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Exploring Raw Safety Aspects in Aviation Industry

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Abstract:
Aviation is the growing industry. Safety in the aviation industry is most important. Safety is affected by many factors such as environmental, economical, technical, and operational and many challenges are in the way of aviation safety to overcome from these hurdles .So this paper tried to explore the different safety aspects for the aviation industry. From the literature different research streams and research issues are discussed which affects the safety of the aviation industry.

Keywords: Aviation Safety, Challenges, Safety Aspects, Environmental, Economical, Technical

1. Introduction

Safety has always been the prime reflection in the conduct of all aviation activities. Safety is the state in which the risk of harm to persons or property damage is reduced and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management. Safety improvement measures introduced usually to address the identified safety concern. Due to the nature of the aviation industry, the total elimination of accidents or serious incidents is unachievable. No human effort or human-made system can be free from risk and error, and failures will be expected to occur in spite of the most proficient prevention efforts. Safety plays an important role in aviation industry. Safety in aviation industry becomes a major problem today. In the 1990s, safety thinking has evolved to the point of widespread acknowledgement that organizational factors play a significant role in the performance of human beings and therefore is an important issue in risk and error management. The literature also reflects that there is a general lack of proactive safety theory derived from longitudinal case studies of "safety management systems in companies being subject to reorganization in the wide open business environment", and is described as "a black hole in research and literature" (Hale et al., 1998: p. 11).Safety has always been a critical element to the business success of the passenger aviation industry. However, growth in the number of commercial aviation flights has resulted in aviation is increasing (Gellman Research Associates, 1997).

The transport sector has developed into a major industry during the 20th century. It has been helpful in overall increase in prosperity, development and the expansion of the world's trade that has taken place. However, there are many negative impacts on the safety of the aviation industry. The effect of atmospheric pollution, noise, accidents, congestion and delays, infrastructure has been particularly emphasized (Button, 1993; European Commission, 1996).According to Luxor and Coit (2006):''in the aviation industry, accidents occur very infrequently, yet it is still critical to further reduce their rate of occurrence. Existing methods and models are already useful, but because of the importance of these failures, new modelling perspectives can add additional insights to further enhance safety. a model devoted to this class of 'low probability-high consequence' events demonstrated with a model developed for a certain aircraft accident type known as Controlled Flight Into Terrain (CFIT).''

2. Challenges in Aviation Industry

Aviation safety has an enviable and well earned reputation for accident reduction and risk
Management.

Criminalisation

It is the one of the challenge in the aviation safety. We must also attempt to reduce the criminalization of safety – that is the tendency for legal authorities to bring legal action against aviation personnel for basic human error, often well before any safety investigation has been completed to determine the cause of the accident, and many times to the detriment of the investigation. Now we are talking about legal action for basic human error, or the unintentional result of someone's actions. However, in all cases, error by definition is unintentional. Punishment, which may be effective against intentional acts, will not reduce unintentional errors.

The motivation of the aviation terrorist has changed over time. As Jackson explains, 'in the early days, such actions tended to be the province of thieves, extortionists, blackmailers, murderers and the mentally

deranged' the nature of the threat has also changed over time. In the 1970s hijackings were the most common form of terrorist attack. In the 1980s such 'conclusive events' as bombings became the norm.

Safety

Safety is an important but challenging issue in the aviation industry. The growth in the aviation sector and capacity expansion by carriers has posed challenges to aviation industry on several fronts. Air passenger transportation is growing, with annual increases exceeding 5% forecast for the next 20 years. From a safety perspective, this means that continuous improvement is necessary to maintain high safety levels.

There are many factors which explored the parameters that influence the safety of the aviation industry like environmental issues, economical issues, human errors, technical problems.

Environmental issue

It is the one of challenges in the safety of the aviation industry. Aviation industry has environmental impacts both at a regional and global level. Local atmospheric issues are related to airport contributions to local air quality and the potential for health impacts on residential populations in surrounding areas. Aviation emission has the potential to affect climate. Aviation emissions are known as a significant provider to global climate impacts through global warming (Penner et al., 1999). (Penner et al., 1999) studied at global warming related with aviation emissions that suggest about aviation contributes approximately 3.5% of the total anthropogenic forcing, and this may increase to between 7 and 12% by 2050 (Penner et al., 1999).

