant difficulty for an entity, be it a corporation or an individual, in meeting its financial obligations. This translates to a critical challenge in fulfilling essential financial commitments, such as debt repayments, bills, and other liabilities on a timely basis.

Several factors can contribute to the onset of financial distress:

- Burdensome Fixed Costs: Entities with a high proportion of fixed costs, like rent or salaries, are particularly susceptible during economic downturns or periods of sluggish sales. The inflexibility of these costs, regardless of revenue fluctuations, makes expense adjustments during economic hardship challenging.

- Illiquid Assets: Owning assets that are difficult to convert to cash quickly, such as specialized equipment or property in a depressed market, can constrain an entity's capacity to secure readily available funds in times of need. Liquidity is paramount for meeting short-term financial commitments.

- Macroeconomic Downturns: Downturns in the economic cycle, characterized by recessions or sluggish growth, can significantly impair a company's revenue generation and margins. This potential decline in

income streams can trigger cash flow constraints and impede the fulfillment of financial commitments.

- Imprudent Financial Decision Making: Making unsound financial decisions, such as taking on excessive debt, neglecting proper budgeting practices, or failing to implement cost controls, can leave an entity exposed to financial distress.

- Unsustainable Spending Patterns: Individuals or businesses that consistently spend beyond their means can accumulate substantial debt and struggle to keep up with repayments.

- Excessive Debt Burden: High levels of debt can create a significant burden of interest payments. If an entity's income isn't sufficient to cover these payments and operating expenses, it can spiral into financial distress.

- Unforeseen Legal Issues: Unexpected legal entanglements, such as lawsuits or regulatory fines, can drain an entity's financial resources and make it difficult to meet existing obligations.

- Loss of Employment: For individuals, a job loss can result in a sudden and significant drop in income, making it difficult to cover essential expenses and potentially leading to financial distress.

The Companies Act offers a clear and objective definition of "financially distressed" to aid in identifying companies facing significant financial challenges. This definition hinges on a two-pronged test:

- Imminent Inability to Pay Debts: This criterion assesses the company's immediate liquidity. It determines whether the company is considered "reasonably unlikely" to settle all its forthcoming debts within the following six months. This highlights potential cash flow shortfalls that could hinder the firm's capacity to fulfill its financial obligations.

- Elevated Insolvency Risk: This criterion takes a broader perspective on the company's long-term financial health. It emphasizes whether there's a "reasonable likelihood" of the company becoming insolvent within the next six months. Insolvency signifies an inability to meet financial obligations, and this criterion ensures companies on the precipice of such a situation are identified promptly.

The Act underscores the importance of a meticulous evaluation of the company's current financial position. This assessment should encompass all relevant factors that could potentially impact the firm's capacity to generate cash flow and fulfill its financial commitments in the foreseeable future.

Identifying a company as financially distressed under the Companies Act can have significant repercussions. It might necessitate restructuring efforts, securing additional funding, or potentially even initiating insolvency proceedings. The specific course of action will be determined by the company's unique circumstances and as per applicable provisions outlined within the Companies Act of India.

By articulating a precise definition of distress and emphasizing the importance of a comprehensive assessment, the Companies Act fosters the early identification and responsible management of financial difficulties within corporations. This

proactive approach safeguards the interests of creditors, investors, and other stakeholders.

As defined by the Act, financial distress encompasses the risk of insolvency while recognizing the potential for the entity to recover, serves as a valuable framework for identifying and addressing financial difficulties proactively. There are two main views, on whether it refers to factual (technical) insolvency or commercial insolvency. Factual insolvency typically involves a balance sheet test where liabilities exceed assets. Commercial insolvency considers the broader context, including subordination agreements and management actions, and aligns with the objectives of the Companies Act related to business rescue.

In conclusion, understanding financial distress through the lens of the Companies Act empowers a comprehensive approach to corporate financial health. The Act's well-defined criteria and emphasis on both financial assessment and business rescue potential provide a robust framework for responsible financial management and navigating complex financial challenges.

1.6.2 Understanding Financial Distress

Financial distress can indeed affect companies, even those that are well-managed, and it can stem from various factors, some of them lie outside the company's direct sphere of influence. Here are some common reasons for financial distress:

- Economic Downturns: Unforeseen macroeconomic downturns can cause substantial declines in corporate revenue. The COVID-19 pandemic, with its associated lockdown measures and quarantine protocols, provides a stark illustration of this phenomenon, significantly disrupting business operations and leading to widespread revenue losses across various industries.

- Interest Rate Fluctuations: Corporations that hold debt with floating interest rates (also known as variable-rate debt) expose themselves to potential financial challenges in periods of rising interest rates. A significant increase in interest rates can translate into a material rise in borrowing costs, potentially straining their debt service coverage ratios and impacting their overall financial stability.

- Management Failures: Poor decisions by top executives, such as overextending the company financially for growth without realizing increased revenues quickly enough, can contribute to financial distress. Marketing or pricing decisions that do not resonate with consumers can also have negative consequences.

- Product Failures: Introducing a new product that fails to gain consumer acceptance, as seen in the case of Coca-Cola's "New Coke," can lead to a severe drop in revenue and financial distress. Rectifying such mistakes, as Coca-Cola did by reverting to "Coca-Cola Classic," can help recover sales.

- Budgeting Issues: Several financial management shortcomings can precipitate a company's descent into financial distress. Without reliable financial forecasting models, firms can project unrealistic revenue and expenditure estimates. This can result in a company being significantly underprepared for unforeseen circumstances or economic downturns. Budgeting based on inflated revenue expectations can lead to excessive spending and a subsequent cash flow squeeze when reality fails to meet overly ambitious projections. A well-constructed budget should not only encompass revenue and expenses but also prioritize cash flow – the lifeblood of any organization. Inadequate cash flow planning can leave a company vulnerable to situations where it lacks sufficient readily available funds to meet its obligations, even if revenue is being generated.

Financial statements act as a vital instrument of corporate transparency, furnishing stakeholders with a comprehensive lens to assess a company's financial well-being. Typically, all this information empowers stakeholders, encompassing both investors and creditors, to conduct a meticulous risk assessment and make well-informed decisions. A critical facet of this assessment involves identifying potential red flags that might signal an elevated risk of financial distress. Some of the key indicators are listed below:

- Negative Cash Flows: A company's cash flow is the lifeblood of its operations. Persistently negative cash flows, signifying a consistent outflow exceeding inflow, can denote difficulty meeting financial obligations. This scenario will raise concern about a firm’s long term operational sustainability.

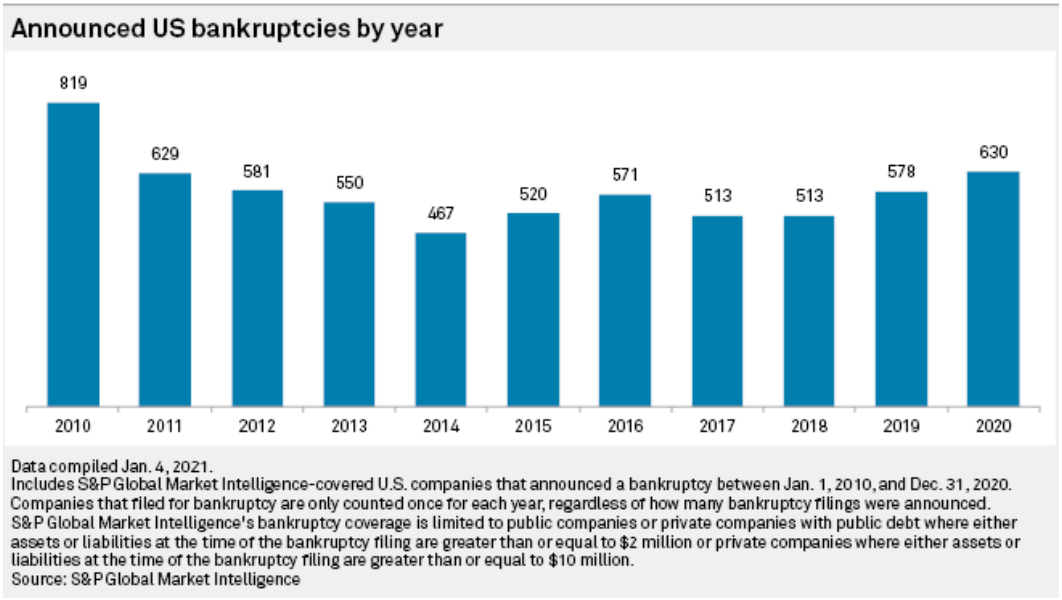
- Deteriorating Working Capital Management: A company's short-term financial health is significantly influenced by its working capital, which represents the current assets readily convertible to cash minus its current liabilities, or obligations due within a year. A material decline in working capital can pose a threat to the company's ability to meet its impending financial commitments, potentially hindering operational continuity and impacting its financial flexibility.

- Disparity Between Cash Payments and Accounts Receivable: To ensure the accuracy of financial reporting, a significant divergence between a company's cash collections and its accounts receivable necessitates a data-driven investigation to reconcile the discrepancy. A rising level of accounts receivable indicates a potential slowdown in customer collections. This can significantly constrain a company's cash flow, hindering its ability to fulfill its short-term financial commitments.

- Burdensome Interest Expenses: High interest payments can significantly erode a firm's operating income, the lifeblood of its financial health. If a considerable part of a firm's operating income is used to cover interest expenses, it highlights potential weaknesses in the underlying business model. The long-term sustainability of this model is brought into question due to the company's capacity to make sufficient earnings for debt servicing.

The year 2020 serves as a potent illustration of how unforeseen external events can trigger a surge in corporate distress. The macroeconomic challenges posed by the COVID-19 pandemic pushed many companies to the brink, resulting in a notable surge in global bankruptcy filings. In light of this situation, the significance of thorough financial analysis and robust risk management by investors is underscored. A comprehensive assessment, incorporating the potential for financial distress, is crucial before making investment decisions.

Figure 15: US Bankruptcies in last 10 Years



1.6.3 Signs of Financial Distress

Financial distress can pose a significant existential threat to a company's long-term viability. However, proactive stakeholders equipped with the knowledge of early warning signs can take timely action to mitigate risks and foster financial resilience.

- Indicators of Weakening Profitability:
  - Persistently Low or Declining Profit Margins: Companies exhibiting consistently low or declining profit margins may be experiencing structural inefficiencies or a fundamental mismatch between their offerings and market demands. The aforementioned factors pose a significant threat to a company's long-term financial health by hindering its ability to generate sufficient cash flow. This cash flow shortage can constrain investments in future growth initiatives and limit the company's capacity to fulfill its debt obligations.

  - Inability to Achieve Break-Even Operations: Companies struggling to achieve break-even, a state where revenue equals total expenses, are particularly vulnerable. This scenario necessitates dependence on external funding sources, such as debt or equity financing. This heightened reliance on external capital amplifies business risks and can negatively impact a company's creditworthiness with lenders, suppliers, and investors. This diminished creditworthiness can, in turn, lead to restricted access to vital funding and hinder a company's ability to navigate unforeseen challenges.

- Symptoms of Declining Demand:
  - Stagnant or Declining Sales Growth: A company experiencing stagnant or declining sales growth, despite significant marketing investments, might be facing a fundamental issue with its product or

service offerings. This lack of demand can be a consequence of a saturated market, customer dissatisfaction, or a failure to adapt to evolving consumer preferences. Unattended, this situation can ultimately lead to business closure.

    - Shifting Customer Preferences: A company's inability to adapt to changing customer preferences or a decline in the quality of its products or services can prompt consumers to switch to competitors. This erosion of customer loyalty can have a devastating impact on a company's sales and overall financial health.

- Cash Flow Strain as a Red Flag:
    - Prolonged Delays in Accounts Receivable Collections: Delayed collections from debtors can severely strain a company's working capital. Any crunch in cash flow restricts a company's capacity to service its financial obligations, potentially impacting payments to suppliers, employees, and creditors. Such challenges can trigger a cascading series of negative consequences, potentially tarnishing the company's reputation, jeopardizing its creditworthiness, and ultimately threatening its ability to operate as a going concern.

Early identification of these warning signs empowers stakeholders, including management, creditors, and investors, to take preventative measures. Potential strategies might involve cost reduction initiatives, product or service innovation, improved collections practices, or debt restructuring efforts. By implementing such measures, companies can enhance their financial resilience and navigate challenging economic landscapes. In conclusion, early recognition of financial distress indicators is paramount for ensuring a company's long-term financial well-being. Through proactive stakeholder engagement and the implementation

of well-defined strategies, companies can mitigate potential financial threats and ensure long-term financial health.

1.6.4 Remedy for Financial Distress

Companies facing financial distress often implement various strategies to alleviate their financial challenges. Common remedies include cost-cutting measures, improvements to cash flow and revenue generation, and debt restructuring aimed at reducing debt payment burdens. While navigating financial distress can be challenging, there are strategies to reverse the situation.

A crucial initial step for many companies is a comprehensive review of their business plans. This involves a thorough examination of both operational efficiency and market performance, coupled with the establishment of clear objectives and timelines for achievement.

Financial distress often compels companies to implement cost-containment measures. These measures can encompass streamlining staffing levels or revising management compensation structures, both of which contribute significantly to a company's overall expenditure. Debt restructuring presents another potential avenue for navigating financial challenges. This process allows companies struggling to meet their financial obligations to renegotiate loan terms with creditors. By altering repayment structures, businesses can improve their cash flow and alleviate short-term financial burdens.

These proactive measures, coupled with strategic planning and implementation, can pave the way for a successful turnaround for companies facing financial distress and help restore their financial health.

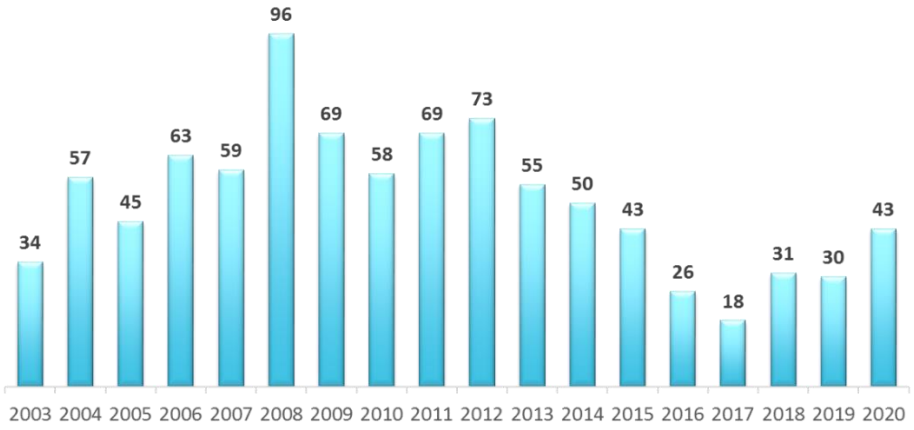
1.7 Financial Distress in Aviation Industry

Aviation industry experienced significant disruptions in 2020, with a notable decline in passenger numbers and substantial financial losses. Compared to the previous year, airlines witnessed a staggering 60.2% year-over-year decline, carrying only 1.8 billion passengers across scheduled services. The substantial decrease signifies the severe impact of COVID-19 and related travel restrictions on the airline industry. The substantial decrease in passenger volume highlights the profound impact of the global health crisis on air travel demand, with ripple effects throughout the aviation sector. On average, a per-passenger loss of $71.7 was incurred, resulting in a total net loss of $126.4 billion.

In terms of available seat kilometers (ASKs), global airline capacity saw a sharp reduction of 56.7%, with international capacity taking the hardest hit at a staggering 68.3% decrease. An analysis of airline industry data reveals that the system-wide passenger load factor experienced a steeper decline in 2020 compared to the decrease in passenger numbers. While passenger traffic on scheduled services witnessed a year-over-year drop of 60.2%, the load factor, a metric indicating seat occupancy, plummeted to 65.1% from 82.5% in 2019. Regionally, the Middle East experienced the largest loss in passenger traffic, with a 71.5% drop in Revenue Passenger Kilometers (RPKs) compared to 2019. Europe and Africa followed closely with declines of 69.7% and 68.5%, respectively.

The financial strain on the industry was amplified by the numerous airline bankruptcies. Between 2003 and 2020, 919 commercial passenger airlines globally ceased operations, with 148 of them failing within the last five years. These failures impacted 158 countries, and 21 of these countries witnessed 10 or more airline failures during this period.

Figure 16: Commercial Airline Bankruptcies (2003 - 2020)



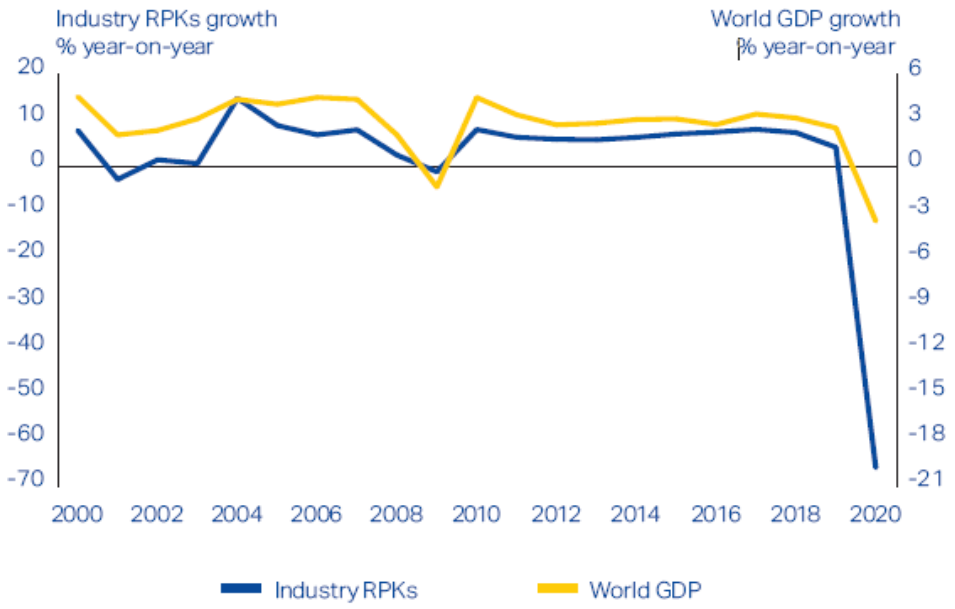
Source – *DGCA, India, CAPA, Media Reports & Independent Research, 2021*

COVID-19 pandemic had triggered a perfect storm of challenges for the global airline industry. Travel restrictions and plummeting demand have resulted in significant operational disruptions, with devastating economic consequences. The closure of 43 airlines in 2020 reflects the unprecedented challenges faced by the aviation sector. The cessation of operations not only affects the airlines themselves but also has wide-reaching consequences, including substantial job losses and a substantial reduction in economic activity.

The grounding of flights, travel restrictions, and a decrease in passenger demand have created a cascading effect on the entire aviation ecosystem. The loss of 46 million jobs and the reduction of USD 1.8 trillion in economic activity underscore the magnitude of the crisis and the interconnectedness of the airline industry with various other sectors of the economy. As the industry works towards recovery, the long-term effects of the pandemic on air travel and related businesses remain significant challenges.

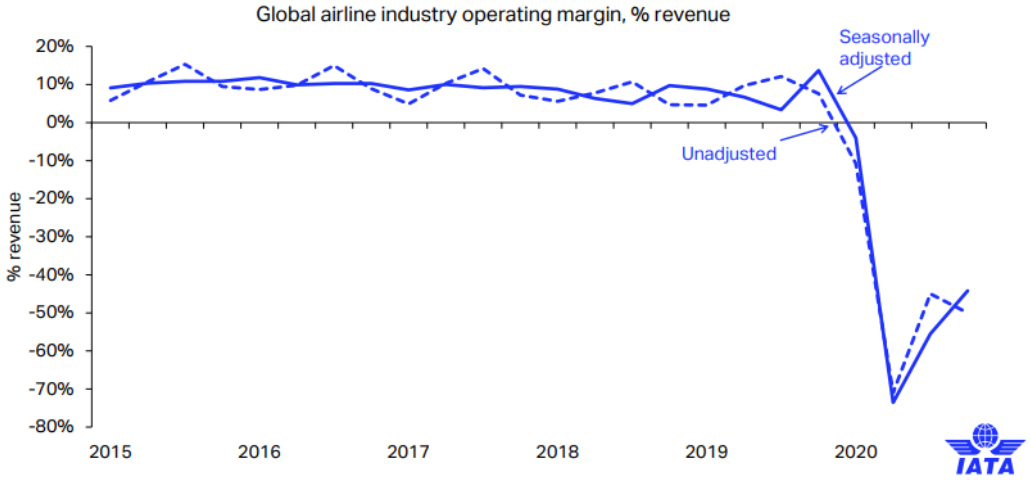
Here are six charts that showcase the main challenges faced by airlines right now:

Figure 17: RPK versus World GDP Growth



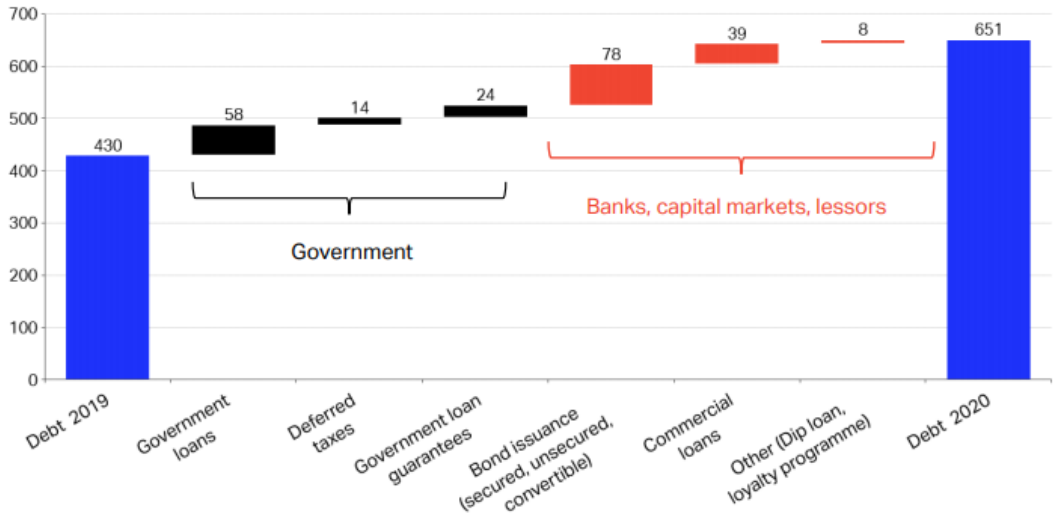
Source: *World Air Transport Statistics (WATS), 2021*

Figure 18: Airlines' Industry Finance for 2015-2020



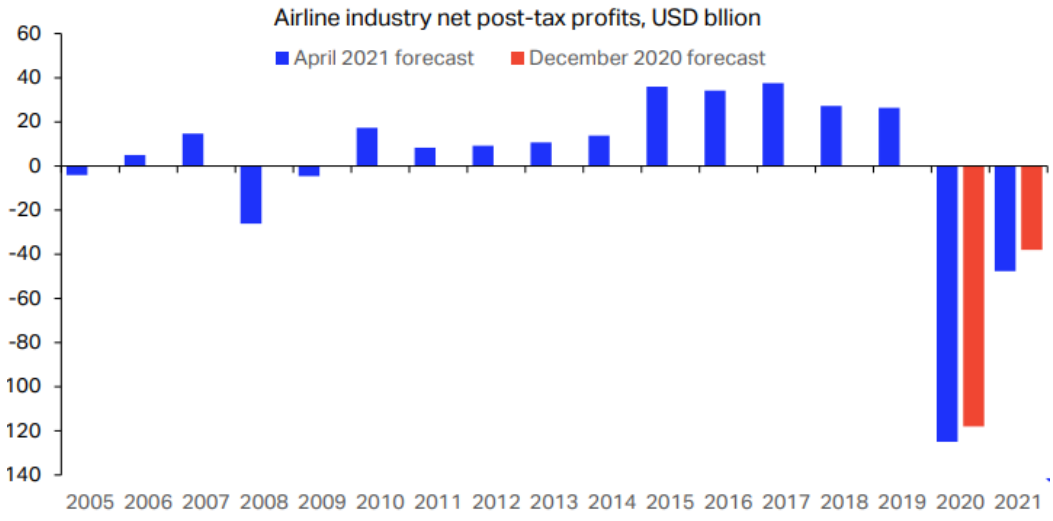
Source: *IATA Economics Airline Industry Financial Forecast update, April 2021*

Figure 19: Airlines' Debt Structure, 2020



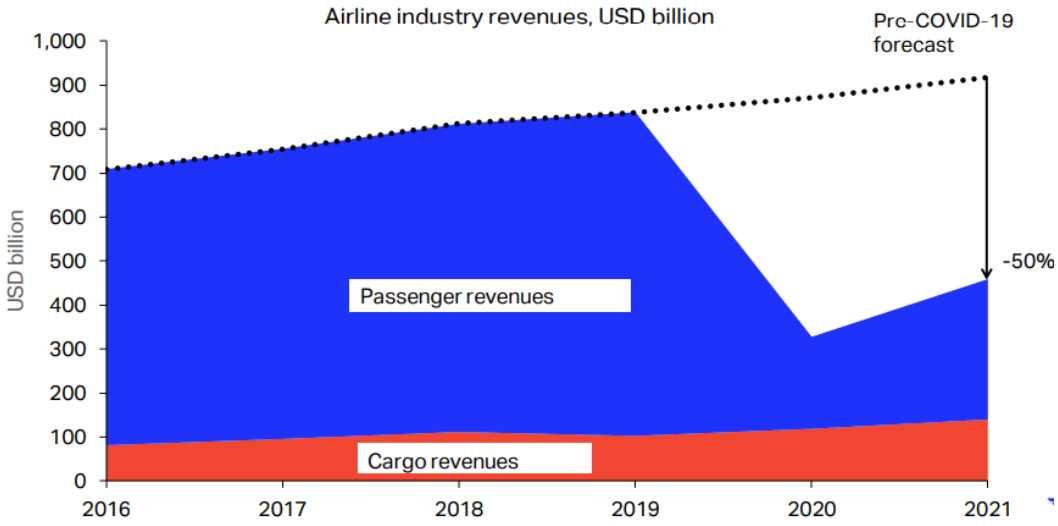
Source: *IATA Economics using data from own estimates of Government aid, private debt estimates from Air Finance Journal, November 2020. Debt includes adjustment for operating leases.*

Figure 20: Airline Industry Net Profits: 2005- 2021



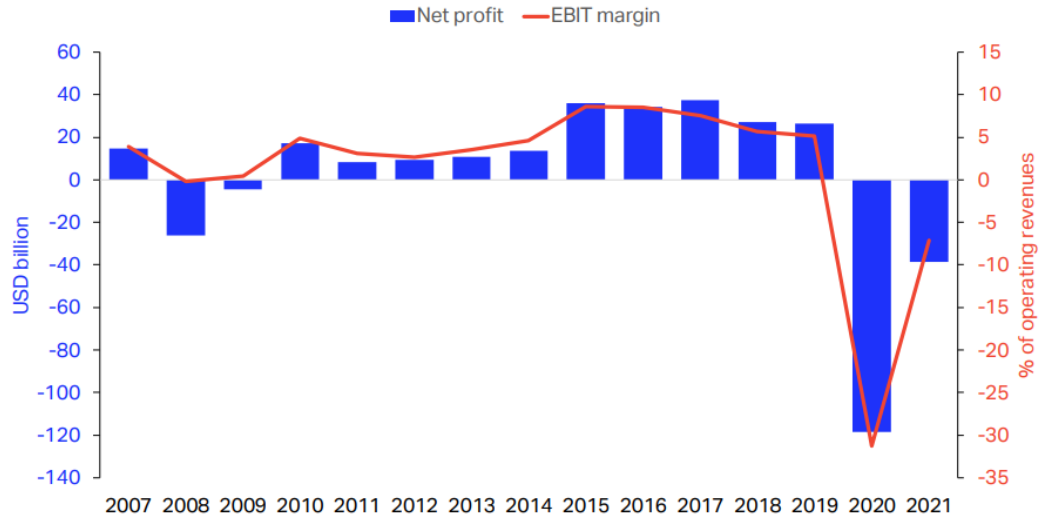
Source: *IATA Economics Airline Industry Financial Forecast update, April 2021*

Figure 21: Airlines Industry Revenue: 2016 - 2020



Source: *IATA Economics, 2022*

Figure 22: Airlines Industry Net Profit vs. EBIT margin (2007 – 2021)



Source: *IATA Economics, 2022*

The COVID-19 pandemic has wreaked havoc on India's aviation sector, with IndiGo, the nation's largest private airline, experiencing its worst financial

performance ever. During the April-June quarter, the airline suffered a staggering loss of Rs. 3174 crores. This financial blow can be largely attributed to the nationwide lockdowns implemented in April and May, which significantly curtailed passenger travel and exacerbated the challenges faced by the airline.

One key factor contributing to the financial strain is the rise in fuel costs, which accounted for 40% of revenue during the period, compared to 30% in the previous quarter. Additionally, the company's debt, including lease liabilities on aircraft, has grown by 35% year-on-year. The economic fallout from the COVID-19 outbreak on IndiGo are further underscored by a historic decline in the airline's net worth. For the first time in its history, the company's net worth has dipped into negative territory. This unprecedented development serves as a stark illustration of the severe financial challenges currently plaguing the aviation industry.

1.8 Financial Distress in Indian Aviation Industry

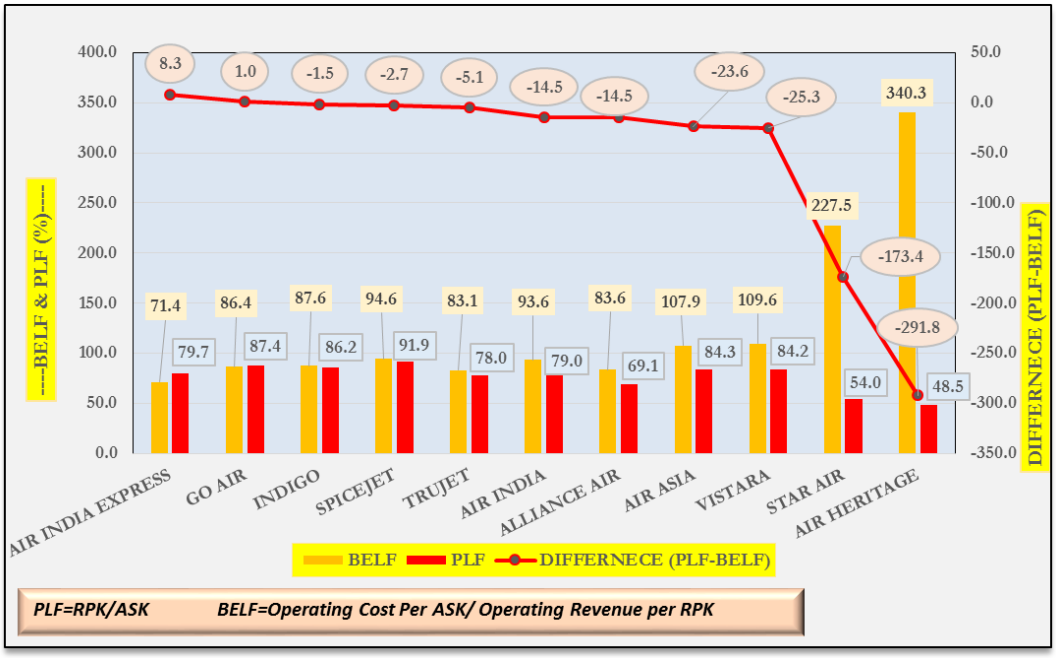
India's aviation sector has witnessed impressive growth across multiple facets, including passenger and cargo traffic, aircraft movements, and airport infrastructure development. However, this industry-wide success story masks the financial struggles faced by some individual air carriers. While the industry enjoys a boom in passenger demand and infrastructure expansion, several airlines grapple with financial headwinds. These challenges can be attributed to various factors, including intense competition, operational inefficiencies, or a combination of both. Notably, in April 2019, Jet Airways was forced to ceased operations due to significant financial crisis, serving as a stark reminder of the vulnerability of individual carriers within a seemingly flourishing industry.

India's booming aviation market presents a double-edged sword for airlines. While it signifies a surge in passenger demand, it also fosters an intensely competitive environment. Airlines are frequently locked in price wars to attract customers,

making it difficult to raise ticket prices and maximize profits. This scenario, exacerbated by restrictions on price hikes, creates a challenging financial landscape for many carriers.

The dynamic and fiercely competitive landscape of the airline industry demands constant strategic adaptation. Profitability remains the cornerstone of growth and long-term success for any company, and airlines are no exception. To navigate these turbulent economic currents and avoid financial distress, airlines must embrace innovative strategies that enhance their financial sustainability. The propensity for financial distress is high in the aviation sector, as evidenced by the number of carriers that have ceased operations in India, with 19 failures reported between 2010 and 2020 out of a total of 65.

Figure 23: Achieving Profitability - Pax Load Factor vs. Break-Even Load Factor (2019 - 2020)



Source – *Director General of Civil Aviation, India, 2021*

Airlines keep a close eye on a key metric called Passenger Load Factor (PLF). While a higher pax load factor means they're successful at selling seats, it doesn't guarantee a profit. Here's the catch: airlines have a specific "break-even load factor" (BELF). This is the minimum PLF they need to achieve to cover all their costs for a flight. If the PLF falls below the BELF, the airline loses money on that flight, even if they have passengers on board.

Passenger Load Factor (PLF) serves as key metric used to assess an airline's effectiveness in maximizing seat occupancy and driving revenue generation. However, a closer look at India's aviation sector in the 2018-19 fiscal year reveals a mixed picture. While Air India Express and Go Air emerged as leaders by surpassing the break-even load factor (BELF), signifying profitability on that metric, other airlines faced challenges.

The past decade has witnessed several Indian carriers grappling with financial distress. Kingfisher Airlines, for instance, ceased operations in 2012 due to its crippling debt burden. SpiceJet, another airline, navigated a period of significant losses in 2014 but managed to secure additional funding and continue its operations.

India's aviation industry has witnessed a concerning trend of airline failures in recent years. In 2016, Air Asia India was forced to halt its ambitious expansion plans due to a severe cash shortage. This financial turbulence continued with Air Pegasus succumbing to bankruptcy in 2017. Most notably, Jet Airways, a major player in the industry, was compelled to suspend operations entirely in 2019 due to crippling financial difficulties.

These successive airline failures underscore the critical need for robust bankruptcy prediction models. Accurately assessing the financial health of airlines and

anticipating potential bankruptcy scenarios can provide invaluable insights to various stakeholders.

The COVID-19 pandemic continues to cast a long shadow over India's aviation sector, acting as a persistent headwind that disrupts the industry's recovery trajectory. A confluence of adverse factors threatens to create further turbulence for domestic airlines in FY 2022. Subdued domestic air traffic, a metric reflecting a continued reluctance to travel, coupled with persistently high fuel prices, are expected to act as a significant drag on profitability. Adding to these woes is a sluggish recovery in international travel, a vital source of revenue for many airlines.

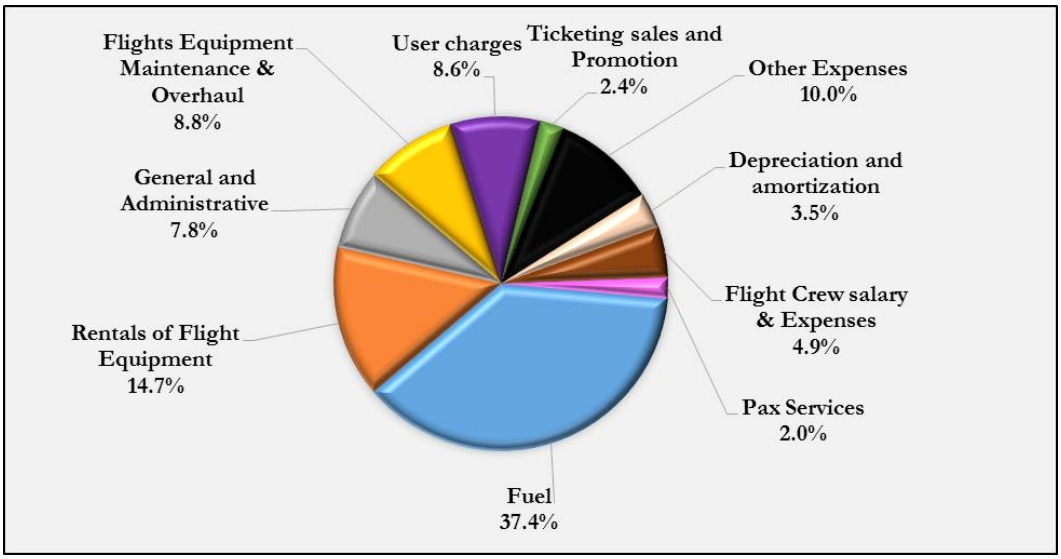
This challenging landscape is projected to result in another year of net losses for domestic airlines, according to a recent analysis by Crisil. The estimated losses for FY 2022 are expected to range between Rs 9,500-10,000 crore, a significant sum that underscores the ongoing financial strain. However, there is a glimmer of hope, as this figure represents a 35-40% improvement compared to the even steeper losses projected for FY 2021. This modest improvement suggests a potential slow climb towards profitability, albeit a fragile one.

The financial woes of Indian airlines have the potential to ripple outwards, impacting various stakeholders within the aviation ecosystem. Passengers might face disruptions due to potential flight cancellations or schedule adjustments by cash-strapped airlines. Additionally, the financial health of airports, which rely on airline fees and passenger traffic for revenue, could also be indirectly affected.

Looking ahead, the ability of Indian airlines to navigate these choppy waters successfully will depend on several factors. Implementing cost-reduction measures, strategically optimizing flight routes, and potentially even revisiting pricing strategies in response to fuel costs will be crucial for achieving financial

sustainability. Furthermore, a sustained recovery in domestic and international travel demand is important for the long-standing viability of the aviation industry.

Figure 24: Cost Structure of Indian Airline Industry (2018-2019)



Source – *Director General of Civil Aviation, India, 2021*

Drawing on information from the DGCA's AT-II division, the above chart depicts the general trajectory of cost components within the aviation industry. Cost structure analysis of scheduled carriers in India highlights the following key expense categories:

- Fuel Cost (37.4%): This represents the largest portion of the operating cost, indicating the significant impact of fuel prices on airline expenses.

- Rental of Flight Equipment (14.7%): This includes the costs associated with leasing or renting flight equipment, such as aircraft. It signifies a substantial portion of the overall cost structure.

- Other Expenses (10.0%): This category covers various miscellaneous expenses that are not explicitly detailed but contribute to the overall operating cost.

