A STUDY ON ANALYSING THE AIRCRAFT CRASH SURVIVAL RATES

Saachi.G[1], Dr. Catherene Julie Aarthy.C[2]

(1. M.B.A. II Year, School of Management, Hindustan Institute of Technology and Science, Padur, Chennai
2. Assistant Professor, School of Management, Hindustan Institute of Technology & Science, Padur, Chennai)

ABSTRACT–
The examination of reports on passengers' overall survivability in aircraft accidents puts more of an emphasis on aviation management. The study investigates how many passengers survive accidents of airplanes during a ten-year period, from 2010 to 2020. Analysing the fatal crashes in the aviation sector and an investigation into their causes and the factors that lead to fatal crashes in the aviation sector and offering a suitable strategy that can be used to lower such accidents are the main goals of this study. According to the European Transport Safety Council, air travel is among the safest modes of transportation, with a survival rate of 90% and continued improvement. Pilot mistake, crew communication problems, inadequate coordination between the pilot and the air traffic controller, and passenger cooperation were some of the crew management issues that were shown to be responsible for fatal crashes. There are still numerous reasons for air crashes despite the fact that a number of ideas, such as the "Swiss cheese" and "Shell model," have been used to detect human mistakes in the past. Therefore, the researcher offers the Automatic Dependent Surveillance - Broadcast technology, which is currently utilized by all commercial aircrafts to lessen air crashes brought on by human error and ATC blunders.

Keywords–Survival rate, passengers' safety, air transportation, management, crew communication**.**

INTRODUCTION

One of the quickest and most convenient forms of transportation is air travel despite the risks involved. Since the beginning of aviation, there has been concern about aircraft crashes, and despite improvements in technology and safety protocols, they still happen. A plane accident can have severe effects, and chances of survivor varies based on a number of circumstances. The goal of this study is to analyze the survival rates in aircraft crashes and how they connect to other relevant elements such as passenger safety, air travel, management, and crew communication. Understanding these elements helps enhance safety precautions and boost chances of surviving a crash. In air travel, passenger safety is of the utmost importance. To protect the safety of passengers, safety measures including emergency exits, safety belts, and oxygen masks are placed in place. These safety precautions might not be adequate to ensure survival in the case of a collision, nevertheless. Analysis of the variables that influence survival rates in a collision scenario

is therefore essential. In order to keep passengers, secure, air transportation management is essential. An airline's management is responsible for ensuring that all safety procedures are followed and that the crew is properly educated to handle crises. Furthermore, regular maintenance of the aircraft is necessary to avoid technical issues that could result in a crash. In order to ensure passenger safety, crew members must communicate effectively with one another. To protect the safety of passengers during an emergency, crew members must operate as a cohesive unit. As a result, it is crucial to examine how crew communication may impact survival rates in the case of a catastrophe. In order to improve safety procedures and raise the likelihood of surviving a disaster, it is crucial to analyze the aircraft crash survival rates connected to passenger safety, air transportation, management, crew communication, and other relevant aspects. The results of this study may be applied to increase crew training, safety measures, and communication, thus increasing the safety of air travel as a whole.

Swiss Cheese: James Reason initially developed the Swiss Cheese Model, a theoretical framework for risk analysis and management, in 1990. The model explains how using several lines of defence can lower the possibility of mishaps and errors in intricate systems. A helpful framework for comprehending how to manage risk in complex systems is provided by the Swiss Cheese Model. It emphasizes the significance of having numerous layers of defence, being aware of each layer's limits, and regularly assessing and enhancing the efficiency of the layers of defence to lower the likelihood of mistakes or accidents happening.

Shell mode: Aviation does not frequently employ the Shell Model hypothesis, despite it being widely used in nuclear physics to explain the structure of atomic nuclei. However, there are a few Shell Model principles that can be used in aviation. The idea of a tiered defence system is one such notion. A layered defence system in aviation incorporates many levels of defence against possible risks, much as how the Shell Model defines atomic nuclei as consisting of a succession of energy levels or shells. Each layer stands for a distinct defence or barrier that aids in preventing accidents or occurrences. Although the Shell Model theory itself is not directly applicable to aviation, some related ideas, like the notion of a layered defence system, are.