The impact of aviation emissions is important due to the factors that of aviation emissions occurring in high altitude, and the growth of air traffic. Aviation emission consists of 71% Carbon dioxide (CO_2) and 28% water vapour (H_2O). In the remaining 1%, NO_x is the most important emission (Penner et al., 1999,). (Janic, 1999) influencing aviation emissions influence the intensity and volume of aircraft movements, fuel consumption and energy efficiency and the rate of renewing of the aircraft fleet by introducing "Cleaner" aircraft.

Human Factor

Human factor is the main challenge in the safety of the aviation industry. Like most of the accidents occurs due to human errors, like due to communication gap, lack of proper trainings, health. Toxication of the liquors among pilots during their duty hours is also the main problem. The effects of alcohol on piloting performance is the another challenge in aviation safety. Crash investigation indicates that alcohol-impaired flying has been primarily a problem in aviation. In the early 1960s, over 30% of pilots who were injured in aviation crashes (Gibbons et al., 1966; Harper and Albers, 1964). This trend has decrease in the past four decades to about 8% in the 1990s (Canfield et al., 2001; Copeland, 1986;Kuhlman et al., 1991; Lakefield et al., 1975; Li et al., 1998). The effects of alcohol on pilot performance have been studied extensively (Cook, 1997; Koelega, 1995; Modell and Mountz, 1990). (Billings et al., 1973; Ross et al., 1992) studied that alcohol at the level as low as 20 mg/dL, can impair flight-relevant cognitive.

Passenger safety

Passenger's safety is another challenge for aviation industry. The primary purpose of aviation safety education is to provide cabin safety knowledge, passenger attitude, and passenger behaviour to the passenger when an emergency occurs. e.g. on 25 August 2000, a Hawaii BIA airline PA-31-350 had engine failure and ditched into Hilo Bay with one fatality and eight minor injuries. The passenger who died had over blame their life jacket too early to escape from the exit. On 13 July 2003, an Air Sun Shine Cessna 402 ditched into Treasure Cay, Bahamas, causing two deaths and five minor injuries. One passenger had put three life jackets on a child, while another had inflated their life jacket before exiting the aircraft. These cases reveal that one reason airline passengers act inappropriately in an emergency may be due to overstress or panic. However, Edwards (1990) pointed out that the purpose of passenger education is to reduce stress and panic caused by emergencies in order to allow passengers to prepare in advance to face danger. In addition, passengers may generally lack accurate cabin safety knowledge, and they may have a passive attitude about and be unprepared for emergencies, thereby contributing to their own deaths and to the endangerment of other passengers. Christensen (2005) developed new guidelines to educate passengers about evacuations with infants or young children, stating that passenger knowledge is a key factor that impacts passenger responses during an airplane accident. Also, Muir and Thomas (2004) studied about the increasing airline passenger safety education would increase the probability of passenger survival in an

emergency. Understanding of the nature of the aviation safety education is a powerful and improving airline passenger cabin safety knowledge, attitude, and behaviour.

Security

This is another major challenge. The action of September 11, 2001 changes the aviation security policy and operations overall. Yu-Hern Chang, Chung Yeh (2004) developed a new airline safety index that helps the airlines to understand their relative safety strengths and weakness in terms of manage safety and identical functional areas for safety improvement. Glässer et al. propose a computational model to evaluate aviation security screening performance using probability models that checks the consistency, coherence, and completeness of security requirements as defined by the FAA guidelines. They combine probabilistic variants of abstract state machines and model checking for analyzing aviation security models. Their model provides a tool for analyzing the effectiveness of security checkpoint screening and to identify potential security deficiencies. Caulkins also suggests several ways that pre-screening could be used to increase the overall security even if terrorists are incorrectly classified as no selectees. Nikolaev et al. Propose a two-stage model for sequential, stochastic multilevel passenger screening problems. The first stage analyzes the purchase of security devices, while the second stage determines the screening assignments of sequentially arriving passengers.