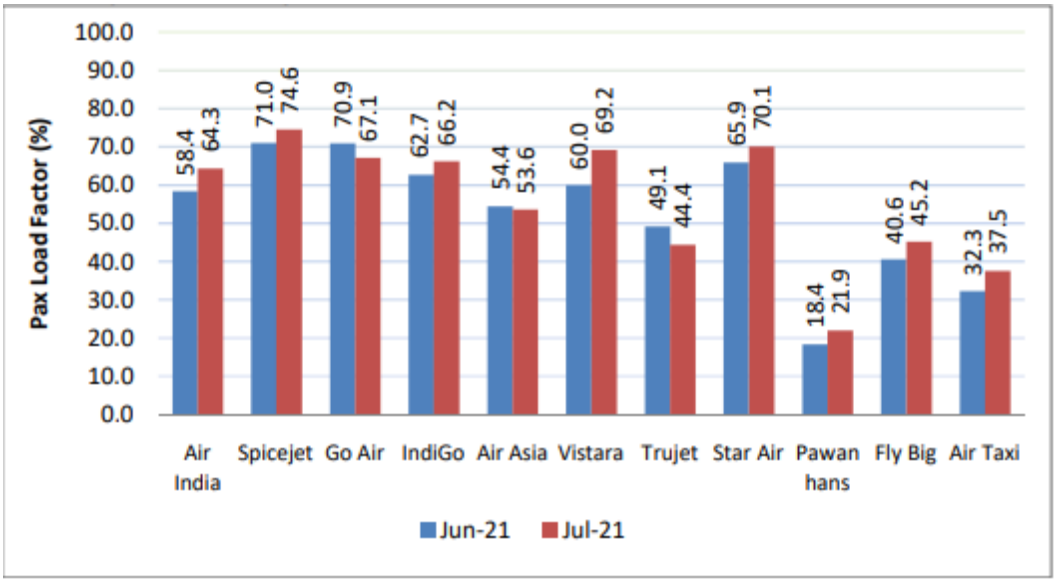
- Flight Equipment Maintenance & Overhaul (8.8%): Costs related to the maintenance and overhaul of flight equipment, ensuring aircraft are in proper working condition and comply with safety standards.

- User Charges (8.6%): Encompassing landing charges, associated airport charges, and air navigation charges, these fees contribute significantly to the operational expenses incurred by airlines.

- General and Administrative Costs (7.8%): This category includes expenses related to administrative tasks and management activities essential for the airline's daily operations.

The figure below details the Passenger load factors (PLF) recorded by various domestic scheduled airlines in July 2021:

Figure 25: Passenger Load Factor (Jun-Jul'21)



Source – *Director General of Civil Aviation, India, 2021*

The prevalence of fuel costs as the largest component highlights the airline industry's susceptibility to variations in global energy prices. We have seen that a resurgence in COVID-19 has dampened air travel demand, forcing airlines to consolidate flights as booking volumes plunge by 40%. This further underscores the industry's susceptibility to external shocks and the need for strategic adaptation to dynamic conditions.

Indian airlines are expected to bleed a staggering $8 billion in combined losses over the past two fiscal years, with a projected $4.1 billion loss for FY22 mirroring the one incurred in 2020-21. The Indian aviation sector is experiencing significant financial strain, highlighting the devastating impact of the COVID-19 outbreak, according to CAPA. Additionally, CAPA also suggests that the industry is entering a period of increased costs, a situation that poses challenges for airlines when they are least equipped to handle it. Factors contributing to this challenging environment include the potential rise in crude oil prices and currency depreciation. The confluence of these factors underscores the ongoing financial strain on the aviation industry in India.

India's scheduled airline industry experienced a significant deterioration in financial performance during FY 2020-21. Indian major carriers like Air India and IndiGo, suffered substantial losses in FY 2020-21(Rs. 4,700 crore and Rs. 5,829.7 crore respectively). The financial woes extended to Vistara, AirAsia India, and Go Air as well. The industry-wide losses in FY 2020-21 represent a concerning upward trend compared to the previous two fiscal years. Total losses for Indian carriers amounted to Rs. 6,709.43 crore in FY19 followed by Rs. 5,497.24 crore in FY20. While the overall trend points towards mounting losses, there are some noteworthy exceptions. Notably, IndiGo, which had achieved profitability in FY20, transitioned to an incurred loss in FY21. Conversely, Go Air, having reported losses in FY 2019-20 (Rs. 481.67 crore), exhibited a financial turnaround the following year.

Table 5: Revenue and Cost Breakdown for Indian Scheduled Airlines (2018 - 2019)

Nos.	Airlines	Operating Revenue	Operating Expenses	Operating Result
				(Rs. In Million)
(A)	**Scheduled National Carriers**			
1.	Air India	255,088.3	301940.9	-46852.6
2.	Air India Express	41,715.7	37378.1	4337.6
3.	Alliance Air	8216.1	9946.5	-1730.4
Subtotal (A)		**305020.1**	**349265.5**	**-44245.4**
(B)	**Scheduled Domestic Private Carriers**			
4.	Air Asia	25116.4	32146.8	-7030.4
5.	Air Heritage	3.0	20.9	-17.9
6.	Blue Dart	7581.0	7201.0	380.0
7.	Go Air	64757.6	64030.7	726.9
8.	Indigo	284967.7	289872.0	-4904.3
9.	Spice Jet	91132.5	93793.6	-2661.1
10.	Star Air	50.4	212.1	-161.7
11.	Trujet	2681.9	2857.6	-175.6
12.	Vistara	29943.8	38948.5	-9004.7
Subtotal (B)		**506234.3**	**529083.2**	**-22848.8**
Grand Total (A+B)		**811254.4**	**878348.7**	**-67094.2**

Source – *Director General of Civil Aviation, India, 2021*

A particularly concerning observation is the consistent pattern of losses incurred by Air India over the past three fiscal years. Despite the ongoing disinvestment process, the airline's financial performance remains under significant strain, suggesting deeper structural issues beyond a change in ownership.

Both Vistara and AirAsia India have grappled with persistent losses throughout the period under examination. Vistara's losses grew from Rs. 900.47 cr. in FY19 to 1,609.7 cr. in FY21. Similarly, AirAsia India’s losses followed a similar trajectory, increasing from Rs. 703.04 cr. to Rs. 1,396 cr. over the same period.

1.9 Business Problem

Escalating Fuel Costs and Currency Fluctuations Strain Indian Aviation Industry. However, a prominent issue often overlooked is the impact of government intervention and the persisting protective measures around Air India, now one of only two remaining full-service carriers in the country. Additionally, a noteworthy aspect of the Indian airline industry is its heavy reliance on leased aircraft, with approximately 81% of the fleet being under lease, according to CAPA. The fluctuating foreign exchange rates further contribute to the financial dynamics of carriers.

The cumulative effect of these factors could potentially lead to financial distress among Indian airlines. Lacking a specialized financial distress prediction model tailored to the Indian business environment and encompassing all pertinent factors for evaluating the carriers' financial well-being, the industry may continue to grapple with financial challenges unless timely corrective measures are implemented to avert insolvency.

So, an imminent business problem faced by the current Indian Airline Industry is:

"**Inadequate assessment and management of factors impacting financial performance of carriers leading to financial distress in Indian Aviation Industry**".

1.10 Motivation/Need for Research

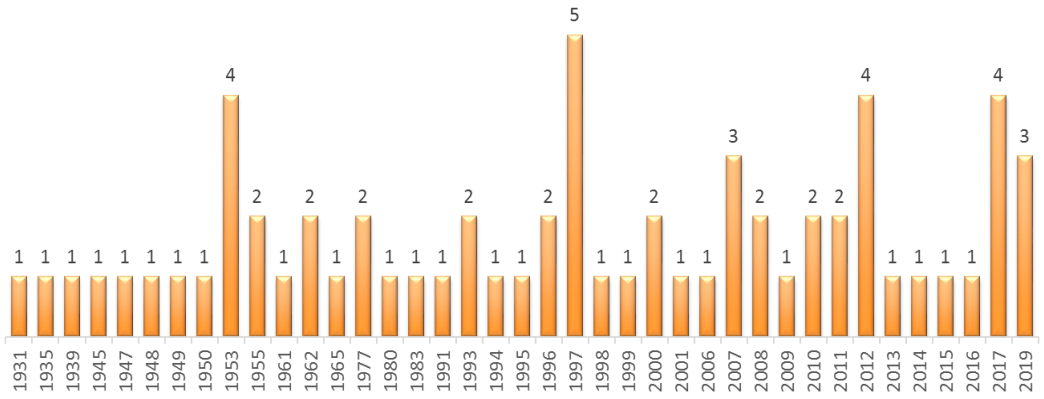
The Indian aviation sector presents a fascinating paradox. Intense competition has fueled remarkable growth, particularly in the domestic market, propelling India to become the world's third-largest. However, the impressive trajectory is not without its turbulence. The industry continues to grapple with significant financial challenges, leading to operational difficulties and even multiple airlines ceased operations over the last two decades exposing the financial vulnerabilities within the industry.

Key incidents in this trend include the shutdown of Kingfisher Airlines in 2012, primarily due to financial constraints. SpiceJet faced severe challenges in 2014, resulting in the cancellation of over 2000 flights due to substantial losses. The airline managed to recover with additional funding. In 2016, Air Asia India, with ambitious expansion plans, was forced to hit the brakes due to a severe cash crunch. This financial turbulence continued in 2017, with Air Pegasus succumbing to bankruptcy. The year also saw the unfortunate grounding of operations for both Air Carnival and Air Costa.

The financial crunch led to the complete suspension of Jet Airways' operations in 2019. The data indicates that a total of 65 carriers have ceased operations in India, highlighting pervasive financial challenges within the industry. These instances emphasize the need for comprehensive measures and strategies to address the financial sustainability of airlines in the Indian market.

The recent spate of financial distress and airline failures in India has accentuated the need for a comprehensive understanding of the factors impacting carrier profitability. Surprisingly, there has been limited research dedicated to systematically identifying a financial distress predictor model specifically tailored for the Indian aviation market. Such a model holds the potential to offer valuable insights to airlines and various stakeholders, including banks, financial institutions, suppliers, and customers. It could enable more informed investment decisions and facilitate the pursuit of profitable returns.

Figure 26: Number of Indian Carriers Shutdown between 1931 and 2019



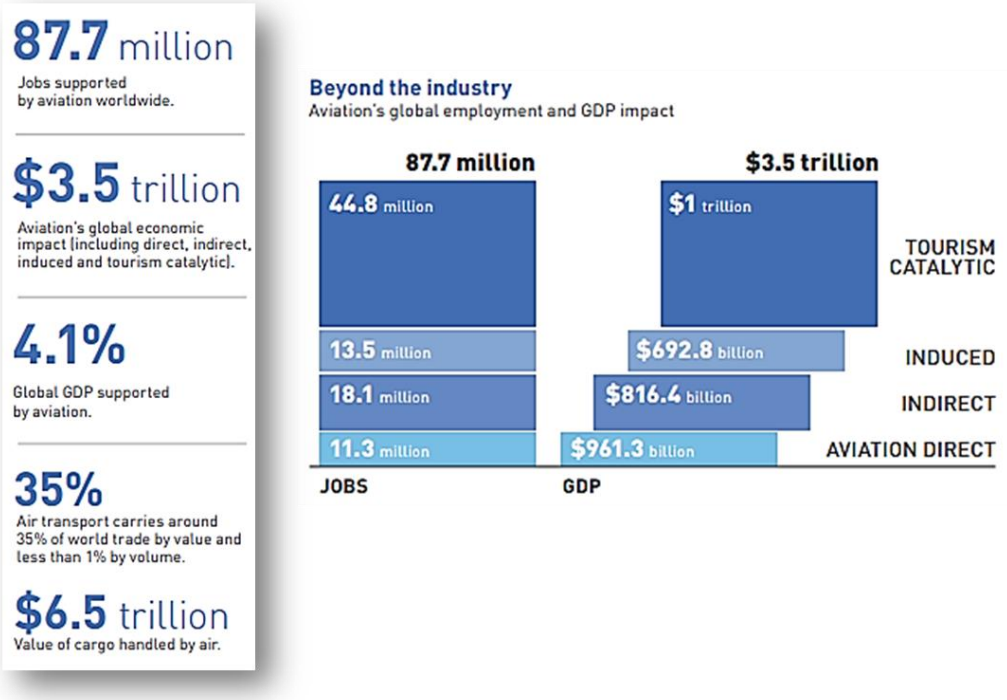
Source – *DGCA, India, CAPA, Media Reports & Independent Research, 2021*

From the above data, it is evident that Indian aviation sector's vulnerability has been amplified by the absence of a tailored financial distress prediction model for Indian context. This necessitates in-depth research to bridge this critical gap.

By developing a model that accounts for the unique challenges and dynamics of the Indian business environment, researchers and industry experts could significantly contribute to the understanding and management of financial risks within the aviation industry. This, in turn, could foster greater financial stability and resilience among Indian carriers, benefiting the industry as a whole and its associated stakeholders.

Additionally, any airline failure has a substantial impact on a country's economy, ranging from job losses to GDP implications.

Figure 27: Economic impact of Aviation Industry



Source – *ATAG Report 2020 & Independent Research*

This proposed research to conduct an empirical study on the Indian aviation industry, specifically through a survey of key stakeholders, represents a crucial and timely initiative. Given the multitude of challenges plaguing the Indian aviation industry, understanding the factors impacting airline financials is paramount.

The planned research approach is a significant step forward, taking a commendable multi-faceted view encompassing operational, economic, performance, financial, regulatory, and government policy factors. This holistic perspective is crucial for dissecting the complex web of influences impacting the financial health of Indian airlines. By employing a multifaceted approach that explores these diverse aspects,

the research has the potential to unlock a far richer and more nuanced perspective on the industry's landscape.

By addressing the existing gap in research and contributing to the literature on financial distress prediction for Indian carriers, this study will have the potential to offer valuable insights. The identification of these significant factors and their impact on financial performance can serve as a foundation for developing effective strategies to proactively address potential threats and safeguard the industry's long-term sustainability.

Moreover, real-world implications of this research for industry stakeholders, including investors, financial institutions, suppliers, and customers, make it highly relevant. The insights to be gained from this study could inform investment decisions, risk management strategies, and contribute to the sustainability and profitability of the Indian aviation sector.

Overall, the proposed research has the potential to make a meaningful contribution to both academic knowledge and practical applications within the Indian aviation industry, with the aim of preventing potential failures or bankruptcies and promoting the long-term viability of Indian carriers.

2 LITERATURE REVIEW

2.1 Review of Literature

This chapter delves into the financial distress plaguing the global airline industry, with a particular emphasis on the Indian aviation market. In doing so, it leverages insights gleaned from prior scholarly research within this domain. A comprehensive review of current literature is undertaken to establish an overall understanding of the scenario. The aim is to lay the foundation for existing knowledge by identifying any research gaps that may exist, serving as the starting point for this research endeavor.

The literature review process for this research employed a two-step approach. In the first stage, the focus was on establishing a solid foundation by thoroughly understanding the theoretical underpinnings of the key terms relevant to the study. This involved examining various definitions, concepts, and existing frameworks that inform this research area.

The second stage then delved into a detailed review of existing literature. This involved critically analyzing relevant academic journals, scholarly articles, and research reports to identify prior research findings and established knowledge related to the research topic.

2.1.1 Theoretical Significance

To lay a strong foundation for this research, a focused review of the literature was conducted. The review examined scholarly sources, including books and online

articles, to develop a nuanced understanding of the theoretical significance attached to key terms. The key terms include "financial distress," "insolvency," "default," "bankruptcy," and "financial distress prediction." This understanding was then critically evaluated to determine their relevance to the subject under study within the context of this research proposal.

Financial distress occurs when a company or individual faces difficulty generating enough revenue or income to meet their financial commitments. This often manifests as a struggle to pay bills, debts, and other obligations on time. Several factors can contribute to financial distress, including substantial fixed costs, a significant amount of illiquid assets (assets difficult to convert to cash quickly), or a business model where revenue is highly sensitive to economic downturns.

One term frequently confused with financial distress is "business failure." Business failure occurs when a company permanently ceases operations, either by choice or by force. This can leave unpaid obligations behind or trigger legal proceedings for reorganization (Altman & Hotchkiss, 2006). It's important to understand that a company can experience financial distress and continue operating. This is particularly true if the company lacks legally enforceable debt, such as outstanding loans or unpaid invoices (Altman & Hotchkiss, 2006). In such cases, the company may be struggling financially but can avoid the more severe consequences associated with business failure.

Financial distress manifests in several ways within a company. As highlighted by Chan and Chen (1991), such firms often experience a decline in market value due to underperformance. They may also struggle with production inefficiencies and become burdened by significant debt and liquidity issues. According to Wruck (1990), financial distress is a state where a firm’s incoming cash is inadequate to cover its current obligations, such as outstanding dues to employees and vendors,

probable legal liabilities, and loan repayments, ultimately leading to a state of default.

Blazy et al. (2014) broaden the understanding of financial distress by characterizing it as a situation where a firm struggles to secure financing for its immediate obligations. They further establish a connection to the Basel II banking regulations, defining "default" as a state where planned payments are overdue by more than 90 days. Complementing this perspective, According to Purnanandam (2008), financial distress is a state characterized by a significant shortage of cash flow and may lead to losses but it may not translate to insolvency (which is the inability to meet financial obligations).

Insolvency refers to a critical financial state where an individual or business is unable to meet their outstanding debts. This essentially means they lack sufficient resources to cover their financial obligations. There are two main types of insolvency:

- Technical Insolvency: As described by Altman & Hotchkiss (2006), this occurs when a firm lacks the immediate cash flow (liquidity) to pay its current debts. A firm's financial distress may be transitory, even when a firm's total assets hold a value greater than its total liabilities. Imagine a firm with valuable equipment but lacking readily available cash to pay its bills.

- Balance Sheet Insolvency: This is a more severe and potentially irreversible state where a firm's liabilities exceed its assets. In simpler terms, the firm's debts outweigh the value of everything it owns, making it impossible to fulfill its financial commitments in the long run.

Understanding the distinction between these two types of insolvency is crucial. While technical insolvency can be addressed through short-term measures, balance sheet insolvency suggests a deeper financial crisis.

Altman & Hotchkiss (2006) introduced the concept of "deepening insolvency". This refers a scenario where the legal framework permits a financially distressed company to remain operational, even if it comes at the expense of the company's remaining assets. This can have severe consequences, as exemplified by the case of Eastern Airlines (Weiss & Wruck, 1996). Despite being declared bankrupt; the airline was permitted to keep operating by the bankruptcy court. However, this decision ultimately led to a significant decline in the company's value (losing 50% before eventual liquidation).

The Eastern Airlines case highlights a critical concern: the requirement for a bankruptcy code that safeguards a financially struggling entity's assets from various threats. This includes not only creditors attempting to recoup their losses but also potentially misguided decisions by management as well, who might be overly optimistic about the entity's turnaround chances.

In terms of financial context, typically a **Default** signifies a borrower's failure to adhere the repayment terms established in a loan agreement (Altman & Hotchkiss, 2006). This essentially means the borrower breaches the contract with the lender, often referred to as a creditor. There are two main ways a default can happen:

- Missed Payment: The most straightforward scenario is when a borrower simply misses a scheduled loan payment. This is a serious violation of the loan agreement and can trigger significant penalties from the lender.

- Financial Deterioration: Defaults can also occur due to a borrower's deteriorating financial health. If key financial ratios (specified in the loan covenants) fall below a certain threshold, it can be considered a breach of contract. This situation often leads to a renegotiation of the loan terms to prevent a complete default.

The severity of the consequences associated with a default depends on the specific cause. Missed payments typically carry harsher penalties than defaults caused by declining financial performance.

The importance of a predictable cash flow for airlines is underscored by the case of Frontier Airlines in 2008 (Bowely, 2008). The company was forced to file for bankruptcy due to a sudden and significant disruption in its financial operations. Frontier's credit card processor unexpectedly altered their established practices, withholding a substantial portion of proceeds from ticket sales. This unforeseen change had a devastating impact on Frontier's financial forecasts and their entire business plan.

As explained by Sean Menke, Frontier's president and CEO, the credit card processor's decision to withhold a significant amount of ticket sale revenue, beginning in April 2011, would have severely limited their access to liquid assets (liquidity). This severely hampered their ability to sustain normal flight operations, forcing them to implement drastic measures.

At times a single missed payment can trigger a loan default and may result in a significant setback for a company. However, there's an option to potentially avoid formal bankruptcy proceedings through a process called "distressed restructuring" (Altman & Hotchkiss, 2006).

In distressed restructuring, a company that has defaulted on a loan continues operating while simultaneously negotiating with its creditors. These negotiations can involve multiple creditors, with the goal of reaching an agreement that allows the company to remain afloat.

Bankruptcy signifies a formal legal process established to provide relief for debtors – individuals or businesses – who are overwhelmed by their financial obligations. It offers a path to escape a state of insolvency, where a firm's liabilities surpass its assets, leading to negative net worth (Altman & Hotchkiss, 2006).

Beyond the financial definition of insolvency, bankruptcy also refers to the official declaration filed within a court of law (Altman & Hotchkiss, 2006). This legal action signifies a firm’s financial failure and closure, as highlighted by Altman (1996).

Within the domain of corporate finance, bankruptcy proceedings serve as a critical legal mechanism for distressed firms. These proceedings aim to achieve several key objectives outlined by Altman & Hotchkiss (2006):

- Protection of Stakeholder Rights: Bankruptcy safeguards the contractual rights of all stakeholders with vested interests in the company. This encompasses creditors, shareholders, and employees. The process ensures a fair and orderly resolution of outstanding claims while adhering to established legal principles.

- Strategic Asset Management: Bankruptcy proceedings facilitate the efficient management of a company's assets. Unproductive or non-core assets can be liquidated, generating capital to settle debts and streamline the operational focus. This process allows for the maximization of value for the various stakeholders.

- Restructuring for Viability: Bankruptcy can create a framework for comprehensive financial restructuring. This may involve debt renegotiation with creditors, operational adjustments to improve efficiency, or even a shift in ownership control. The ultimate objective is to enable the company to emerge from bankruptcy as a viable and sustainable business entity.

The decision to either pursue reorganization or liquidation hinges on a critical factor: the company's overall value proposition (Altman & Hotchkiss, 2006). Here's a breakdown of the key considerations:

- Intrinsic Value vs. Liquidation Value: If a company's intrinsic value, representing its ongoing operational potential, exceeds its liquidation value (the value of its assets if sold off individually), then reorganization becomes a viable strategy. This approach prioritizes reviving the core business for long-term success.

- Liquidation for Unviable Entities: When a firm’s liquidation value is more than its intrinsic value, then it is not viable for the firm to continue operations. In all such conditions, liquidation is the recommended course of action. The company's assets are sold to generate funds for repaying creditors, and the business operations cease.

By meticulously evaluating these factors, the parties involved in the bankruptcy proceedings can determine the most optimal path forward, ensuring a fair and value-maximizing outcome for all stakeholders.

Financial distress prediction is a critical tool in the realm of corporate finance. It's not an exact science, but rather a method of estimating a company's likelihood of experiencing bankruptcy or significant financial hardship. Many existing prediction models rely on a set of core financial indicators to assess a company's risk profile.

The main objective of any financial distress predictor model lies in its ability to act as a proactive indicator of potential financial strain within a firm. A comprehensive analysis of a company's financial health data using a financial distress predictor model helps to proactively recognize potential operational and financial risks before they become significant challenges. This valuable foresight empowers

business owners and managers to take proactive measures. They can implement strategies to avoid or mitigate these risks, potentially safeguarding the company from financial distress or even bankruptcy.

The importance of such predictive capabilities is underscored by the events of the 2008 global financial crisis, as highlighted by Hsieh et al. (2012). This crisis lays bare the far-reaching economic consequences of financial failures not only at country level but at global scale. that financial failures can have on a national and global scale. By implementing robust financial distress prediction systems, businesses and economies can be better equipped to anticipate and potentially prevent such widespread financial turmoil.

Financial statements like balance sheet (showcasing assets and liabilities) and income statement (highlighting profitability), act as a window into its financial health. By analyzing these statements, it's possible to identify signs of potential financial distress, which can ultimately lead to bankruptcy. Given the potential for significant economic consequences, the ability to predict financial distress has emerged as a critical area of research. An early detection allows companies to take corrective actions and potentially avoid financial failure.

Several statistical techniques have been instrumental for developing accounting-based bankruptcy prediction models, as evidenced by a review of the existing literature. These techniques, as outlined by Altman and Saunders (1998), include:

- Logistic regression
- Multiple discriminant analysis
- Linear probability models
- Probabilistic models

By applying these techniques to financial statement data, researchers and financial analysts can develop models that estimate a company's likelihood of experiencing

financial distress. This foresight empowers companies to take proactive measures and potentially avoid a more severe financial downturn.

2.1.2 Detailed Literature Review

Commencing with a broad perspective, the review of literature subsequently narrowed its focus to delve deeper into the specific issue of financial distress within the airline industry. Airlines are inherently susceptible to external factors, making them vulnerable to financial volatility. This complex and challenging environment can lead to financial distress for airlines due to various internal or external forces. Recognizing this complexity, numerous research studies have been conducted to develop methods for predicting financial distress and assessing a company's risk of insolvency.

Following this initial broad approach, the review process was further refined to specifically explore the "Indian Aviation Industry" and the "Financial Distress of Indian Carriers". This review of literature highlights the need for developing country-specific distress prediction models.

To address the identified limitations and build upon existing knowledge, a systematic review of the literature was performed. This review pinpointed the major factors specific to India that significantly influence the financial performance of Indian carriers. Additionally, it provided a general overview of the various frameworks and methodologies currently applied in financial distress modeling. The details of the literature review are discussed below:

A. Financial Distress in Aviation Industry

Airlines operate globally in a uniquely turbulent environment. Several factors contribute to this, making airlines more vulnerable to financial turmoil than any other businesses:

- Higher Fixed Costs: Airlines grapple with significant ongoing expenses like aircraft leases, employee salaries, and airport fees, regardless of passenger volume. This creates a financial burden even during periods of low demand.

- Cyclical Demand: Passenger demand for air travel fluctuates significantly. Seasonal changes, economic downturns, and unexpected events can all dramatically impact airline revenue.

- Intense Competition: Airlines are engaged in a cut-throat competition, with a large number of players eyeing the larger passenger share. This pressure often leads to price wars, further squeezing profit margins.

- Susceptibility to External Shocks: Airlines are prone to external risks beyond their control, like fluctuations in global fuel price, natural disasters, and global pandemics. These events can disrupt travel patterns and significantly increase operating costs.

The combined effect of these challenges exhibits a higher risk of bankruptcy in airlines. The vulnerability gets reflected in the sector's history of consistently weak financial performance compared to other industries. While financial distress has been extensively studied in various contexts, there's no single definition that universally applies. However, several key indicators are often used to identify a financially distressed company:

- Insolvency: This is state when a firm's liabilities are greater than the current asset value (Altman, 1968). Essentially, the company's debts outweigh the value of everything it owns.

- High Leverage/Debt: Firms experiencing a high debt-burden are considered more financially vulnerable, as they rely heavily on borrowed funds to finance operations (Altman et al., 1994).

- Negative Earnings: Consistent losses over a prolonged period (e.g., three consecutive years) are a significant red flag, indicating a firm's constraint to meet its ongoing operational expenses (Lin et al., 2016).

- Liquidity Issues: Inability to pay bills or meet short-term financial obligations due to cash shortages can be a precursor to more serious financial problems (Gudmundsson, 2002).

A detailed understanding of these characteristics and the airline industry's inherent challenges, enables us to gain valuable insights of the parameters that contribute to financial distress in this specific sector.

Financial distress in the airline industry can ripple outwards, impacting both the services offered by airlines and the overall health of the air travel market. Distressed airlines may act conservatively and refrain from entering new markets due to low liquidity (Liu, 2009). Bankruptcies within the industry lead to a reduction in available flights at mid-size airports (Borenstein and Rose, 2003). Financially stable airlines also correlate with a focus on safety (Noronha and Singhal, 2004).

Price wars are a notable consequence of financial distress, as struggling carriers cut prices to boost demand, triggering competition among competitors (Busse, 2002). Financial hardship within the carriers frequently sets off a downward spiral in pricing, as evidenced by extensive research. Airlines facing financial hardship are more likely to resort to aggressive price cuts in a desperate attempt to stimulate demand and generate much-needed revenue (Borenstein & Rose, 1995; Phillips, 1995; Hendel, 1996; Chevalier & Sharfstein, 1996; Barla & Koo, 1999; Kennedy, 2000; Busse, 2002; Hofer et al., 2005, 2009). This strategy has also been endorsed by Borenstein and Rose (1995) as well as Barla and Koo (1999) in their respective studies, who observed airlines lowering fares in response to financial pressures.

The rationale behind this behavior is rooted in the airlines' short-term need to increase cash flow. By offering lower fares, they hope to attract more passengers and generate enough revenue to cover immediate expenses. This strategy can be particularly appealing in the face of declining passenger demand, a common challenge for airlines during economic downturns (Hofer et al., 2005).

However, it's important to recognize that price cuts are often a double-edged sword. While they may boost passenger numbers in the short term, they can also lead to destructive price wars within the industry, ultimately eroding profitability for all airlines involved (Chevalier & Sharfstein, 1996; Busse, 2002). Studies by Hofer et al. (2005, 2009) highlight this concern, suggesting that a race to the bottom on pricing can have negative long-term consequences for the financial well-being of the entire airline sector.

Financial distress compels airlines to prioritize short-term survival tactics, often leading to price cuts as a means to generate immediate cash flow. While this strategy may provide temporary relief, it can also trigger industry-wide price wars that erode profitability down the line. A comprehensive understanding of this dynamic is key for all the stakeholders in this industry, as it highlights the importance of building financial resilience to weather periods of economic hardship.

While Chapter 11 bankruptcy offers a potential lifeline for financially struggling U.S. airlines, it presents a complex scenario (Payne and Hogg, 1994). This process allows for business reorganization, aiming for eventual recovery. However, studies by Borenstein and Rose (1995) and Hofer et al. (2005) suggests a potential downside: a decline in consumer confidence in bankrupt carriers leads to a downfall in passenger demand, creating a pressure point for airlines. To counteract this decline and stimulate demand, bankrupt carriers may resort to price cuts. As per

Busse (2002) and Hofer et al. (2005), such strategies can trigger industry-wide price wars, further squeezing profit margins for all airlines involved.

Airlines that undergo Chapter 11 bankruptcy may use the process to implement cost-cutting measures, potentially leading to lower fares for passengers (Hendel, 1996; Barla & Koo, 1999; Kennedy, 2000; Hofer et al., 2005). This often happens after the airline successfully restructures its operations and reduces its overall expenses (Barla & Koo, 1999; Kennedy, 2000). By streamlining operations and minimizing costs, airlines emerging from Chapter 11 may have more flexibility to offer lower fares in a bid to attract customers.

For airlines facing the extreme financial hardship that necessitates a Chapter 11 filing, survival becomes the paramount concern (Hofer, 1980; Robbins & Pearce, 1992; Sudarsanam & Lai, 2001). Companies in such situation often adopt a two-pronged strategy:

- Short-Term Revenue Generation: This involves aggressive price cuts to stimulate demand and generate immediate cash flow. As per Chatterjee et al. (1996) and Hofer et al. (2005), airlines facing bankruptcy are more likely to resort to such tactics compared to financially healthy companies.

- Operational Restructuring: Airlines also focus on streamlining operations and reducing costs to improve their long-term financial health. This might involve measures like workforce reductions, asset sales, or renegotiating contracts with suppliers.

The prevalence of these strategies among airlines in Chapter 11 underscores the severity of their financial distress. They are forced to take drastic steps to generate quick cash and become more efficient, all in a bid to survive and potentially emerge from bankruptcy.

Critical research is essential for identifying operational performance factors influencing financial performance and vice versa, enabling a comprehensive assessment to alert potential distress in airlines.

B. Financial Distress in Indian Aviation Industry

India's aviation industry is a fast-paced and unpredictable environment where numerous factors can heavily influence an airline's success (Jayaraman & Srinivasan, 2014). This volatility is compounded by intense competition among Indian carriers, creating pressure to keep prices low and attract customers (Jayaraman & Srinivasan, 2014). While cost reduction is essential for profitability, airlines also need to focus on revenue generation to ensure long-term financial health (Jayaraman & Srinivasan, 2014).

This constant push and pull between cost control and revenue growth, within a highly competitive market, exposes Indian airlines to a significant risk of financial distress (Tyagi & Nauriyal, 2016). The pressure to maintain profitability for survival and growth (Tyagi & Nauriyal, 2016) necessitates continuous strategic innovation to secure healthy profit margins. However, navigating this dynamic landscape can be a precarious task, potentially leading to financial difficulties and even bankruptcy for airlines that are unable to adapt effectively.

In India, the airline sector has navigated turbulent weather for last two decades, with several prominent carriers succumbing to significant financial pressures. This trend underscores the inherent challenges airlines face in this dynamic and competitive market.

- Kingfisher Airlines (2012): This once-major player was forced to cease operations entirely due to its inability to manage its financial obligations.

- SpiceJet (2014): The airline faced substantial losses, leading to the cancellation of over 2,000 flights. Recovery was only possible through additional funding secured from its promoters.

- Air Asia India (2016): Ambitious expansion plans were halted due to shortage of funds.

- Air Carnival and Air Costa (2017): Both airlines ceased operations in the same year, further highlighting the industry's vulnerability.

- Air Pegasus (2017): The company declared bankruptcy, signifying its financial demise.

- Jet Airways (2019): Financial constraints ultimately led to the airline's complete suspension of operations.

These successive instances of financial distress within the Indian aviation sector warrant closer examination. To secure a sustainable future for Indian airlines, a thorough examination of the root causes is urgently needed to pave the way for effective solutions.

The Altman Z-score model is heavily reliant on financial factors and has been a common tool for assessing the solvency of companies across various industries. Vasantha et al. (2013) demonstrate its application to Indian airline companies.

However, a critical review of existing research on the Indian aviation industry reveals a significant gap in knowledge. While adaptations of established bankruptcy prediction models offer some insights but a more comprehensive approach to financial health assessment is crucial for Indian carriers.

The financial health of the Indian aviation industry faces a pressing challenge. To proactively mitigate insolvency risks and ensure the long-term success of Indian carriers, there's a critical need to identify key factors specific to the Indian market that significantly impact airline financial performance.

By conducting a detailed impact analysis of these India-specific factors, we can develop more accurate and effective distress prediction models. Such new age models would equip airlines and overall industry to take preventative measures, fostering a more sustainable and prosperous future for Indian aviation.

C. Factors Impacting Financial Performance of Global Airlines

For any company, its financial performance is like a compass, guiding us towards understanding how effectively a company uses its resources to achieve its goals. This evaluation hinges on analyzing policies and activities through a financial lens.

To gain deeper insights, industry-specific studies are crucial. These studies delve into the financial statements of companies within a particular sector. Techniques like ratio analysis allow for meaningful comparisons and illuminate the unique financial landscape of each industry.

While some factors influencing financial performance are universal (e.g., revenue, costs, profitability), a more nuanced approach is necessary. By considering the specific dynamics of an industry, we can identify the critical elements that truly drive performance for companies operating within that sector.

A substantial body of literature investigates the determinants of financial performance across multiple industries or within a specific sector. Whittington (1980) explored various UK industries from 1960 to 1974, determining that smaller

firm size correlates with lower profitability, challenging assumptions about profit margins and sales/asset ratios. Studies across industries have explored the relationship between financial metrics and profitability. Mesquita and Lara (2003) examined Brazilian firms from 1995 to 2001, finding that higher financial leverage weakens profitability, while short-term debt has a positive but unspecified association with profitability.

Similarly, Alarussi and Alhaderi (2018) investigated Malaysian multi-industry companies between 2012 and 2014. Their research revealed that factors like total sales, working capital, and asset turnover ratio tend to correlate positively with profitability. Conversely, they observed negative correlations between profitability and debt-to-equity ratio, along with leverage ratio.

Several studies in the past have highlighted multiple factors that typically impacts airline's financial performance but some early research by Schefczyk (1993) and Tsikriktsis (2007) explored the relationship between a firm's profitability and its operational efficiency.

With some regional focus, Mwangi's (2013) investigation into the Kenyan aviation industry (2008-2012) revealed a complex interplay of factors. The study found that return on assets (ROA), a key profitability metric, exhibited varied correlations with economic factors, suggesting that broader economic conditions can have an unpredictable impact on Kenyan airlines.

Alahyari's (2014) research broadened the scope to multinational aviation companies (1994-2013). This study identified several key drivers of profitability:

- Tangibility of Assets: Companies with a heavy reliance in physical assets, like aircrafts, engines, etc., may experience drawbacks in profitability compared to those with more intangible assets like brand value.

- Growth Opportunities: The ability to expand operations and tap into new markets can positively influence profitability.

- Liquidity Ratios: These reveal a firm's capacity to pay its short-term debts. Alahyari's research suggests that healthy liquidity ratios are associated with stronger profitability.

The airline industry is a fiercely competitive landscape, characterized by two key challenges that airlines must constantly grapple with:

- Downward Pressure on Prices: Intense competition among airlines forces them to keep prices low to attract customers. This can significantly reduce profit margins.

- Rising Input Costs: Airlines face increasing costs for essential resources like fuel and labor. These rising costs put further strain on profitability.

A study by Oum and Yu (1998) investigated these challenges and their impact on airline profitability. Their model explored how changes in productivity and price recovery ability affect airline profits. The study revealed a concerning trend:

- Limited Ability to Raise Prices: Increased competition in international air travel markets made it difficult for airlines to raise prices effectively, even when faced with rising costs.

- Soaring Input Costs: The study found that input prices, including labor and fuel, were on the rise. This further squeezed airline profits despite significant efforts to improve efficiency.

The research by Oum and Yu (1998) highlights the precarious situation airlines face. While they strive to become more efficient, the combination of intense

competition limiting their ability to raise prices and rising operational costs makes it difficult to achieve consistent profitability.

The literature review identified various factors influencing airline financial performance. Primarily, such factors can be examined into five key areas as listed below:

I. Operational Factors: Load factor for airlines serves as a cornerstone metric for assessing operational efficiency and financial health. This critical ratio, expressed as a percentage, indicates the utilization rate of an airline's available seating capacity. In simpler terms, it reflects the proportion of seats filled with revenue-generating passengers on a given flight.

A high PLF (Passenger Load Factor) directly translates to a more efficient distribution of fixed costs, such as aircraft maintenance and crew salaries, across a larger revenue base. This positive correlation between PLF and profitability has been well-established by academic research (Chang & Yeh, 2001; Prakash & Barua, 2016d; Chow & Tsui, 2017). Acutely aware of this relationship, airlines actively employ a multifaceted strategic approach to maximize their PLF.