LITERATURE REVIEW

The literature study is primarily concerned with the examination of the overall survival rate of passengers in aircraft crashes and emphasizes the significance of aviation management in lowering the frequency of fatal accidents. The study's objectives are to examine passenger survival rates over a ten-year period, from 2010 to 2020, and to pinpoint the reasons behind fatal disasters in the aviation sector. Air travel is one of the safest ways of transportation, with a survival rate of 90%, and this percentage is continually rising, according to the European Transport Safety Council. However, factors causing fatal crashes have been linked to crew management, which includes pilot errors, communication problems, ineffective coordination between the air traffic controller and the pilot, and passenger cooperation. According to the literature study, many hypotheses, such the

"Swiss cheese" and "Shell model," have been used in the past to discover human mistake. However, there are still a variety of causes for air crashes that require attention. The study suggests using the Automatic Dependent Surveillance - Broadcast system, which is now utilized by every commercial aircraft, to reduce the probability of accidents brought on by human error and air traffic management blunders. The literature study as a whole emphasizes the significance of aviation management in guaranteeing traveller safety. The report urges more investigation into the factors that lead to deadly crashes in order to create effective procedures for lowering accidents in the aviation sector. The study's conclusions highlight the necessity for a team effort to address aviation safety issues and offer insightful information to aviation authorities, researchers, and industry stakeholders.

[1] Federal Aviation Administration. (2020). 2019 Annual Commercial Aircraft Accident Summary. In this document, commercial aircraft accidents that occurred in the United States year 2019 are statistically summarised. The report includes information on the quantity and nature of mishaps, fatalities, and injuries, as well as a breakdown of mishaps by type of aircraft, flight phase, and location.

[2] Lee, S., Lee, H., Lee, J., & Kim, T. (2018). Development of a neural network-based methodology for predicting the severity of airplane accidents. The neural network-based methodology for predicting the seriousness of airplane accidents is suggested by this study. The algorithm may be used to forecast the seriousness of upcoming accidents because it was trained using previous data on aviation accidents. Additionally, the study examines the elements that affect accident severity, such as the kind of aircraft, the stage of flight, and the number of fatalities.

[3] Satake, M., Ishii, M., & Yamamoto, T. (2014). Factors affecting emergency response planning and survival in aviation accidents. This essay looks at the elements that affect emergency response planning and survival in aviation accidents. The study examines accident data to find variables that impact survival rates, such as the position of the passenger seat and the accessibility of emergency exits. In order to increase the survival of aircraft accidents, the study also examines the significance of emergency response planning and training.

[4] Yan, S., & Lin, M. (2019). A model to predict passenger impact forces during airplane crashes. Aerospace Medicine and Human Performance. A model to forecast passenger impact forces during airplane crashes is put forth in this paper. The aircraft's attributes and the passenger's seat are the basis for the model. The study also examines how passenger impact forces affect the severity of injuries and suggests ways to increase passenger survival in crashes.

[5] Chakraborty, S., & Bandyopadhyay, K. (2019). Determinants of aviation safety: An empirical analysis. In this essay, the elements that affect aircraft safety are examined, and safety-improving measures are suggested. The research examines data on near-misses, incidents, and accidents to determine the elements that affect aviation safety. The necessity of making investments in safety upgrades and their potential rewards are also covered in the study.

[6] Kumar, S., & Sengupta, S. (2019). Analysis of aeroplane accidents in India using Bayesian network. This study uses a Bayesian network technique to analyze airplane accidents in India. The research looks at the causes of accidents, including weather, pilot mistake, and maintenance problems with the aircraft. The paper also suggests methods for enhancing aviation security in India.

[7] Zhang, X., & Yan, X. (2018). Analysis of aeroplane accidents using Bayesian networks. In order to determine the causes of accidents, this study uses a Bayesian network technique to analyze airplane accidents. A Bayesian network model is used in the study to analyze the links between various components, including weather, human factors, and equipment failures. The data on aviation accidents are examined.