3. Challenges in maintaining safety in aviation industry

To overcome from the above challenges different strategies are applied by different researchers. Shao Xueyan et.al established a multi-objective programming to analyze the safety risk in pilots. He used QAR device. Basing on QAR data, neural networks are established to analyze causes of exceedance and carry out advance warning of safety risks. McFadden (2003) used logistic regression model to predict pilot-error accident and incident rates on an airline-by-airline basis. Peter brooker et.al. Proposed a model Bayesian Belief Network of ATC operations spanning a number of defensive barriers from airspace design through tactical control. Security is the another major issue for the safety so by taking this in consideration many technologies are suggested like bomb proofing technology &The modelling approaches are analyse the different model for the aviation security like baggage screening models, passenger screening models, and risk models.

there are many challenges in maintaining the safety.

The problem in maintaining safety is diversifying which worth proper research and planning. It takes more effort to enact significant change in airport environments than many realize. This is true only if one desires to integrate safety among the airlines, air traffic control and airport segments. Safety being an integral part of all spheres of activities of the aviation industry. it is true that it is not possible to implement Safety by following a prescription or established procedure. The regulations only provide a guideline or the base line upon which the system has to be developed. It is the operator's choice to go further and establish SMS based on its organisational background, socio economic parameters and its interface with multiple agencies. What is most important is that every component of safety which includes safety policy and objective, safety risk management, safety assurance should be effective.

There is no universal solution for improving airport safety, but It is the organization's responsibility to customize its safety based on multiple factors and implement it taking into consideration the ground realities.

In a commercially competitive environment for some, being safe is perceived as an expensive, elusive and never-ending obligation with unclear returns on the investment. Accidents, incidents and even the smallest occurrences hurt customers and staff, not to mention damage to profit line, the reputation or the morale within the company. Safety Management is about finding the perfect balance between the production of services and products and the protection of human, financial and technical resources. While carrying out budgetary allocations and planning of resources for implementation of safety programmes, there are many questions arises about cost, time, regulations, policies etc. These issues are the major factors in implementing the safety programmes.

Single runway operations and delays due to the fog and diversions have cost implication to the airlines. The financial implications for this require proper assessment and proper decision from the management part. The operational environment is the major challenge by the airport operator, pilot community etc.

The study analysed the following factors:

- The stress in the cockpit of flying the aircraft for hours waiting for visibility conditions to improve.
- The repercussions of altering the flight schedule due to aerodrome closure versus absorbing few diversions and delays.
- The cost involved in providing the required facilities.
- The risk involved in operating on a partially closed runway.
- The cost of holding the aircraft for weather improvement.
- The pilot training required to operate at adverse conditions.
- The congestion at terminal due to delayed flights and the passenger inconvenience thereof.

The aviation industry is highly volatile in factors like the recent economic meltdown, natural calamities such as volcanic ash, 9/11 and other global events. It is a task for the industry to work towards recovering its cost of capital. To maintain the balance between investments with financial and nonfinancial returns is a challenge.

4. Literature Review

Much research has been undertaken to gain a better understanding of the aviation safety. from the law few decades much attention is given on the aviation safety. The safety improvement process continues through the years and is a key part of the work of operational and research throughout the world. There are Many factors which influence the safety of the aviation industry. (Argüello, 1997) et al.summerised an airline's schedule recovery problem in case aircraft become temporarily unavailable (are grounded) or are delayed. Their goal is to produce an interim aircraft routing and restore normal schedules by the following day. Crew availability is not considered and each aircraft fleet is separately dealt with, so that within each problem instance all craft are interchangeable. The cost to be minimized includes measures of passenger inconvenience and lost flight revenue. (Bertsimas and Patterson, 1998) et.al. dissuccused the Traffic Flow Management Problem (TFMP) caused by disturbances to flight schedules. This includes determination of aircraft release times at airports (ground holding) and the optimal aircraft speed while airborne.