- Targeted Marketing Initiatives: Airlines leverage a diverse arsenal of marketing strategies, encompassing targeted advertising campaigns and the development of loyalty programs, to stimulate passenger demand (Behn & Riley, 1999).

- Data-Driven Decision Making: Technological advancements play a vital role in optimizing PLF. Predictive analytics empower airlines to forecast seat demand with greater accuracy, enabling them to make data-driven decisions regarding pricing strategies and capacity allocation (Zhu, 2011; Prakash & Barua, 2017).

By meticulously managing their PLF through these strategic initiatives, airlines can achieve sustainable financial performance and navigate the ever-competitive landscape of the aviation industry.

II. Performance Factors - Airlines track a key metric called Operating Revenue per Revenue Passenger Kilometer (ORPK). This essentially tells us how much money an airline makes per passenger, per kilometer flown. ORPK is estimated by dividing the total passenger revenue by the total Revenue Passenger Kilometers (RPKs) to estimate ORPK. A higher ORPK indicates the airline is efficiently earning revenue from its passengers. This potentially allows them to set higher fares or optimize pricing strategies. As per Chow et al. (1991), industry-specific financial models, like the Air Score model, considers ORPK as a key factor for airline health.

Operating Expense per Revenue Passenger Kilometer (OEPRK): This metric reflects the average operating expenses an airline incurs per passenger, per kilometer flown. It's essentially a cost counterpart to the revenue metric ORPK (Operating Revenue per RPK). A lower OEPRK indicates a more efficient airline that spends less to transport passengers.

Labor Cost per Air Kilometer (CASK): This metric focuses specifically on labor expenses. It tells us how much an airline spends on labor costs per kilometer flown. Analyzing CASK alongside OEPRK provides a deeper understanding of how different cost components contribute to the overall operating expenses.

III. Financial Factors: Understanding a firm's financial well-being is crucial for its management and shareholders. This evaluation hinges on analyzing financial statements through key metrics called ratios. These ratios, focusing on profitability, liquidity, and solvency, indicates a holistic view of a firm's financial well-being. Financial ratios are heart of any financial analysis, empowering a wide range of

stakeholders, from analysts and investors to suppliers and regulators globally, to gauge a firm's long-term financial health and stability. These ratios are readily available in a firm's financial reports and forms critical for informed decision-making.

- Liquidity Ratios:
  - Working Capital to Total Assets: WC/TA ratio measures an airline's ability to pay its short-term financial obligations (liquidity). A lower WC/TA ratio might indicate potential challenges in settling short-term debts.

  - Current Assets to Current Liabilities: CA/CL ratio indicates the availability of current assets (like cash and inventory) to cover current liabilities (like accounts payable). A higher CA/CL ratio suggests a stronger ability to meet short-term obligations.

- Solvency Ratios:
  - Total Liabilities to Total Assets: TL/TA ratio reflects the proportion of an airline's total assets financed by debt (both short-term and long-term) compared to equity. A lower TL/TA ratio indicates a more financially stable company with less reliance on debt (higher solvency).

  - Book Value of Equity to Total Liabilities: BV/TL ratio is particularly relevant for private Indian carriers and measures the book value (recorded accounting value) of equity capital relative to total liabilities. A higher ratio suggests a stable financial position with a larger equity cushion.

- Profitability Ratios:
  - Retained Earnings to Total Assets: RE/TA ratio indicates the portion of profits retained by the airline for reinvestment and future operations. A

lower RE/TA ratio might suggest a higher risk of financial distress due to limited retained earnings.

- Operating Profit (EBIT) to Total Assets: EBIT/TA ratio measures how efficiently an airline generates profit from its assets. A higher ratio indicates better profitability and asset utilization.

- Activity Ratio:
  - Total Sales to Total Assets: Sales/TA ratio exhibits the efficiency of an airline to generate revenue utilizing its assets. A higher Sales/TA ratio indicates higher asset utilization for generating revenues.

Two major cost factors airlines grapple with are labor and aircraft equipment. Inefficient management of these resources can significantly impact airline performance.

- Labor: Low labor productivity can lead to inefficiencies in operations, potentially impacting factors like on-time performance or turnaround times.

- Aircraft Equipment: Inadequate management of aircraft equipment, including maintenance and utilization, can lead to increased costs and operational disruptions.

Effectively managing these costs, along with maximizing labor productivity, is crucial for airlines to achieve improved performance.

IV. Economic Factors: The price of aviation turbine fuel is a major pain point for airlines, significantly impacting their profitability (Krishnan, 2008; Kochher, 2010; Behera, 2016). In India, aviation turbine fuel constitutes more than 30% of an

airline's total operating airline’s total operating expenses (DGCA, 2006-2017). This high dependence on fuel costs creates a precarious situation, as any price increase forces airlines to take corrective actions. When fuel prices rise, airlines must find ways to protect their profit margins. This often leads to a difficult choice:

- Raising Fares: Airlines may resort to increasing ticket prices, which can potentially reduce passenger demand.

- Cutting Costs: Airlines may also try to reduce expenses in other areas, but this can impact service quality or growth opportunities.

Further complicating the situation is India's reliance on imported aviation fuel. This dependence on external sources exposes airlines to global fuel price fluctuations. Additionally, government-imposed taxes and duties on this essential input can add further strain on airline finances, as these charges are also prone to change.

Inflation is considered as a key barometer of economic health of any country where the industry operates. In this case, the underlying assumption is that high inflation rates signal potential problems in economic management and stability. This, in turn, can negatively impact airline performance.

V. Political influence – This factor typically impacts airline’s management performance. While government involvement can offer some benefits, studies have shown that high levels of government ownership are often associated with:

- Poorer airline performance: This could manifest in areas like profitability, efficiency, or service quality.

- Increased risk of financial distress: Airlines with high government ownership may be more susceptible to financial difficulties.

While government involvement in airlines can offer certain advantages but a comprehensive analysis must also highlight the potential risks associated with such involvement, to understand its true impact on management quality.

Research by Asquith (1991) suggests that companies can face financial distress due to three main challenges: a downturn in their industry, a heavy burden of interest payments, or lagging behind competitors in terms of performance.

In a 2023 study, Shi et al. examined the relationship between an airline's ESG disclosure practices and their chances of experiencing financial stress. They used the Altman Z-score model for assessing the airline's financial health. Their findings suggest that while the implementation of environmental initiatives might heighten the risk of financial distress, enhancing social and governance practices could help airlines alleviate this risk. Interestingly, they observed that the adverse impact of the environmental aspect and the beneficial effect of the social aspect may be less pronounced for airlines in the Asia-Pacific (APAC) region.

A more profound comprehension of airline financial performance requires further research to explore the unique interplay of variables that lead to financial distress or success within specific airline contexts.

D. Factors Impacting Financial Performance of Indian Carriers

Various research in the past has investigated the various attributes which typically impacts the financial performance of Indian companies. Typically, such studies have considered metrics like return on equity (ROE), return on assets (ROA), earnings per share (EPS) and profit after tax (PAT) as key financial performance indicators. Utilizing a fixed-effects regression model, Tabash et al. (2021) identified four significant determinants of financial performance for these companies:

- Leverage Ratio: As per the study, a curvilinear relationship exists between leverage and firm's financial performance. While leverage positively impacted ROE (potentially due to increased financial returns) but it impacts ROA, PAT and EPS negatively. This suggests that companies must strategically manage their debt levels to optimize financial health.

- Liquidity Ratio: Firms with greater access to cash (higher liquidity) exhibits a positive correlation between liquidity ratio and firm's financial performance. This reiterates the importance of efficient cash flow management for listed companies.

- Company Size: The analysis indicated a positive association between company size and its financial performance. Generally, larger companies will benefit from economies of scale and have greater access to financial resources.

- Company Age: Established companies with a longer operating history demonstrated a stronger link to positive financial performance. This suggests that experience and established business practices can contribute to financial stability.

These findings underscore the need for a comprehensive analysis that incorporates various financial ratios beyond profitability measures when evaluating the performance of Indian listed companies.

The airline industry in India is characterized by a dynamic passenger market and volatile input costs, creating a challenging financial environment (Krishnan, 2008; Pathak, 2015; Behera, 2016; Mahtani & Garg, 2018). This complexity has unfortunately resulted in financial distress and even bankruptcy for some airlines.

To navigate these challenges and achieve sustainable financial performance, airline management requires a comprehensive understanding of the key factors influencing their financial health.

Mahtani and Garg (2020) addressed this critical need by conducting a focused study on Indian carriers. Their research employed a financial distress assessment model that incorporates both financial and operational conditions. Utilizing data for seven Indian airlines spanning the period 2006-2017, the study integrated factors identified in prior research on airline financial health, operational efficiency, and external influences (Chow et al., 1991; Pilarski & Dinh, 1999; Gudmundsson, 2002; Silva et al., 2005; Prakash & Barua, 2016; Garg et al., 2016 & 2017; Gupta et al., 2017; Kumar & Garg, 2017; Sengar et al., 2018).

Debnath et al. (2020) pinpointed cost pressures as an important attribute for Indian carriers which highly contributes to their financial challenges. Their study identifies high airport and maintenance charges, coupled with VAT on Aviation Turbine Fuel (ATF), as significant burdens on airline profits. Additionally, regulatory shortcomings disadvantage new entrants, hindering a level playing field.

The current research landscape lacks a comprehensive analysis of airline financial performance in India. While studies exist on various factors, a holistic examination that incorporates both industry-specific metrics and India's unique geopolitical landscape is yet to be conducted.

E. Financial Distress Predictor/Bankruptcy Prediction Modeling

While numerous studies have explored financial distress in airlines, the primary focus has been on predicting its likelihood rather than complete insolvency (bankruptcy). Existing models function as early alert systems, identifying airlines

at risk of financial trouble (Gudmundsson, 1999, 2002; Van der Colff & Vermaak, 2014; Manzaneque et al., 2016). All these models typically predict airline's financial distress, a precursor to bankruptcy. However, financial distress serves as a warning sign, not an inevitable outcome.

This focus on financial distress presents a limitation. A more comprehensive approach to risk assessment is necessary for a clearer picture of an airline's financial health.

The quest to predict airline financial woes has been a major area of research worldwide. Early efforts focused on simpler models, like the one by Beaver (1966) that simply relied on comparing cash flow to its total debt. Altman (1968) took things a step further by incorporating multiple factors into a model that used a statistical technique called multiple discriminant analysis (MDA) along with accounting data. This model is well-known as Altman's Z-score model. In 1977, Altman and his colleagues refined this model, to be known as ZETA model.

Researchers have made significant strides in developing models that can assess the probability of financial distress or bankruptcy. These models empower stakeholders with valuable foresight, allowing them to make informed decisions.

The construction of these models leverages various techniques and methodologies. Early research, such as Springate's work in 1978, utilized MDA along with four accounting ratios. Ohlson (1980) introduced a different approach by using logistic regression for such predictions. As research progressed, a comprehensive model was designed by Fulmer et al. (1984) using MDA technique but with a wider range of 40 accounting ratios.

The recent trend has been to design models using non-parametric techniques such as neural networks (NN), rough set DEA, case-based reasoning, and support vector machines (Odom and Sharda, 1990; Tam and Kiang, 1992; Altman et al., 1994; Yang et al., 1999; Tay and Shen, 2002; Cielen et al., 2004; Bose, 2006; Chun and Park, 2006; Hui and Sun, 2006; Hua et al., 2007; Shetty et al., 2012). The success of any financial distress prediction model lies in its ability to forecast which companies might possibly go bankrupt, even several years before they file for bankruptcy. Beaver (1966) made the initial attempt in this direction, using cash flows for prediction through a Univariate model (UVA). He identified six financial ratios with discriminating power out of 29 ratios examined between 79 bankrupt and 79 non-bankrupt firms. According to Beaver's analysis, the profitability ratio, net income plus depreciation and amortization/total liabilities, best predicted the potential for bankruptcy.

Traditionally, financial distress prediction models relied on simpler techniques that analyzed a set of financial ratios. However, the recent trend has shifted towards non-parametric techniques like neural networks, support vector machines, and case-based reasoning (Odom & Sharda, 1990; Tam & Kiang, 1992; Altman et al., 1994; Yang et al., 1999; Tay and Shen, 2002; Cielen et al., 2004; Bose, 2006; Chun and Park, 2006; Hui and Sun, 2006; Hua et al., 2007; Shetty et al., 2012). These advanced models hold promise for capturing more complex relationships within financial data, potentially leading to more accurate predictions.

The ultimate goal of any bankruptcy prediction model is to provide an early warning signal for any potential financial collapse in future. Early efforts, like Beaver's (1966) pioneering work, used simpler models to analyze cash flow data. While groundbreaking for its time, this approach had limitations. Beaver's research showed profitability ratios help predict airline bankruptcies.

In 1993, Altman recognized the need for industry-specific approaches and crafted a revised Z" score model with four variables, specifically targeting non-manufacturing firms. This revised model gained traction due to its perceived effectiveness. Studies like Hanson's (2003) doctoral research demonstrated promising results, with the Z" score model achieving high accuracy (over 90%) in classifying bankrupt service companies within the first year of prediction.

Studies by Beaver in 1966, followed by Altman in 1968 sparked subsequent interest in developing models to predict bankruptcy risk. Since then, researchers have continuously strived to validate, improve upon, and create new models altogether.

This pursuit of better prediction methods has led to the exploration of diverse techniques. In a significant advancement, Zavgreen's 1985 model extended bankruptcy prediction capabilities to a five-year horizon. The quest for even more accurate models continued with Jones and Hensher's (2004) application of a mixed logit method, and Gepp and Kumar's (2008) innovative approach combining discriminant and logit analyses.

The 1980s saw a shift towards industry-specific bankruptcy models for airlines, pioneered by Gritta in 1982 and then by Altman and Gritta in 1984 using discriminant analysis.

This recognition spurred the development of several specialized models for airlines. Prominent examples include the AIRSCORE model by Chow et al. (1991), the P-Score model by Pilarski and Dinh (1999), and Neural Network models developed by Davalos, Gritta, and Chow (1999) for major US airlines and Gritta et al. (2000) for smaller carriers. All these models achieved promising results in predicting bankruptcies within a one-year timeframe.

However, a crucial takeaway from this research is that, while effective, these industry-specific models didn't offer a significant leap in predictive power compared to existing techniques like multiple discriminant analysis (MDA) or logistic regression (Gudmundsson, 2002).

Altman and Gritta's (1984) groundbreaking research marked a significant milestone. They were the first to apply bankruptcy prediction models beyond the borders of the United States, encompassing data from over ten countries. While their study focused on a single type of statistical model, it paved the way for further exploration of the model's applicability in diverse geographical contexts.

However, a critical gap remains. The vast majority of research on bankruptcy prediction models has concentrated on developed economies. This focus leaves a substantial knowledge gap regarding the effectiveness of these models in emerging and developing economies. Further research is needed to determine if existing models require adaptation or entirely new approaches are necessary to accurately predict financial distress in airlines operating within these diverse economic landscapes.

Accurately assessing the financial health of airlines is crucial for stakeholders, including investors, creditors, and regulators. To achieve this, researchers use financial data-driven models to predict airline financial problems. Following four prominent models stand out for this sector:

- Altman Z" Score Model: This versatile model has an applicability to a broad range of companies, but it may not capture all the nuances specific to the airline industry.

- P-Score Model: This industry-specific model tailors its analysis to financial metrics relevant to airlines, potentially improving the accuracy of an airline's financial health assessment.

- Fuzzy Logic Model: This model incorporates a more flexible approach, allowing for the inclusion of non-financial factors that might influence an airline's risk of bankruptcy.

- Kroeze Model: Similar to the P-Score model, this model focuses on financial metrics specific to airlines, potentially providing a more targeted assessment.

The selection of the most suitable model depends on the specific needs of the user. If a general overview is desired, the Z" score model might be a good starting point. However, for a more in-depth analysis that considers airline-specific factors, industry-specific models like the P-Score or Kroeze model might be preferable. Additionally, the Fuzzy Logic Model offers a unique approach by incorporating non-financial data points. Here's a brief overview of each model:

Altman Z" Score Model – This model is as a valuable tool for assessing financial distress in various industries. Its effectiveness extends to the aviation sector, as demonstrated by Gritta's (1982) successful application. Notably, Gritta applied Z-score model to predict the financial struggles of Braniff and Continental airlines well before they filed for bankruptcy.

However, it's important to acknowledge that the Z-score model, while powerful, may not address all the complexities specific to the airline industry. For a more nuanced understanding, industry-specific models or models that incorporate non-financial factors might be necessary.

$$Z = 0.012\ X_1 + 0.014\ X_2 + 0.033\ X_3 + 0.006\ X_4 + 0.999\ X_5$$

The Altman Z" Score Model evaluates a company's financial health using five key metrics:

- X_1 (Liquidity): Measured by the net working capital to total assets ratio. This assesses a company's ability to meet its short-term financial obligations using its current assets.

- X_2 (Profitability from Retained Earnings): Measured by retained earnings to total assets ratio. This indicates how much profit a company has reinvested in its operations over time.

- X_3 (Profitability from Operations): Measured by operating profit to total assets ratio. This focuses on a company's ability to generate profit from its core business activities.

- X_4 (Solvency (Debt Level)): Measured by market value of equity to book value of debt ratio. This reflects the balance between a company's ownership (equity) and its liabilities (debt).

- X_5 (Efficiency): Measured by operating revenues to total assets ratio. This assesses how effectively a company utilizes its assets to generate sales.

We have seen above that the Z" score model works by analyzing five key financial indicators, symbolized by X_1 to X_5. These indicators, expressed as ratios, act like gauges that measure various dimensions of a company's financial well-being. Professor Altman (1968) developed this model using a special statistical technique called "multiple discriminant regression". This technique allows the model to go beyond just calculating ratios. It assigns importance to each ratio based on how well it has historically predicted bankruptcies. By combining these strengths and weaknesses using a mathematical formula, the model arrives at a single Z" score, which delivers better insights on a company's chances for financial failure.

The growing use of operating leases in the aviation industry has cast some doubt on the Z" score model's continued effectiveness for airlines (Gritta et al., 1995). Operating leases allow airlines to use aircraft without recording them as debt on their balance sheet. This can distort the X_5 ratio (operating revenues to total assets), potentially leading to misleading results regarding an airline's financial health.

Recognizing this limitation, Altman (1983), himself proposed a modified Z" model, specifically designed for service-oriented industries like airlines. This model addresses the concerns raised by operating leases and offers a potentially more accurate assessment of airline financial health.

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

Where:

- X_1: Liquidity Ratio – This ratio measures how easily a company can cover its short-term debts using its current assets, like cash and inventory.

- X_2: Profitability from Reinvestment Ratio - This indicates how much profit a company has kept and reinvested in its operations over time.

- X_3: Profitability from Operations Ratio - This focuses on a company's ability to generate profit from its core business activities.

- X_4: Debt-to-Equity Ratio - This reflects the balance between a company's ownership (equity) and its borrowings (debt).

The Z" score model is a powerful tool, but it doesn't take into account factors unique to the aviation industry, which can limit its accuracy for predicting airline bankruptcies.

The P-Score Model – Pilarski and Dinh crafted this model specifically targeting the aviation industry. Unlike some general models, it focuses on assessing the financial health of major US airlines. As per Goodfriend et al. (2005), this model has gained recognition for its accuracy in predicting bankruptcy with respect to other available models in the market.

The P-Score Model assigns a "P value" to each airline. This P value represents the likelihood, or probability, of an airline going bankrupt.

$$W = -1.98X_1 - 4.95X_2 - 1.96X_3 - 0.14X_4 - 2.38X_5$$

In this model, the variables are defined as follows:

- X_1: Operating Revenues to Total Assets Ratio (Sales Efficiency): This ratio estimates effectiveness of an airline's asset (aircrafts, engines, etc.) utilization to generate sales. A higher sales efficiency ratio indicates higher efficiency; thus, the airline makes more revenue out of its resources.

- X_2: (Financial Strength): This signifies the ratio between retained earnings to total assets ratio.

- X_3: Debt-to-Equity Ratio: This ratio shows the balance between an airline's own money (equity) and the money it owes to lenders (debt). If this ratio is lower, then, it demonstrates a healthier financial position, since the airline depends more on borrowed funds.

- X_4: Liquidity Ratio: This ratio assesses an airline's ability to pay its short-term debts using its most accessible cash and other valuable assets. If this ratio is higher, then the airline has more immediate resources available to cover its bills.

- X_5: Profitability Ratio (Before Taxes and Interest): This ratio measures the quantum of profit an airline produces from its core business operations, excluding the impact of interest payments and taxes. A higher ratio advocates that the airline is more effective in converting its revenue into profit.

In a P-Score model, all the five ratios mentioned above along with a specific mathematical formula ($P = 1/ [1+e^{-w}]$) is used to calculate a P value for an airline. The "e" represents a mathematical constant (approximately 2.71828), and "w" represents a weighted sum that combines the values of X_1 to X_5. As the weighted sum (w) increases, the P value (probability of bankruptcy) approaches zero, indicating a lower risk. Conversely, a lower weighted sum leads to a P value closer to one, suggesting a higher risk of bankruptcy.

The P-Score Model's ability to assess airline bankruptcy risk has garnered recognition beyond academic circles. The U.S. Department of Transportation utilized this model, as described in Gritta et al. (2006), to keep a close watch on the financial health of U.S. based carriers. This demonstrates the practical application of the P-Score Model as a valuable tool for regulators to identify potential financial vulnerabilities within the airline industry.

Fuzzy Logic Model - While the P-Score Model relies on specific financial ratios, another approach utilizes fuzzy logic for bankruptcy prediction. Fuzzy logic allows for a more nuanced assessment by incorporating factors that might be difficult to quantify with traditional ratios.

Several researchers have explored this approach. Silva et al. (2005) developed a model called Hybrid Financial Statement Analysis (HFSAT) that combines a traditional statistical technique with fuzzy logic. HFSAT analyzes financial data

from airlines but goes beyond just ratios. It can consider factors like management experience, industry trends, and even government regulations, which can be difficult to express as precise numbers. By incorporating these elements, HFSAT offers a more holistic view of an airline's financial distress.

The model used is mentioned below:

$$Z = 2.637 - 0.879\ X_1 + 0.466\ X_2 - 0.268\ X_3 - 0.28\ X_4$$

This model takes a different approach compared to the P-Score Model. While the P-Score Model relies on strict financial ratios, HFSAT incorporates a broader range of factors that influence an airline's financial health. Here's a breakdown of some key elements considered by HFSAT:

- X_1: Financial Strength (Shareholder Funds to Total Assets): This is a critical ratio and reflects the part of airline's assets that are financed by its own shareholders' equity, indicating a stronger financial position if the ratio is higher.

- X_2: Debt Burden (Liabilities to Total Assets): This ratio shows the proportion of an airline's assets that are financed through either short term or long-term debts. A lower ratio suggests a healthier financial structure, as the airline relies less on borrowed funds.

- X_3: Revenue Generation Efficiency (Net Operating Revenue to Total Assets): This metric indicates how effectively the airline utilizes its assets to make revenues from its core operations. Typically, a higher ratio suggests improved efficiency in converting assets into sales.

- X_4: Investment in Fixed Assets (Fixed Assets to Total Assets): This specific ratio shows the part of the airline's assets invested in aircrafts, engines, and other long-term holdings. A balanced ratio is important, as too much investment in fixed assets could limit the airline's flexibility.

There's growing interest in exploring alternative approaches to bankruptcy prediction for airlines. Fuzzy logic models are emerging as a potential challenger to traditional methods. Studies by Chen et al. (2009) and Korol (2012) provide promising evidence in terms of prediction accuracy. Korol showcased the advantages of fuzzy logic models over the well-established Altman Z-score model. These findings suggest that fuzzy logic models warrant further investigation for their potential to improve airline bankruptcy risk assessment.

Kroeze Model – According to Kroeze**,** the popular Altman Z-score model has certain limitations when used for predicting airline bankruptcies. Recognizing this, Kroeze (2005) developed a modified model specifically tailored for the aviation industry. This model, known as the Kroeze Model, aims to provide more accurate bankruptcy risk assessments for airlines.

Airline bankruptcies can be influenced by factors beyond those considered in generic financial models. The Kroeze Model, introduced by Kroeze (2005), addresses this issue. It offers a more industry-specific approach to predicting airline bankruptcies by incorporating variables that are particularly relevant to the airline sector.

This model is represented by:

$$Y_a = 0.268\ X_1 + 0.838\ X_2 + 0.111\ X_3 + \acute{\varepsilon}$$

In this case the variables X_1 to X_3 are,

- Y_a: This represents the overall Kroeze Model index. A higher Y_a value likely indicates a lower risk of bankruptcy for an airline

- X_1: Working Capital to Total Assets Ratio: This ratio measures an airline's short-term liquidity. If this ratio is higher, then, it signifies that the airline has more current assets (like cash and inventory) readily available to cover its short-term debts.

- X_2: Retained Earnings to Total Assets Ratio: This ratio indicates how much profit an airline has kept and reinvested in its operations over time. A higher ratio suggests stronger financial health from past profitability.

- X_3: Book Value of Equity to Total Liabilities Ratio: This ratio reflects the airline's capital structure. A higher ratio demonstrates a stronger financial condition, since the airline relies less on borrowed funds (total liabilities) compared to its own equity (ownership stake).

- έ: This symbol represents the error term in the model. It acknowledges that there will always be some level of uncertainty in any prediction, and this term accounts for those unforeseen factors that can influence an airline's financial health.

The Kroeze Model (Kroeze, 2005) offers a parsimonious approach to airline bankruptcy prediction. It utilizes multiple discriminant analysis to combine three key financial ratios into a single Kroeze Model index (Y_a). These ratios specifically target metrics crucial for the airline industry:

- Working Capital Ratio: This is a key ratio which reflects short-term liquidity and assess an airline’s capacity to settle its current liabilities.

- Retained Earnings Ratio: This ratio emphasizes the significance of past profitability and reinvestment in the airline's core operations.

- Capital Structure Ratio: This ratio assesses the airline's financial health by evaluating the balance between its equity (ownership stake) and debt financing.

The Y_a index serves as a single point of reference for bankruptcy risk. Positive Y_a values indicate a lower likelihood of bankruptcy, while negative Y_a values suggest a higher risk. This model specifically highlights the importance of retained earnings (X_2) as a distress predictor. Companies with negative retained earnings are at a higher risk of experiencing financial difficulties in the future.

Beyond its theoretical elegance, the Kroeze Model's true strength lies in its demonstrably accurate predictions. Kroeze successfully employed the model to predict bankruptcies of US Airways, Air Canada and Hawaiian Airlines four years prior. This extended lead time allows airlines and stakeholders to take proactive measures to address potential financial vulnerabilities. Furthermore, the model identified the impending financial struggles of American Trans Air (ATA) two years in advance and for Trans World Airlines (TWA), a good three years prior. This valuable foresight can be instrumental in implementing restructuring plans or exploring strategic partnerships to mitigate bankruptcy risks.

Traditional distress prediction models, like the Altman’s Z-Score and ZETA models, depend entirely on the data available in either company balance sheets or income statements. However, a growing number of researchers argue that this approach might be insufficient.

Here's why cash flow data is gaining attention:

- Potential for Manipulation: John (1976) raised concerns that companies can manipulate data in balance sheets and income statements. As suggested by Kordestani et al. (2011), cash flow statements might be less susceptible to such manipulation and thus cash flow data demonstrates more accurate information about a company's financial well-being.

- Focus on Liquidity: Focus on liquidity is essential, as cash flow statements indicate a company's cash generation ability, key for paying debts and future investments, making them critical for bankruptcy prediction.

By incorporating cash flow data alongside traditional metrics, future models might offer better results in terms of bankruptcy prediction.

Various research in the past has supported the argument for including the cash flow data in financial distress prediction models but Gentry et al. (1985) demonstrated that incorporating specific cash flow variables, particularly those related to dividends, investments, and receivables, alongside traditional financial ratios, led to more accurate bankruptcy predictions. Similarly, Almamy et al. (2016) found that by introducing a company's operating cash flow data into the Altman's Z-Score model significantly improved its effectiveness in identifying companies at risk of bankruptcy. These findings highlight the potential of cash flow data to enhance the accuracy of bankruptcy prediction models.

Sloan (2005) argues that improvements in reported earnings, often achieved through accounting adjustments (accruals), might not be sustainable and don't reflect a company's true financial health. According to Agrawal (2015), accounting practices play a crucial role in shaping the quality of a company's earnings, which is a more critical indicator of financial health than just the reported figures. In line

with this argument, Janes (2005) demonstrates that incorporating accrual data, which can shed light on earnings quality, as variables in bankruptcy prediction models can significantly improve their accuracy.

Building on the importance of earnings quality for bankruptcy prediction, the F-Score model, developed by Piotroski (2000), offers a valuable approach. This model goes beyond traditional financial ratios and incorporates factors that can influence earnings quality. Agrawal (2015) showcased the F-Score's effectiveness in predicting loan defaults among Indian firms. In 2017, Kolte et al. applied this F-Score model to an India specific case, evaluating its effectiveness in predicting the bankruptcy of Kingfisher Airlines. Their research revealed that Kingfisher Airlines had consistently low F-Scores in the years leading up to its bankruptcy. This suggests that the F-Score's focus on earnings quality might have provided early warning signs of the airline's financial troubles.

Existing models on financial distress prediction have demonstrably improved our understanding of airline financial health. However, these models primarily rely on financial ratios or data, often tailored to specific regions. For Indian air carriers, a more comprehensive model is necessary. This model should incorporate the following aspects:

- Financial and Non-Financial Factors: While financial ratios are valuable, they don't provide the whole picture. A new model should integrate non-financial factors specific to the Indian aviation industry, such as infrastructure, regulations, and fuel costs.

- Country-Specific Business Environment: Business conditions can vary significantly by country. The ideal model would account for factors unique to the Indian business environment, such as tax laws and government policies, that can influence airline profitability and risk.

By incorporating both financial and non-financial industry-specific variables alongside country-specific business considerations, a new model could offer a more nuanced and accurate assessment of bankruptcy risk for Indian air carriers. This would empower stakeholders to make informed decisions and potentially mitigate financial distress.

F. Financial Distress Predictor Modeling for Indian Aviation Market

In India, research on bankruptcy prediction has largely focused on applying models designed in other countries to various domestic industries, such as cement and pharmaceuticals (Nair, 2013; Bapat and Nagale, 2014; Vimala and Saranya, 2014; Barki and Halageri, 2014; Singh and Mishra, 2016). While these studies provide valuable insights, they might not be fully optimized for the unique challenges faced by the Indian aviation industry.

A significant portion of Indian bankruptcy prediction research has centered on applying generic models, such as the Z-Score and modified Z-Score, across various industries. These models were originally developed for non-specific contexts. Barki and Halageri (2014) used the Altman Z-Score model to analyze the financial health of textile companies in India. Panigrahi (2019) applied the same Z-Score model to Indian pharma companies to identify potential financial distress. Kumar and Anand (2013) used both the Z-Score and modified Z-Score models to assess the financial condition of Kingfisher Airlines, confirming its poor financial state.

Several studies have explored the applicability of generic financial distress prediction models, like the Altman Z-Score and its variants, to the Indian aviation sector. One such study by Vasantha et al. (2013) focused on select Indian airlines. While the Z-Score model might be a valuable tool in some contexts, its application in this case highlighted a potential shortcoming.

The study using the Z-Score model on select airlines, including Kingfisher Airlines, revealed the airline's precarious financial health and its impending bankruptcy. However, this outcome could also indicate that the Z-Score model, designed for a broader context, might not fully capture the unique risk factors specific to the Indian aviation industry.

Studies applying the Z-Score model, like one by Kulkarni (2018) that focused on calculating Z-scores for Indian airlines, paint a concerning picture of the industry's financial health. The study suggests that most Indian airlines are struggling financially, with the exception of Indigo, which stands out for its relative financial stability.

Several studies in the last two decades like Bandyopadhya (2006), Avenhuis (2013), Tinoco and Wilson (2013), Nanayakkara and Azeez (2015), Altman et al. (2016) and Sayari and Mugan (2017) have emphasized the growing focus on developing bankruptcy prediction models tailored to specific industries around the world. These studies demonstrate that industry-specific models achieve significantly higher accuracy compared to generic models applied across various sectors.

Traditionally, bankruptcy prediction models have focused primarily on financial or accounting data from a company itself. However, some research by Xie et al. (2011) and Madrid-Guijarro et al. (2011) suggests that incorporating local macroeconomic conditions and market factors can significantly improve the accuracy of these models. These researches highlight the importance of moving beyond a purely financial lens in bankruptcy prediction. By incorporating local economic and market factors, models can become more nuanced and effective in identifying potential financial distress for companies.

While past studies in the Indian aviation sector have explored the applicability of models like the Z-Score and its variants (Pandey & Rathore, 2013; Safiuddin, 2017; Kulkarni, 2018), there's a gap in research focused on developing entirely new models specific to the Indian context. Existing models while valuable, were designed for broader applications.

This study takes a step forward by aiming to formulate a financial distress prediction model specifically tailored to Indian airline companies. By considering the unique financial characteristics, regulations, and market dynamics of the Indian aviation industry, this research aspires to contribute a more nuanced and potentially more accurate tool for predicting airline financial distress in India.

This revised passage highlights the limitations of prior research and positions your study as a novel effort to address a specific need in the Indian aviation sector. It emphasizes the potential for a more accurate model by considering the unique characteristics of the Indian market.

2.1.3 Theoretical Premise of the Study

Predicting Financial Distress: Key Theories

Financial distress prediction models rely on a strong foundation of theories to identify the characteristics of companies facing financial difficulty. These theories not only help us understand the root causes of financial distress but also serve three key purposes in model development:

Theories like Liquidity and Profitability Theory and Cash Management Theory guide researchers in selecting relevant financial ratios and metrics that can provide advance alerts for potential financial distress. Balance Sheet Decomposition Theory

and Credit Risk Theory help us comprehend the functional relationships between these chosen predictors. For instance, a high debt-to-equity ratio (from Balance Sheet Decomposition) might increase a company's credit risk (as suggested by Credit Risk Theory), making it more likely to default on loans. Liquid Asset Theory emphasizes the importance of a company's cash reserves in weathering financial challenges. Based on this insight, models can be enhanced by including variables that capture a company's liquidity position.

1. Liquidity and Profitability Theory

As per Hashi's findings in 1997, a company is deemed healthy and at a lower risk of bankruptcy when it exhibits favorable indicators in terms of liquidity and profitability. Conversely, poor indicators in these areas are associated with an unhealthy status and an elevated bankruptcy risk. According to the theory, companies can significantly reduce their risk of financial failure by keeping a healthy level of liquidity and profitability.

As per the theory, no company can achieve sustained financial health by focusing solely on one aspect. Imagine a company with strong profits but poor cash flow management. They might have a significant amount of money tied up in accounts receivable or inventory, making it difficult to access cash readily. This situation could lead to a liquidity crisis, even if the company is fundamentally profitable. On the other hand, a significant cash balance can be good, but if it's consistently unprofitable, it's essentially burning through its reserves. Eventually, the company will run out of cash and be unable to meet its obligations. By effectively managing both profitability and liquidity, companies can navigate challenges, invest in growth opportunities, and secure their long-term financial stability

2. Balance Sheet Decomposition Measure (BSDM)

The Balance Sheet Decomposition Measure (BSDM) serves as a valuable tool within financial distress prediction. This method emphasizes a meticulous examination of a company's balance sheet to identify material changes in its composition over a specified timeframe (Aziz & Dar, 2006). The underlying rationale posits that substantial alterations in the structure of assets and liabilities can signal potential future challenges in maintaining financial equilibrium (Monti & Moriano, 2010). These significant shifts, if left unchecked, can become increasingly difficult to manage, potentially leading the firm towards a state of financial distress.

BSDM theory suggests that significant and potentially uncontrollable shifts in the balance sheet structure can serve as early warning signs of a potential loss of financial stability. It's important to acknowledge that BSDM primarily relies on historical data and may have limitations in its ability to predict future events. Additionally, interpreting the significance of changes in the balance sheet composition can involve a degree of subjectivity.

3. Cash Management Theory

Within the realm of corporate finance, Cash Management Theory occupies a pivotal position. It centers on the critical task of maintaining adequate cash reserves, a foundation for any company's financial stability. The theory acknowledges the inherent challenges associated with this endeavor, primarily stemming from two key factors:

- The Imprecise Nature of Cash Flow Forecasting: Precise forecasting of a company’s future cash inflows, particularly those reliant on customer payments, can be a complex undertaking. This inherent uncertainty presents significant difficulties in strategically planning for a company's cash needs.

- The Inherent Discrepancies of Cash Flows: The ideal scenario where a company's cash inflows and outflows perfectly synchronize rarely exists. In reality, there are often unavoidable time lags between a company's disbursement of funds for operational needs and the corresponding receipt of payments from customers.

Cash Management Theory posits that any substantial discrepancies between these two cash flow components can serve as a potential indicator of shortcomings within a firm's cash management practices. According to Aziz & Dar (2006), if left unaddressed, such shortcomings can escalate into financial distress and even culminate in ceased operations.

4. **Liquidity Risk Theories** (Credit Risk Theory)

Within the domain of Liquidity Risk Theories, Credit Risk Theory plays a central role in elucidating the potential for borrower default and its consequences for lenders (Westgaard & Wijst, 2001). This theory establishes a clear link between borrower default and a lender's exposure to liquidity risk. In simpler terms, if a borrower fails to fulfill their loan repayment obligations (defaults), the lender faces a potential liquidity shortfall.

Credit Risk Theory posits a strong cyclical relationship between credit risk and the broader economic environment. During periods of economic contraction, characterized by rising unemployment and sluggish growth, borrowers are more likely to encounter financial hardship. This translates into an increased likelihood of loan defaults, potentially straining the lender's cash flow (Westgaard & Wijst, 2001). Nyunja (2011) expands on Credit Risk Theory by highlighting the potential losses that investors face due to borrower defaults. These losses can be both financial, encompassing the unrecovered loan principal and interest, and non-

financial, including the time and resources expended in attempting to collect outstanding debts.

5. Liquid Asset (Cash Flow) Theory ✓

The Liquid Asset (Cash Flow) Theory stands as a cornerstone within the framework of financial distress prediction. As per Scott (1981), this theory emphasizes the paramount importance of any company's cash flow generation capability in relation to its current liabilities in assessing its financial health.

Companies that consistently generate positive cash flow possess a distinct advantage. Such companies are perceived as more creditworthy by lenders, enabling them to readily access external financing through capital markets. This enhanced access to additional capital strengthens their financial flexibility and resilience in the face of unforeseen challenges.

Conversely, companies experiencing negative or persistently low cash inflows encounter significant obstacles. Their limited access to capital markets due to a perceived higher risk of default can severely restrict their ability to meet debt obligations. This situation exposes them to a heightened risk of insolvency, potentially culminating in bankruptcy.