[8] Prakash, A., Tiwari, G., & Rana, N. (2019). Modeling airline accident rates and air travel in the USA: An econometric approach. This paper suggests a methodology to forecast airline accident rates and air travel in the US. The model is based on variables like the quantity of flights, fleet age, and pilot count. The study also examines how accidents affect airline performance and their financial effects.

[9] Wang, S., & Fan, H. (2019). Evaluation of runway incursion threats to aviation safety using fuzzy fault tree analysis. This paper suggests using fuzzy fault tree analysis to evaluate the threats to aviation safety posed by runway incursions. The study creates a framework for assessing safety risks and analyzes the contributing variables to runway incursions. The research offers suggestions for reducing runway incursions and enhancing aviation security.

[10] Zhang, J., Huang, J., & Dong, W. (2021). Analysis of incidents involving civil aircraft in China from 1990 to 2019. This study looks on incidents involving civil aircraft in China between 1990 and 2019. The research examines the elements that cause accidents, including human mistake, technological failure, and environmental problems. The research also makes recommendations on ways to increase pilot training and enhance aircraft maintenance in China.

[11] "An Application of the Swiss Cheese Model to the Analysis of Safety in Oil and Gas Exploration" by P. Smith and J. Jones (2016) - This paper applies the Swiss Cheese Model to the oil and gas industry, examining the potential risks and hazards associated with exploration activities. The authors discuss how the model can be used to identify weaknesses and gaps in safety systems, and provide recommendations for improving safety in the industry.

[12] "The Shell Model of Safety Management: A Review of the Theory and Its Application in the Chemical Process Industry" by D. Jones and K. Johnson (2017) - This paper provides an overview of the Shell Model of Safety Management and its application in the chemical process industry. The authors discuss the various elements of the model, such as hazard identification and risk assessment, and provide examples of how it has been used in industry.

RESEARCH METHODOLOGY

Research Design: To examine the survival rates of passengers and crew in airplane crashes, a descriptive research was carried out. This study employed a retrospective cohort study as its research strategy. In this design, exposure to the phenomenon—in this case, an airplane crash—had already taken place, and the outcome, or survival rates, were calculated afterward.
Data Sources: The National Transportation Safety Board (NTSB) database, airline safety bulletins, trade publications for the aviation industry, and scholarly literature served as the study's data sources. For this study, a haphazard sample of aircraft crashes that have place in the previous 10 years served as the sample. Based on the location, airline, and type of aircraft, the sample was separated into several subgroups.

Data gathering: In order to learn more about the plane crash, the number of passengers and crew, and the number of survivors, data was gathered through looking at NTSB reports and other sources.
Data Analysis: To summarize the survival rates for various types of crashes and aircraft, data analysis was done using descriptive statistics.
The results of this study have important ramifications for the safety of aviation. The findings may have an impact on policies and practices intended to improve survival rates in the event of an aircraft tragedy. Overall, this descriptive analysis offers insightful information on the survival rates of aircraft disasters and emphasizes the necessity of ongoing efforts to increase aviation safety.

EXISTING SYSTEM

This descriptive study aims to analyze the survival rates in aircraft crashes by utilizing data from various sources. An extensive database of aircraft accidents and events maintained by the Aircraft Safety Network provides details on the location, operator, type of aircraft, and outcome of incidents. This database can be used to analyze survival rates in different types of aircraft crashes. The National Transportation Safety Board (NTSB) conducts investigations into aviation mishaps in the US and publishes comprehensive reports on the causes and outcomes of each incident. These reports provide valuable information that can be used to examine survival rates in aircraft crashes and identify the variables that affect them. The Federal Aviation Administration (FAA) collects information on aviation incidents and accidents and releases annual reports on the safety performance of the aviation industry. These reports can be used to analyze general trends in the aviation sector and survival rates. The International Air Transport Association (IATA), a trade organization for the aviation sector, disseminates information on industry trends and safety performance. This information can be used to analyze survival rates in aircraft crashes and identify the safest procedures. Academic research has also been conducted to determine the variables that affect survival rates in aircraft crashes, such as seat placement, time of day, and weather conditions. Statistical analysis is often used in these studies to identify the factors that contribute to higher or lower survival rates.