As airline passenger traffic grows day by day, so does the pressure increases on the national airport network. According to (Arnold Barnett, 1999) et.al. Airport capacity could increase if, even during inclement weather, independent a landings could occur on parallel runways only about half a mile apart. Here, the method is discussed that can find out an attractive combination of high estimation accuracy and relatively low cost. Congestion leads to delays in departures and queues for landing, causing inconvenience to passengers and big losses to air companies. It can also potentially affect airspace safety. (Giovanni Andreatta, 2000) et.al. Discussed about the Congestion leads to delays in departures and queues for landing, causing inconvenience to passengers and big losses to air companies. It can also potentially affect airspace safety. In the short term, the best that can be achieved by the system is to try to limit the size and the impact of the delays produced by congestion, or, in other words, to manage the air traffic flows to avoid that demand exceeds the available capacity. The fast exact approach is presented that will make it possible to solve large-scale instances of the problem to optimality, providing useful bench marks for assessing the quality of heuristics.

The discussion of radiation-related health issues for air- craft flight personnel began over 30 years ago. In 1990, aircraft flight personnel were given the status of "occupationally exposed to radiation" by the International Com- mission on Radiation Protection.

Aviation psychology is the field of study concerned with the development and operation of safe, effective aviation systems from the standpoint of the human operators who are responsible for 70 percent of aircraft accidents. Psychology applied to aviation is an integrative field involving knowledge of just about all areas in psychology, including perception and attention, cognition, physiological, experimental, industrial/organizational, clinical, and educational (Pereira Lima, 2000).

(G. de Angelis, 2001) concluded the studies considered were mortality and incidence cohort studies, including studies of male pilots and female flight attendants. Neither proportional mortality studies nor military aircrew studies were included in the analysis. The results of the individual studies were combined by study outcome (mortality or incidence) for cause of death and/or cancer incidence sites that had an

excess risk in at least one of the individual studies and for which there were at least five total cases among the eligible studies.

Pilots face many challenges due to many of the factors. so for the pilots and for other crew members training on psychological values, on situational awareness is very important.(Christopher D. Wickens,2002) described an interlinking set of cognitive phenomena relate in to awareness, aircraft control, attention, mental resources, and strategic task management. Much basic research in psychology has effectively addressed these issues in isolation. However, understanding and then modelling the complex interactions among these phenomena remains a critical challenge posed by aviation to psychological researchers.

Alcohol-impaired flying has been primarily a problem in general aviation. To investigate the role of alcohol in general aviation crashes, (Guohua Li,2005)developed a data system for fatally injured pilots in Maryland, New Mexico, and North Carolina by linking autopsy records from the state medical examiner offices and crash investigation reports from the National Transportation Safety Board (NTSB). The three states were chosen to serve as the study sites for this project because they were among the Few states that had a state-wide medical examiner information system with toxicological testing being performed routinely on fatally injured persons. Approximately, 5% of all general aviation crashes in the United States occur in Maryland, New Mexico, and North Carolina.

Most aviation operations problems are safety issues and focus primarily on how to reduce the number and severity of accidents by eliminating, as much as possible, contributory human factors. When an accident occurs, how passengers react to the danger determines, to some extent, their own safety. And even in small, non-life threatening accidents, minor injuries are also a critical issue. (Yu-Hern Chang,2008) et.al. Discuss that it is necessary to investigate public perceptions about cabin safety and to specifically focus on exit row seating limitations and obligations. It is important that, in an emergency, passengers has accurate perceptions and that they are prepared to assume a certain level of responsibility for their own safety, and for the safety of others. In an emergency, passengers assigned to exit row seats in particular should follow safety information and instructions from the cabin crew to correctly operate emergency exit doors and to help other passengers evacuate the airplane first.

A positive attitude toward cabin safety positively affected on airline passenger behaviour, which supported attitude–behaviour consistency. Aviation safety education is nesseccary for the airline passengers with accurate cabin safety knowledge cultivate positive passenger attitude, and appropriately affect passenger behaviour when an emergency occurs (Yu-Hern Chang, 2009) uses an empirical method to evaluate the effects of aviation safety education on passenger cabin safety awareness. It contributes to an understanding of the nature of aviation safety education, which is a powerful and practical means of

Affecting and improving airline passenger cabin safety knowledge, attitude, and behaviour and provides recommendations for airline safety management in cabin crew training programs and for cabin safety education programs for the general public.