The theory offers two key perspectives on predicting a company's potential bankruptcy based on cash flow dynamics:

- Negative or Insufficient Cash Flow: If a company experiences a negative profit or net cash flow, or fails to meet its current debt obligations, it signifies a dire financial strain. This scenario serves as a critical warning sign for potential bankruptcy.

- Technical Insolvency: A situation where a company's profitability for the current year, when added to the anticipated future worth of its shares (excluding current income) falls below zero is termed technical insolvency (Altman & Hotchkiss, 2006). This scenario indicates a state of financial distress where the company lacks sufficient resources to meet its current financial obligations, highlighting a critical liquidity shortfall.

By highlighting the centrality of cash flow adequacy, the Liquid Asset (Cash Flow) Theory underscores the need for companies to implement robust cash flow management strategies. Companies that prioritize efficient cash flow management are better equipped to navigate financial turbulence, meet their debt obligations, and ensure long-term financial sustainability.

Table 6: Process of Financial Distress Prediction

Nos.	Process	Theories / Models	Remarks
1.	Financial Impact Assessment	Trend Analysis	This analysis, often referred to as the Pyramid Method, entails identifying the ratios of different items for various periods and subsequently comparing them. By scrutinizing these ratios over a span of years, one can discern whether the business concern is exhibiting an upward or downward trend. This analysis is otherwise called as Pyramid Method.
		Average Analysis	When calculating trend ratios for a business concern, it is common

Nos.	Process	Theories / Models	Remarks
			practice to compare these ratios with the industry average. Both trends can be visually represented on graph paper, often in the form of curves. This visual presentation enhances the comprehensibility and impact of the analysis and comparison.
		Cash Flow Analysis✔	Cash flow analysis focuses on the movement of cash and bank balances, emphasizing the actual movement of cash rather than changes in working capital. Two main types of cash flows are considered: actual cash flows and notional cash flows.
		Statement of Changes in Working Capital	The statement of changes in working capital helps identify the extent of increase or decrease in working capital. Net working capital is calculated by subtracting the sum of current liabilities from the sum of current assets. However, it does not provide detailed information about the reasons for changes in working capital.
	Distress Prediction	Univariate Analysis (UVA)	Univariate Analysis involves examining the effects of a single variable on a set of data. In this context, the predictive ability of ratios

Nos.	Process	Theories / Models	Remarks
			can be analyzed on an individual basis, one variable at a time.
2.		Discriminant Analysis (Multivariate) (DMA)	Discriminant analysis is a versatile statistical method employed to classify observations into distinct groups, relying on scores from one or more quantitative predictor variables. DMA operates by utilizing a linear discriminant function to differentiate between distressed and non-distressed firms. The discriminant function transforms the values of the individual variables of the firm into a single discriminant score (z score), subsequently used to categorize the firms into either the failed or non-failed group.
		Conditional Probability ✓	Conditional probability is defined as the likelihood of an event or outcome occurring, contingent on the occurrence of a previous event or outcome. Conditional probability models, such as Probit, Logit, and LRA (Logistic Regression Approach), are employed to estimate the

Nos.	Process	Theories / Models	Remarks
			probability of the occurrence of a specific choice or outcome. These models utilize the coefficients of the independent variables to predict the probability of an event happening for a dichotomous dependent variable.
		Neural Networks	Neural Network (NN) models are conceptually based on efforts to replicate the neural structure of the human brain.

2.2 Research Gap

The gaps identified during the extensive literature review are listed below:

Table 7: Identified Research Gaps

Nos.	Area of Study	Literature Details	Gaps
1	Financial Distress in Aviation Industry	Altman, (1968); Altman et al., (1994); Gudmundsson, (2002); Lin et al., (2016); Manzaneque et al., (2016); Hotchkiss et al. (2008); Borenstein and Rose, (1995, 2003); Liu, (2009); Noronha and Singhal (2004); Busse (2002); Barla and Koo, 1999; Chevalier and Sharfstein,	Several studies have primarily focused on assessing the risk of financial distress rather than complete insolvency within the airline industry. The airline sector is capital-intensive, marked by cyclical demand, intense competition, and vulnerability to external

Nos.	Area of Study	Literature Details	Gaps
1		(1996); Hendel, (1996); Hofer et al., (2005, 2009); Kennedy, (2000); Phillips, (1995); Payne and Hogg, (1994); Wong, (2003); Hofer, 1980; Robbins and Pearce, (1992); Sudarsanam and Lai, (2001); Chatterjee, et al., (1996)	shocks. Consequently, airlines are more susceptible to financial failures, often necessitating reactive corrective actions. There is a pressing need for in-depth research to pinpoint the causes of an airline's financial distress, tailored to the nuances of the specific region or country, taking into account local business intricacies. A comprehensive understanding of stakeholders' perceptions regarding financial distress demands a detailed approach. Coordinated efforts are essential to mitigate the impact of distress factors effectively.

Nos.	Area of Study	Literature Details	Gaps
1			The identification of non-financial factors, such as operational performance, economic conditions, regulatory frameworks, and government policies, affecting financial performance, requires rigorous research. This holistic approach enables the assessment of both financial and non-financial factors, enhancing the ability to foresee potential distress in the airline industry.
2	Financial Distress in Indian Aviation Industry	Jayaraman & Srinivasan, (2014); Tyagi & Nauriyal, (2016); Altman, (1968); Vasantha et al., (2013); Shome and Verma, (2020)	The Indian aviation industry is characterized by complexity, with various input parameters playing a pivotal role in the performance of individual airline companies. However, there is limited research available regarding financial distress in the

Nos.	Area of Study	Literature Details	Gaps
2	Financial Distress in Indian Aviation Industry		context of the Indian aviation sector and the key factors or variables influencing distress. Existing studies on Indian carriers have incorporated selective financial and non-financial variables for distress prediction. Therefore, there is an urgent need to identify India-specific significant factors, both internal and external, influencing the financial performance of Indian carriers, despite being a robust growth market for years. A thorough impact analysis of these identified significant factors is necessary to proactively mitigate insolvency risks. Extensive research is also required to understand the

Nos.	Area of Study	Literature Details	Gaps
2			impact of regulatory strategies and socio-political factors on airline failures in India. This comprehensive approach will contribute to a more nuanced understanding of the challenges and opportunities within the Indian aviation industry.
3	Factors Impacting Financial Performance of Global Airlines	Whittington (1980); Mesquita and Lara (2003); Alarussi and Alhaderi (2018); Schefczyk (1993) and Tsikriktsis (2007); Schefczyk (1993); Mwangi (2013); Alahyari (2014); Oum and Yu (1998); Prakash and Barua, (2016); Chow and Tsui, (2017); Chang and Yeh, (2001); Behn and Riley, (1999); Zhu, (2011); Prakash and Barua, (2017);Chow et al., (1991); Krishnan, (2008); Behera, (2016); Kochher, (2010); Altman (1968,	Previous research underscores the significance of distress assessment models incorporating industry-specific factors for achieving the highest accuracy in evaluating the risk of financial distress. While factors influencing financial performance may exhibit general similarities, it is imperative to conduct separate examinations that consider industry-specific

Nos.	Area of Study	Literature Details	Gaps
3		1983); Altman et al., (1977); Pilarski and Dinh, (1999); Silva et al. (2005); Asquith (1991); Shi et al., (2023)	characteristics and geopolitical dynamics to pinpoint the factors affecting performance accurately. There is a need for research dedicated to identifying the distinctive factors impacting bankruptcy in Full-Service Carriers versus Low-Cost Carriers. Furthermore, additional research is essential, focusing on identifying various variables contributing to financial distress. This research should emphasize both financial and non-financial variables critical for enhancing the financial performance of airlines on a case-by-case basis. This nuanced approach will

Nos.	Area of Study	Literature Details	Gaps
3			contribute to a more thorough understanding of the complex dynamics within the aviation industry.
4	Factors Impacting Financial Performance of Indian Carriers	Mosab I. Tabash et al., (2021); Mahtani and Garg, (2018, 2020); Krishnan, (2008); Pathak, (2015); Behera, (2016); Sengar et al., (2018); Kumar and Garg, (2017); Garg, (2016); Garg et al., (2017); Gupta et al., (2017); Prakash and Barua, (2016); Chow et al., (1991); Pilarski and Dinh, (1999); Gudmundsson, (2002); Silva et al., (2005); Shome and Verma, (2020); Debnath et al. (2020)	While some studies have explored factors influencing financial distress in Indian firms, research specific to Indian carriers is limited. Only one study has assessed the financial distress of Indian carriers, incorporating factors identified from studies in other countries. The current research landscape lacks a comprehensive examination of India-specific external factors affecting the financial performance of carriers. There is a gap in research that specifically identifies the significant factors

Nos.	Area of Study	Literature Details	Gaps
4			influencing the financial performance of carriers in India. This research should consider a combination of industry-specific financial and non-financial factors, along with India-specific geopolitical factors. Urgent and critical research is needed to identify advance warning indicators, encompassing significant factors and their impact, to predict potential financial distress in any Indian carrier. This will contribute to a more nuanced understanding of the unique challenges faced by Indian carriers in the aviation industry.
5	Financial Distress Predictor/ Bankruptcy	Gudmundsson, (1999, 2002); van der Colff and Vermaak, (2014); Manzaneque et al., (2016); Beaver, (1966); Altman et	Several studies have predominantly focused on assessing the risk of financial distress rather than complete insolvency,

Nos.	Area of Study	Literature Details	Gaps
5	Prediction Modeling	al., (1977);Springate (1978);Ohlson (1980);Fulmer et al. (1984); Odom and Sharda, (1990); Tam and Kiang, (1992); Altman et al., (1994); Yang et al., (1999); Tay and Shen, (2002); Cielen et al., (2004); Shetty et al., (2012); Bose, (2006); Chun and Park, (2006); Hui and Sun, (2006); Hua et al., (2007);Altman and Gritta (1984); Zavgreen (1985); Jones and Hensher (2004). Gepp and Kumar (2008); Chow et al. (1991); Pilarski and Dinh (1999); Davalos, Gritta and Chow (1999); Gritta et al. (2000); Gritta (1982); Gritta et al., 1995; Gritta et al., 2006; Silva et al. (2005); Chena, H. J. et al. (2009); Kordestani et al. (2011); Gentry et al. (1985);	with a majority conducted in developed economies. The utilization of financial ratios has been a common practice in financial distress prediction modeling, mostly designed for non-aviation industries. While these models are standardized and applicable globally, they face challenges in predicting company failure several years in advance. Specific models such as P-Score, Fuzzy Logic, and Kroeze are tailored to airline-specific data but primarily rely on financial factors or ratios for predicting air carrier insolvency. To address these limitations, there is an urgent need to develop a comprehensive financial distress prediction model

Nos.	Area of Study	Literature Details	Gaps
5		Almamy et al. (2016); Sloan (2005); Agrawal (2015); Piotroski (2000); Kolte et al. (2017)	for air carriers. This model should incorporate both financial and non-financial industry-specific variables, considering country-specific business factors like government policies and economic conditions. Intensive research is essential to create dedicated financial distress prediction models, especially for developing countries with high growth potential. Such models aim to prevent carrier insolvency and mitigate potential cascading economic impacts.
6	Financial Distress Predictor Modeling for Indian Aviation Market	Nair, (2013); Barki and Halageri, (2014); Vimala and Saranya, (2014); Bapat and Nagale, (2014); Singh and Mishra, (2016); Barki and Halageri, (2014);Panigrahi	Studies have primarily concentrated on evaluating the applicability of existing bankruptcy predictor models to gauge the financial well-being of specific Indian carriers.

Nos.	Area of Study	Literature Details	Gaps
6		(2019); Kumar and Anand (2013); Vasantha et al., (2013); Kulkarni, 2018); Avenhuis, (2013); Tinoco and Wilson, (2013); Nanayakkara and Azeez, (2015); Altman et al., (2016); Sayari and Mugan, (2017); Bandyopadhya, (2006); Madrid-Guijarro et al., (2011); Xie et al., (2011); Pandey & Rathore, (2013); Safiuddin, (2017); Kulkarni, (2018); Shome and Verma, (2020)	However, these standardized models, predominantly focused on financial data, exhibit limited relevance across various industries, as they overlook factors crucial to specific sectors or countries. There is a notable scarcity of studies on financial distress prediction models for Indian carriers beyond conventional models like Altman Modified Z Score, P-Score, Fuzzy Logic, and Kroeze. Existing research in the Indian context has predominantly centered around the application of Z score and modified Z" score to companies across different sectors, including aviation.

Nos.	Area of Study	Literature Details	Gaps
6			There is a pressing need for research on Financial Distress Prediction Modeling tailored to Indian carriers, incorporating variables and factors specific to the Indian context. Further investigations are essential for assessing the financial health of Indian Scheduled Carriers, encompassing both Full-Service Carriers and Low-Cost Carriers.
7	Theories on Financial Distress and Distress Modeling	Hashi (1997); (Aziz & Dar, 2006); Monti & Moriano, (2010); Westgaard and Wijst (2001); Nyunja, (2011); Altman & Hotchkiss, (2006); Beaver (1966); Altman (1968); Frederikslust, (1978); Edmister (1972); Altman and Gritta, (1984); Gritta, (1982); Tam and Kiang (1992); Davalos, Gritta, &	Numerous theories such as Liquidity and Profitability Theory, Balance Sheet Decomposition Measure, Cash Management Theory, and Liquidity Risk Theory consider macroeconomic variables, imbalances between cash inflows and outflows, significant changes in balance sheets, or a combination of liquidity and profitability

Nos.	Area of Study	Literature Details	Gaps
7		Chow, (1999, 2000); Ohlson (1980), Santomero and Vinso (1977); Martin (1977)	factors. However, it is crucial to monitor whether the current year's profit or net cash flow is negative or falls below the level of debt obligations, leading to technical insolvency. While various studies delve into multiple theories on Financial Distress, considering profitability, liquidity, debts, and changes in balance sheet composition, the impact of financial and non-financial variables on airline cash flows has not been explored extensively. Further research in this direction would contribute to the understanding of the Liquid Asset theory. There is an urgent need for research, as no prior studies are available for

Nos.	Area of Study	Literature Details	Gaps
7			developing a distress prediction model using the Conditional Probability (LRA Approach) for a combination of financial and non-financial datasets. Such research would contribute significantly to enhancing our understanding of the intricate dynamics involved in predicting financial distress.

The commercial aviation industry operates within a unique and dynamic financial environment. Several key factors contribute to the inherent challenges airlines face in maintaining financial stability:

- Cyclical Demand Patterns: Passenger demand exhibits significant seasonality, leading to periods of both peak travel and reduced activity. This cyclical nature necessitates strategic capacity management to optimize revenue generation throughout the year.

- Intense Competitive Landscape: The aviation sector is intensely competitive on both domestic and foreign routes. Airlines constantly vie for market share, often leading to price pressures and erosion of profit margins.

- Susceptibility to External Disruptions: This industry is particularly susceptible to a range of external events, from natural disasters and geopolitical crises to global economic slumps. These unforeseen events can disrupt travel patterns and significantly impact airline profitability.

Despite these industry-specific challenges, extant financial distress prediction models for airlines often focus predominantly on financial data from the companies themselves. While financial ratios and metrics undoubtedly offer valuable insights, this exclusive reliance overlooks other critical factors that contribute to an airline's financial health. The literature review highlights the necessity for intensive research to identify region-specific causes of airline financial distress, thus considering a holistic view that extends beyond just financial considerations, also incorporating non-financial factors.

The dynamic and evolving Indian aviation sector necessitate targeted research to identify factors unique to the country that impact the financial performance of its airlines. While existing bankruptcy prediction models from Pilarski, Kroeze, etc. developed for Indian contexts, primarily rely on financial ratios, there's a critical gap in understanding the broader factors influencing airline health.

A more comprehensive approach to financial distress prediction in Indian aviation requires acknowledging both internal and external elements. This includes:

- Geopolitical and Regulatory Considerations: The impact of geopolitical tensions and evolving regulatory frameworks on airline profitability needs in-depth exploration.

- Socio-Political Factors: Examining the interplay of social and political factors, such as fuel pricing policies and government intervention, on airline financial health is crucial.

- Full-Service vs. Low-Cost Carriers: Developing accurate models require a nuanced understanding of the key factors affecting the financial vulnerabilities and strengths of full-service versus low-cost airlines.

Extensive research is paramount to comprehend the intricate interplay between civil aviation regulations, socio-political forces, and failures in India airline sector. The key to building more accurate financial distress prediction models lies in incorporating a broader range of variables alongside financial data. Generally, the financial ratios, which is considered as the mainstay of existing models, might not provide sufficient predictive power in the aviation sector. These ratios may struggle to anticipate airline failures well in advance, particularly when considering the dynamic nature of the industry.

Previous research in Indian aviation has primarily focused on adapting existing bankruptcy prediction models from other contexts. However, these models might not capture the unique challenges and dynamics of the Indian aviation industry. This highlights a critical gap in research: a lack of distress prediction models specifically designed for Indian carriers. There's a growing need for novel approaches like the Conditional Probability (LRA Approach) that integrate both financial and non-financial datasets. By incorporating a broader range of variables, these models can offer a more nuanced understanding of financial distress in Indian airlines.

While traditional financial distress theories often explore factors like profitability, liquidity, debt, and balance sheet structure to predict distress, the influence of these factors, combined with non-financial considerations, on airline cash flow is a relatively understudied area. A deeper exploration of this underexplored area could lead to a more nuanced understanding of how the Liquid Asset Theory applies to airlines. This knowledge can be instrumental in building next-generation financial

distress prediction models specifically tailored to the aviation sector, enabling more accurate assessments of airline vulnerability.

While established financial distress theories like Liquidity and Profitability, Cash Management, Balance Sheet Decomposition and Liquidity Risk offer valuable insights, they might not fully capture the nuances of the Indian aviation sector. These theories often focus on macroeconomic variables, cash flow imbalances, and major balance sheet shifts, which while important, may not provide a complete picture.

For Indian airlines, identifying technical insolvency requires a more nuanced approach than simply monitoring current year profits or net cash flow against debt obligations.

The current lack of a comprehensive financial distress prediction model specifically tailored to Indian air carriers creates significant challenges for airline leadership. Without such a model, proactive financial health assessments and monitoring become more difficult, potentially leading to unforeseen failures. The urgency to address this gap in knowledge is amplified by the intense competition within the Indian aviation market, further exacerbated by the unprecedented effect of COVID on air travel. Effective navigation of the challenges in the Indian aviation sector requires a clear identification of the domestic factors impacting profitability and cash flow.

A critical step towards a more secure future for Indian aviation lies in creating a reliable financial distress prediction model tailored specifically to the unique challenges faced by Indian carriers. This model should not only encompass key financial metrics, but also relevant non-financial variables, providing a more holistic and accurate assessment of an airline's risk of financial distress. By having access to such a model, airline management can make informed decisions,

implement proactive strategies, and navigate the complexities of the Indian aviation market with greater confidence.

2.3 Research Problem

A comprehensive investigation into the Indian aviation market's unique influence on airline financial performance is currently lacking in the academic literature.

Extant research on financial distress prediction for Indian airlines (Mahtani & Garg, 2020; Shome & Verma, 2020) primarily relies on a combination of financial data, operational metrics, and external factors as identified from some past researches by Kumar & Garg (2017) and Sengar et al. (2018). These studies often focus on either testing established bankruptcy prediction models or developing new ones using similar methodologies and a limited set of variables (Chow et al., 1991; Pilarski and Dinh, 1999; Gudmundsson, 2002; Silva et al., 2005; Prakash & Barua, 2016; Garg et al., 2016, 2017; Gupta et al., 2017).

The current focus on established models with limited variables may hinder a comprehensive understanding of how financial distress unfolds within the Indian aviation sector.

A critical area remains unexplored in research: the interplay between financial and non-financial factors affecting airline cash flow. This combined analysis is essential for developing early warning indicators of financial distress and preventing airlines from succumbing to technical insolvency.

Country specific financial distress predictor model has not been developed for Indian Carriers to avoid failures or insolvency and relationship between India specific significant factors impacting Airline's cash flow and financial distress has not been analyzed.

The current financial landscape for Indian airlines demands a paradigm shift in distress prediction. Existing models may not fully capture the unique challenges of this market.

To safeguard the future of Indian aviation, urgent research is needed to pinpoint the key financial and non-financial factors impacting the financial well-being of Indian carriers. This research should ultimately lead to the creation of a robust, India-specific model for predicting financial distress.

2.4 Research Questions

This research aims to develop an early warning system for the financial health of Indian carriers, enabling timely identification of potential financial distress. This initiative aims to benefit various stakeholders, including investors, financial institutions, suppliers, and shareholders. Furthermore, the research seeks to establish a robust framework for predicting the financial distress of Indian carriers, ultimately augmenting the efficacy of financial distress prediction.

By addressing the following research questions, this study aims to establish its core purpose:

RQ1 – What are the various significant factors impacting financial performance of Indian Carriers leading to financial distress?

RQ2 – What are the impact of identified factors on cash flows of Indian Carriers?

RQ3 – What is the relationship between the identified factors impacting cash flows and financial distress of Indian Carriers?

2.5 Research Objectives

This study seeks to accomplish the following key objectives:

RO1 – To identify the various significant factors impacting financial performance of Indian Carriers leading to financial distress

RO2 – To evaluate the impact of identified factors on cash flows of Indian Carriers

RO3 – To develop an Airline financial distress predictor model for Indian Aviation Industry in terms of relationship between the identified factors impacting cash flows and financial distress of Indian Carriers

2.6 Scope of the Research

The research scope shall be limited to:

- Indian scheduled air transport operators with a fleet size exceeding 5 aircraft.
- Identifying India-Specific Determinants of Financial Health in the Airline Industry.
- Constructing an India-Specific Financial Distress Prediction Model based on the identified significant factors impacting the financial performance of scheduled carriers in India.
- Conducting an online survey targeting industry experts and academic professionals in the airline sector.

The scope of the study will be confined to scheduled air transport operators in India due to data limitations for non-scheduled operators. Both Full-Service and Low-Cost Carriers with domestic or international operations in India will be considered based on recent literature reviews.

While existing research explores various financial distress theories, such as profitability, liquidity, debt, and balance sheet composition, this study takes a distinct approach. Our research seeks to shed light on the complex relationship between financial and non-financial factors, and their combined influence on airline cash flow. This shift in perspective aligns with the core tenets of the Liquid Asset theory, which emphasizes cash flow generation as a critical indicator of financial health. Leveraging this theory within the unique context of airlines, this research aspires to refine our comprehension of financial distress in this dynamic industry.

3 RESEARCH METHODOLOGY

A central pillar of this research is the robust research methodology designed to achieve accurate financial distress prediction for Indian carriers. To effectively answer the research questions mentioned earlier, this study implements a systematic, multi-stage research design. The fundamental steps of the Research Process are listed below:

- Problem Definition and Literature Review: The initial stage involves a clear articulation of the research problem, predicting financial distress in Indian airlines. The study involves an in-depth examination of past research through a comprehensive literature review. This involves exploring existing financial distress theories and assess their applicability to the aviation sector.

- Data Collection: The next stage focuses on gathering pertinent data from reliable sources. This analysis will utilize a strategically selected set of data points, including financial and non-financial variables, to gain insights into the financial health of Indian carriers.

- Data Analysis: Once collected, the data will be subjected to rigorous statistical analysis using appropriate techniques. This analysis will identify significant relationships between the chosen variables and their influence on airline financial performance.

- Model Development and Testing: Utilizing the insights gleaned from the data analysis, a financial distress prediction model specifically tailored to the Indian aviation market will be developed and rigorously tested.

- Conclusion and Contribution: Following the analysis and model testing, the research will culminate in well-supported conclusions and a discussion of the study's contribution to existing knowledge. This research is likely to lead to advancements in predicting airline financial distress, with a specific focus on developing models that are better suited to the Indian aviation market.

This chapter delves into the methodological framework crafted to address the core research objectives. As outlined earlier, these objectives are threefold:

- Identifying Key Drivers: Pinpointing the critical financial and non-financial determinants impacting the financial health of Indian carriers.

- Cash Flow and Distress: Assessing the combined influence of these factors on airline cash flows.

- A Predictive Model: Developing a robust financial distress prediction model tailored to the Indian aviation market.

To achieve these objectives, a comprehensive research design will be employed. This chapter will detail the following steps involved in this design:

- Research Design: The specific approach used to structure the research and gather data.

- Sampling Procedure: The method for selecting a representative sample of Indian carriers for analysis.

- Measurement and Instrumentation: The selection and application of appropriate tools to quantify and measure the chosen variables.

- Data Collection: The process of gathering the necessary financial and non-financial data from reliable sources.

- Data Analysis: The techniques used to analyze the collected data and identify significant relationships.

- Model Formulation and Validation: Model designing and testing for accuracy.

Research Classification

Research can be classified from various perspectives, and Kumar (1999) proposed a categorization based on three key viewpoints:

- Applications of the research study's findings
    - Pure Research: Conducted to enhance scientific knowledge without any immediate practical application.

    - Applied Research: Focused on solving specific real-world problems and has direct practical applications.

- Objectives of the study
    - Descriptive Research: This type of research typically describes the current state of a specific phenomenon or situation.

    - Exploratory Research: This helps to investigate research questions that lacks any in depth study in the past.

    - Correlational Research: Investigates relationships between two variables (or more) without the researcher controlling or manipulating any of them.

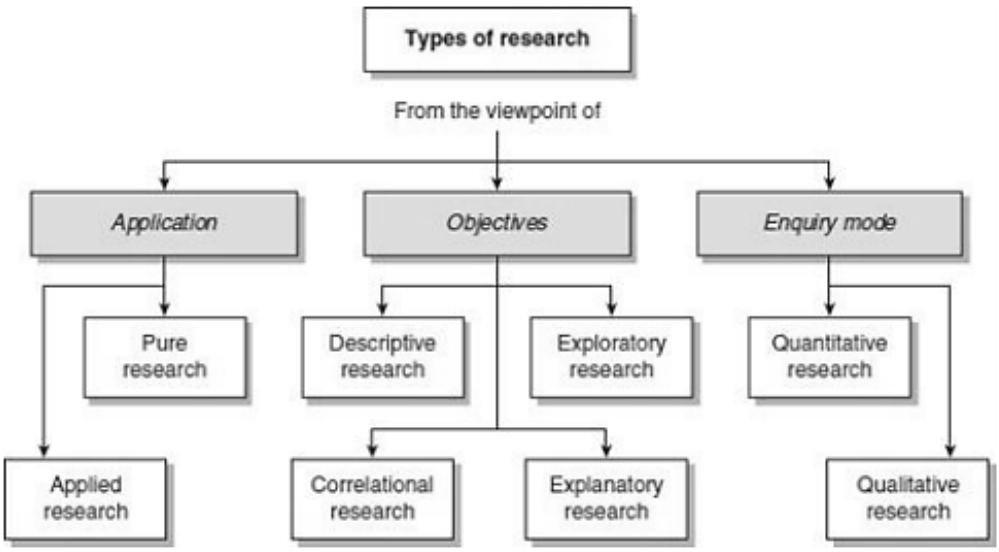
    - Explanatory Research: Aims to identify the reasons and relationships behind a specific occurrence.

- Mode of inquiry employed in conducting the study
    - Quantitative Research: This encompasses collection and analysis of numerical data for statistical interpretation.

    - Qualitative Research: Focuses on non-numerical data, exploring attitudes, opinions, and behaviors.

This categorization provides a useful framework for researchers to define the nature, scope, and goals of their research endeavors.

Figure 28: Types of Research



Source: *Research Methodology, Kumar (1999)*

3.1 Research Design

In this study, the research design combines both exploratory and analytical elements. The focus is on predicting the financial distress of Indian carriers through the identification and evaluation of significant factors affecting financial

performance. Factor analysis will be employed to assess these crucial factors, and subsequently, regression analysis will be utilized to gauge their impact on the carriers' financial performance.

Given the large volume of research data and variables obtained from diverse sources and literature, there is a need for further analysis to distill this information into significant factors. To achieve this, the perceptions of industry and academic professionals will be gathered using a "Likert 5 Point Scale," which constitutes Ordinal Data Form. The total scores or mean levels for all factors influencing airline financial performance will be identified.

To establish that the scale components are adequately inter-correlated and that the grouped items effectively measure the underlying variable, the Factor Analysis Technique is recommended by experts (Sullivan, 2013). Factor analysis serves multiple purposes, including data elimination, identification and explanation of information, data transformation, testing of hypothesis, exploration of relationships in new areas of interest, and mapping the construct. Factor analysis is particularly beneficial when dealing with numerous variables, allowing for the reduction of questionnaire items to a more manageable set, unveiling underlying concepts, and facilitating interpretations (Rummel, 1970).

Confirmatory factor analysis adds a quantitative evaluation of the factor structure's quality and further substantiates the validity of the new measure. Nevertheless, its application requires careful judgment, and a comprehensive and explicit reporting of confirmatory factor analyses is essential (Hinkin, 1998).

Principal component analysis (PCA) focuses on summarizing the relationships between multiple variables by condensing it into a smaller set of key variables that capture the significant variations in the original data. This approach often reveals

associations not previously considered, enabling interpretations that might not have surfaced otherwise. Principal component analysis serves as an intermediate step in more extensive investigations (Johnson, 2007).

The theoretical framework of Factor Analysis, leveraging Principal Component Analysis (PCA) for extraction, is deemed the most suitable technique for distilling a manageable set of relevant factors identified during the literature review, ensuring their relevance for airline financial distress prediction.

Prediction Model Design

Review of the literature reveals four main approaches used to develop financial distress prediction models: univariate analysis, discriminant analysis, conditional probability and neural networks. This section will delve into each approach to understand their strengths and limitations.

Univariate analysis represents a fundamental approach that examines the individual predictive power of various financial ratios. Beaver (1966) exemplifies this approach in his study of 79 industrial firms over five years. He compared failed and non-failed firms based on industry and asset size. This comparative analysis involved three key steps:

- Comparison of Means: This step revealed significant differences in key ratios between the two groups, highlighting potential indicators of financial distress.

- Dichotomous Classification: Ratios were assigned cut-off points to categorize firms as likely to fail or not fail.

- Likelihood Ratio Analysis: This analysis identified the cash flow to total debt ratio as the most effective predictor, demonstrating the lowest error rate in classifying firms within the sample.

While Beaver's (1966) univariate approach using individual ratios achieved promising results, it had a key limitation. Focusing on a single ratio at a time could lead to conflicting classifications for a firm, depending on the specific ratios examined. Recognizing this limitation, Altman (1968) argued that a firm's financial health is multifaceted and a single ratio is insufficient for a comprehensive assessment. To address this, he championed a multivariate approach, paving the way for the widespread use of discriminant analysis (DA) in financial distress prediction research.

Unlike univariate analysis, discriminant analysis incorporates multiple financial ratios simultaneously. This method utilizes a linear discriminant function to analyze these combined variables. This function acts as a financial fitness calculator. It combines individual financial ratios into a single z-score. This score acts as a benchmark to classify companies (typically "failed" or "non-failed") based on pre-determined cut-off point (Frederikslust, 1978). By considering multiple ratios simultaneously, discriminant analysis offers a more comprehensive assessment of a firm's financial health compared to univariate approaches

Altman did some important research in the 1960s using a special method (Discriminant Analysis) to look at 33 companies that went bankrupt in the US between 1946 and 1965. While the model achieved a remarkable 95% accuracy in predicting bankruptcy one year in advance but this success rate significantly declined to 72% in the second year and concerningly dipped to just 48% in the third year, approaching random chance.

Research following Beaver (1966) and Altman (1968) aimed to continuously improve upon their foundational models. For instance, Edmister (1972) tackled the challenge of bias introduced by highly correlated variables within these models. His approach involved eliminating such redundant variables. By focusing solely on ratios identified as statistically significant predictors of bankruptcy in prior studies,

Edmister was able to develop a more streamlined seven-variable discriminant function. This refined model achieved an impressive overall error rate of just 7% in predicting bankruptcy within the first year.

The 1980s witnessed a surge in applying financial distress prediction models to the airline industry. Pioneering studies by Altman and Gritta (1984) and Gritta (1982) utilized Discriminant Analysis (DA), a well-established technique. One study developed a new model specific to airlines, while the other adapted the existing Altman ZETA model for this sector.

As research progressed, scholars began exploring alternative prediction techniques beyond DA. As a next alternative Neural Networks (NN), inspired by the intricate architecture of the human brain, emerged as a promising option. Tam and Kiang (1992) were among the first to apply NN models to predicting bank failures, achieving good results for one and two years in advance. However, unlike many other studies, their model wasn't tested on data exceeding three years before failure, limiting its long-term predictive power.

Building on the potential of Neural Networks (NN), researchers like Davalos et al. (1999) and Gritta et al. (2000) developed NN models specifically for predicting airline distress. While both models displayed encouraging performance in predicting bankruptcy one year in advance, some limitations require further exploration.

The model designed for smaller carriers by Gritta et al. (2000) lacked testing on data from two or three years prior to bankruptcy. This limitation restricts its generalizability and makes comparisons with models using different methodologies more challenging. Ideally, a robust model should be tested on data from various timeframes to assess its long-term predictive power.

While Neural Networks (NN) offer advantages in addressing certain methodological issues, their predictive capabilities haven't yet surpassed established approaches like Logistic Regression Analysis (LRA) or Multivariate Discriminant Analysis (MDA) with respect to financial distress prediction.

For this study, interpretability and comparability of the model has been prioritized. Logistic Regression offers a clear advantage in these areas compared to Neural Networks. Therefore, LRA method has been utilized with a conditional probability approach to develop the distress prediction model for Indian carriers.

Airlines can benefit from financial distress prediction using conditional probability models like Probit, Logit and Logistic Regression. These models estimate the likelihood of an airline going bankrupt. They achieve this by using coefficients assigned to various independent variables (financial ratios, market factors, etc.) to ultimately predicting the probability of an airline falling into one of two categories: distressed or non-distressed.

To ensure these probabilities fall within the expected range of possibilities (between 0 and 1), the models rely on cumulative probability distributions. This mathematical framework translates the raw calculations into a clear probability score.

Pioneering research by Martin (1977), Santomero and Vinso (1977) and Ohlson (1980), exemplifies the early applications of these probabilistic methods for predicting financial distress.

Logistic Regression (LRA) offers distinct advantages over other models for our purposes in predicting airline financial distress. Here's why LRA is the optimal choice for this study:

- Interpretability: Unlike some models (e.g., Neural Networks), LRA allows us to understand how changes in individual financial ratios (independent variables) impact the predicted probability of airline distress (dependent variable). This interpretability is crucial for drawing meaningful insights from the model.

- Distribution-Free Advantage: Unlike Discriminant Analysis (DA), Logistic Regression Analysis (LRA) is a more flexible approach as it doesn't constrain the data to follow a specific distribution. This flexibility is beneficial when dealing with financial data that might not perfectly conform to specific statistical distributions.

- Reliable Performance: Research by Aziz and Dar (2006) confirms the dependability of LRA models in bankruptcy prediction. Their findings highlight the stability of LRA and its ability to minimize errors in classification (both Type 1 and Type 2 errors).

Given these combined strengths, Logistic Regression emerges as the most suitable statistical technique for developing our airline financial distress prediction model.

3.2 Theoretical Framework

A) **Objective 1** - To lay a solid foundation for the research, an in-depth review of existing literature was undertaken. This comprehensive literature review aimed to create a well-rounded understanding of the factors impacting corporate financial performance. To gauge the effectiveness of the research, a pilot questionnaire was administered to experts from the Airlines Industry and Academicians, with a particular focus on factors unique to the Airlines Industry. Following a pilot study to ensure clarity and effectiveness, a

comprehensive questionnaire was distributed among various stakeholders. This survey aimed to gather their perceptions on the key factors impacting airline financial performance. Utilizing a Likert 5 Point Scale, the survey responses were collected and analyzed.

To gain insights into the critical factors influencing the financial health of Indian carriers, factor analysis was employed. This approach leveraged the diverse perspectives of various stakeholders by analyzing their opinions on relevant attributes. Statistical tools, including Exploratory Factor Analysis (EFA) and Principal Component Analysis (PCA), were then used to identify the most significant factors contributing to airline financial health. PCA aided in simplifying the investigation of numerous relationships between these variables. The identified significant factors from the factor analysis constituted the basis for further model development. To quantitatively assess the identified factor structure and strengthen the validity of the newly developed measure, Confirmatory Factor Analysis (CFA) was subsequently conducted. This statistical technique provides robust evidence regarding the quality of the factor model.

B) **Objective 2** – The factors identified as significant in achieving the first research objective were utilized to evaluate their impact on the cash flows of Indian carriers through Regression Analysis. Drawing on the findings of Mahtani and Garg (2020), it is asserted that a logistic regression model incorporating performance, operating, and financial factors exhibits greater accuracy in assessing financial distress for Indian airlines compared to models exclusively comprising financial factors.

Following formula was used for this part of the study:

$Y_i = f(X_i, \beta) + e_i$

where,

Y_i = dependent variable (Cash Flow)

f = function

X_i = independent variable (Financial and Non-Financial factors)

β = unknown parameters

e_i = error terms

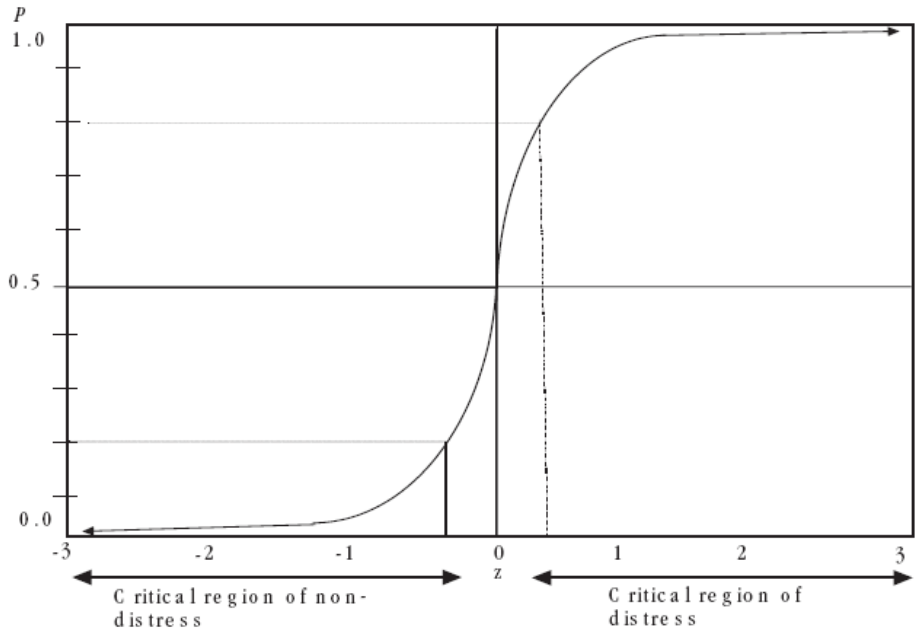
C) **Objective 3** – This research develops a novel financial distress prediction model designed specifically for the unique characteristics of the Indian aviation industry. The model aims to elucidate the connections between key factors impacting airline cash flows and the financial health of Indian carriers.