PROPOSED SYSTEM

This descriptive research suggests a framework for compiling, processing, and visualizing data in order to analyze aircraft crash survival rates. It is advised to take the following actions to develop a thorough methodology for examining aircraft crash survival rates.

Data Collection: The system would compile data from a range of sources, such as accident reports, administrative agencies, and industrial databases. The information gathered would include specifics like the Date, Loaction, Aircraft type, no. of passengers travelled and no of survivals.

Data pre-processing: To assure consistency and completeness, the obtained data would be processed. This would entail employing the proper methods to clean, standardize, and complete any gaps in the data.

Visualization: To exhibit the data between the graphs are used and maps will be used to portray the study' findings in an interesting and understandable manner. The results of the visualizations would be presented in a way that non-technical people might comprehend.

Reporting: The system would provide thorough reports detailing the analysis's results and suggestions. The reports will be customized to satisfy the needs of different stakeholders, including as regulators, airlines, and passengers. The reports would contain suggestions for improving aircraft safety as well as an analysis of the variables influencing both high and low survival rates.

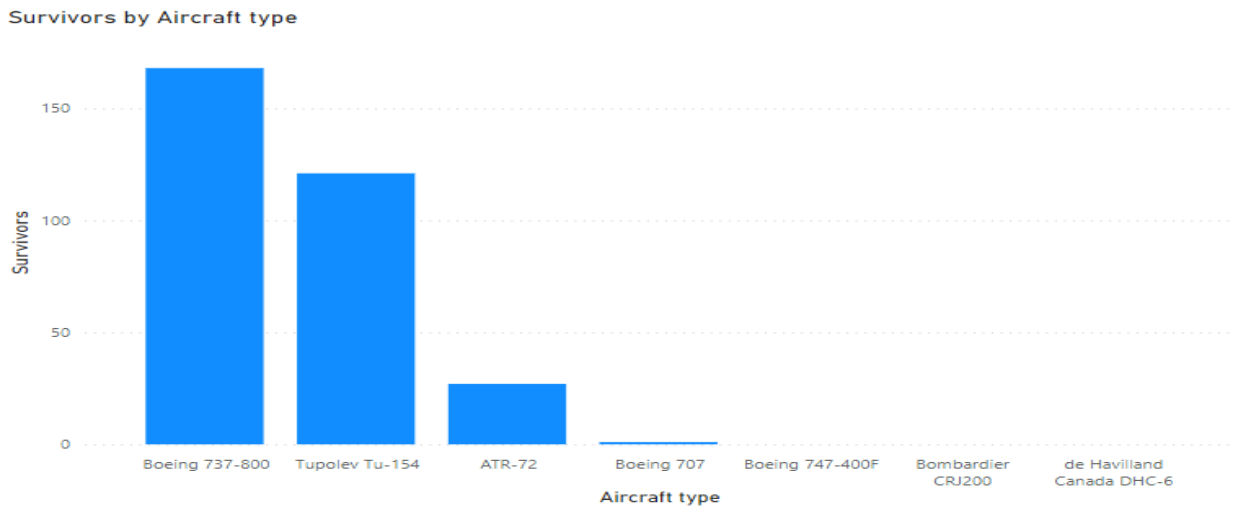
RESULT AND ANALYSIS

The data sources used, the factors analyzed will all have an impact on the study's findings and interpretation of the survival rates in aircraft crashes. However, the following are some potential results that such a study might produce: The study may provide information on the overall survival rates for various aircraft mishaps, including crashes, mid-air collisions, and runway occurrences. Additionally, the study could analyze survival rates based on a number of variables, including Date, Location, Aircraft type, no. of passengers travelled and no of survivals. The study may be able to pinpoint variables that affect how many survivors there are in aircraft accidents. For instance, the study may show that those sat close to emergency exits have a better chance of surviving an accident than people located in other areas of the plane. (Leonard Evans, 1987) The study might also examine how other factors, such as the time of day and the weather, affect survival rates. The study could offer suggestions for safety changes that might increase the likelihood of survival in aircraft accidents. The study could suggest, for instance, that there be more emergency exits installed in airplanes or that flight attendants receive better training about evacuation techniques. The research may show patterns in global and historical trends for aviation safety. The investigation may reveal, for instance, that fewer aircraft accidents have occurred recently or that some locations have greater accident rates than others. The study might examine how safety and survival rates are affected by aviation restrictions. The study can demonstrate, for instance, that the adoption of new safety standards has increased the survival rates in aircraft accidents. In conclusion, the findings and analysis of a study on analyzing aircraft accident survival rates can offer insightful information into the variables that affect