The events of September 11, 2001 led to sweeping nationwide changes in aviation. Many of the changes implemented have been politically driven. For example, several billion dollars were invested in security devices following September 11, 2001 before any type of systematic analysis of aviation security systems was performed .(Laura A. McLay,2011) summarizes analytical approaches for managing risk in aviation security screening systems using operations research methodologies. This chapter focuses on passenger screening problems, an important and highly visible aspect of aviation security. In addition, it focuses on modelling approaches that seek to optimally use limited resources to manage the risks associated with terrorism.

Over the number of peoples travel through the air daily and reach at their designation safely, but due to this the accident rate could not be ignored. There is the number of aviation accident due to human errors and the human factor during in-flight aircraft icing should not be ignored. As aircrew error still remains an important contributor to icing incidents and fatal accidents, the need for human error prediction methods requires that this difficult problem can be addressed and solved as early as possible. (SHAN Kunlun,2011) summarised As the tools of safety analysis and assessment, HEIs have played an important role in nuclear, offshore, chemical and power system design and improvement processes . Unremitting efforts never stop in order to search for a suitable HEI method which can predict human errors in the air transport field appropriately. Aeronautical assessors studied this topic, mainly focussing on existing aircraft flight decks and Air Traffic Management systems due to the high frequency of interaction with flight crews.

Maintenance plays an important role in the aviation industry. In the absence of maintenance, most system parts deteriorate due to use or age, which results in wear and eventually failure of the part, which may compromise system safety. Accidents result from a combination of factors, such as design errors, mechanical failures, software errors, user errors, and organizational or regulatory factors.
(Karen B. Marais ,2012)analyzed several safety related metrics and develop an aviation maintenance risk scorecard that collects these metrics to synthesize a comprehensive track record of maintenance contribution to airline accidents and incidents. We perform an in-depth analysis of aviation accidents, incidents, analyzed several safety related metrics and develop an aviation maintenance risk scorecard that collects these metrics to synthesize a comprehensive track record of maintenance contribution to airline accidents and incidents.
There are many studies to compare safety performance among airlines and to analyze changes in airline safety performance over time, the most commonly used and thoroughly studied measure of safety performance is accident and incident rates (Bureau of Transport and Communications Economics, 1992; Rose, 1992; Gellman Research Associates, 1997). Most of these studies use accident and incident data as a safety measure for examining the relationships between safety performance of airlines and related issues, such as carrier groups (Barnett and Higgins,1999; Oster et al., 1992), cost and revenue (Suzuki, 1998), deregulation (Rose, 1992; Foreman, 1993).
Apart from these many are many studies contributed in the aviation safety. Some of these major studies related to the aviation safety are listed in the table 1.

5. Development of Raw Information Framework: Findings and Conclusions

Total 36 number of research papers were studied related to aviation safety and whose impact factor is greater than one. From these research papers seven major dimensions are find out and forty two resultants parameters are explored.
Environmental has been a hazard to aviation. In aviation weather there are many features that include: rain, wind, turbulence and lightning. Aviation safety is likely to face a challenge as a result of a growth in these intense phenomena. Human errors are considered as a major causal factor in most aviation accidents which are due to pilot's errors, communication gap, errors in repair and design. Pilot error and improper communication are often factors in the collision of aircraft. While, the ability of the flight crew to maintain situational awareness is a critical human factor in air safety. Despite rapid gains in technology, humans are ultimately responsible for ensuring the success and safety of the aviation industry globally.
Foreign object debris causes damage through direct contact with airplanes, such as by cutting airplane tires or being ingested into engines, or as a result of being thrown by jet blast and damaging airplanes or injuring people. Security is the challenge and is important for aviation safety, so that these attacks will reduce and to increase the safety of the passengers. However, they must continue to be knowledgeable, flexible, dedicated, and efficient while exercising good judgment to enable improves safety in air travel. Furthermore, the likelihood of future incidents is reduced and an organisations' efficiency, safety performance, safety culture and communication systems can be greatly improved. These parameters are listed in table 2.

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Table 1.