The financial distress prediction model for Indian airlines will be constructed upon a robust foundation of data acquisition and statistical analysis. A comprehensive dataset encompassing both financial and non-financial variables relevant to the Indian scheduled airline industry will be curated. This data will be meticulously compiled from reliable sources to ensure its accuracy and completeness.

Logistic Regression Analysis (LRA), a statistical method based on conditional probability, will be employed to develop the prediction model. This selection aligns with the established body of research, as evidenced by Collins and Green (1982) who advocate for LRA's theoretical superiority in bankruptcy prediction compared to Multiple Discriminant Analysis (MDA). A key advantage of LRA lies in its utilization of the logistic cumulative distribution function. This function generates an S-shaped curve (sigmoid curve) that inherently captures the concept of a threshold, a critical element differentiating a distressed carrier with a non-distressed carrier.

This study capitalizes on a rich dataset and the established Logistic Regression Analysis (LRA) methodology to construct a dependable and insightful model for predicting financial distress among Indian scheduled carriers.

Figure 29: Sigmoid Probability Curve



The S-shaped curve (sigmoid curve) depicted above is an important aspect of the financial distress prediction model. This visually represents a relationship between the predicted probability of failure (p) and a specific financial ratio or variable.

Lower Segment (p = 0 to p = 0.2): In this region, the probability score (p) is very low (between 0 and 0.2). This indicates a near negligible likelihood of an airline experiencing financial distress.

Ascending Segment (p = 0.2 to p = 0.5): The probability of failure sharply rises as the score climbs along the steeper section of the curve, particularly

between 0.2 and 0.5. This is the critical zone where airlines transition from a low to a moderate risk of distress.

Upper Segment (p = 0.8 to p = 1): In the upper segment of the curve (between 0.8 and 1), the probability of failure shows a limited rise. Here, airlines are already classified as having a high risk of distress.

Therefore, the critical juncture for identifying potential financial distress lies somewhere in the middle of the ascending segment of the S-shaped curve, typically around a probability of $p \approx 0.5$. This score threshold on the model signifies a critical juncture, where an airline transitions from a moderate risk of failure to a high-risk category.

In Logistic Regression Analysis, the model doesn't directly predict probabilities. Instead, it generates a Z value that represents a linear combination of the independent variables (financial ratios, etc.) you included in the model. This linear combination essentially captures the combined influence of these variables on the predicted outcome (financial distress in this case). However, the Z value itself isn't a probability. To translate this value into a meaningful probability score (between 0 and 1), we utilize a separate function called the probability function. This function transforms the Z score into a probability that reflects the likelihood of an airline experiencing financial distress.

$$p\,(\text{failure}) = 1 / (1 + e^{-z})$$

Where,

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots + \beta_n X_n$$

And,

X_n = independent variables (factors impacting financial performance of Indian carriers)

e = a mathematical constant and its value is ~2.718 (the base of the natural logarithms).

The model will use a logistic regression method and derive the values of the coefficients (β_0, β_1, β_2,…, β_n), for each of the independent variables (both financial and non-financial).

3.3 Source of Data

The various sources of data to be utilized for conducting this study are classified under two major categories:

- Primary Data
- Secondary Data

3.3.1 Primary Data

The primary data for this study was sourced from:

- Indian Airline Managers (Air India Ltd., Air India Express, Indigo, SpiceJet, Vistara, Go First, AirAsia India)
- Aviation Consultants (like CAPA, etc.)
- Airline Subject Matter Experts
- Finance Consultants
- Academic Researchers on Indian Aviation

3.3.2 Secondary Data

Typical secondary data like annual financial reports, performance metrics, economic reports, etc. has been collected from:

- Director General of Civil Aviation (DGCA) Database & Annual Reports
- MoCA (Ministry of Civil Aviation) Reports
- IATA (International Air Transport Association) Economics Reports
- Center for Asia Pacific Aviation (CAPA) Reports
- Airline Annual Financial Reports & Investor Presentations
- Other Research Journal / Research Papers / Articles

3.4 Sampling

Sampling is a crucial aspect of the study, serving to determine the size of the population involved in the Indian Aviation business. Given the extensive nature of this population, it is impractical to collect data directly from all members. Therefore, the study targets a subset of individuals engaged in managing various aspects of airline operations, finance, policy-making, strategy development, or providing consulting services to Indian carriers.

To address the specific requirements and characteristics of this unique population, the research employed a judgmental sampling technique. The Expert Judgmental sampling technique was specifically utilized during the initial questionnaire phase to ensure an informed and targeted selection of participants.

In research, the number of participants, or sample size, significantly impacts the credibility and applicability of the findings to a broader population. Studies with a larger sample size provide more reliable estimates because they are less likely to be skewed by chance. This is because sampling error, the difference between the sample and the population, is reduced with a bigger sample.

Structural Equation Modeling (SEM) analyzes relationships between variables. Unlike some statistical techniques, the number of participants needed (sample size) in an SEM study can vary based on the specific model being used. Established research by Bentler and Chou (1987) suggests a ratio of ten responses per freely estimated parameter for measurement models to achieve reliable parameter estimates.

While there are no universally accepted sample size requirements for questionnaire-based studies, some general guidelines exist. For example, researchers may recommend a minimum of ten participants per item when developing a new survey instrument. This number may be increased to fifteen per item if the data is expected to be particularly volatile or complex.

Previous research suggests that with certain characteristics, such as high correlations among variables (> .60) and factors defined by multiple survey items, a smaller sample size might be adequate. One factor influencing sample size requirements is the strength of relationships between variables. Studies by Guadagnoli and Velicer (1988) suggest that fewer participants might be needed when correlations are high (above .80). Similarly, Sapnas and Zeller (2002) found that even a sample size of 50 could be sufficient for certain factor analysis applications within SEM.

Unlike some quantitative research methods, questionnaire surveys generally lack strict rules regarding the number of distributed surveys. The primary goal of this study was to acquire a comprehensive range of insights from professionals with expertise in the Indian aviation industry. This included individuals directly working for airlines as well as those whose work is connected to the industry. Therefore, questionnaires were distributed to a sampling frame encompassing all known professionals within the sector. This strategy was employed to ensure the data collected accurately reflects the broader population of interest in the aviation

industry. This, in turn, strengthens the ability to generalize the research findings to a wider audience.

A pilot study was conducted to assess the efficacy of the survey instrument, utilizing a sample of 10 airline industry experts. The main survey questionnaire targets a broader sample of 628 respondents, designed to achieve a 95% confidence level with a +/- 5% confidence interval. This sample is strategically segmented to include representatives from airline operations, the broader aviation industry, and academic experts.

3.5 Statistical Tools

This study commenced with a thorough exploratory analysis of the data. This initial phase employed a range of descriptive statistics, which are fundamental tools for summarizing and characterizing a dataset. By using these measures, we gain crucial understanding of the data's central tendencies (like average or mean) and how spread out the data points are (like standard deviation). By calculating and analysing these descriptive statistics, we gain a foundational understanding of the data's overall characteristics and any potential trends or patterns. This initial exploration serves as a springboard for further analysis using more sophisticated econometric tools.

To fulfil the research goals, this study will employ Exploratory Factor Analysis (EFA) to uncover underlying factors within the data. Subsequently, Regression Analysis will be utilized to examine the relationships between these factors and the variables of interest. These methods will be instrumental in (a) identifying significant factors influencing the financial performance of Indian carriers and (b) assessing the impact and constructing models for financial distress prediction. To quantitatively assess the validity and appropriateness of the factors identified earlier, a confirmatory factor analysis will be subsequently conducted.

To build a model for predicting airline financial distress, this research employed Logistic Regression, a form of conditional probability modelling. This choice aligns perfectly with the study's objective of developing a predictive model. Logistic Regression excels at estimating the likelihood of a binary outcome, such as an airline either experiencing financial distress or not.

4 DATA ANALYSIS AND INTERPRETATION

A core objective of any company is to achieve sustainable financial performance, which ultimately contributes to maximizing shareholder wealth. This study commenced with a comprehensive review of the literature to identify the key factors influencing a firm's financial well-being.

Identifying the most relevant survey variables is a key step in developing an accurate financial distress prediction model. To ensure the selected variables comprehensively capture the factors influencing airline financial health, we employed a multi-pronged approach. This approach included:

- Reviewing existing academic literature to identify variables with a well-established track record of impacting airline financial performance.

- Incorporating valuable insights from industry professionals to ensure the variables accurately reflect the real-world challenges faced by Indian carriers.

- Prioritizing variables recognized for their effectiveness in predicting financial distress within the airline sector.

Table 8: List of Variables Studied for Identification of Significant Factors

Operational	Performance	Finance
On-Time Performance	Passenger Yield	Working Capital/Total Assets
Cancellation Rate	Revenue Passenger Kilometres (RPK)	Current Assets/Current Liabilities
Aircraft Equipment Type	Available Seat Kilometres (ASK)	Total Liabilities/Total Assets
Passenger Load Factor	Revenue per ASK (RASK)	Book Value of Equity/Total Liabilities
Average Seat Capacity	Cost per ASK (CASK)	Retained Earnings/Total Assets
Number of Employees per Aircraft	Revenue Tonne Kilometres (RTK)	Operation Profit (EBIT)/Total Assets
Average Fleet Age	Cost per ASK ex Fuel	Total Sales/Total Assets
Aircraft Utilization		Operating Revenues/Total Assets
Irregularity Ratio		Cash to Cash Cycle
International Operations		Cost/Employee
		Revenue/Employee
Economic	**Market**	**Govt./Political/Regulatory/Safety**
Gross Domestic Product	Number of Competitors	Bilateral Agreements
ATF Price	Market Share	Aviation Policies
Corporate Tax Rate	Industry Growth Rate	FDI %
Aviation Fuel Tax % per Litre	Passenger Traffic Growth Rate	Tourism Policies
Inflation	Mergers & Acquisition	Political Influence
Foreign Exchange Rate	Alternate Source of Transport	Aviation Infrastructure Investments
		Pandemic
		Safety Disruptions

4.1 Pilot Study & Questionnaire Development

A questionnaire was subjected to a pilot study involving Airlines Industry experts and Academicians to evaluate effectiveness of the survey questionnaire. For the pilot study, a sample size of 10 respondents (Airline Experts) was utilized. To ensure relevance to the airline industry, this pilot study incorporated industry-specific factors. The insights gained from this pilot study shaped the final questionnaire administered to a broader audience.

4.1.1 Pilot Study - Findings

Findings from pilot study and revisions to the questions from pilot study are summarized below:

Question 1: Operational variables impacting the financial performance of Indian carriers.

Expert Comments: Participants selected the following operational variables which will impact the financial performance of Indian carriers and rejected the rest

- *Selected - On-Time Performance, Cancellation Rate, Aircraft Utilization, Passenger Load Factor, Average Seat Capacity, Number of Employees per Aircraft, Average Fleet Age, Aircraft Equipment Type, Irregularity Ratio and International Operations*
- *Eliminated - Block Time Performance, Satisfied Passenger Quota, Number of Aircraft on Ground (AOGs), Average Pax Carried Per Departure*

Action - Eliminated variables were excluded from the questionnaire

Question 2: Performance variables impacting the financial performance of Indian carriers.

Expert Comments: Participants selected the following performance variables which will impact the financial performance of Indian carriers and rejected the rest.

- *Selected - Passenger Yield, Revenue Passenger Kilometers (RPK), Available Seat Kilometers (ASK), Revenue per ASK (RASK), Cost per ASK (CASK), Revenue Tonne Kilometers (RTK) and Cost per ASK ex Fuel*
- *Eliminated - Profitability Per Flight, Profitability Ratio, Total Revenue per ASK, Passenger Revenue per ASK, Labor Cost per ASK, Fuel Consumption per Passenger Kilometers and Cargo Tonne Kilometers (CTK)*

Action - Eliminated variables were excluded from the questionnaire

Question 3: Economic variables impacting the financial performance of Indian carriers.

Expert Comments: Participants selected the following Economic variables which will impact the financial performance of Indian carriers and rejected the rest.

- *Selected - Gross Domestic Product, ATF Price, Corporate Tax Rate, Aviation Fuel Tax % per Liter, Inflation and Foreign Exchange Rate*
- *Eliminated – Per Capita Income, Interest Rate, Real Gross Domestic Product, Disposable Income, Credit Rating*

Action - Eliminated variables were excluded from the questionnaire

Question 4: Financial variables impacting the financial performance of Indian carriers.

Expert Comments: Participants selected the following financial variables which will impact the financial performance of Indian carriers and rejected the rest.

- *Selected - Working Capital/Total Assets, Current Assets/Current Liabilities, Total Liabilities/Total Assets, Book Value of Equity/Total Liabilities, Retained Earnings/Total Assets, Operation Profit (EBIT)/Total Assets, Total Sales/Total Assets, Operating Revenues/Total Assets, Cash to Cash Cycle, Cost/Employee and Revenue/Employee*
- *Eliminated – Net Income/Average, Total Assets, Net Income/Shareholders' Equity, Market Value of Equity by Book Value of Debt, Earnings per Share, Days Payable Outstanding, Days Sales Outstanding and Days Inventory Outstanding*

Action - Eliminated variables were excluded from the questionnaire

Question 5: Market related variables impacting the financial performance of Indian carriers.

Expert Comments: Participants selected the following market related variables which will impact the financial performance of Indian carriers and rejected the rest.

- *Selected - Number of Competitors, Market Share, Industry Growth Rate, Passenger Traffic Growth Rate, Mergers & Acquisition, Alternate Source of Transport*
- *Eliminated – Market Size, Slot Availability, Airport Capacities and Expat Skilled Resources*

Action - Eliminated variables were excluded from the questionnaire

Question 6: Govt/Political/Regulatory/Safety variables impacting the financial performance of Indian carriers.

Expert Comments: Participants selected the following Govt/Political/Regulatory variables which will impact the financial performance of Indian carriers and rejected the rest.

- *Selected - Bilateral Agreements with Other Countries, Aviation Policies, FDI %, Tourism Policies, Pandemic, Safety Disruptions, Political Influence and Aviation Infrastructure Investments*
- *Eliminated – Political Stability, Environmental Policies, Natural Calamity, Act of Terrorism, Population Growth Rate, Technology & Innovation Advancement, Consumer Behavior, Weather Conditions, Climate Change and Legal Environment*

Action - Eliminated variables were excluded from the questionnaire

4.1.2 Questionnaire Development & Survey Administration

Based on this pilot study feedback from the industry experts, the questionnaire was fine tuned for seeking response from individuals engaged in managing various aspects of airline operations, finance, policy-making, strategy development, or providing consulting services to Indian carriers. To ensure robust and representative data collection, the study utilized a multi-modal approach. A survey was administered to a strategically selected sample of 628 respondents. This sample

size was carefully chosen to achieve a 95% confidence level with a +/- 5% confidence interval, ensuring the results can be confidently generalized to the target population. The primary method of data collection involved in-person administration of the survey. This method allows researchers to clarify any ambiguities and ensure comprehension of the questions. However, to enhance participant accessibility and cater to diverse preferences, the study also offered email and phone options for survey completion.

The survey questionnaire comprised mainly of closed ended questions designed to elicit firm responses, utilizing a five-point ordinal scale (Likert 5 Point Scale): 1 = strongly disagreed, 2 = disagreed, 3 = neutral, 4 = agreed, and 5 = strongly agreed. Weaknesses identified during the pilot survey were addressed.

To ensure the accuracy of survey findings, reliability of the survey results was evaluated using Cronbach's alpha. This test yielded a score of 0.814, indicating a high level of internal consistency. In simpler terms, the survey questions consistently measured the intended concept. A score above 0.70 is generally considered good, and the result of this study surpasses that benchmark. The robust reliability score enhances the confidence in the consistency and dependability of the study's measurements.

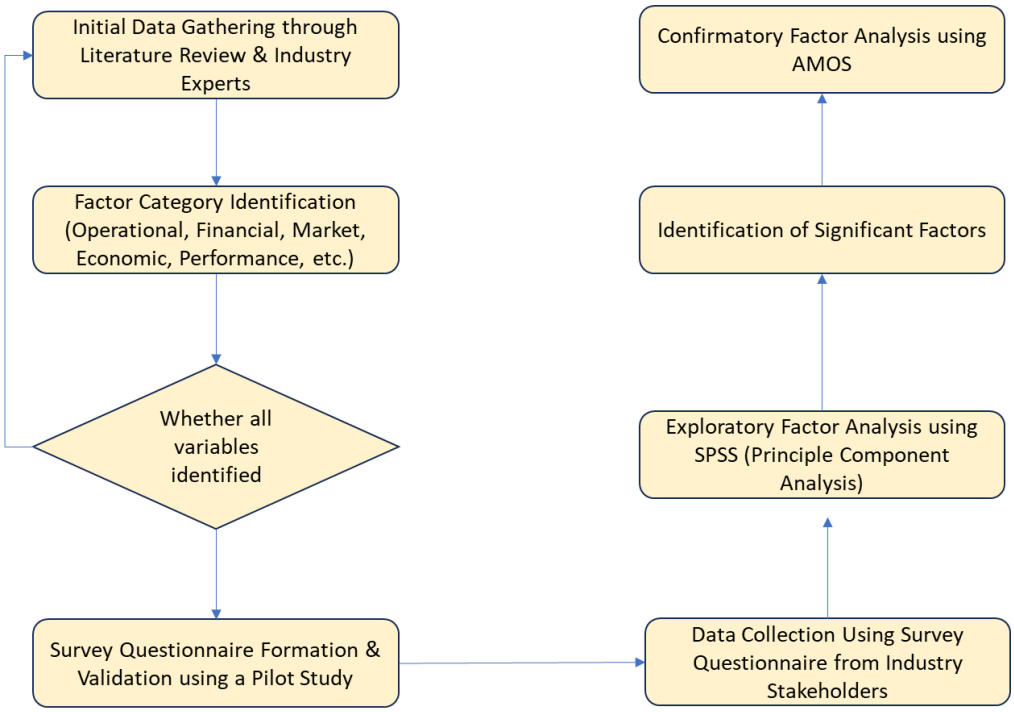
4.2 Identification of Significant Factors impacting Financial Performance – Findings & Analysis

Research Question & Objective 1

RQ1 – What are the various significant factors impacting financial performance of Indian Carriers leading to financial distress?

RO1 – To identify the various significant factors impacting financial performance of Indian Carriers leading to financial distress.

Figure 30: Research Objective 1 – Research Flow



4.2.1 Preliminary Analysis

This study incorporates factor analysis, a well-established statistical technique, to investigate the interrelationships among the various survey variables employed (Malhotra & Dash, 2009). Factor analysis offers significant benefits within this research context:

- Dimensionality Reduction: This technique simplifies complex data by condensing a potentially large set of variables into a smaller number of underlying factors (latent factors), capturing most of the variation within the data.

- Identification of Key Factors: By analysing the extracted factors, we can pinpoint the most critical underlying dimensions influencing the financial performance of Indian carriers, ultimately contributing to potential financial distress.

This study specifically utilizes Principal Component Analysis (PCA), a well-regarded variant of factor analysis. PCA excels at efficiently identifying a minimum set of factors that capture the most significant variation within the data. This makes it ideal for situations where data reduction and identifying core underlying patterns are priorities. Given the research objective of uncovering the factors with the most significant explanatory power for variables affecting financial performance, PCA serves as the optimal methodological choice. Prior to employing factor analysis, a rigorous assessment was performed to determine the data's appropriateness for this technique using two specific tests - Bartlett's test of Sphericity and Kaiser–Meyer–Olkin (KMO) measure.

This statistical test assesses the null hypothesis that the variables within the target population exhibit no linear correlation. In simpler terms, if the null hypothesis were true, the correlation matrix for the entire population would be an identity matrix. An identity matrix has 1's along the diagonal (representing perfect correlation between a variable and itself) and 0's everywhere else (representing no correlation between different variables). By statistically assessing the likelihood of observing an identity matrix, Bartlett's Test helps determine if enough inter-relationships exist among the variables to warrant factor analysis. Kaiser-Meyer-Olkin (KMO) measure provides a quantitative index to evaluate the sampling adequacy for factor analysis. Higher KMO values (typically ranging from 0.5 to 1.0) indicate a greater suitability for factor analysis. These results suggest that the sampling method was successful in gathering data that reflects the key underlying patterns. This paves the way for factor analysis to extract meaningful factors.

The Kaiser-Meyer-Olkin (KMO) statistic (ranging from .796 to .836) and Bartlett's test of sphericity support the adequacy of our sample for factor analysis (Field, 2018). These values surpass the commonly recommended threshold of 0.5, indicating that the sampling method successfully captured the underlying structures within the data, facilitating the extraction of meaningful factors.

Furthermore, Bartlett's test of sphericity yields a significance level below 0.05. The test statistically rejects the null hypothesis, which posits that there is no correlation between the variables. This suggests that the variables exhibit statistically significant inter-relationships, a key requirement for meaningful factor analysis.

By meeting these criteria, the data demonstrates strong suitability for factor analysis, allowing us to proceed with confidence in extracting relevant factors that impact the airline's financial well-being.

Table 9: KMO and Bartlett's Test

		Operational	Performance	Economic	Finance	Market	Govt./ Political/ Regulatory/Safety
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.806	.821	.798	.836	.796	.811
Bartlett's Test of Sphericity	Approx. Chi-Square	263.926	275.033	75.912	890.131	111.264	261.010
	df	45	21	15	55	15	28
	Sig.	<.001	<.001	<.001	<.001	<.001	<.001

4.2.2 Factor Extraction

Understanding factor loadings is crucial when interpreting the results of factor analysis. As Kline (1996) defines them, factor loadings represent the strength of the correlation between a variable and the underlying factor it's linked to. In simpler terms, variables with higher factor loadings have a stronger association with a particular factor, making them more informative in explaining that factor.

Guadagnoli and Velicer (1998) proposed criteria for evaluating factor reliability, considering both sample size and factor loadings. Their research suggests that factors with at least four loadings exceeding 0.6 can be considered reliable, even for studies with modest sample sizes. Additionally, for studies with a sample size

exceeding 150, factors with ten or more loadings surpassing 0.40 are also considered reliable.

In the present study, the sample size exceeds 300, which allows to leverage a 0.40 factor loading threshold for reliable factor extraction. This selection aligns with the established criteria by Guadagnoli and Velicer (1998) and ensures factors are identified with a strong influence on the variables within the model.

The determination of the number of factors extracted is guided by achieving a cumulative percentage of variance extracted by the factors that is deemed satisfactory, accounting for at least 60% of the variance. In line with Malhotra and Dash's (2009) recommendation, when using the percentage of variance method for factor analysis, the extracted factors should ideally explain at least 60% of the total variance in the data. The cumulative percentage of variance refers to the sum of explained variance captured by all the extracted factors. The number of factors to be extracted were determined by considering both eigenvalues and the explained variance. In both analyses, factors with eigenvalues exceeding 1 were chosen. These factors collectively account for nearly 60% of the total variance in the data, indicating they capture the most significant underlying patterns

4.2.3 Factor Rotation

Following factor analysis, a key step involves factor rotation. As noted by Kline (1996), rotation can lead to a situation where variables have strong loadings on a single factor, reducing the need to interpret multiple, potentially overlapping factors. This simplifies the overall analysis.

There are two primary approaches to consider factor rotation:

- Orthogonal Rotation: This approach, exemplified by Varimax, Quartimax, and Equamax, ensures that the extracted factors remain uncorrelated with

each other. This characteristic simplifies the interpretation of each factor because its influence on the variables is distinct from the influence of other factors.

- Oblique Rotation: In contrast, methods like Direct Oblimin and Promax allow factors to be correlated. While potentially more realistic, oblique rotations can lead to more complex interpretations due to the interconnectedness of the factors.

In this study, initial solutions were explored using oblique rotation techniques. However, the analysis revealed minimal correlation among the extracted factors. Therefore, to maximize interpretability and clarity, I have opted for Varimax rotation, an orthogonal method. This choice aligns with the principle of maintaining distinct and non-overlapping influences for each factor, ultimately facilitating a more straightforward understanding of the underlying financial performance dimensions affecting Indian carriers.

Factor Analysis Result

The factor analysis yielded nine factors, each explaining a significant portion of the variance in the data (having an eigenvalue greater than 1.0). As shown in Table 10, the factors group the original variables into meaningful categories:

- Operational Factors: Six out of ten operational variables loaded onto two factors, indicating these factors capture the key operational influences on financial performance.

- Performance Metrics: Five out of seven performance variables formed a single factor, suggesting a unified underlying dimension for performance.

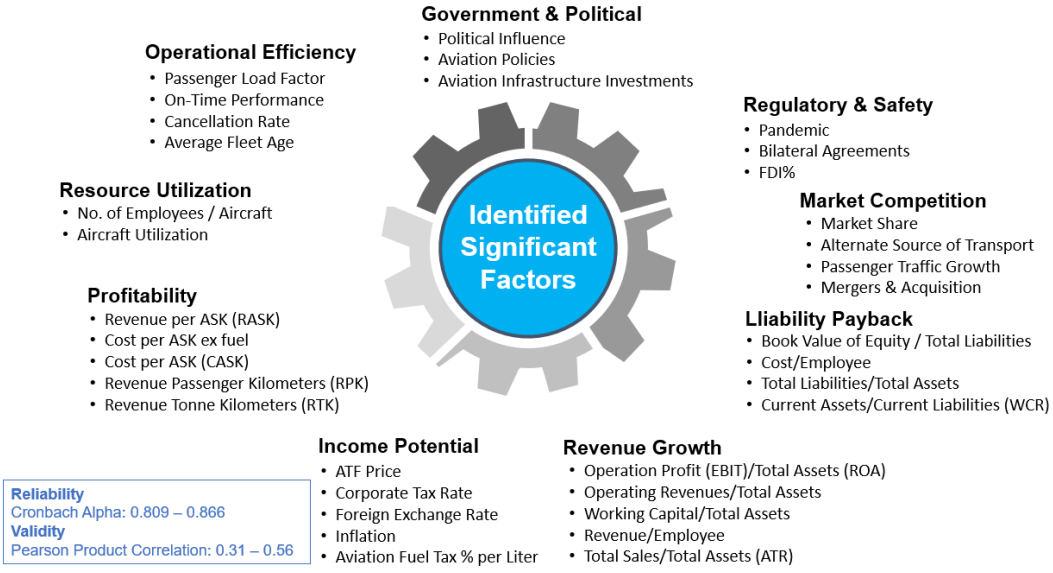
- Economic Conditions: Five out of six economic variables were loaded onto one factor.

- Financial Conditions: Nine out of 11 financial variables jointly loaded onto two factors, highlighting the impact on financial health.

- Market Dynamics: Four out of six market variables loaded onto one factor, representing a distinct market influence on performance.

- Government/Political/Regulatory/Safety Environment: Six out of eight variables from this category loaded onto two factors, suggesting a complex interplay between these regulatory forces.

Figure 31: Significant Factors Extracted from Exploratory Factor Analysis



The factor analysis in this study involved 35 variables (Figure 31) related to various aspects of airline performance, operational efficiency, economic conditions, and industry-specific factors. Here is a summary of the variables considered:

- On-Time Performance: Percentage of flights operating within a specified time window.

- Cancellation Rate: Percentage of scheduled flights canceled by the airline.

- Passenger Load Factor (PLF): This is a critical metric used in the airline industry to gauge capacity utilization. It's calculated as the ratio of Revenue Passenger Kilometers (RPK) to Available Seat Kilometers (ASK). A higher PLF indicates better efficiency in using the airline's seat capacity.

- Average Fleet Age: This metric reflects the average age of an airline's entire fleet of aircraft. A younger fleet can offer advantages in terms of fuel efficiency, maintenance costs, and passenger comfort.

- Employee-to-Aircraft Ratio: This metric expresses the number of employees per aircraft in an airline. It can be used to assess staffing levels relative to fleet size and potentially indicate labor productivity.

- Aircraft Utilization: This metric reflects the average number of flight hours an aircraft operates per day or month. Higher utilization implies efficient use of the airline's resources.

- Revenue per Available Seat Kilometer (RASK): This metric is a key indicator of an airline's ability to translate seat capacity into revenue. It's calculated by dividing total passenger revenue by Available Seat Kilometers (ASK). A higher RASK suggests the airline is effectively pricing tickets and managing capacity to maximize revenue.

- Cost per Available Seat Kilometer excluding Fuel (CASK-Ex Fuel): This metric reflects the average cost incurred (excluding fuel expenses) per

available seat kilometer. It captures expenses associated with crew, maintenance, and other operational aspects, and helps assess operational efficiency aside from fuel costs.

- Cost per Available Seat Kilometer (CASK): This metric is crucial for evaluating an airline's overall cost efficiency. It reflects the total cost incurred per available seat kilometer flown, encompassing all operational expenses including fuel. A lower CASK indicates the airline is effectively managing its expenses relative to seat capacity.

- Revenue Passenger Kilometers (RPK): This metric is a key indicator of an airline's traffic volume. It represents the total distance traveled by all revenue-generating passengers. It's calculated by multiplying the number of paying passengers by the distance traveled. A higher RPK signifies a busier airline with increased passenger traffic, translating to greater revenue potential.

- Revenue Tonne Kilometers (RTK): This metric represents the total distance traveled by revenue-generating cargo. It's calculated by multiplying the weight of the cargo (in tonnes) by the distance traveled. A higher RTK indicates greater cargo volume and potential for cargo revenue.

- Aviation Turbine Fuel (ATF) Price: This metric reflects the per-unit cost of the fuel used by aircraft, typically jet fuel. Fuel prices significantly impact airlines' operational costs.

- Corporate Tax Rate: This metric represents the percentage of an airline's profits that are paid as taxes to the government. Corporate tax rates can influence profitability and investment decisions.

- Foreign Exchange Rate: This metric expresses the rate at which one currency can be exchanged for another. Fluctuations in exchange rates can impact airlines' costs and revenues, especially for those operating internationally.

- Inflation: This metric represents the sustained increase in the general price level of goods and services within an economy. On the one hand, inflation can lead to a rise in operational costs, such as fuel, labor, and maintenance expenses. On the other hand, it can also dampen consumer demand for air travel as discretionary spending power diminishes.

- Aviation Fuel Tax % per Litre: This metric represents the percentage tax levied on each liter of aviation fuel purchased by an airline. Fuel taxes contribute to government revenue and can impact airlines' operational costs.

- Return on Assets (ROA): This key financial ratio measures an airline's profitability relative to its total asset base. It's calculated as operating profit divided by total assets. A higher ROA signifies the airline's efficiency in leveraging its assets, such as airplanes, equipment, and infrastructure, to generate operating profits.

- Operating Revenue to Total Assets Ratio: This metric shows what portion of an airline's total assets generates revenue. A higher ratio indicates the airline is effectively using its assets to bring in money.

- Working Capital to Total Assets Ratio: This metric shows the percentage of an airline's total assets that are readily available as cash or can be quickly converted to cash (working capital). A higher ratio indicates greater short-term financial flexibility (liquidity) but could also suggest the airline is not fully utilizing its resources for potential growth.

- Revenue per Employee: This metric shows the average amount of revenue each airline employee helps generate. A higher revenue per employee can indicate efficient utilization of the workforce. This can be used to assess labor productivity and potentially identify areas for efficiency improvement.

- Asset Turnover Ratio (ATR): This key metric, calculated by dividing total sales by total assets, assesses an airline's efficiency in utilizing its asset base to generate revenue. A higher ATR indicates better asset management, translating to more revenue generated from each dollar invested in assets.

- Cost per Employee: This metric reflects the total cost incurred by the airline per employee. It can be used to assess labor costs relative to productivity and identify potential cost-saving opportunities.

- Debt-to-Equity Ratio: This metric is a key indicator of an airline's capital structure. It's calculated by dividing the book value of equity by total liabilities. A higher D/E Ratio suggests a greater reliance on debt financing, which can increase the airline's financial risk.

- Liabilities to Total Assets Ratio: This metric shows what portion of an airline's assets are financed through debt (liabilities) compared to the ownership investment (equity). A higher ratio indicates a greater reliance on debt financing, which can increase the airline's financial risk.

- Current Ratio (WCR): This metric is a crucial indicator of an airline's short-term financial health. It's calculated by dividing current assets by current liabilities. A higher current ratio signifies better short-term liquidity,

- Market Share: This metric shows what percentage of the total passenger/cargo transportation business the airline controls. A larger market share suggests the airline has a stronger position compared to its competitors.

- Availability of Alternative Transportation Means: This factor refers to the existence and accessibility of alternative modes of transportation (e.g., trains, buses) on routes served by the airline. Greater availability of alternatives can influence passenger demand for air travel.

- Passenger Traffic Growth: This metric focuses on the change in passenger demand for the airline's services. It's expressed as a percentage change in the number of passengers carried over a set period. A positive growth signifies a rise in demand.

- Mergers and Acquisitions (M&A): This factor refers to the process of airlines combining forces through acquisitions or mergers. This consolidation can significantly reshape the competitive landscape, impacting market share and the overall dynamics of the industry.

- Pandemic: This factor refers to a widespread outbreak of a contagious disease that significantly affects travel and economic activities. Pandemics can have a severe negative impact on airline revenue and profitability.

- Bilateral Agreements: These are agreements established between two countries that define the terms and conditions for air services between them. Bilateral agreements can influence airline route access and traffic rights.

- Foreign Direct Investment (FDI) Percentage: This metric represents the percentage of ownership in a domestic airline by foreign investors. The

level of FDI can influence airline strategy, governance, and access to capital.

- Political Influence: Government policies and political shifts can have a significant impact on how airlines operate. From tax regulations to subsidies and ownership restrictions, the political landscape shapes the business environment for airlines.

- Aviation Policies: This factor refers to the specific rules and regulations established by governments to govern the aviation industry. These policies can cover areas such as safety standards, environmental regulations, air traffic control procedures, and airline licensing. Aviation policies can significantly impact airline costs, operational efficiency, and route networks.

- Aviation Infrastructure Investments: This factor refers to government or private investments in infrastructure projects related to aviation. This includes investments in airport facilities (runways, terminals), air traffic control systems, and other supporting infrastructure. Adequate investment in aviation infrastructure is crucial for handling air traffic growth, improving operational efficiency, and enhancing connectivity.

While a comprehensive range of variables was considered for inclusion in the factor analysis, thirteen were ultimately excluded. The **thirteen variables** which were **not included** are:

- Operations:
    - Aircraft Equipment Type: This variable likely exhibits high redundancy with other operational factors already included in the analysis (e.g., Average Fleet Age).

- Average Seat Capacity: This variable may be captured within the broader concept of aircraft type or utilization.

- Irregularity Ratio: While potentially relevant, this variable might be better suited for a separate analysis focused specifically on operational efficiency.

- International Operations: This characteristic is likely reflected in other operational variables or could be incorporated as a separate grouping within the chosen factors.

- Performance:
  - Passenger Yield and Available Seat Kilometers (ASK): Since RASK (Revenue per ASK) was already included, these individual components (Passenger Yield and ASK) might be redundant.

- Economic:
  - Gross Domestic Product (GDP): This variable might be too broad for the specific context of Indian carriers. Potentially, a more targeted economic indicator could be explored in future analyses.

- Financial:
  - Retained Earnings/Total Assets: This metric is likely to be correlated with other financial ratios already included in the analysis.

  - Cash to Cash Cycle: Similar to Retained Earnings/Total Assets, this metric might exhibit redundancy with other financial measures.

- Market:
    - Number of Competitors: The chosen factors likely capture the competitive landscape sufficiently.

    - Industry Growth Rate: This variable might be incorporated into a future analysis focused on industry trends, but wasn't essential for the current investigation of factors influencing financial performance.

- Government/Political/Regulatory/Safety:
    - Tourism Policies: While relevant to the industry, this factor might be better suited for a separate analysis focused on external influences on airline performance.

    - Safety Disruptions: Similar to Irregularity Ratio in Operations, this variable might be more appropriate for a separate analysis on operational safety.

4.2.4 Reliability Test

In any research endeavor, ensuring the reliability of our measurements is paramount. Reliability essentially refers to the consistency of results produced by a measure across different situations. When applied to data analysis, it signifies that the data items provide a stable and trustworthy picture of the underlying phenomenon (Ghosh & Jintanapakanont, 2004). A key step during the analysis involved assessing the reliability of the extracted factors. This was achieved by calculating Cronbach's alpha (α) for each factor. This widely used measure helps to determine whether the questions within a factor consistently capture the same underlying theme. It essentially assesses how well the variables within a factor are interrelated and reflect the same underlying concept. By ensuring reliable factors through this assessment, we establish a solid foundation for further analysis and a

more accurate understanding of the financial performance drivers for Indian airlines.

Table 10: Factor Loading & Reliability Score for Significant Factors Identified in the Study

Factors	Factor Interpretation	Variables	Factor Loading	Cronbach Alpha
Operational	Operational Efficiency	Passenger Load Factor	.864	.821
		On-Time Performance	.811	
		Cancellation Rate	.718	
		Average Fleet Age	.706	
	Resource Utilization	No. of Employees / Aircraft	.830	.842
		Aircraft Utilization	.812	
Performance	Profitability	Revenue per ASK (RASK)	.879	.809
		Cost per ASK ex fuel	.827	
		Cost per ASK (CASK)	.818	
		Revenue Passenger Kilometers (RPK)	.768	
		Revenue Tonne Kilometers (RTK)	.713	
Economic	Income Potential	ATF Price	.883	.850
		Corporate Tax Rate	.844	
		Foreign Exchange Rate	.799	

Factors	Factor Interpretation	Variables	Factor Loading	Cronbach Alpha
		Inflation	.797	
		Aviation Fuel Tax % per Liter	.768	
Financial	Revenue Growth	Operation Profit (EBIT) / Total Assets (ROA)	.836	.818
		Operating Revenues/Total Assets	.822	
		Working Capital/Total Assets	.814	
		Revenue/Employee	.725	
		Total Sales/Total Assets (ATR)	.718	
	Liability Payback	Book Value of Equity / Total Liabilities	.856	.838
		Cost/Employee	.824	
		Total Liabilities/Total Assets	.801	
		Current Assets/Current Liabilities (WCR)	.717	
Market	Market Competition	Market Share	.894	.866
		Alternate Source of Transport	.836	

Factors	Factor Interpretation	Variables	Factor Loading	Cronbach Alpha
		Passenger Traffic Growth	.809	
		Mergers & Acquisition	.748	
Govt. / Political / Regulatory / Safety	Regulatory & Safety	Pandemic	.876	.854
		Bilateral Agreements	.852	
		FDI%	.772	
	Government & Political	Political Influence	.942	.841
		Aviation Policies	.844	
		Aviation Infrastructure Investments	.771	

As shown in Table 10, to assess the reliability of the factors, Cronbach's Alpha has been calculated for each factor. This statistic measures internal consistency, or how well the variables within a factor are interrelated. The Alpha values in the study ranged from 0.809 to 0.866, which suggests good reliability for all factors. It's important to acknowledge that there's no single universally accepted threshold for Cronbach's Alpha. The suitability of a value hinges on the research context and the nature of the employed measures. According to Kline (1999), a value of 0.8 is considered satisfactory for well-established constructs like intelligence tests. For tests assessing specific abilities, a threshold of 0.7 might be more appropriate. Nunnally (1978) suggests that in exploratory research phases, even values as low as 0.5 can be acceptable as a starting point. Field (2013) cautions that simply increasing the number of items within a scale can artificially inflate Cronbach's Alpha without necessarily ensuring true reliability. Tavakol & Dennick (2011) acknowledge that in situations with a restricted number of variables or where the

survey questions exhibit lower inherent interrelatedness, a slightly lower Cronbach's Alpha might still be acceptable for factor analysis to proceed. In light of these considerations, the Cronbach's Alpha values (0.809 to 0.866) obtained in this study suggest a strong degree of internal consistency within the extracted factors.