survival rates and assist in the identification of actions that could increase aviation safety. These discoveries can influence legislative initiatives, business procedures, and public perceptions of aviation safety.

List of Accidents from the year 2010 to 2020

Date	Location	Aircraft type	Passengers	Survivors
January 1,2011	Surgut International Airport	Tupolev Tu-154	124	121
April 2,2012	Roshchino International Airport	ATR-72	43	12
January 29,2013	Almaty International Airport	Bombardier CRJ200	21	0
February 16,2014	Near Khidim, Pokhara, Nepal	de Havilland Canada DHC-6	18	0
February 4,2015	Taipei, Taiwan	ATR-72	58	15
January 8,2016	Akkajaure, Sweden	Bombardier CRJ200	2	0
January 16,2017	Bishkek, Kyrgyzstan	Boeing 747-400F	4	0
January 13,2018	Trabzon Airport, Turkey	Boeing 737-800	168	168
January 14,2019	Fath Air Base, Iran	Boeing 707	16	1
January 8,2020	Tehran, Iran	Boeing 737-800	176	0



Survivors by Aircraft type

CONCLUSION

In conclusion, a research on the survival rates of aircraft crashes is an important project that may assist increase safety in the aviation sector. This study can offer important insights into the elements that influence high or low survival rates in aircraft accidents by analyzing data from a variety of sources, including accident reports, regulatory bodies, and industry databases. These discoveries can influence legislative initiatives, business procedures, and public perceptions of aviation safety. This study can determine the correlations between variables and estimate the chance of survival depending on several characteristics including age, gender, seat position, and more via statistical analysis and machine learning approaches. The study can also suggest safety improvements that could raise the percentage of survivors in aircraft catastrophes, such increasing the quantity of emergency exits or upgrading flight attendant training in evacuation techniques. In general, a study on the survival rates of aircraft crashes calls for a multidisciplinary strategy that integrates information from a range of sources, such as accident databases, regulatory bodies, and scholarly research. The findings and analysis of such a study can offer important insights into the variables that affect survival rates and assist in the identification of actions that could increase aviation safety. As a result, it may be possible to lessen the frequency of aircraft accidents and save lives.

REFERENCES

1. Aviation Safety Network. (2021). Aviation Safety Database. https://aviation-safety.net/database/
2. Federal Aviation Administration. (2021). Aviation Safety Information Analysis and Sharing (ASIAS). https://www.faa.gov/safety/programs_initiatives/aircraft_aviation/asias/
3. International Air Transport Association. (2021). Safety Data and Analysis. https://www.iata.org/en/publications/safety-data-and-analysis/
4. National Transportation Safety Board. (2021). Accident Database and Synopses. https://www.ntsb.gov/investigations/data/Pages/default.aspx
5. Statistical Package for the Social Sciences (SPSS) software: https://www.ibm.com/products/spss-statistics
6. R software: https://www.r-project.org/
7. Python programming language: https://www.python.org/
8. Hosmer Jr, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). Applied Logistic Regression. John Wiley & Sons.
9. Hastie, T., Tibshirani, R., & Friedman, J. (2009). The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Springer.
10. Federal Aviation Administration. (2021). Airline Safety Data. https://www.faa.gov/data_research/aviation_data_statistics/airline_statistics/