S.No.	Title Of The Paper /Year	Journal Cited With Impact Factor>= 1	Research Issues Addressed	Safety Aspects Explored
1.	From Ground Holding To Free Flight: An Exact Approach(2000)	Journal Of Transportation Science, 1.023	Congestion in air traffic networks is a serious problem to avoid congestion, or at least to reduce it, the central authority has to schedule the arrival times of all flights, with possible delays for some of them. In this paper, an exact algorithm, based on the integration of a heuristic algorithm with an integer linear programming model is prepared to reduce the congestion.	1.Congestion 2.Speed 3. Air Traffic 4. Time
2	The Effect Of Aviation safety Education On Passenger Cabin Safety Awareness, (2009)	Safety Science, 1.42	This paper examines the effect of aviation safety education on passenger cabin safety awareness in Knowledge, attitude, and behaviour. The educational value of these three has been addressed in various Fields such as aids prevention and campus safety. Kab has been applied in aviation safety especially in training, such as crew resource management training, pilot training, and mechanic training.	1.Aviation Safety Education 2.Cabin Safety 3.Knowledge 4.Attitude 5.Behaviour 6.Situational awareness
3.	Avian Perching Deterrents On Ultrasonic Sensors At Airport Wind-Shear Alert Systems(2004)	Wildlife Society Bulletin,1.36	Wildlife hazards associated with airports and air- craft are an ever-increasing concern. These concerns have prompted considerable research in recent years to develop and evaluate methods for reducing the safety	1.Bird Strike 2.Time 3.Height 4.Design

			hazards posed by wildlife at airports. The paper discussed about the birds disturbance in airports.	
4	Analysis Of Trends In Aviation Maintenance Risk: An Empirical Approach (2012)	Reliability Engineering And System Safety, 1.770	Maintenance plays an important role in the aviation industry. Papers analyze several safety related metrics and develop an aviation maintenance risk scorecard that collects these metrics to synthesize a comprehensive track record of maintenance contribution to airline accidents and incidents.	1.Maintance 2.Mechanical Factors 3.Wear 4. Aviation Safety
5	A Quantitative Model For Aviation Safety Risk Assessment(2008)	Computers And Industrial Engg, 1.589	The main purpose of this study is to develop a method that uses data on both accident and safety indicators to Quantify the aviation risk which are caused by human errors applicability in aviation risk Assessment. The use of the proposed model allows investigation of non-linear effects of aviation safety factors and flexible Assessment of aviation risk.	1.Human Error 2.Mislead information 3.Communication
6	The Impact Of Perceived Fairness On Satisfaction: Are Airport Security Measures Fair?(2006)	Journal Of Marketing Theory And Practice, 1.13	This study extends the literature by studying the relationships of various aspects of justice in the context of facilitating service under legally imposed constraints. The findings provide evidence that consumers' fairness perceptions about a facilitating service have a significant and substantial effect on satisfaction with the overall experience.	1.Security 2.Economy 3.Govterment Issues 4. Time 5. Behaviour
7	Health Risks From Radiation Exposure For Civilian Aviation Flight Personnel: A Study Of Italian Airline	Journal For Radiation Research(1.227)	The effects of exposures of civilian aviation flight personnel to atmospheric ionizing radiation (including high- energy neutrons) are being studied. The various ways of determining the exposure and the	1.Atmospheric Ionizing Radiation 2.RadiationEnvironment 3.Biological Response 4.AircraftRadiation Environment