4.2.5 Content Validity and Construct Validation

Typically, in a study the content validity signifies the degree to which the tool accurately captures the intended construct or domain (Rusticus, 2014). In simpler terms, it establishes a clear link between the measurements and the theoretical concept being investigated. Sireci (1998) identified three core components of content validity: domain definition, representation, and relevance. These aspects ensure a measurement tool adequately captures the intended construct. According to Yusof SM (2000), subjective evaluation by the researcher can be employed to assess content validity. In this study, I have prioritized establishing content validity for the survey questionnaire. This was achieved through a two-pronged approach:

- Extensive Literature Review: A comprehensive review of relevant academic literature provided a strong foundation for understanding the domain and identifying key aspects to be measured.

- Subject Matter Expert Consultation: Invaluable insights were gleaned through consultations with subject matter experts (SMEs) possessing extensive knowledge of the airline industry and financial performance metrics. By incorporating their perspectives, we ensured the survey content accurately reflected the complexities of the domain.

Unlike content validity, which checks if the questions measure what we intend them to, construct validity assesses how well they capture the underlying concepts we're interested in. To evaluate this, correlations were computed between each question

and the relevant outcomes using statistical software (SPSS). These correlations ranged from 0.31 to 0.56, all with a significance level below 0.05, indicating that the questionnaire effectively measures the targeted constructs (Baer, 2008).

4.2.6 Findings - Detailed Interpretation of Significant factors

- Factor 1 - Operational Efficiency

  The Cronbach Alpha for the factor reached 0.821, representing a high level of internal consistency among the variables within this factor. This factor encompasses four variables: On-Time Performance, Cancellation Rate, Passenger Load Factor, and Average Fleet Age. Notably, Passenger Load Factor demonstrated the maximum loading factor (0.86), closely followed by On-Time Performance (0.81). These loading factor rankings underscore the significance of Passenger Load Factor and On-Time Performance (OTP) in the eyes of stakeholders, emphasizing their pivotal roles in ensuring operational efficiency. Passenger Load factor is a crucial performance indicator (KPI) for airlines as it reflects how efficiently they are utilizing their available seating capacity. It's expressed as a percentage and is calculated by dividing the Revenue Passenger Miles (RPM) by Available Seat Miles (ASM) and then multiplying by 100. A higher load factor indicates better utilization of seating capacity, leading to potentially higher revenue for the airline. Conversely, a low load factor suggests underutilized capacity, which can negatively impact profitability. Operating with a high load factor allows airlines to spread their fixed operating costs (such as aircraft maintenance, crew salaries, and airport fees) across a greater number of revenue-generating passengers. This can result in lower per-passenger operating costs. However, it's essential to strike a balance, as excessively high load factors may lead to operational challenges, passenger dissatisfaction, and potential revenue loss if demand exceeds available capacity. Airlines need to optimize load factors to maximize revenue while ensuring a positive passenger experience.

Stakeholders place substantial importance on airlines maintaining a high Passenger Load Factor and OTP, coupled with minimizing flight cancellations, especially with the use of newer aircraft. Customers have elevated expectations regarding airlines' punctuality and reliability, as evidenced by their emphasis on factors such as OTP and Cancellation Rate. Delays and cancellations hurt airlines financially and competitively. Poor OTP leads to lost market share and damaged reputation, while cancellations incur penalties, refunds, and lost revenue. Airlines combat this by optimizing operations and prioritizing communication to keep passengers flying. Additionally, airlines with a smaller base of scheduled flights may experience more pronounced financial impacts due to both low On-Time Performance percentages and higher flight cancellations.

- Factor 2 – Resource Utilization

  The Cronbach Alpha for this factor was calculated at 0.842. This factor was characterized by two significant variables: Number of Employees per Aircraft and Aircraft Utilization. Notably, the Number of Employees per Aircraft exhibited the highest loading factor (0.83), closely followed by Aircraft Utilization (0.81).

  The high loading factor for Number of Employees per Aircraft indicates its strong influence on the factor, emphasizing that a higher number of employees per aircraft has a notable impact. This can result in reduced profitability for the airline. The number of employees per aircraft can differ significantly based on the carrier, the type of aircraft, and the specific operations of the carrier. Additionally, Aircraft Utilization, with its substantial loading factor, underscores its significance in the context of the factor. Airlines that heavily invest in automation and advanced technology may require fewer employees per aircraft. Modern aircraft often come equipped with advanced avionics and systems that reduce the need for a

large onboard crew. If utilization level of aircraft is low, then it can lead to a loss of potential revenue realization and market share for the airline. The total number of hours an aircraft spends in flight is a key component of utilization. Airlines aim to keep their aircraft in the air as much as possible to generate revenue. It is an important indicator for airlines and operators to maximize the return on their investment in aircraft. Maximizing aircraft utilization is crucial for improving operational efficiency and profitability in the aviation industry. However, achieving high utilization requires a careful balance between operational considerations, maintenance requirements, and market demand. Thus, optimizing the number of employees per aircraft and maximizing aircraft utilization are crucial considerations for operational efficiency and financial performance.

- Factor 3 – Profitability

  The Cronbach Alpha for this factor was calculated at 0.809. This factor exhibited significant loading from five variables: Revenue per ASK (RASK), Cost per ASK ex fuel, Cost per ASK (CASK), Revenue Passenger Kilometers (RPK), and Revenue Tonne Kilometers (RTK). Notably, Revenue per ASK (RASK) demonstrated the highest loading factor (0.88), closely followed by Cost per ASK ex fuel (0.83).

  The top two variables, Revenue per ASK (RASK) and Cost per ASK ex fuel, are particularly crucial contributors to airline profitability. Their substantial loading factors underscore their significant impact on the factor. A higher RASK value signifies that the airline is generating more revenue for each unit of capacity it offers. Conversely, a lower RASK may suggest challenges in revenue generation relative to available capacity. ATF costs are often a significant portion of an airline's overall expenses, and excluding them allows for a more focused analysis of the non-fuel operating costs. It's important to note that while CASK ex fuel provides valuable insights into

an airline's cost structure. Lower CASK ex fuel values suggest that the airline is effectively managing its non-fuel operating costs in relation to the capacity it offers.

RPK is a measure of the airline's ability to attract and serve paying passengers. Increasing RPK indicates growing passenger demand and improved operational performance. It's noteworthy that Revenue Tonne Kilometers (RTK) ranks the lowest among the five variables. This ranking can be attributed to the fact that cargo revenue for Indian scheduled carriers is heavily dependent on belly capacity available after prioritizing passenger baggage. Understanding and optimizing these key variables are vital for enhancing airline profitability and financial performance.

- Factor 4 - Income Potential

  The Cronbach Alpha for this factor was calculated at 0.850. This factor exhibited significant loading from five variables: ATF Price, Corporate Tax Rate, Foreign Exchange Rate, Inflation, and Aviation Fuel Tax % per Liter. Notably, ATF (Fuel) demonstrated the highest loading factor (0.88), closely followed by Corporate Tax Rate (0.84).

  The ranking underscores the significance of ATF as a critical economic factor for stakeholders. Aviation Turbine Fuel (ATF) represents one of the highest costs for airlines, accounting for 20-40% of expenditure depending on price and region. Any increase in fuel prices directly impacts the operating cost of airlines, and carriers may need to absorb this additional cost to remain competitive in the market. Corporate Tax Rate is another noteworthy factor influencing EBIT for airlines, and any tax rebate can positively impact net profitability. Understanding and navigating these

economic factors are crucial for effective financial management and sustained profitability in the airline industry.

The Exchange rate can have a significant impact on the financial performance of airlines, especially for those that operate internationally and scores slightly lower than tax rate (.80). Given the global nature of the airline industry, exchange rate fluctuations are an inherent risk. Airlines generate revenue in various currencies, depending on the markets they serve and Operating costs, including fuel, aircraft maintenance, and personnel expenses, may be denominated in different currencies. So, Exchange rate movements can impact the revenue and cost structure of airlines.

Inflation and aviation fuel taxes can have notable impacts on the financial performance of airlines although ranked 4 and 5 in the order. Inflation can influence consumer purchasing power. If inflation outpaces income growth, consumers may reduce discretionary spending, including travel. This can affect passenger demand and, consequently, the revenue generated by airlines. Airlines operating in regions with higher fuel taxes may face a competitive disadvantage compared to those in regions with lower or no fuel taxes. It can affect the overall cost structure and pricing competitiveness of airlines. Fuel costs often represent a substantial portion of an airline's total operating expenses. Higher fuel taxes can compress profit margins unless airlines can pass on the increased costs to passengers through higher ticket prices.

- Factor 5 – Revenue Growth

The Cronbach Alpha for this factor was determined to be 0.818. This factor exhibited significant loading from five variables: Operation Profit (EBIT)/Total Assets (ROA), Operating Revenues/Total Assets, Working Capital/Total Assets, Revenue/Employee, and Total Sales/Total Assets (ATR). Notably,

Operation Profit (EBIT)/Total Assets (ROA) demonstrated the highest loading factor (0.84), closely followed by Operating Revenues/Total Assets (0.82).

Return on Assets (ROA) as a key indicator for stakeholders. ROA reflects revenue growth for an airline and is crucial for sustaining a business in the long run. A rising Return on Assets (ROA) is a positive indicator. It suggests the company is improving its ability to generate profits from the resources it has, like equipment and property. On the other hand, a falling ROA suggests potential over-investment in assets that fail to yield revenue growth, signaling potential financial challenges for the company. Understanding and optimizing these financial performance indicators are essential for airlines to navigate challenges and maintain a sustainable business model. Operating Revenues/Total Assets often referred to as the asset turnover ratio, calculated by dividing operating revenue by total assets, measures an airline's efficiency in utilizing its assets to generate revenue. A higher ratio indicates better asset utilization. Airlines with a strong Asset Turnover Ratio can squeeze more revenue out of their existing assets, reflecting a positive sign of operational efficiency.

Working Capital/Total Assets provides insights into the efficiency of working capital management in relation to total assets of the company. A higher ratio signifies effective management of working capital in proportion to total assets. This can indicate that an airline is efficiently using its current assets and liabilities to support its operations.

Revenue/Employee measures the revenue generated per employee and reflects labor productivity. A higher Revenue/Employee ratio indicates higher productivity, meaning the airline is generating more revenue with a

relatively lower number of employees. This could result from effective workforce management, automation, or other efficiency measures.

Total Sales/Total Assets also known as Asset Turnover Ratio – ATR has lowest loading (.718) amongst the five, measures how well an airline uses its assets to generate sales. A higher ATR indicates better asset utilization and operational efficiency. Airlines with a high ATR are effective at generating sales relative to their asset base, which is a positive indicator of financial performance.

Higher ratios in these metrics generally suggest improved operational efficiency. Airlines that can generate more revenue from their assets, maintain effective working capital management, and achieve higher revenue per employee are likely to be more operationally efficient.

- Factor 6 – Liability Payback

  The Cronbach Alpha for this factor was calculated to be 0.838. This factor demonstrated significant loading from four variables: Book Value of Equity/Total Liabilities, Cost/Employee, Total Liabilities/Total Assets, and Current Assets/Current Liabilities (WCR). Notably, Book Value of Equity/Total Liabilities exhibited the highest loading factor (0.86), closely followed by Cost/Employee (0.82).

  This underscores the critical importance of the Book Value of Equity/Total Liabilities ratio as a key indicator for stakeholders. The high loading factor for this variable (0.86) indicates its strong influence on financial stability. The ratio reflects the payback capacity for an airline's liabilities, emphasizing the significance of managing liabilities in relation to equity for ensuring financial health and stability. Airlines need to carefully assess and

optimize these financial metrics to maintain a robust financial position and mitigate risks associated with liabilities. Cost/Employee measures the average cost incurred by an airline for each employee and reflects labor efficiency. A lower Cost/Employee ratio suggests better cost management and higher labor productivity. Airlines with lower costs per employee are generally more efficient and may be better positioned to achieve profitability.

Total Liabilities/Total Assets known as the leverage or debt ratio, reflects the proportion of an airline's assets financed through debt (liabilities) compared to the ownership investment (equity). A higher leverage ratio indicates a greater reliance on borrowed money, which can be both an opportunity and a risk for the airline. A lower leverage ratio implies lower financial leverage and less reliance on debt to finance operations. A conservative debt strategy (leverage approach) can mitigate an airline's financial risk exposure. However, achieving optimal capital structure requires a balance. Airlines still need sufficient resources to fuel expansion and sustain core operations.

Current Assets/Current Liabilities (Working Capital Ratio - WCR) is a key measure of an airline's short-term financial health. It's calculated by dividing current assets by current liabilities. A higher WCR signifies better liquidity, meaning the airline has enough resources readily available (cash, receivables, inventory) to cover its short-term debts (accounts payable, accrued expenses). This suggests strong liquidity and the ability to cover immediate financial obligations, enhancing financial stability.

By achieving favorable ratios in these critical categories, airlines can attract investments. secure favorable loan terms. and build trust with stakeholders.

This is all thanks to sound financial management that prioritizes cost control, strategic debt utilization, and maintaining healthy cash flow.

- Factor 7 - Market Competition

  The Cronbach Alpha for this factor was computed as 0.866. This factor exhibited significant loading from four variables: Market Share, Alternate Source of Transport, Passenger Traffic Growth, and Mergers & Acquisition. Notably, Market Share demonstrated the highest loading factor (0.89), closely followed by Alternate Source of Transport (0.84).

  The prominence of Market Share, with its high loading factor, underscores its critical role as a key determinant affecting airline profitability. Maintaining a substantial market share is vital for airlines, as it directly impacts their revenue and competitive standing. Additionally, the presence of Alternate Source of Transport and Passenger Traffic Growth as influential factors highlights the need for airlines to adapt to evolving market dynamics and consumer preferences. Furthermore, considerations related to mergers and acquisitions emphasize the strategic and industry-specific challenges that can significantly impact an airline's financial performance and stability.

  Both passenger traffic growth and mergers and acquisitions (M&A) have significant impacts on the financial performance of airlines, albeit in different ways. Passenger traffic growth generally leads to higher ticket sales and increased revenue for airlines. If passenger traffic growth is managed effectively, it can contribute to improved profitability. Higher revenue combined with efficient cost management can enhance an airline's financial performance. M&A activities often lead to an expanded route network and increased market share. This can enhance an airline's competitive position and revenue-generating capabilities. M&A

transactions involve significant integration costs, including technology harmonization, employee restructuring, and alignment of operational processes. These costs can impact short-term financial performance.

- Factor 8 - Regulatory & Safety

  The Cronbach Alpha for this factor was computed as 0.854. This factor demonstrated significant loading from three variables: Pandemic, Bilateral Agreements, and FDI%. Noteworthy is the fact that Pandemic exhibited the highest loading factor (0.88), closely followed by Bilateral Agreements (0.85).

  The preeminence of Pandemic, with its top-ranking loading factor, underscores its substantial impact on airline operations and financial viability. The Covid-19 pandemic has been a significant contributing factor to the financial difficulties and subsequent bankruptcies experienced by more than 40 airlines. The challenges posed by the pandemic, including safety concerns, operational disruptions, and market unpredictability, have significantly influenced the financial health of airlines.

  Moreover, the importance of Bilateral Agreements in this factor highlights their role in enabling airlines to expand international routes and enhance profitability. These agreements play a crucial role in shaping the regulatory environment for airlines and influencing their strategic decisions in the global aviation landscape.

  FDI can bring in additional capital to the airline, supporting its expansion, fleet modernization, and other investment initiatives. This can contribute to improved operational efficiency and service quality. FDI may enable airlines to access new markets and routes, fostering international expansion

and facilitate strategic partnerships and alliances with foreign carriers, allowing for code-sharing agreements, joint ventures, and collaborative efforts. These partnerships can lead to synergies, cost-sharing, and revenue-sharing opportunities.

- Factor 9 - Government & Political

  The Cronbach Alpha for this factor was calculated as 0.841. This factor exhibited substantial loading from three variables: Political Influence, Aviation Policies, and Aviation Infrastructure Investments. Notably, Political Influence emerged with the highest loading factor (0.94), followed by Aviation Policies (0.84).

  The preeminence of Political Influence, with its top-ranking loading factor, underscores its paramount importance in shaping aviation policies and influencing the growth trajectory of airlines in India. The dynamic nature of political powers and changes in governance often lead to significant shifts in policies that impact the aviation sector. The high loading factor for Political Influence in this factor reflects its critical role in shaping the regulatory landscape and influencing strategic decisions within the Indian aviation industry.

  Investments in aviation infrastructure can have significant impacts on airline financial performance. Aviation infrastructure encompasses various elements, including airports, air traffic control systems, runways, terminals, and related facilities. Improved infrastructure, such as modernized airports and efficient air traffic control systems, can enhance overall operational efficiency. Reduced congestion, faster turnaround times, and streamlined processes contribute to cost savings for airlines. Investments in air traffic management systems and airport facilities can help reduce delays and

downtime. Airlines benefit from improved punctuality and a more reliable schedule, which can positively impact their reputation and operational efficiency. Modern and well-maintained infrastructure contributes to a positive passenger experience. Improved facilities, comfortable waiting areas, and efficient boarding processes can enhance customer satisfaction, potentially leading to increased demand for air travel. But Infrastructure projects often face challenges such as construction delays, regulatory hurdles, and environmental concerns. Delays can impact the expected benefits and may lead to extended periods of disruption for airlines. Challenges such as high initial costs, coordination issues, and the risk of overcapacity require careful consideration and strategic management by both airports and airlines.

Confirmatory Factor Analysis (CFA) validates a pre-specified factor structure for observed variables. Unlike Exploratory Factor Analysis (EFA) which discovers factors, CFA confirms if your existing theory about how variables group together holds true in the data. Its primary purpose is to assess and confirm the hypothesized relationship between observed variables and their latent constructs. In the context of this study, CFA was conducted using AMOS, aiming to quantitatively assess the robustness of the factor structure derived from principal component analysis. This analysis not only corroborates the validity of the newly identified measure but also offers additional empirical evidence supporting the proposed relationships among variables and latent constructs.

Table 11: CFA – Model Fit Summary

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default Model	54	1319.786	116	.051	11.377
Saturated Model	170	.000	0		
Independence Model	34	15766.648	1361	.057	115.931

The p-value obtained from the analysis exceeds 0.05, indicating that the model is considered a good fit. In statistical terms, when the p-value is greater than 0.05, null hypothesis cannot be rejected due to insufficient evidence. In this case, the null hypothesis posits that the model fits perfectly, and the statistical results support this assertion.

Table 12: CFA - Baseline Comparisons

Baseline Comparisons

Model	NFI Delta1	RFI Rho1	IFI Delta2	TLI Rho2	CFI
Default Model	.916	.902	.923	.910	.923
Saturated Model	1.000		1.000		1.000
Independence Model	.000	.000	.000	.000	.000

The fit indices NFI, RFI, IFI, TLI (Tucker Lewis Index), and CFI (Comparative Fit Index), are commonly used to assess the goodness of fit in structural equation models. As a general guideline, we typically strive for index values greater than 0.9 to indicate an acceptable level of model fit. In this case, since all the values are above 0.9, it suggests that the model exhibits an acceptable fit based on these fit indices. This is a positive indication of the validity and reliability of your confirmatory factor analysis.

Table 13: CFA - RMSEA

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default Model	.041	.060	.067	.060
Independence Model	.049	.209	.214	.071

In this case, RMSEA (Root mean Square Error of Approximation) values are below 0.50 with a 90% confidence interval, and PCLOSE is above 0.05. These criteria indicate an acceptable fit for the model. The outcomes of the principal component

analysis (PCA) provide evidence for the validity of the extracted factor structure. This enhances confidence in the robustness of the confirmatory factor analysis (CFA) model. Having model fit indices within acceptable ranges is crucial for ensuring the reliability and validity of your measurement model.

4.3 Impact of Identified Significant Factors on Cash Flows – Findings & Analysis

Research Question & Objective 2

RQ2 – What are the impact of identified factors on cash flows of Indian Carriers?

RO2 – To evaluate the impact of identified factors on cash flows of Indian Carriers

4.3.1 Preliminary Analysis

Expanding the scope of the study to include economic, market, government, political, regulatory, and safety variables beyond the traditional performance, operating, and financial factors aligns with a comprehensive approach to identifying significant factors impacting the financial performance of Indian carriers. Mahtani and Garg's (2020) findings underscore the importance of incorporating a diverse set of variables in assessing financial distress, and your study builds upon this by encompassing a broader range of factors.

Leveraging regression analysis aligns with this study's objectives of assessing the influence of identified significant factors on the financial performance (cash flows), of Indian carriers. This analytical approach allows for a nuanced understanding of how various variables, beyond the conventional financial ones, contribute to or affect the financial performance of airlines. It provides a valuable insight into the

multifaceted dynamics influencing the financial health of the carriers and enhances the overall robustness of the research findings.

Following formula was used for this part of the study:

$$Y_i = f(X_i, \beta) + e_i$$

where,

Y_i = dependent variable (Cash Flow)

f = function

X_i = independent variable (Financial and Non-Financial factors)

β = unknown parameters

e_i = error terms

The list of significant factors identified from Objective 1 are listed in Table 14. All these variables will be used as independent variables for logistic regression.

Table 14: Significant factors impacting Financial Performance of Indian Carriers

Factor Category	Factors	Variables
Operational	Operational Efficiency (MOPSEFF)	Passenger Load Factor
		On-Time Performance
		Cancellation Rate
		Average Fleet Age

Factor Category	Factors	Variables
	Resource Utilization (MRESUTIL)	No. of Employees / Aircraft
		Aircraft Utilization
Performance	Profitability (MPROFIT)	Revenue per ASK (RASK)
		Cost per ASK ex fuel
		Cost per ASK (CASK)
		Revenue Passenger Kilometers (RPK)
		Revenue Tonne Kilometers (RTK)
Economic	Income Potential (MINCPOT)	ATF Price
		Corporate Tax Rate
		Foreign Exchange Rate
		Inflation
		Aviation Fuel Tax % per Litre
Financial	Revenue Growth (MREVGRWT)	Operation Profit (EBIT)/Total Assets (ROA)
		Operating Revenues/Total Assets
		Working Capital/Total Assets
		Revenue/Employee
		Total Sales/Total Assets (ATR)

Factor Category	Factors	Variables
	Liability Payback (MLIABCAP)	Book Value of Equity / Total Liabilities
		Cost/Employee
		Total Liabilities/Total Assets
		Current Assets/Current Liabilities (WCR)
Market	Market Competition (MMKTCOMP)	Market Share
		Alternate Source of Transport
		Passenger Traffic Growth
		Mergers & Acquisition
Govt. / Political / Regulatory / Safety	Regulatory & Safety (MREGSAFT)	Pandemic
		Bilateral Agreements
		FDI%
	Government & Political (MGOVTPOL)	Political Influence
		Aviation Policies
		Aviation Infrastructure Investments

This study centers on the financial performance of airline carriers, with a specific focus on cash flow as the dependent variable. Cash flow is a critical indicator of a company's financial well-being, reflecting its ability to generate cash from its operations. Cash flow is treated as a dichotomous variable in this study, categorized as either positive or negative.

The data on cash flow was collected through a questionnaire survey. The underlying theory guiding this analysis is based on the principles of Liquid Asset theory (Scott, 1981). This theory proposes that a company's risk of bankruptcy rises significantly when its current year's profitability (negative profit) or cash flow generation (negative net cash flow) is insufficient to meet its debt obligations. In simpler terms, a negative cash flow suggests difficulty meeting current financial commitments, raising concerns about the company's solvency.

Furthermore, the concept of technical insolvency is introduced (Altman & Hotchkiss, 2006). This state occurs where the sum of a company's current-year net income and the anticipated fair value of its shareholders' equity (excluding current period earnings) falls below zero. Technical insolvency denotes a financial state where a company is unable to fulfill its short-term debt obligations due to insufficient liquid assets.

By analyzing cash flow through the lens of these theoretical perspectives, the study aims to identify factors that contribute to financial distress among airline carriers. To assess the factors influencing financial distress among airlines, this study adopts a binary classification approach for financial performance. Here, cash flow serves as the dependent variable, categorized as:

- Negative Cash Flow (Coded as 1): This signifies poor financial performance and potential distress. A negative cash flow for an airline signifies an inability to generate sufficient cash to meet its current financial obligations. This raises concerns regarding the airline's solvency, or its long-term financial health.

- Positive Cash Flow (Coded as 0): This denotes good financial performance and no immediate distress. A positive cash flow for an airline signifies its ability to generate sufficient cash to cover its financial obligations and

potentially invest in future growth initiatives. This financial strength is crucial for the airline's long-term sustainability

To explore how the identified significant factors influence financial performance, binary logistic regression was deployed. This statistical technique is ideal for investigating how various factors (independent variables) affect a key business metric (dependent variable) that has only two possible outcomes, such as positive or negative cash flow for airlines in this instance.

In this context, the independent variables will comprise the factors identified as statistically significant in previous analyses. These factors likely represent various aspects of an airline's operations, financial health, or external environment. The dependent variable remains the impact on cash flow, categorized as positive or negative.

Table 15 – LRA - Case Processing Snapshot

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	628	100
	Missing Cases	0	0
	Total	628	100.0
Unselected Cases		0	.0
Total		628	100.0

a. If weight is in effect, see classification table for the total number of cases.

The initial section of the statistical output presents a Case Processing Summary (Table 15), which details the cases included within the analysis. For this study, the total number of respondents is 628.

Table 16 – LRA – Dependent Variable Coding

Dependent Variable Encoding

Original Value	Internal Value
Cashflow (+ve) (non-distress)	0
Cashflow (-ve) distress)	1

The coding scheme utilized for the criterion variable is presented in Table 16. In this context, negative cashflow, representing poor financial performance (distress), is coded as 1. Conversely, positive cashflow, indicating healthy financial performance (non-distress), is coded as 0. The adopted coding scheme contributes to a more straightforward interpretation and analysis of the logistic regression model's results. This is achieved by establishing a clear distinction between the categories of distressed and non-distressed financial performance.

Table 17: LRA – Block 0: Beginning Block

Classification Table[a,b]

			Predicted		
			CashFlow Ratio		
	Observed		Cashflow (+ve) (non-distress)	Cashflow (-ve) distress)	Percentage Correct
Step 0	CashFlow Ratio	Cashflow (+ve) (non-Distress)	0	60	.0
		Cashflow (-ve) distress)	0	568	100.0
	Overall Percentage				90.5

a. Constant is included in the model.
b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	1.826	.116	249.739	1	<.001	0.105

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Operational Efficiency Factor	.0853	1	.012
		Resource Utilization Factor	.432	1	.116
		Profitability Factor	2.016	1	.000
		Income Potential Factor	.551	1	.039
		Revenue Growth Factor	.397	1	.065
		Liability Capacity Factor	1.243	1	.152
		Market Competition Factor	.157	1	.071
		Regulatory and Safety Factor	1.857	1	.132
		Government and Political Factor	.610	1	.107
	Overall Statistics		8.183	9	.000

The segment labeled "Block 0" in the output displays the initial analysis results, obtained without including any explanatory variables (independent variables) in the model. This starting point, also known as the null model, serves as a baseline for comparison when we subsequently introduce the predictor variables into the model and assess their impact.

The null model ("Block 0") serves as a crucial benchmark for evaluating the incremental effect and statistical significance of the subsequently introduced independent variables. This comparison allows to assess how much the model's predictive power for financial distress classification improves with the inclusion of these additional explanatory factors.

Table 18: LRA – Goodness of Fit Test 1

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	120.609	9	<.001
	Block	120.609	9	<.001
	Model	120.609	9	<.001

The core of statistical models lies in coefficients, which mathematically represent the influence exerted by different independent variables on the dependent variable. These coefficients quantify the magnitude and direction of the relationship between the independent variables and the outcome variable. The "Omnibus Tests of Model Coefficients" is a statistical test that checks if all these coefficients, taken together, are statistically significant. In simpler terms, it assesses whether the entire model, with all the included factors, significantly contributes to explaining the dependent variable (cash flow in this case) compared to a basic model with no explanatory factors (null model).

The Omnibus test yielded a statistically significant result (p-value < 0.05), suggesting a good fit for the model incorporating the identified factors. This signifies a substantial improvement compared to a null model with no explanatory variables. The analysis suggests a good fit between the chosen model and the data. This implies that the included factors effectively account for a significant portion of the observed variation in airline cash flow (financial performance).

Table 19: LRA – Goodness of Fit Test 2

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	2.475	8	.521

The analysis utilized the Hosmer-Lemeshow test, a well-established approach for assessing model fit in logistic regression. This test evaluates the calibration of the model, meaning how well the predicted probabilities correspond to the observed outcomes. A statistically significant p-value (< 0.05) suggests a lack of calibration, while a non-significant p-value (> 0.05) implies the model exhibits good calibration and aligns with the data. In this instance, the test yielded a non-significant p-value (greater than 0.05), indicating a good fit for the model. This implies that the predicted cash flow values from the model closely resemble the actual cash flow observations of the airlines, suggesting the model effectively captures the underlying patterns in the data.

Table 20: LRA – Model Summary

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	73.499[a]	.374	.719

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

The analysis output includes a model summary, which offers insights into the goodness-of-fit of the logistic regression model. This information is crucial for evaluating the model's effectiveness and reliability.

In this study, the Pseudo R-Square is reported as 0.719. The analysis indicates that the predictor variables incorporated into the model account for approximately 71.9% of the variance observed in financial performance (cash flow) among the studied airlines. Within the context of logistic regression analysis, a higher Pseudo R-Square value generally, signifies an improved model fit. This translates to the included predictor variables effectively accounting for a greater portion of the observed discrepancies in cash flow across the studied airlines.

- This analysis utilizes Cox & Snell (0.374) and Nagelkerke (0.719) R-squared statistics, which are adjusted measures to account for the specific characteristics of logistic regression models. These values quantify the proportion of variance explained by the model in the dependent variable (cash flow). This indicates that the chosen factors explain a substantial portion of the variation observed in financial performance (cash flow) among the airlines. Accounting for the inherent characteristics of logistic regression models, both the Cox & Snell and Nagelkerke R-squared statistics suggest a statistically significant association between the independent variables and airline financial performance (as measured by cash flow).

The high Pseudo R-Square and significant Cox & Snell R Square and Nagelkerke R Square values collectively indicate that the model is effective in explaining and predicting variations in financial performance based on the selected predictor variables. The model demonstrates a strong association between the included factors and financial performance, supporting its utility in assessing and predicting the financial condition of airlines.

Table 21: LRA – Classification Table

Classification Table[a]

			Predicted		
			CashFlow Ratio		
	Observed		Cashflow (+ve) (non-distress)	Cashflow (-ve) (distress)	Percentage Correct
Step 1	CashFlow Ratio	Cashflow (+ve) (non-distress)	102	10	91.1
		Cashflow (-ve) (distress)	23	493	95.6
	Overall Percentage				93.4

a. The cut value is .500

This model exhibits promising results with a sensitivity of 95.6% and a specificity of 91.1%. Sensitivity refers to the model's ability to correctly identify true positives (financially distressed airlines), while specificity indicates its accuracy in identifying true negatives (healthy airlines). The high sensitivity suggests that a significant proportion (95.6%) of cases with negative cashflow were correctly predicted by the model. However, the specificity is relatively lower at 91.1%, indicating that the model is slightly less precise in correctly identifying cases with positive cashflow. The overall accuracy of 93.4% highlights the model's effectiveness in classification. Overall, the model is effective in predicting the impact, particularly in identifying cases with (-ve) cashflow.

4.3.2 Impact Analysis of Significant Factors

Table 22: Analysis of Significant Factors

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Operational Efficiency Factor	-.224	.116	.428	1	.004	1.035
	Resource Utilization Factor	-.473	.110	2.594	1	.031	1.066
	Profitability Factor	-.466	.112	1.464	1	.000	1.291
	Income Potential Factor	.136	.106	.195	1	.015	1.027
	Revenue Growth Factor	-.499	.101	1.218	1	.036	1.347
	Liability Capacity Factor	.277	.105	.302	1	.008	1.119
	Market Competition Factor	.233	.092	.587	1	.039	1.261
	Regulatory and Safety Factor	.565	.123	1.788	1	.029	.679
	Government & Political Factor	-.188	.138	.625	1	.037	.527
	Constant	1.454	.657	1.645	1	.041	1.391

a. Variable(s) entered on step 1: Mean Operational Efficiency Factor, Mean Resource Utilization Factor, Mean Profitability Factor, Mean Income Potential Factor, Mean Revenue Growth Factor, Mean Liability Capacity Factor, Mean Market Competition Factor, Mean Regulatory and Safety Factor, Mean Government and Political Factor.

This analysis focused on coefficients within the model that are statistically significant (p-value < 0.05). The estimated coefficients associated with the independent variables offer significant insights into the critical factors that influence the probability of financial distress among airlines. It's important to go beyond simply identifying significant coefficients. The signs (positive or negative) of these coefficients reveal the direction of their impact on financial distress.

- Positive Coefficients: A positive coefficient for an independent variable indicates a statistically significant positive association with the probability of financial distress for airlines. This translates to a higher likelihood of encountering financial hardship for airlines as the corresponding independent variable increases by one unit, holding all other factors constant.

- Negative Coefficients: Conversely, a negative coefficient for an independent variable indicates a statistically significant protective effect. This translates to a lower likelihood of airlines encountering financial hardship as the corresponding independent variable increases by one unit, holding all other factors constant.

A negative coefficient implies that factors such as diminished operational efficiency, decreased resource utilization (e.g., aircraft and other resources), lower profitability, and reduced revenue realization from operating revenues, profits, and sales contribute to an elevated probability of financial distress, potentially resulting in negative cashflow. Similarly, an upswing in liabilities and expenses, intensified market competition, escalating fuel prices, taxes, economic imbalances caused by inflation, heightened regulatory compliance requirements, and safety concerns are linked to an elevated susceptibility to financial hardship and experiencing negative cash flow. Furthermore, the findings underscore that elements such as reduced political influence on the aviation sector and unfavorable government policies exert an impact on the financial performance of airlines in India.

Analysis of the estimated coefficients reveals critical insights into the connections between the independent variables (influential factors) and the dependent variable (probability of financial distress). This type of analysis is common in econometrics and statistical modeling to understand the drivers of specific outcomes.

Based on empirical evidence from past studies on bankruptcy prediction models, it has been observed that certain variables, while individually exhibiting lower significance, can significantly differentiate between financially distressed and non-distressed conditions when considered in combination with other factors (Zavgren, 1983). These findings confirms that the interplay of these statistically significant factors significantly influences the financial health of Indian airlines. This combined effect allows for a more accurate identification of airlines at risk of financial distress within the Indian aviation industry.

Building upon the insights gleaned from this analysis, a comprehensive model for assessing the risk of financial distress in airlines should incorporate the following key factors: Operational Efficiency, Resource Utilization, Profitability, Income Potential, Revenue Growth, Liability Capacity, Market Competition, Regulatory and Safety Compliance, and Government Policies & Political Influence.

4.4 Financial Distress Prediction Model for Indian Carriers – Findings & Analysis

Research Question & Objective 3

RQ3 – What is the relationship between the identified factors impacting cash flows and financial distress of Indian Carriers?

RO3 – To develop an Airline financial distress predictor model for Indian Aviation Industry in terms of relationship between the identified factors impacting cash flows and financial distress of Indian Carriers

4.4.1 Model Development

To develop a predictive model for financial distress among Indian scheduled carriers, Logistic Regression Analysis (LRA) leverages a dataset comprised of both financial and non-financial variables specific to these airlines. The selection of Logistic Regression Analysis (LRA) aligns with the findings of Collins and Green (1982), who highlight the theoretical advantages of LRA over Multiple Discriminant Analysis (MDA) for applications in bankruptcy prediction. LRA's suitability stems from its ability to model the probability of an event (financial distress in this case), making it a well-matched choice for this analysis. They attribute this preference to the sigmoid (S-curve) nature of the logistic cumulative distribution function, which inherently possesses the threshold trait necessary for the bankruptcy forecasting problem.

In logistic regression, a linear combination of the model's variables is calculated, resulting in a Z-score. This Z-score is then transformed into a probability using a specific function. The resulting probability represents the likelihood of a particular outcome, such as financial distress or bankruptcy. The logistic regression approach is well-suited for binary classification problems, making it particularly relevant for predicting whether an airline is likely to face financial distress or not.

The function takes the form:

$$p\ (\text{failure}) = 1 / (1+ e\text{-}z)$$

Where,

$$Z = \beta\ 0 + \beta\ 1\ X1 + \beta\ 2\ X2 + \ldots\ldots\ldots\ldots + \beta\ n\ Xn$$

And,

Xn = independent variables (factors impacting financial performance of Indian carriers)

e = a mathematical constant and its value is ~2.718 (the base of the natural logarithms).

The model uses the logistic regression method and derive the values of the coefficients (β0, β1, β2,…, βn), for each of the independent variables (both financial & non-financial) as per Table 22.

Data Description

The analytical framework leverages a comprehensive dataset encompassing financial ratios, continuous variables, and nominal variables. This data collection spans a five-year period, providing a robust foundation for the logistic regression analysis.

Airline specific data like (annual financial reports, performance metrics, economic reports, etc.) for Indian carriers has been collected for the period of 2016 - 2021 from:

- Director General of Civil Aviation (DGCA) Database & Annual Reports
- MoCA (Ministry of Civil Aviation) Reports
- IATA (International Air Transport Association) Economics Reports
- Center for Asia Pacific Aviation (CAPA) Reports
- Airline Annual Financial Reports & Investor Presentations
- Prowess Database [Centre for Monitoring Indian Economy (CMIE)].