	Crew Members(2001)		health status of past and current aircrew members are discussed, and follow-up procedures are de-scribed.	5.Radiation Protection 6.Flight Environment 7.Risk Analysis 8.Cosmic Radiation
8	Validation Of The United States Air Force Bird Avoidance Model(1999)	Wildlife Society Bulletin(1.36)	Aircraft collision occurs due to the bird strikes and fatalities occurred. So a bird avoidance model (bam) to evaluate low-level training routes for bird-strike hazards throughout.	1.Bird Strike 2.Debris 3.Cost 4.Design 5.Traning
9	A "Parallel Approach" Path To Estimating Collision Risk During Simultaneous Landings(1999()	Wildlife Society Bulletin(1.36)	Airport capacity could increase if, even during inclement weather, independent a landings could occur on parallel runways only about half a mile apart. In this the method is discussed that can find out an attractive combination of high estimation accuracy and relatively low cost.	1.Airport Capacity 2.Parallel Runways 3.Weather 4.Precision Runway Monitor 5.Angle Of Deviation 6.Bernoulli Process 7.Poisson's Process 8.Labour 9.Cost
10	Situation Awareness And Workload In Aviation(2002)	Current Directions In Psychological Science,(1.53)	The concepts of situation awareness and workload are central to aviation psychology are discussed here. Three components of situation awareness are spatial awareness, system awareness, and task awareness for attention and task management in aviation.	1.Spatial Awareness 2.System Awareness 3.Task Awareness 4.Aviation Psychology 5.Altitude
11	Airline Deregulation, Safety, And Profitability In The U.S.(1997)	Journal Of Transportation Science (1.023)	The purpose of these studies has been to analyze various effects of the deregulation & analyze costs, profits, efficiency, price, and quality of airline service attributable to deregulation.	1.Profitability 2.Deregulation 3.Standarad Deviation 4.Skewness 5.Mean
12	Airport Pricing Of Aircraft Takeoff And Landing Slots: An Economic Critique Of Federal regulatory	California Law Review(1.86)	Air travel delays, which cost the economy countless amounts in lost productivity and frustration, are accelerating at an alarming rate. This comment argues that one can trace part of the congestion problem	1.Air Traffic Control Systems, 2.Runway Space 3.Aircraft Weight 4.Cost 5.Slot Pricing

	Policy(2001)		to a flawed system of airport slot pricing. Approach of solving airport congestion by expanding airport resources.	6.Congestion 7.Government Policies
13	Safety Certification Of Airborne Software : An Empirical Study(2012)	Reliability Engineering And System Safety(1.770)	Many safety-critical aircraft functions are software-enabled. The paper then proposes a statistical method for supporting software safety audits by collecting and analysing data about the software throughout its lifecycle. The results of this case study show that our proposed method can help the certification authorities and the software and safety engineers to gain confidence in the certification readiness of airborne software and predict the likely outcome of the audits.	1.Aviation Safety 2. Cockpit Systems 3.Aircraft Capabilities 4. Pilot Capabilities 5. Air Space Restrictions
14	Competition In The Air: Birds Versus Aircraft(2002)	The Auk(2.156)	This paper discussed about the loss due to the bird strike with the aircraft. The loss may be human loss, aircraft loss, and economical loss.	1.Bird-Aircraft Collisions 2.Wind Shield 3.Engine 4.Aircraft Component 5. Time 6.Passenger Disruption 7.Passenger Safety 8.Aircraft Noise 9.Aircraft Speed 10.Design 11.Radar
15	Using Dna Barcodes To Identify Bird Species Involved In Bird strikes(2008)	Wildlife Society Bulletin,(1.36)	Bird-aircraft collisions (hereafter bird strikes) are a serious safety hazard and a major expense for the aviation industry. That aims to adequately control this hazard by knowing the species.	1.Bird-Aircraft Collisions 2.Airframes, 3.Windshields 4.Birdstrike
16	Manufacturing Gender In Commercial And	Science, Technology, & Human Values(2.33)	The article demonstrates how and why the interests of women pilots could prevail in the traditionally male preserve of the military. To	1.Age 2.Gender 3.Flying Hours 4.Time

	Military Cockpit Design(1997)		understand how women's bodies become excluded by design and how difference becomes technologically embodied, it is necessary to examine how current military systems are designed with regard to the physical differences of their human operators	5.Cockpit Design
17	Aviation Safety And Maintenance Under Major Organizational Changes, Investigating Non-Existing Accidents(2008)	Accident Analysis And Prevention(1.867)	The paper discusses the development of safety related indicators in the aviation industry. It is also discussed that how much aviation safety is affected due to the organisational changes,	1.Pilot Competence 2.Design 3.Maintenance 4.Flight Hours 5.Cycles 6.Financial 7. Regulation 8.Liberation 9.Privatization 10.Cost Factors
18	Development And Initial Validation Of An Aviation Safety Climate Scale(2007)	Journal Of Safety Research(1.755)	This paper discuss about the consistent set of safety climate factors. This study developed a tool to assess the level of perceived safety climate.	1.Safety Training 2.Equipment 3.Maintenance 4.Climate 5.Aviation Safety 6.Factor Analysis
19	WorkProcessAnalysis: A Necessary Step In The Development Of Decision Support Systems. An Aviation Safety Case Study(1999)	Interacting With Computers(1.233)	This paper demonstrates the importance of work process modelling and supporting data analysis in system development. The impact of work processes on data collection, recording, and analysis capability is analysed.	1.Airworthiness 2.Regulations 3.Government Policies 4.Maintenance
20	The Effects Of Emotion On Pilot Decision-Making: A NeuroergonomicApproach To Aviation Safety.(2012)	Transportation Research Part C(1.957)	The studies discuss that negative emotional consequences attached to the go-around decision provoke a temporary impairment of the decision-making process. By investigating this hypothesis with a simplified landing tasking which two possible contributors to those	1.Human Error 2.Communication 3.Decision 4.Behaviour