The classification criteria used to categorize airlines as either distressed or non-distressed involved examining the cashflow trends over a specific period. In this context, if an airline exhibited negative cashflows in three out of the five years within the period from 2016 to 2021, it was classified as distressed. On the other hand, if the airline demonstrated positive cashflows, it was deemed to have good financial performance and was categorized as non-distressed. This approach facilitated an objective evaluation of the financial health of airlines by analyzing their cash flow patterns over the designated time period.

Choice of Variables

The following list of variables have been used for model development:

Table 23: Variables Utilized for Model Development

Description	Variables
Operational Efficiency	(MOPSEFF)
Resource Utilization	(MRESUTIL)
Profitability	(MPROFIT)
Income Potential	(MINCPOT)
Revenue Growth	(MREVGRWT)
Liability Payback	(MLIABCAP)
Market Competition	(MMKTCOMP)
Regulatory & Safety	(MREGSAFT)
Government & Political	(MGOVTPOL)

The financial distress prediction model for Indian Aviation Industry in terms of relationship between the identified factors impacting cash flows and financial distress of Indian Carriers was constructed based on LRA approach (Conditional probability)

p (failure) = 1 /(1+ e-z)

Where,

$Z = \beta\ 0 + \beta\ 1\ X1 + \beta\ 2\ X2 + \ldots\ldots\ldots\ldots + \beta\ n\ Xn$

Logistic regression method was run in SPSS and values of the coefficients (β0, β1, β2,…, βn), for each of the independent variables are estimated. Following Table shows the resultant model.

Table 24: Airline Distress Prediction Model

Variables in the Equation

		B	S.E.	Wald	df	Sig.
Step 1[a]	MOPSEFF	-.329	.217	2.297	1	.013*
	MRESUTIL	-.052	.047	1.248	1	.031*
	MPROFIT	-.036	.016	1.049	1	.000*
	MINCPOT	.136	.002	1.787	1	.019*
	MREVGRWT	-.419	.026	3.324	1	.041*
	MLIABCAP	.267	.335	4.101	1	.012*
	MMKTCOMP	.133	.113	1.922	1	.046*
	MREGSAFT	.565	.538	1.464	1	.022*
	MGOVTPOL	-.188	.197	1.597	1	.044*
	Constant	1.876	.917	0.589	1	.047

* Statistically significant

4.4.2 Detailed Analysis

The negative coefficients within the model signify an association between certain factors and an increased likelihood of financial distress, potentially resulting in negative cashflows for airlines in India. Here's a detailed breakdown of the interpretation for these negative or positive coefficients:

- Operational Efficiency and Resource Utilization: A decrease in operational efficiency and diminished resource utilization, encompassing aircraft and other resources, is associated with an elevated probability of financial distress and negative cashflows. This could be indicative of inefficiencies in processes, resource management, or operational strategies that contribute to financial challenges. Inefficient operations may lead to heightened costs and diminished profitability. Similarly, suboptimal utilization of resources may lead to underperformance and increased financial strain.

- Profitability and Revenue Realization: Reduction in profitability and lower revenue realization from operating revenues, profits, and sales are associated with an increased probability of financial distress and negative cashflows. Lower profits may signify challenges in revenue generation, cost management, or overall financial health. Airlines with declining financial performance may struggle to cover their costs.

- Liabilities and Expenses: The positive coefficient associated with an increase in liabilities and expenses indicates a connection to a heightened risk of financial distress. A rise in liabilities and escalating expenses may exert pressure on the financial health of airlines, contributing to an increased risk of financial distress and negative cashflows. Managing and monitoring these liabilities and expenses becomes crucial for maintaining financial stability within the airline industry.

- Market Competition and Economic Factors: The positive coefficients in relation to stronger market competition and economic factors, including increases in fuel prices, taxes, and inflation, suggest a correlation with an elevated probability of financial distress. Intensified competition within the market, coupled with economic challenges such as rising fuel costs, increased taxes, and inflation-induced economic imbalances, collectively contribute to a higher likelihood of financial distress for airlines and negative cashflows. Understanding and addressing these external pressures is essential for navigating the complexities of the aviation industry and maintaining financial resilience.

- Regulatory Compliance and Safety Concerns: The positive coefficients indicating an increase in compliance requirements for regulatory practices and safety concerns are correlated with a heightened risk of financial distress. The imperative to comply with stringent regulatory standards and safety requirements can result in additional costs for airlines, contributing to an increased probability of financial distress. Balancing compliance and safety measures with cost-effectiveness becomes crucial for sustaining financial health and positive cashflows within the aviation industry.

- Political Influence and Government Policies: The negative coefficients associated with lower political influence on the aviation sector and non-favorable government policies indicate an impact on the financial performance of Indian carriers. Reduced political influence and unfavorable government policies can contribute to uncertainties and challenges within the industry. Navigating these political and policy-related factors becomes essential for airlines to enhance financial stability or cash flows and mitigate the potential risks associated with such influences.

The analysis reveals a compelling interplay between various factors and airline financial health. The negative coefficients associated with operational, economic, regulatory, and political variables highlight that these dimensions significantly influence an airline's risk of financial distress and negative cash flow. This implies that airlines should adopt a holistic approach to risk management, considering not only internal operations but also the broader economic, regulatory, and political landscapes. Recognizing and addressing these elements is pivotal for the sustainable financial performance and resilience of airlines in the face of potential challenges.

Table 25: Airline Distress Prediction Model Summary

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	22.663	.559	.749

The model summary statistics provide valuable insights into the relationship between the independent variables and the dependent variable.

In logistic regression analysis, the Cox & Snell R-squared statistic serves as a measure of pseudo-variance explained by the model. This value, in our case at 0.559, indicates that the model explains approximately 55.9% of the variability in the likelihood of financial distress among airlines (the binary outcome variable). It's important to note that the Cox & Snell R-squared is not directly comparable to the R-squared value used in linear regression models, although both serve a similar purpose of explaining variance. A higher R Square indicates a better fit of the model.

Building upon the Cox & Snell R-squared, the Nagelkerke R-squared statistic offers an adjusted measure of explained variance in logistic regression, ranging from 0 to 1. It takes into account the theoretical maximum possible value for the R-squared in a given model. In this study, the Nagelkerke R-squared of 0.749 suggests a strong association between the factors (independent variables) considered and the likelihood of financial distress among airlines. A higher Nagelkerke R Square indicates a better overall fit of the model.

These R Square values demonstrate that the logistic regression model has a substantial ability to explain the variation in financial distress based on the selected independent variables. The statistically significant association highlights the model's ability to leverage the combined influence of the included factors for a robust prediction of financial distress among Indian airlines.

Rejecting the null hypothesis further supports the notion that the independent variables are indeed related to the dependent variable (financial distress), reinforcing the model's validity and reliability in assessing the risk of financial distress for airlines.

Table 26: Predictive Power of Airline Distress Prediction Model

			Predicted Status		
			CashFlow		
	Observed Status		Cashflow (+ve) (non-distress)	Cashflow (-ve) (distress)	Percentage Correct
Step 1	CashFlow	Cashflow (+ve) (non-distress)	4	1	80
		Cashflow (-ve) (distress)	0	2	100
	Overall Percentage				90.8

a. The cut value is .50

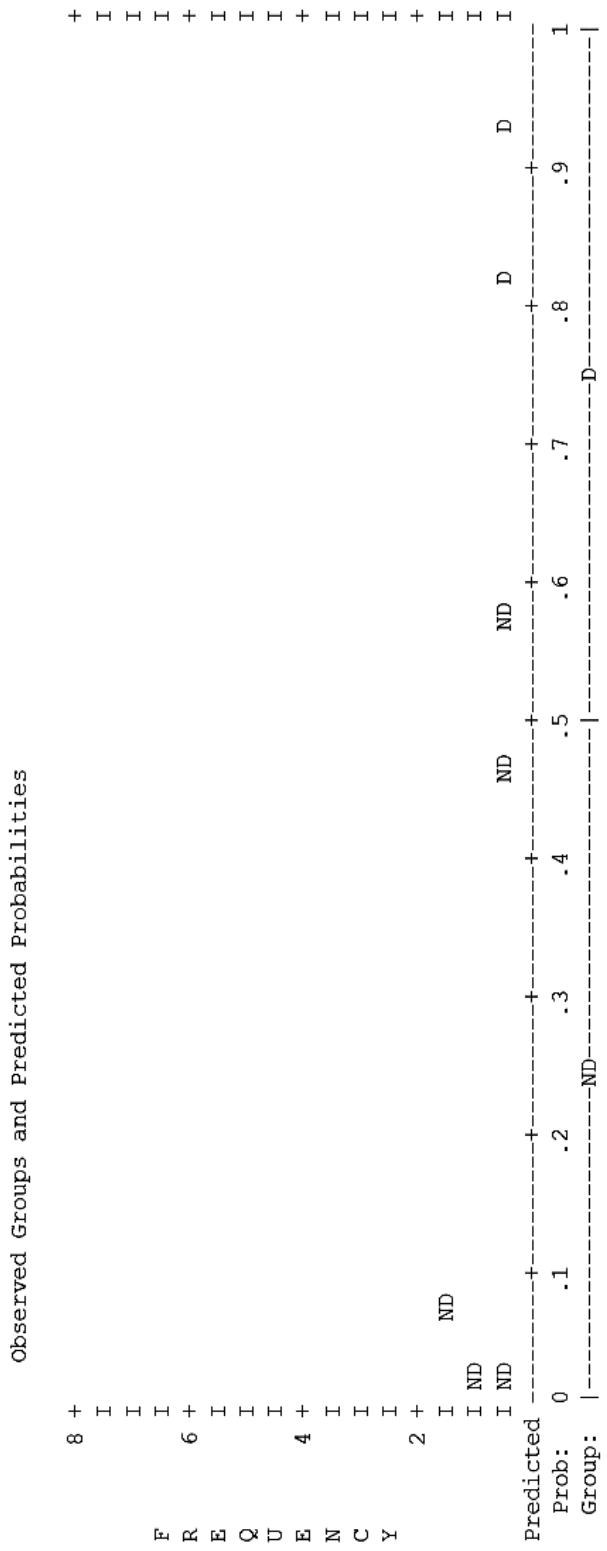
The model achieves an impressive overall accuracy of 90.8%, demonstrating its effectiveness in predicting financial distress among Indian airlines. This performance is particularly noteworthy when compared to traditional benchmark models and industry-specific methods, suggesting the model's superior ability to identify airlines at risk.

Figure 32 visually depicts the distribution of predicted probabilities for financial distress across all cases. Notably, a substantial portion of cases cluster at the opposite ends of the spectrum, indicating strong prediction tendencies. These probabilities range from very low ($p \approx 0.0$) to very high ($p \approx 1.0$). While this concentration signifies a well-performing model, a small number of misclassified cases fall near the classification threshold ($p \approx 0.5$). These borderline cases likely possess characteristics that are ambiguous for financial distress prediction, such as low profits alongside positive financial indicators, or vice versa.

- Distribution of Probabilities: The majority of cases have predicted probabilities that fall into the extreme ends of the spectrum, ranging from $p = 0.0$ to $p = 0.1$ on the left and $p = 0.8$ to $p = 1.0$ on the right. This distribution indicates that the model effectively distinguishes between cases with very low and very high probabilities of a particular outcome, which in this context is likely financial distress.

- Model Performance at Borderline Probabilities: Some misclassified cases are observed near the cut-off value of $p = 0.5$, indicating borderline traits where the distinction between distressed and non-distressed carriers is less clear. These cases may exhibit characteristics that are typical of both distressed and non-distressed carriers, making them challenging to classify accurately.

Figure 32: Observed Groups and Predictive Probabilities of Distress for Indian Carriers



- Borderline Traits: These borderline cases ($p \approx 0.5$) likely represent airlines with financially ambiguous characteristics. For instance, an airline might exhibit low profits, a typical distress indicator, yet possess other financial strengths uncharacteristic of distressed carriers. These borderline traits contribute to the model's challenges in accurately classifying such cases, as they do not clearly align with either category.

- Model Assessment: Examining the distribution of predicted probabilities alongside the identification of misclassified cases near the classification threshold ($p \approx 0.5$) offers valuable insights into the model's performance. The model's ability to effectively differentiate between extreme probabilities suggests its robustness in identifying cases with high confidence levels of financial distress. However, the presence of misclassified cases near the cut-off value highlights areas for potential improvement, particularly in handling borderline traits and enhancing the model's sensitivity and specificity around the decision threshold.

Previous empirical research on bankruptcy prediction models has consistently demonstrated the power of combining multiple variables, even if some variables may not be statistically significant in isolation. The current findings align with this established principle, as the combined influence of the significant factors identified in this study contributes to a strong model for differentiating between financially healthy and distressed airlines in the Indian aviation sector.

The results reveal that a model that incorporates the following statistically significant factors is best suited for predicting financial distress in airlines: Operational Efficiency, Resource Utilization, Profitability, Income Potential, Revenue Growth, Liability Capacity, Market Competition, Regulatory and Safety and Government policies & Political influence.

This research effort sheds light on a critical set of factors that, when considered holistically, offer a comprehensive assessment of an airline's financial health within the Indian context. Leveraging these factors within a logistic regression model yields a highly accurate prediction of financial distress. This achievement underscores the model's significant potential utility for airlines and industry stakeholders seeking to evaluate and manage financial risks within the dynamic Indian aviation sector.

Thus, in this case,

$$p(\text{failure}) = 1 / (1 + e^{-z})$$

Where,

$$Z = \beta_0 + \beta_1 X1 + \beta_2 X2 + \ldots\ldots\ldots\ldots + \beta_n Xn$$

$$\mathbf{Z = 1.876 + (.329)\ X1 + (.052)\ X2 + (.036)\ X3 + .136\ X4 + (.419)\ X5 + .267\ X6 + .133\ X7 + .565\ X8 + (.188)\ X9}$$

And,

X1 = Operational Efficiency
X2 = Resource Utilization
X3 = Profitability
X4 = Income Potential
X5 = Revenue Growth
X6 = Liability Capacity
X7 = Market Competition
X8 = Regulatory and Safety
X9 = Government Policies & Political influence

4.4.3 Evaluating Financial Distress for Indigo and Go First using the New Model

Airline specific data like (annual financial reports, performance metrics, economic reports, etc.) for Indigo and Go First has been collected for the period of 2016 - 2021. These data have been considered for applying in the newly developed distress prediction model and evaluate the financial health condition for both the airlines to validate the accuracy of this new distress prediction model.

Z = 1.876 + (.329) X1 + (.052) X2 + (.036) X3 + .136 X4 + (.419) X5 + .267 X6 + .133 X7 + .565 X8 + (.188) X9

Currently, Indigo is in healthy financial condition and has elevated its position as the 6th largest airline in the world while Go First has filed for bankruptcy due to extreme financial distress.

Table 27: Distress Prediction for Indigo and Go First

Predictive Power of Airline Distress Prediction Model

			Predicted Status		
			CashFlow		
	Observed Status		Cashflow (+ve) (non-distress)	Cashflow (-ve) (distress)	Percentage Correct
Step 1	CashFlow	Cashflow (+ve) (non-distress)	1	0	100
		Cashflow (-ve) (distress)	0	1	100
	Overall Percentage				100

a. The cut value is .50

This new model has correctly predicted the distress condition for both the airlines. Indigo has been predicted as a non-distressed carrier and Go First has been predicted as a highly distressed carrier.

Figure 33: Predictive Probabilities of Distress for Indigo and Go First

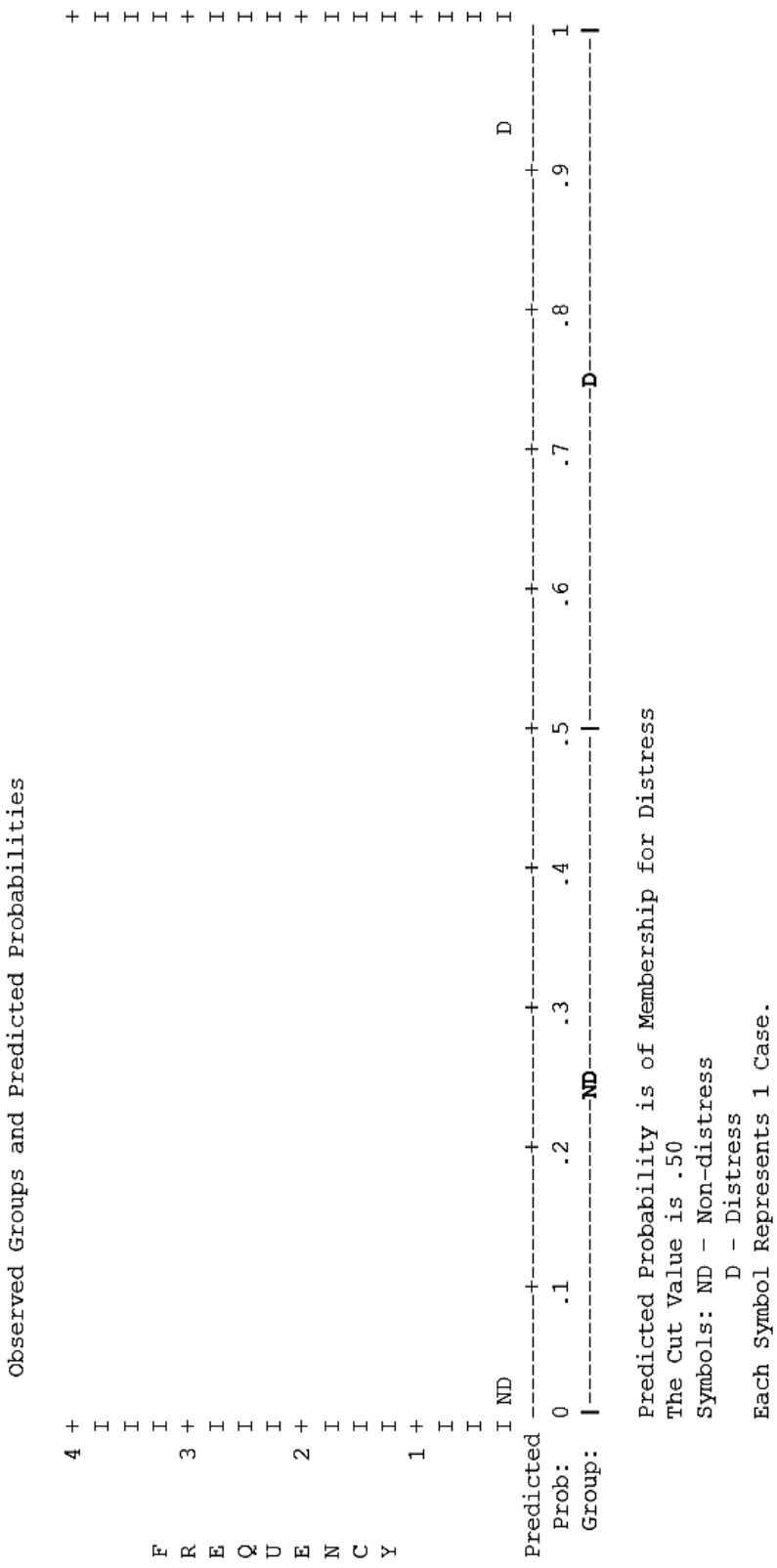


Figure 33 depicts the distribution of observed versus predicted probabilities of financial distress across all cases. The case probability for Indigo is situated in the extreme left range, specifically from p = 0.0 to p = 0.1, while the case probability for Go First falls within the extreme right range, ranging from p = 0.9 to p = 1.0. This distribution confirms the accuracy of the model's predictions, as it successfully places Indigo and Go First in their respective probability ranges with high confidence.

4.4.4 Model Limitations

There are inherent challenges and limitations in achieving perfect prediction capability for any model, particularly in the context of predicting financial distress in carriers. Several factors contribute to the complexity of predicting shifts between non-distress and distress states, creating borderline cases that exhibit characteristics of both conditions in the short- to medium-term.

One significant challenge is the dynamic nature of business environments, where external and internal factors can influence a carrier's financial status. The potential for manipulation of financial data ("creative adjustments") can introduce bias into the sample. This bias may lead the data to be less representative of the true financial health of some firms. While increasing the sample size can help mitigate this issue to a degree, entirely eliminating the risk is challenging.

As a result, a certain degree of misclassification is anticipated, and perfect prediction remains an elusive goal. Recognizing these inherent challenges is crucial for interpreting and contextualizing the results of predictive models, allowing for a more realistic understanding of their capabilities and limitations in the dynamic and complex landscape of the airline industry.

5 CONCLUSION AND RECOMMENDATIONS

The Indian aviation industry is poised for significant growth in the coming years, fueled by a confluence of positive factors:

- Soaring Passenger Demand: The Indian aviation market is experiencing a rapid rise in passenger traffic. A notable 19% surge was observed in 2022, with the trend projected to continue. This surge in demand translates into increased revenue potential for airlines.

- Focus on Efficiency: Airlines are actively implementing strategies to enhance operational efficiency, leading to substantial cost reductions. A prime example is IndiGo, achieving a commendable 10% reduction in fuel consumption in recent years. By streamlining operations, airlines can improve their profit margins and become more competitive.

- Government's Supportive Measures: The Indian government is actively supporting the aviation sector through a series of policy initiatives. To promote affordability and broaden passenger participation in air travel, several measures have been implemented, including tax reductions and the elimination of airport charges for new airlines. These policies aim to bring down the overall cost of flying. This increased affordability is expected to further stimulate passenger demand, creating a positive feedback loop for the industry.

Despite recent improvements, the financial health of Indian airlines remains a cause for concern. The industry continues to struggle with significant debt burdens, casting doubt on the long-term viability of the current profitability trend. It’s very

important to note that the government's relief package, while providing temporary respite, necessitates eventual debt repayment by airlines.

5.1 Conclusion

This research investigates the unique features of the Indian airline industry that exert a significant influence on the financial health and creditworthiness of airlines operating within this sector. A comprehensive analysis identifies specific factors unique to the local airline business, forming the basis for constructing a financial distress assessment model. The model, showcasing a robust prediction capability of 91.7%, outperforms the conventional benchmark models proposed by Beaver (1966) and Altman (1968).

The findings offer valuable insights into the intricate challenges faced by carriers, serving as a resource for industry stakeholders, policymakers, and researchers. This research reinforces the critical importance of adopting a holistic approach to assess and strengthen the financial well-being of commercial airlines.

The Indian commercial airline industry is characterized by a high degree of complexity, as evidenced by the ongoing interplay of diverse internal and external factors that exert a continuous influence on airline financial health. Financial health goes beyond just profitability; it encompasses an airline's ability to sustain itself, grow strategically, and remain resilient in a rapidly changing market.

The insights gleaned from this research offer valuable guidance for Indian carriers. Equipped with insights into the key drivers of financial performance, airlines can strategically deploy their resources and efforts to:

- Conquer Challenges: Proactively address the obstacles that may hinder their financial stability.

- Capitalize on Opportunities: Identify and seize emerging opportunities for growth and profitability.

- Thrive in Competition: Develop strategies to gain a competitive edge and achieve long-term success in the Indian aviation market.

Study findings highlighted the significance of factors such as lower operational efficiency, reduced resource utilization, decreased profitability, and unfavorable economic conditions in shaping financial vulnerabilities. Moreover, the positive coefficients associated with market competition, economic imbalances, regulatory compliance, safety concerns, and government policies emphasized the multifaceted challenges faced by airlines in India.

To fortify their financial foundations, carriers must proactively seek partnerships, leverage technological advancements, optimize operations, and stay attuned to the broader economic and regulatory landscape. By adopting this strategic approach, airlines can not only ensure their own long-term financial resilience but also establish themselves as vital drivers of the nation's economic growth and enhanced connectivity.

By providing a comprehensive understanding of the Indian commercial airline landscape, this analysis equips decision-makers and stakeholders with valuable insights for strategic planning, risk management, and financial decision-making. By providing in-depth insights into the factors impacting financial performance, this research empowers them to make strategic choices that will contribute to the industry's long-term success.

These choices, informed by the data and analysis presented here, have the potential to:

- Enhance Stability: By understanding the key drivers of financial health, airlines can develop proactive strategies to mitigate risks and optimize their operations for long-term success.

- Fuel Growth: The research highlights opportunities for airlines to capitalize on emerging trends and expand their market share, fostering overall industry growth.

- Promote Collaboration: The findings can spark valuable discussions and collaborations among stakeholders, leading to a more robust and resilient aviation sector in India.

The creation of a financial distress prediction model for commercial carriers in India holds significant ramifications for the country's aviation sector. This research addresses the crucial challenge of identifying and mitigating financial distress, given the intricate interplay of economic, operational, and regulatory factors impacting airlines. Through meticulous analysis and modeling, the research highlights key indicators and variables contributing to financial distress in this sector.

It's crucial to emphasize that the identification of financial distress does not inevitably result in bankruptcy. Rather, it serves as an indication of a potential risk of future failure. The outcome is not predetermined, and companies, with proactive measures and strategic interventions, can reverse the trajectory of distress. This proactive response may come from internal actions taken by the company itself or external interventions, including supportive measures initiated by the government.

Recognizing financial distress or weak performance early provides an opportunity for organizations to implement corrective measures, adjust strategies, and make informed decisions aimed at improving financial health. Governments, regulators,

and industry stakeholders also play a significant role in supporting distressed companies through policies, financial assistance, or other interventions that contribute to the recovery and sustainability of businesses.

In essence, the identification of financial distress should be viewed as an early warning signal, prompting timely and targeted interventions to mitigate risks and enhance the prospects of financial recovery. This perspective aligns with the notion that challenges can be addressed through adaptive strategies and collaborative efforts, potentially averting the more severe outcome of bankruptcy.

In conclusion, this Distress Prediction Model serves as a significant contribution to the industry by offering a nuanced understanding of financial health determinants. This study contributes to the ongoing discourse on financial risk management within the aviation sector and provides a foundation for strategic decision-making. Moving forward, continuous monitoring, adaptation to changing economic landscapes, and proactive risk mitigation strategies will be essential for enhancing the resilience and sustainable growth of the Indian Aviation Industry.

5.2 Recommendations

The study emphasizes the need for comprehensive risk assessment and proactive management strategies within Indian commercial carriers. The predictive model, developed using historical data encompassing financial, operational, performance, market, regulatory, safety, government, and political influence factors, provides a valuable tool for decision-makers and stakeholders to foresee financial challenges and implement timely interventions. This model extends its value beyond Chief Financial Officers (CFOs). All C-suite executives (CXOs) can leverage it to gain insights into how their specific functional areas can influence a company's financial health. By identifying potential challenges in advance, airlines can take informed measures to optimize their financial health, enhance operational efficiency, negotiate favorable financing terms, and adapt to evolving market dynamics.

However, it is crucial to recognize the inherent limitations of any predictive model. The aviation industry is characterized by its dynamism and vulnerability to unforeseen external disruptions, rendering historical data potentially insufficient for comprehensive risk assessment. Therefore, continuous refinement and validation of the model are essential to ensure its accuracy and relevance over time. Additionally, the successful implementation of the model relies on real-time data availability, robust risk management protocols, and a proactive organizational culture that values predictive insights.

The recommendations stemming from this study are as follows:

- Continuous Model Enhancement: Regularly update and refine the predictive model to incorporate new data and adapt to evolving industry trends. This continuous improvement will enhance prediction accuracy and maintain the model's relevance in different economic scenarios.

- Integration of Real-time Data: Implement mechanisms to incorporate real-time data sources into the predictive model. This integration will enable the prompt identification of emerging financial distress indicators, empowering airlines to promptly undertake corrective measures.

- Collaboration and Industry Benchmarks: Foster collaboration among industry stakeholders, regulatory bodies, and financial institutions to establish industry-wide benchmarks for financial health. These benchmarks will offer a comprehensive context for evaluating airlines' performance and assessing distress risk.

- Strategies for Risk Mitigation: Formulate contingency plans and strategies for mitigating risks based on the forecasts provided by the model. All such plans should encompass a combination of short-term measures for

immediate relief and long-term strategic adjustments for sustainable improvement.

- Employee Training and Communication: Provide training for employees at all levels to understand the significance of financial health and distress indicators. Effective communication and shared understanding will empower the entire organization to contribute to risk management efforts.

- Scenario Planning: Incorporate scenario planning exercises that leverage the predictive model's insights. This proactive approach will help airlines anticipate potential distress scenarios and formulate preemptive strategies.

In conclusion, development of this tailored financial distress prediction model for Indian commercial carriers represents a significant leap forward. By empowering stakeholders with a proactive risk assessment tool, this model strengthens the industry's resilience against potential financial crises. By embracing these recommendations and committing to data-driven decision-making, airlines can navigate uncertainties more effectively, ensuring sustainable growth in the dynamic aviation landscape. The expectation is that the insights and recommendations presented will encourage additional discussions, research, and initiatives aimed at nurturing a flourishing, sustainable, and financially resilient scheduled carriers in the country.

5.3 Contribution to Theoretical Premise

5.3.1 Theoretical Gap

The literature review explored various established financial frameworks that can be applied to assess airline financial performance. These frameworks can be broadly categorized as follows:

- Liquidity-Focused Frameworks:

- Liquidity and Profitability Theory: This Theory posits that a company's financial well-being is contingent upon achieving profitability while maintaining sufficient liquidity to meet its short-term financial commitments.

- Cash Management Theory: This theory emphasizes strategies for airlines to optimize their cash flow through effective management of both cash inflows and outflows. This ensures the availability of sufficient liquid assets to meet current operational expenses.

- Liquidity Risk Theory: This theory highlights the importance of managing cash flow effectively to avoid the risk of airlines defaulting on short-term financial commitments due to inadequate liquidity.

- Balance Sheet-Based Frameworks:
  - Balance Sheet Decomposition Measure: This framework involves analysing the components of an airline's balance sheet (assets, liabilities, and equity) to identify potential areas of financial vulnerability. Significant changes in these components can signal potential financial distress.

These frameworks often consider a combination of factors, including:

- Macroeconomic variables: External economic variables like interest rates, inflation, and economic growth, exert a significant influence on carrier's financial health.

- Cash flow discrepancies: Significant imbalances between an airline's cash inflows and outflows can pose financial challenges.

- Balance sheet alterations: Major changes in the composition of an airline's balance sheet can indicate potential financial stress.

The Liquid Asset Theory highlights the importance of cash flow monitoring as a risk management tool for assessing a company's financial health, particularly for airlines that are susceptible to cash flow fluctuations. This theory highlights the danger of a negative net cash flow or profit in the current year. When this happens, an airline might fall into a state of technical insolvency.

A state of technical insolvency signifies a company's current inability to meet its short-term financial commitments. In layman's terms, this means the airline doesn't have sufficient liquid assets readily available to settle its outstanding bills and ongoing expenses. This situation arises from a liquidity shortfall, where cash outflows exceed inflows. The Liquid Asset Theory underscores the importance of effective cash flow management. This involves carefully balancing cash inflows and outflows to maintain sufficient liquidity. Here's a breakdown of what this entails:

- Cash Inflows: Airlines need to forecast and manage the incoming cash from various sources such as ticket sales, revenue from investments, and any financing activities (e.g., loans).

- Cash Outflows: It's crucial to estimate and manage the outgoing cash used for various purposes, including operational expenses (e.g., fuel, salaries), servicing existing debt obligations (e.g., loan repayments, interest), and any capital expenditures (e.g., purchasing new aircraft).

While prior research addresses various theories of financial distress, encompassing factors such as profitability, liquidity, debt, and changes in balance sheet composition, a significant gap existed in examining the collective influence of financial and non-financial factors on cash flows.

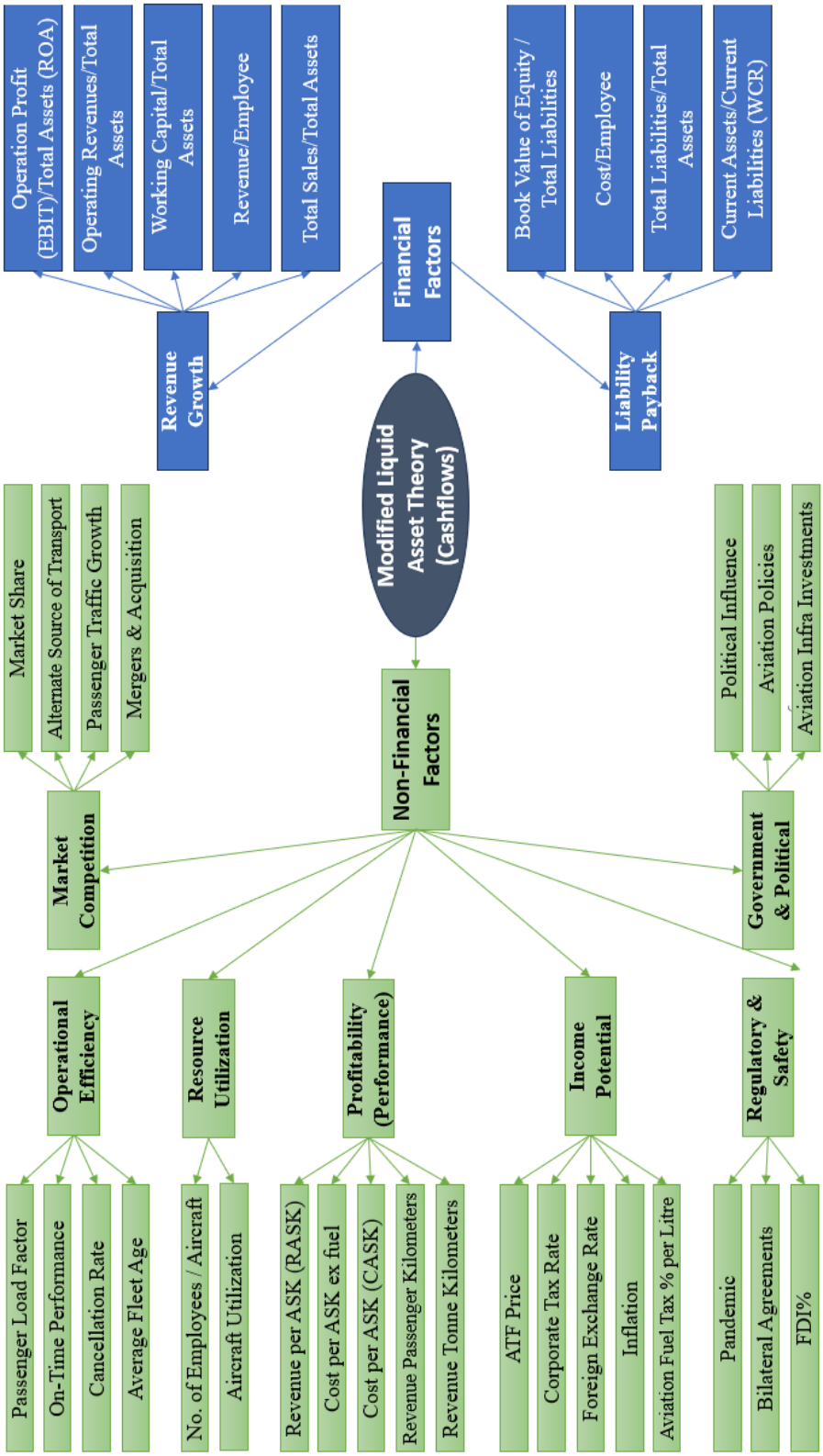
The interplay between non-financial factors, cash flow, and operational insolvency in airlines remained under-investigated. This highlights the need for a holistic approach that considers both financial and non-financial factors when assessing airline financial health.

5.3.2 Research Contribution – Modified Liquid Asset Theory

This study seeks to enhance the Liquid Asset Theory by presenting a novel perspective on the collective influence of both financial and non-financial factors on a scheduled carrier's cash flow, ultimately resulting in financial distress. The research establishes a nuanced relationship between cash flow and a comprehensive set of variables, encompassing both financial and non-financial aspects that significantly influence a firm's financial well-being. Specifically, the study identifies Operational Efficiency, Resource Utilization, Profitability, Revenue Growth, and Government and Political factors as having a negative coefficient relationship with a company's cash flow. However, Liabilities, Income Potential, Market, Regulatory, and Safety factors exhibit a positive coefficient relationship with cash flows.

The negative coefficients suggest that lower operational efficiency, reduced resource utilization, diminished profitability, and lower revenue realization from operating revenues, profits, and sales contribute an increased likelihood of encountering financial distress, resulting in potential negative cash flow. Conversely, an increase in liabilities and expenses, heightened market competition (e.g., new carriers or entry of foreign carriers), rising aviation fuel prices, taxes, inflation causing economic imbalances, increased compliance for regulatory practices, and safety concerns are linked to an elevated probability of financial distress and negative cash flows. Additionally, less political influence on the aviation sector and unfavourable government policies are identified as factors that also influences the financial health of India carriers.

Figure 34: Modified Liquid Asset Theory



Proactive cash flow forecasting is a key element of the Liquid Asset Theory. Forecasting future cash flow empowers organizations to proactively manage their liquidity position. This allows them to optimize their readily available cash reserves, ensuring they have sufficient funds to meet upcoming obligations resulting in better cash flow management and risk mitigation of cash shortages or liquidity crises.

The outcomes of this research are anticipated to be highly valuable for various stakeholders, including airline management, investors, shareholders, financial institutions, analysts, and suppliers. The robust predictive model developed in this research offers a significant advancement for Indian carriers. It empowers stakeholders with the ability to proactively identify potential financial distress, enabling them to make data-driven decisions to safeguard the financial health of their carriers.

5.4 Contribution to Research

Traditionally, airline financial health assessments relied heavily on financial factors, while a few recent investigations have incorporated selected non-financial factors for assessing the financial health of airlines. Widely recognized models like Altman's Z-Score, Pilarski's P-Score, Fuzzy Logic, or Krueze Models have been employed in these studies.

This research endeavours to stand out by identifying key factors unique to India that influence the financial performance of Indian carriers. It involves a comprehensive evaluation of an exhaustive list of operational, economic, performance, financial, regulatory, and government policy factors, which were not considered in earlier research.

The study's distinctive contribution lies in the development of a new India-specific Airline Distress Predictor Model. This model is built on a broader and more accurate foundation of identified significant factors, utilizing a Conditional Probability Approach. This research employs a multifaceted approach to offer a rich and thorough understanding of the diverse factors shaping the financial health of Indian carriers.

5.5 Contribution to Industry

The core contribution of this research lies in the creation of an innovative Airline Distress Predictor Model specifically tailored for the Indian context. The findings are expected to hold significant value for a wide range of stakeholders, including airline management, investors, shareholders, financial institutions, analysts, and suppliers. This predictive model will serve as a robust tool for assessing the financial well-being of Indian carriers and proactively identifying potential distress, thereby facilitating timely and informed decision-making.

The creation of a bespoke financial distress prediction model for Indian carriers signifies a pivotal step in bolstering the industry's capacity to withstand future financial hardships. The insights and recommendations offered by this model are anticipated to be particularly beneficial for all CXOs (CMO, CFO, CIO, CDO, CCO, etc.), empowering them to explore the impact of function-specific variables on financial distress.

By embracing these recommendations and prioritizing data-driven decision-making, airlines can effectively navigate uncertainties, ensuring sustainable growth in the ever-evolving aviation landscape. It is expected that the insights and recommendations presented will stimulate additional discussions, research, and initiatives aimed at cultivating a flourishing, sustainable, and financially resilient commercial carrier industry in India.

5.6 Limitations of Study

The current study focuses solely on significant factors pertinent to the Indian aviation sector, utilizing data exclusively from Indian scheduled carriers.

5.7 Scope for Future Research

Since the current study is limited to significant factors related to Indian aviation sector, future research endeavours can explore the development of financial distress predictor models for international carriers, spanning both developed and developing countries worldwide. By leveraging airline data from various countries, researchers can investigate the uniformity in influencing factors identified in the current study and assess their applicability across diverse global contexts. This kind of comparative analysis can offer valuable insights into the commonalities and variations within the factors that contribute to airline financial distress.

Furthermore, this developed model could serve as a foundation for exploring its application in other industries beyond aviation. Testing the model's accuracy in predicting financial distress for different sectors could contribute to understanding the broader applicability and robustness of the predictive framework. Expanding the research focus to encompass various industries offers the potential to illuminate the unique challenges and dynamics that influence financial distress in each sector. This will ultimately lead to a more nuanced understanding of how to predict financial problems across the economy.

6 BIBLIOGRAPHY

Altman, E., & Hotchkiss, E. (2006). *Corporate financial distress and bankruptcy: Predict and avoid bankruptcy, analyze and invest in distressed debt* (3rd ed.). Hoboken, NJ: Wiley Finance.

Altman, E. I. (1968). Financial ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *Journal of Finance*, 23(X), 589-609.

Altman, E. (1983). *Corporate Financial Distress: A Complete Guide to Predicting, Avoiding and Dealing with Bankruptcy*. New York. John Wiley & Sons.

Altman, E. & Gritta, R. (1984). Airline Bankruptcy Propensities: A ZETA Analysis. *Journal of the Transportation Research Forum*, 25(1), 150-154.

Altman, E. (1984). The Success of Business Failure Prediction Models. *Journal of Banking and Finance*, 8, 171-198.

Altman, E., Marco, G. and Varetto, F. (1994). Corporate distress diagnosis: Comparisons using linear discriminant analysis and neural networks. *Journal of Banking and Finance*, 18, 505–529.

Altman, E. (1983). Multidimensional graphics and bankruptcy prediction: A comment. *Journal of Accounting Research*, 21, 297–299.

Altman, E.I., Iwanicz-Drozdowska, M., Laitinen, E.K. and Suvas, A. (2016). Financial and non-financial variables as long-horizon predictors of bankruptcy. *Journal of Credit Risk*, Vol. 12, No. 4.

Asquith (1991). Anatomy of financial distress: an examination of junk bond issuers. National Bureau of Economic Research. [Working Paper No. 3942]

Avenhuis, J.O. (2013). Testing the generalizability of the bankruptcy prediction models of Altman, Ohlson, and Zmijewski for Dutch listed and large non-listed firms [Unpublished master's thesis, University of Twente].

Adnan Aziz, M., & Dar, H. A. (2006). Predicting corporate bankruptcy: Where we stand? *Corporate Governance*, 6(1), 18–33

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., & Williams, J. M. G. (2008). Construct validity of the five-facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment*, 15(3), 329-342.

Bandyopadhya, A. (2006). Predicting probability of default of Indian corporate bonds: logistic and Z-score model approaches. *Journal of Risk Finance*, 255-272.

Bapat, V. and Nagale, A. (2014). Comparison of bankruptcy prediction models: evidence from India. *Accounting and Finance Research*, 3(4), 91.

Barki, G. & Halageri, S. (2014). Analysis of financial strength of select firms from Indian Textiles Industry using Altman's 'Z' Score Analysis. *Acme Intellects*

International Journal of Research in Management, Social Sciences & Technology, 5(5).

Barla, P., Koo, B. (1999). Bankruptcy protection and pricing strategies in the US airline industry. *Transportation Research*, 35, 101–120

Beaver, W. (1966). Financial ratios as predictors of failure. *Journal of Accounting Research*, 4, 71-111. https://doi.org/10.2307/2490171

Behera, B. (2016). Indian aviation industry: issues and challenges in post-reform era. *Splint International Journal of Professionals*, 3(2), 58.

Behn, B.K. and Riley, R.A. (1999). Using non-financial information to predict financial performance: The case of the US airline industry. *Journal of Accountancy and Auditing Finance*, 14(1), 29–56.

Borenstein, S. and Rose, N. (1995). Bankruptcy and pricing behavior in us airline markets. The American Economic Review, 85(2), 397-402.

Borenstein, S. and Rose, N. (2003). The impact of bankruptcy on airline service levels. *The American Economic Review*, 93(2), 415-419

Bose, I. (2006). Deciding the financial health of dot-coms using rough sets. *Information Management*, 43(5), 835–846.

Busse, M. (2002). Firm financial condition and airline price wars. *The Rand Journal of Economics*, 33(2), 298-319.

Chang, Y.H. and Yeh, C.H. (2001). Evaluating airline competitiveness using multi-attribute decision making. *Omega*, 29(5), 405–415.

Chatterjee, S., Dhillon, U.S., Ramirez, G.G. (1996). Resolution of financial distress: Debt restructurings via chapter 11, prepackaged bankruptcies, and workouts. *Financial Management*, 25(1), 5-18.

Chen, H.J., Huang, S.Y. and Lin, C.S. (2009). Alternative Diagnosis of Corporate Bankruptcy: A Neuro Fuzzy Approach. *Expert Systems with Applications*, 36(4), 7710-7720. https://doi.org/10.1016/j.eswa.2008.09.023

Chevalier, J. and Scharfstein, D. (1996). Capital-market imperfections and counter-cyclical markups: Theory and evidence. *The American Economic Review*, 86(4), 703-726.

Chow, C.K.W. and Tsui, W.H.K. (2017). Organizational learning, operating costs and airline consolidation policy in the Chinese airline industry. *Journal of Air Transport Management*, 63, 108–118.

Chow, G., Gritta, R. & Leung, E. (1991). A New Approach to Forecasting Financial Distress in Air Transportation: The AIRSCORE Model. *Journal of the Transportation Research Forum*, XXXI (2), 371-376.

Chow, G., Gritta, R. and Leung, E. (1991). A multiple discriminant analysis approach to gauging air carrier bankruptcy propensities: the AIRSCORE model. *Journal of the Transportation Research Forum*, 1(2), 371–377.

Chun, S-H. and Park, Y-J. (2006). A new hybrid data mining technique using a regression case-based reasoning: application to financial forecasting. Expert System Appl., Vol. 30, No. 2, pp.329–336.

Cielen, A., Peeters, L. and Vanhoof, K. (2004). Bankruptcy prediction using a data envelopment analysis. *European Journal of Operation Research*, 2, 526–532.

Davalos, S., Gritta, R. & Chow, G. (1999). The Application of Neural Network Approach to Predicting Bankruptcy Risks facing the Major US Carriers: 1979-1996. *Journal of Air Transport Management*, 5(2), 81-86. https://doi.org/10.1016/S0969-6997(98)00042-8

Debnath, B., Shantharam, S.A., Dwarampudi, A.R. and Vidya, D.S. (2020). A Study on the Causes of Financial Crisis in the Indian Aviation Industry with Special Reference To – Kingfisher Airlines (2020). *Journal of Management*, 7(1), 28–41.

DGCA Report (2011–2020). *Hand Book on Civil Aviation Statistics*. [online] http://dgca.nic.in/ pub/Handbook_2019-20.pdf

Edmister, R. O. (1972). An empirical test of financial ratio analysis for small business failure prediction. *Journal of Financial and Quantitative Analysis*, 7(2), 1477-1493.

Field, A. (2013). Discovering statistics using IBM SPSS statistics (4th ed.). *SAGE Publications.*

Frederikslust, R. A. I. (1978). *Predictability of corporate failure*. Martinus Nijhof Social Division.

Fulmer Jr., J.G., Moon, J.E., Gavin, T.A. and Erwin, M.J. (1984). A bankruptcy classification model for small firms. *Journal of Commercial Bank Lending*, 66(11), 25–37.

Fung, M. K. Y., Law, J. S., & Ng, L. W. K. (2006). Economic contribution to Hong Kong of the aviation sector: A value-added approach. *Chinese Economy*, 39(6), 19-38. https://doi.org/10.2753/CES1097-1475390602

Garg, C.P. (2016). A robust hybrid decision model for evaluation and selection of the strategic alliance partner in the airline industry. *Journal of Air Transport Management*, 52, 55–66.

Garg, C.P., Sharma, A. and Goyal, G. (2017). A hybrid decision model to evaluate critical factors for successful adoption of GSCM practices under fuzzy environment. *Uncertain Supply Chain Management*, 5(1), 59–70.

Gepp, A. & Kumar, K. (2008). The Role of Survival Analysis in Financial Distress Prediction. *International Research Journal of Finance and Economics*, 16, 14-34.

Ghosh, S., and J. Jintanapakanont. (2004). Identifying and assessing the critical risk factors in an underground rail project in Thailand: A factor analysis approach. *International Journal of Project Management.* 22 (8), 633-643. https://doi.org/10.1016/j.ijproman.2004.05.004

Goodfriend, J., Gritta, R., Adrangi, B. & Davalos, S. (2004). Assessing the Financial Condition of the Major U.S. Passenger Airlines Over the 1993-2003 Period Using the P Score and Z″ Score Discriminant Models. *Credit and Financial Management Review*, 10(4).

Gritta, R. D. (1982). Bankruptcy Risks Facing the Major U.S. Airlines. *Journal of Air Law & Commerce*, 40(7), 89-108.

Gritta, R. D., Adrangi, B., Davalos, S. & Bright, D. (2006). A review of the history of air carrier bankruptcy forecasting and the application of various models to the U.S. airline industry: 1980-2005. Paper presented at the XIV International Economic History Congress, Helsinki, Finland.

https://doi.org/10.2469/faj.v30.n2.47

Gritta, R. D., Chow, G. & Lippman, E. (1995). The Impact of the Capitalization of Leases on Financial Analysis: An Issue Revisited. *Logistics and Transportation Review*. 30 (2), 189-202.

Gritta, R. D., Wang, M., Davalos, S. & Chow, G. (2000). Forecasting small air carrier bankruptcies using a Neural Network Approach. *Journal of Financial Management and Analysis*, 13(1), 44-49.

Gudmundsson, S. V. (2002). Airline Distress Prediction Using Non-Financial Indicators. *Journal of Air Transportation*, 7(2), 3-24.

Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological Bulletin*, 103(2), 265–275.

https://doi.org/10.1037/0033-2909.103.2.265

Gudmundsson, S. V. (2002). Airline Distress Prediction Using Non-Financial Indicators. *Journal of Air Transportation*, 7(2), 3-24.

Gupta, H., Prakash, C., Vishwakarma, V. and Barua, M.K. (2017). 'Evaluating TQM adoption success factors to improve Indian MSMEs performance using fuzzy DEMATEL approach. *International Journal of Productivity and Quality Management*, 21, (2), 187–202.

Hua, Z., Wang, Y., Xu, X., Zhang, B. and Liang, L. (2007). Predicting corporate financial distress based on the integration of support vector machine and logistic regression. *Expert Syst. Appl*., 33(2), 434–440.

Hendel, I. 1996. Competition under financial distress. *Journal of Industrial Economics*, 44(3), 309-324.

Hofer, C., Dresner, M., Windle, R. (2005). Financial distress and US air fares. *Journal of Transport Economics and Policy*, 39(3), 323-340.

Hofer, C., Dresner, M., Windle, R. (2009). The impact of airline financial distress on US air fares: A contingency approach. *Transportation Research Part E*, 45, 238-249.

Hotchkiss, E., John, K., Mooradian, R., Thorburn, K. (2008). Handbook of Empirical Corporate Finance. *Elsevier B.V.*, 2-53.

Hui, X-F. and Sun, J. (2006). An application of support vector machine to companies' financial distress prediction. *Artificial Intelligence*, 5, 274–282.

Jayaraman, A. R. & Srinivasan, M. R. (2014). Performance evaluation of banks in India: A Shannon–DEA approach. *Eurasian Journal of Business and Economics*, 7, 51–68.

Jones, S. & Hensher, D. A. (2004). Predicting Firm Financial Distress: A Mixed Logit Model. *The Accounting Review*, 79(4), 1011-1038. https://doi.org/10.2308/accr.2004.79.4.1011

Kennedy, R. (2000). The effect of bankruptcy filings on rivals' operating performance: Evidence from 51 large bankruptcies. *International Journal of the Economics of Business*, 7(1), 5- 25.

Kline, P. (1994). *An Easy Guide to Factor Analysis*. Abingdon-on-Thames: Routledge.

Kochher, P. (2010). *Indian Aviation Industry – a Disaster Waiting to Happen. An Economic Analysis*, SSRN: https://ssrn.com/abstract=2604243 [online] http://dx.doi.org/10.2139/ssrn.

Krishnan, R.T (2008). The Indian Airline Industry in 2008. In Vol. 2.0/1.7 [Indian Institute of Management Bangalore].1–36.

Kulkarni, S. (2018). Analysis of Z score for BSE Listed Airline Companies in India, *Paridnya – The MIBM Research Journal*, 6(1), Online ISSN No. 2457-0281.

Kumar, M. & Anand, M. (2013). Assessing Financial Health of a Firm Using Altman's Original and Revised Z-Score Models: A Case of Kingfisher Airlines Ltd (India). *Journal of Applied Management and Investment*, 2(1), 36-48.

Kumar, D. and Garg, C.P. (2017). Evaluating sustainable supply chain indicators using fuzzy AHP: case of Indian automotive industry. *Benchmarking: An International Journal*, 24(6), 1742–1766.

Lin, H-W.W., Lo, H-C. and Wu, R-S. (2016). Modeling default prediction with earnings management. *Pacific-Basin Finance Journal*, 40, 306–322.

Liu, C. (2009). Entry behavior and financial distress: An empirical analysis of the US domestic airline industry. *Journal of Transport Economics and Policy*, 43(2), 237-340.

Lukic, R. (2014). Analysis of the efficiency of small independent retailers in Serbia. *Eurasian Journal of Business and Economics*, *7*(13), 91-103.

Madrid-Guijarro, A., García-Pérez-de-Lema, D. and Van Auken, H. (2011). An analysis of non-financial factors associated with financial distress. *Entrepreneurship and Regional Development*, 23 (3–4), 159–186.

Mahtani, U.S. and Garg, C.P. (2018). An analysis of key factors of financial distress in airline companies in India using fuzzy AHP framework. *Transportation Research Part A: Policy and Practice*, 117, 87–102.

Mahtani, U.S. and Garg, C.P. (2020). An analysis of factors affecting financial distress of airline companies: case of India. *International Journal of Business Excellence*, 20(1), 30–148.

Manzaneque, M., Priego, A.M. and Merino, E. (2016). Corporate governance effect on financial distress likelihood: evidence from Spain. *Spanish Accounting Review*, 19(1), 111–121.

Martin, D. (1977). Early warning of bank failure. *Journal of Banking and Finance*, 1, 247-276.

Nair, J. (2013). A performance analysis and solvency prediction of Indian pharma companies. International Journal of Marketing, *Financial Services & Management Research*, 2(5).

Nanayakkara, K.G.M. and Azeez, A.A. (2015). Predicting corporate financial distress in Sri Lanka: an extension to Z-score model. *International Journal of Business and Social Research*, 5(3), 41–56.

Nunnally, J. C. (1978). *Psychometric Theory (2nd ed.)*. New York: McGraw-Hill.

Odom, M. and Sharda, R. (1990). A neural network for bankruptcy prediction', In International Joint Conference on Neural Networks (Vol. 2, pp. 163-168). CA: IEEE.

Ohlson, J. A. (1980). Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of Accounting Research*, 18(1), 109-131. https://doi.org/10.2307/2490395

Oum, T. H. & Yu, C. (1998). An analysis of profitability of the world's major airlines. *Journal of Air Transport Management*, 4, 12-45.

Pandey, S.L.D. & Rathore, G.S. (2013). An Analysis of Bankruptcy in Indian Aviation Infrastructure Firms. *The Indian Journal of Commerce*, 66(3), 238-252.

Panigrahi, A. (2019). Validity of Altman's "Z" Score Model in Predicting Financial Distress of Pharmaceutical Companies. *NMIMS Journal of Economics and Public Policy*, 4(1).

Pathak, A.A. (2015). Survival lessons from a dying kingfisher – What not to do in the airline's industry in India. *Strategic Direction*, 31(8), 13–16, doi:10.1108/SD-06-2015-0086.

Payne, D., Hogg, M. (1994). Three perspectives of chapter 11 bankruptcy: Legal, managerial, and moral. *Journal of Business Ethics*, 13(1), 21-30.

Pilarski, A., & Dinh, T. (1999). Numerical Scoring Approach to Credit Risk Analysis. *Handbook of Airline Finance,* 329-342. New York: McGraw-Hill.

Prakash, C. and Barua, M.K. (2016a). An analysis of integrated robust hybrid model for third-party reverse logistics partner selection under fuzzy environment. *Resources, Conservation & Recycling*, 108, 63–81.

Prakash, C. and Barua, M.K. (2016b). A combined MCDM approach for evaluation and selection of third-party reverse logistics partner for Indian electronics industry. *Sustainable Production and Consumption*, 7, 66–78.

Prakash, C. and Barua, M.K. (2016c). A robust multi-criteria decision-making framework for evaluation of the airport service quality enablers for ranking the airports. *Journal of Quality Assurance in Hospitality & Tourism*, 17(3), 351–370.

Prakash, C. and Barua, M.K. (2016d). A multi-criteria decision-making approach for prioritizing reverse logistics adoption barriers under fuzzy environment: case of Indian electronics industry. *Global Business Review*, 17(5), 1–18.

Prakash, C. and Barua, M.K. (2017). Flexible modelling approach for evaluating reverse logistics adoption barriers using fuzzy AHP and IRP framework. *International Journal of Operational Research*, 30(2), 151–171.

Rusticus, S. (2014). Content Validity. In: Michalos, A.C. (Ed.) *Encyclopedia of Quality of Life and Well-Being Research* (Vol. X). Springer, Dordrecht.

Safiuddin, S.K. (2017). Prediction of Insolvency-A Study of Select Companies in Indian Aviation Industry. *International Research Journal of Management Science & Technology*, 8(10), 304-309.

Santomero, A & J. Vinso (1977). Estimating the Probability of Failure for Firms in the Banking System. *Journal of Banking and Finance*, 1, 185-205.

Sapnas, K. G., & Zeller, R. A. (2002). Minimizing sample size when using exploratory factor analysis for measurement. *Journal of nursing measurement*, *10*(2), 135–154. https://doi.org/10.1891/jnum.10.2.135.52552

Sireci, S. G. (1998). Gathering and analyzing content validity data. *Educational Assessment*, 5(4), 299–321. https://doi.org/10.1207/s15326977ea0504_2

Scott J.T. (1981). The probability of bankruptcy: a comparison of empirical predictions and theoretical models. *Journal of Banking and Finance*. 5.

Sengar, V.S., Garg, C.P. and Raju, T.B. (2018). Assessment of sustainable initiatives in Indian ports using AHP framework. *International Journal of Business Excellence*, 16(1), 110–126.

Shetty, U., Pakkala, T.P.M. and Mallikarjunappa, T. (2012). A modified directional distance formulation of DEA to assess bankruptcy: an application to IT/ITES companies in India. *Expert Systems with Applications*, 39(2), 1988–1997.

Shi, Y., Li, X. & Asal, M. (2023). Impact of sustainability on financial distress in the air transport industry: the moderating effect of Asia–Pacific. *Financial Innovation*, 9(1), 97. https://doi.org/10.1186/s40854-023-00506-1

Shome, S., & Verma, S. (2020). Financial distress in Indian aviation industry: Investigation using bankruptcy prediction models. *Eurasian Journal of Business and Economics*, 13(25), 91-109.

Silva, V., Respico A. Spiritu Santo, S. and L. da Silva Portugal (2005). *Using the "Hybrid Financial Statement Analysis Technique" to rate and monitor airlines' Financial Status*. Paper presented at the World Conference on Transport Research of the Air Transportation Research Society, Brazil.

Singh, B.P. and Mishra, A.K. (2016). Re-estimation and comparisons of alternative accounting-based bankruptcy prediction models for Indian companies. *Financial Innovation*, 2(6), 6.

Springate, G.L. (1978). Predicting the possibility of failure in a Canadian firm, Unpublished research project, Simon Fraser University.

Sudarsanam, S., Lai, J. (2001). Corporate financial distress and turnaround strategies: An empirical analysis. *British Journal of Management*, 12(3), 183-199.

Tabash, M. I., Senan, N.A.M., Ahmad, A., Anagreh, S. and Al-Homaidi, E.A., (2021). An empirical analysis of financial leverage and financial performance: Empirical evidence from Indian listed firms. *Investment Management and Financial Innovations*, 18(2), 322-334

Tam, K.Y. and Kiang, M. (1992). Predicting bank failures: a neural network approach. *Decision Science*, 23, 926–947.

Tavakol, M., & Dennick, R. (2011). Making Sense of Cronbach's Alpha. *International Journal of Medical Education*, 2, 53-55.

Tay, F.E.H. and Shen, L. (2002). Economic and financial prediction using rough set model. *European Journal of Operations Research*, 141, 641–659.

Tinoco, M.H. and Wilson, N. (2013). Financial distress and bankruptcy prediction among listed companies using accounting, market and macroeconomic variables. International Review of Financial Analysis, 30, 394–419.

Tyagi, V. & Datta, M. (2017). Bankruptcy Potential of Indian Aviation Industry: An Analysis of Selected Firms. *Research Bulletin*, *42*(4), 38-49. https://doi.org/10.17015/ejbe.2016.017.01

Tyagi, S. & Nauriyal, D. K. (2016). Profitability determinants in Indian drugs and pharmaceutical industry: An analysis of pre and post TRIPS period. *Eurasian Journal of Business and Economics*, 9(17), 1-21.

van der Colff, F. and Vermaak, F. (2014). Predicting financial distress using financial and non-financial variables. *Journal of Economic and Financial Sciences*, 8(1), 243–260.

Vasantha, S., Dhanraj, V. & Thiayalnayaki. (2013). Prediction of Business Bankruptcy for Selected Indian Airline Companies Using Altman's Model. *International Journal of Research in Business Management*, 1(4), 19-26.

Vimala, S. and Saranya, P.B. (2014). Predicting corporate bankruptcy in Indian pharmaceutical companies – an application of Altman's 'Z' score and zeta models. *IMPACT: International Journal of Research in Business Management (IMPACT: IJRBM)*, 1(4), 19–26.

Xie, C., Luo, C. and Yu, X. (2011). Financial distress prediction based on SVM and MDA methods: the case of Chinese listed companies. Quality & Quantity: International Journal of Methodology, 45(3), 671-686. doi:10.1007/s11135-010-9376-y

Yang, Z.R., Platt, M.B. and Platt, H.D. (1999). Probability neural network in bankruptcy prediction. *Journal of Business Research*, 44, 67–74.

Yusuf, S.M. and Aspinwall, E. (2000). TQM Implementation Issue: Review and Case Study. *International Journal of Operation and Production Management*, 20, 634-655. https://doi.org/10.1108/01443570010321595

Zavgren, C. V. (1985). Assessing the Vulnerability to Failure of American Industrial Firms: A Logistic Analysis. *Journal of Business Finance & Accounting*, 12(1), 19-45. https://doi.org/10.1111/j.1468-5957.1985.tb00077.x

Zhu, J. (2011). Airline performance via two-stage network DEA approach. *Business and Economic Research Journal*, 4(2), 260-269.

APPENDIX 1: SURVEY QUESTIONNAIRE

Identification of Variables Impacting Financial Performance of Airlines

Dear Participants,

I am inviting you to participate in this research by completing the following survey. The aim of this research is to investigate the multiple variables impacting the financial performance of Indian carriers. The following questionnaire will approximately require 10-15 minutes to complete. Thank you for your time in assisting me with this research. Under no circumstances are you obliged to answer any of the questions, however, in doing so will greatly assist me in completing my doctoral research and enhancing the understanding of this research focus. The data collected will remain confidential and used solely for academic purposes. If you have any questions about this questionnaire, please drop an email at debjyoti.goswami@gmail.com.

Sincerely,

Debjyoti Goswami

PhD Research Scholar, Aviation Management

University of Petroleum and Energy Studies,

India

Section 1: Instruction: Please fill in the details in Block Letters for all the fields listed below:

1. Email:

   ……...

2. Organization Name:

   …….

3. Current Job Role:
   a) *Managerial: ...*
   b) *Executive: ...*
   c) *Academician: ...*
   d) *Other: ...*

Section 2 - Instruction: Please select the right option based on your opinion

1. Please select the appropriate option below for the Operational variables impacting financial performance of Indian carriers.

Nos.	**Name of the Factors**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	On-Time Performance					
2	Cancellation Rate					
3	Aircraft Equipment Type					
4	Passenger Load Factor					
5	Average Seat Capacity					

6	Number of Employees per Aircraft					
7	Average Fleet Age					
8	Aircraft Utilization					
9	Irregularity Ratio					
10	International Ops					

2. Please select the appropriate option below for the Performance related variables impacting financial performance of Indian carriers.

Nos.	**Name of the Factors**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Passenger Yield					
2	Revenue passenger Kilometres (RPK)					
3	Available Seat Kilometres (ASK)					
4	Revenue per ASK					
5	Cost per ASK					
6	Revenue Tonne Kilometres (RTK)					
7	Cost per ASK ex Fuel					

3. Please select the appropriate option below for the Economic variables impacting financial performance of Indian carriers.

Nos.	Name of the Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Gross Domestic Product					
2	ATF Prices					
3	Corporate Tax Rate					
4	Aviation Fuel Tax % per Litre					
5	Inflation Rate					
6	Foreign Exchange Rate					

4. Please select the appropriate option below for the financial variables impacting performance of Indian carriers.

Nos.	Name of the Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Working Capital/Total Assets					
2	Current Assets by Current Liabilities					
3	Total Liabilities by Total Assets					
4	Book Value of Equity by Total Liabilities					

5	Retained Earnings by Total Assets					
6	Operation Profit (EBIT)/Total Assets					
7	Total Sales/Total Assets					
8	Operating Revenues/ Total Assets					
9	Cash to Cash Cycle					
10	Cost per Employee					
11	Revenue per Employee					

5. Please select the appropriate option below for the Market related variables impacting financial performance of Indian carriers.

Nos.	**Name of the Factor**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	Number of Competitors					
2	Market Share					
3	Industry Growth Rate					
4	Passenger Traffic Growth Rate					
5	Mergers & Acquisition					
6	Alternate Source of Transport					

6. Please select the appropriate option below for the Govt/Political/Regulatory/Safety related variables impacting financial performance of Indian carriers.

Nos.	Name of the Factor	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Bilateral Agreements					
2	Aviation Policies					
3	FDI%					
4	Tourism Policies					
5	Political Influence					
6	Aviation Infrastructure Investments					
7	Pandemic					
8	Safety Disruptions					

Section 3 - Instruction: Please share your own opinion in less than 50 words

1. Please mention if any other variables according to you has an impact on financial performance (cash flow) of Indian Carriers? Also add the degree of impact (Yes/No) based on your understanding.

   ……

   ……

   …….....

   .....

---------- Thanks for your valuable response ----------

PROFILE OF THE AUTHOR

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Summary of Qualifications:

- Senior Leader in Digital Transformation & Consulting with 20+ years of global experience in Travel, Transportation and Hospitality business.
- Extensive background in eCommerce/Platform Business Model, Revenue Management, Revenue Accounting, Logistics & Cargo Operations, Airport Operations (AOCC), Airport Asset Tracking, Multiple Sales Channel, Bookings, Supplier and Inventory Management, Retail Merchandising, Cashflow Improvement and Cost Optimization.
- Exceptional analytical skills and proven abilities in airline and travel business management.
- Working knowledge of Passenger and Cargo Revenue Management, Pricing Solutions, CargoiQ, Travel ERP system, Airline Inventory Management, Flight Scheduling, Flight Disruption Management, Fares, Global Distribution Systems (GDSs), Airline Proration, PSS, DCS, Loyalty Management, Business Intelligence, Analytics & Reporting, Airport IoT Solutions, Last Mile Logistics Operations.
- Certified Digital Transformation professional and Alumni of IIM, Bangalore, FAU, Germany and INSEAD, Singapore.

- Senior Leadership Professional and Alumni of XLRI, Jamshedpur, Certified Platinum Mentor and Workplace Coach from TCS to accelerate organizational growth.
- Certified Professional Scrum Master and Professional Agile Leadership from Scrum.org
- Certified RPA Advanced Professional from Automation Anywhere and UI Path.
- Lean Six Sigma Certified Black Belt from Anexas, Denmark and Implementation specialist for Business Process Transformation Projects using Design Thinking, Artificial Intelligence, Machine Learning, NLP, Analytics, Robotics, IoT, Blockchain, etc.
- Proven academic career and University Topper in Aviation Management and Engineering studies.
- Identified as a results-oriented, people-oriented achiever with exquisite communication skills.

Research Publications:

- Goswami, D., & Gupta, S. (2023). Future of Metaverse in Education: A Pathway to Engaging, Immersive and Inclusive Learning. Empirical Economics Letters, 22(Special Issue 2), 27-39.
- Goswami, D., & Gupta, S. (2023). A Comprehensive Analysis of Significant Factors Affecting Financial Health of Commercial Carriers in India. European Economic Letters, 13(4), 80-94.
- Goswami, D., & Gupta, S. (2022). A Review of Financial Distress Prediction: Evidence from Global Airlines Industry. NeuroQuantology, 20(6), 8724-8746.

Professional Experience:

- Tata Consultancy Services Ltd., Mumbai, **Global Head – Consulting & Industry Transformation Group, Travel Transportation and Hospitality**, **Consumer Business Group,** Jun'13 onwards.

    - Responsible for managing P&L and strategizing business growth for Consulting and Digital Offerings/Services using Emergent Technologies (GenAI/ML, Analytics, RPA, IoT, Blockchain & Metaverse)
    - Manage Digital Transformation projects for Travel, Transportation and Hospitality, Government, Retail & Consumer Packaged Goods (CPG) Verticals and deliver Business Value
    - Lead Strategic Initiatives, Operational Cost Management and Margin Improvement for the Business Unit
    - Manage cross selling of offerings/capabilities for Airlines, Airports, Logistics Suppliers, Shipping Carriers, Ports, Hotels, TMCs, Car Rental Companies, etc.
    - Manage relationships at CXO level to maintain revenue growth and renewals
    - Mentor bids for annuity business and build GTM Strategies for Offerings/Services
    - Explore and analyze market trends to identify new business opportunities and partnerships.
    - Manage Analyst briefings, publish Thought Leadership articles on Business Transformation
    - Lead quarterly business reviews with customer's Senior Management
    - Train, mentor and motivate a cross functional business unit team with global team members

- Manage Co-Innovation Partner Network for solution development and new business generation

- **Revenue Technology Services,** *(RTS Systems Pvt. Ltd.),* Chandigarh

  Senior Manager – Client Services and Sales Support, Aug'11 – Jun'13.

  - Responsible for managing Global Client Services and Offshore Client Services Center.
  - Responsible for implementation of Passenger and Cargo Revenue Management solutions for Airlines, Cruise/Ferry and Railways.
  - Manage key accounts, project delivery and client relationship for Airline and Travel Sector.
  - Provide domain consultancy for Airline and Cargo Revenue Management solutions, Airline (Charter) Inventory Management system and Fleet Scheduling, Fares Management systems and Pricing Solutions.
  - Manage client requirement gathering and documentation for products and solutions.
  - Strategize new business development for Revenue Management, Profit Optimization, Pricing Management and Business Intelligence solutions for Airlines, Cruise/Ferry and Railways.
  - Manage sales campaigns, demo, workshops and conferences.
  - Prepare business proposals for clients and respond to RFPs, RFIs and RFTs.
  - Prepare Training materials and provide Functional training to Client Users.
  - Manage global marketing and media communications including brand management / visibility.

Client Manager – APAC & EMEA, Mar'09 – Aug'11.

- Responsible for implementation of Passenger and Cargo Revenue Management solutions for Airlines and Cruise/Ferry.
- Manage client requirement gathering and documentation.
- Provide domain consultancy for Airline and Cargo Revenue Management solutions, Airline (Charter) Inventory Management system and Fleet Scheduling, Fares Management systems.
- Strategize new business development for Revenue Management, Profit Optimization and Business Intelligence solutions for Airlines, Cruise/Ferry and Railways.
- Formulate and execute customized sales and marketing strategies.
- Responsible for achieving the Regional sales target and sales process management.
- Manage sales campaigns, demo, workshops and conferences.
- Manage key accounts, project delivery and client relationship for Airline and Travel Sector.
- Prepare business proposals for clients and respond to RFPs, RFIs and RFTs.
- Prepare prospective clients database, competitor analysis, case studies, white papers and newsletters.
- Provide functional training to software developers, testers and sales team.

- **Kale Consultants Ltd.**, Mumbai, **Associate Manager–Sales**, May'07 - Mar'09.
  - Identify new business opportunities in Airlines, Airports, Travel, Cargo & Logistics verticals.
  - Responsible for achieving the annual sales target for the vertical.

- Manage the entire sales process and provide training to the sales team.
- Plan and develop marketing collaterals for Airlines, Airports, Travel & Hospitality solutions.
- Prepare business proposals for clients and respond to RFPs, RFIs and RFTs.
- Prepare prospective clients database and plan Go To Market activities.
- Demonstrate solutions to prospective and existing clients.
- Prepare System Requirement Specification documents.
- Understanding of customer needs, gap analysis and process designing for the solution.
- Project co-ordination and key accounts management.
- Prepare market research reports, competitor analysis, carrying out requirement analysis and feasibility studies for the various projects.
- Prepare white papers on new emerging markets.

- **Nicholas Piramal India Ltd.**, Mumbai, **Territory Business Manager**, Jul'03 - Jun'04.
  - Plan and develop marketing collaterals and Go To Market activities.
  - Organize marketing campaigns and Prepare business proposals for clients.
  - Plan and monitor primary sales of the company.
  - Manage Secondary sales and achieve sales target.
  - Manage and train a successful sales team.

- **Air India Ltd**, Mumbai, **Implant Trainee Aircraft Maintenance Engineer**, Jan'02 - Jul'03.
  - Service, modification, repair, tests and overhaul of aircraft components/items and engines.

- Carry out major checks like Check 4A and C for B747-300/400, Check 2A and C for B747-200 and Check C for A310-300, A300B4 were also performed.

Industry Internship (Aviation Management):

- **Indian Airlines Ltd**, New Delhi, **Management Trainee**, Jun – Jul'06.
  - Carried out a comparative study and analysis of Services provided by Indian Airlines vs. Private Domestic Airlines.
  - Recommended specific measures for improvement of service.

Training:

- **Indian Oil Corporation Ltd**, AFS, N.S.C.B.I. Airport, Kolkata, **Trainee,** Oct'2000 (2 weeks).
  - Carry out fueling of aircrafts and manage logistics operation within an AFS station.
  - Conduct ATF quality control tests.

Educational Qualifications:

- **Post Graduate in Senior Leadership,** Xavier Labor Relations Institute, Jamshedpur, 2020
- **Leading Digital Transformation,** Indian Institute of Management, Bangalore, 2019.
- **Leading Digital Transformation,** Friedrich–Alexander University Erlangen–Nürnberg, Germany, 2019.
- **M.B.A., Aviation Management**, University of Petroleum and Energy Studies, Gurgaon Campus, 2007.

- **M.Sc., Computer Science**, Sikkim Manipal University, 2007.
- **Post Graduate Diploma in Computer Application**, Sikkim Manipal University, 2005.
- **Aircraft Maintenance Engineering**, Director General of Civil Aviation, India, S.C.M. Air Technical Training Institute, Kolkata, 2002.
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Professional Certifications:

- **Platinum Certified Mentor,** Tata Consultancy Services Ltd., 2024
- **TCS Workplace Coach,** Tata Consultancy Services Ltd., 2024
- **Giving Sense to your Leadership Experience,** HEC Paris, 2023
- **Leading Digital Transformation & Innovation,** INSEAD, Singapore, 2021
- **Gold Certified Mentor,** Tata Consultancy Services Ltd., 2021
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- **Professional Agile Leadership™,** Scrum.org, 2020
- **Professional Scrum Master™,** Scrum.org, 2020
- **IBM Blockchain Foundation for Developers**, IBM, 2019
- **RPA Trained,** Automation Anywhere, 2019
- **Leader in You,** Tata Consultancy Services Ltd., 2018
- **RPA Business Analyst,** UI Path, 2018
- **Lean Six Sigma Certified Black Belt**, Anexas, Denmark, 2015.
- **Six Sigma Certified Green Belt,** 3S Certifications and Trainings, New Delhi, 2013.
- **PIBS™ Certified Professional,** Tata Consultancy Services Ltd., 2013

Achievements:

- Achieved **Platinum Mentor, Workplace Coach**, G**olden Guru, Contextual Master** and **Extraordinary Leadership Awards** from Tata Consultancy Services Ltd.
- Achieved ATM certification from Carnegie Mellon® Software Engineering Institute (SEI) for carrying out CMMi Audits and Certifications.
- **University Topper and Medal Winner** in **MBA (Aviation Management)** at University of Petroleum and Energy Studies **for 2006-07** and 100% scholarship achiever.
- **Topper** in the engineering college to get placed at Air India Ltd, Mumbai.
- Awarded proficiency at French.

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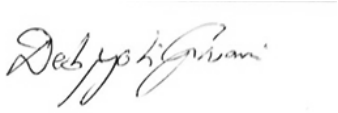
PLAGIARISM CERTIFICATE

1. I **Prof (Dr.) Sumeet Gupta (Internal Guide)** certify that the Thesis titled **"DEVELOPMENT OF FINANCIAL DISTRESS PREDICTOR MODEL FOR INDIAN AVIATION INDUSTRY"** submitted my scholar **Mr. Debjyoti Goswami** having **SAP ID** 500058058 has been run through a Plagiarism Check Software and the Plagiarism is reported to be **4%**.

2. Plagiarism Report generated by the Plagiarism Software is attached.

Prof (Dr.) Sumeet Gupta

Signature of the Internal Guide



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