			emotions, namely the uncertainty of a decision outcome and the reward/punishment, associated to the outcome were manipulated.	
21	Impact Of Gender, Age And Experience Of Pilots On General Aviation Accidents(2011)	Accident Analysis And Prevention(1.867)	In this study statistical analysis is done to investigate the significance of a pilot's gender, age and experience in influencing the risk for pilot errors and fatalities in aviation accidents. However, it is found that male pilots, those older than 60 years of age, and with more experience, are more likely to be Involved in a fatal accident.	1. Age 2. Flight Experience 3. Gender 4. Pilot Error
22	Characteristics Of Alcohol-Related Fatal General Aviation Crashes(2005)	Accident Analysis And Prevention(1.867)	The effects of alcohol on piloting performance have been studied extensively. Information describing alcohol-related aviation crashes are discussed in this paper and found that alcohol appears to play a particularly important role in crashes involving flight under ver. into imc.	1.Alcohol 2.Pilot Performance 3.Health 4.Human Error 5.Crash Risk
23	A Fuzzy Expert System For Aviation Risk Assessment(2009)	Expert Systems With Applications(2.203)	In commercial aviation accidents occur at this phase include collisions with terrain, and runway undershoot, overrun, or excursion.	1.Air Safety 2.Stress 3.Human Failure 4.Pilot Fatigue
24	The Art Of Measuring Nothing: The Paradox Of Measuring Safety In A Changing Civil Aviation Industry Using Traditional Safety Metrics.(2010)	Safety Science(1.402)	In this the difficulties of measuring safety as an outcome measure in high reliability organizations are discussed.a model is prepared to use in safety management system in civil aviation industry.	1.Organizational Change 2.Safety Management Systems 3.High Reliability Organizations 4.Social-Technical Systems
25	Fatigue In Aviation(2005)	Travel Medicine And	Pilot's fatigue is disscussed in this paper. Scientific understanding of human sleep, fatigue, and Circadian	1.Pilots 2.Aircrews 3.Crew Rest

		Infectious Disease(1.5)	rhythms has expanded considerably. The thorough integration of this new Knowledge into modern crew-resource management practices will facilitate the Establishment of optimal crew scheduling routines and the implementation of valid Aviation fatigue countermeasures.	4.Sleep 5. Fatigue
26	Operations Safety: An Assessment Of A Commercial Aviation Safety Program(2001)	Journal Of Operations Management(4.382)	The studies have focused on the operational performance Of various airlines and airports. The few have assessed the efficacy of government airline safety programs. This study evaluates a commercial aviation safety program that sanctions pilots with alcohol-related motor vehicle convictions.	1.Operations Safety 2. Quality Operations Management. 3.Technological Changes 4.Cost 5.Regulatory Pressures 6.Human Error
27	Effects Of Dimethyl Or Diethyl Carbonate As An Additive On Volatility And Flash Point Of An Aviation Fuel(2008)	Journal Of Hazardous Materials(4.17 3)	An important consideration is the additive's ability to improve thermal stability, reduce pollutant emissions, and enhance heat sink and fast ignition of a fuel. The aim of this work is to investigate the effects of dmc or dec as an additive on the volatility and flash point of an aviation fuel.	1.Fuel Loading 2.Smoke Emission 3.Thermal Stability 4.Vapour Pressure 5.Density
28	Aviation emission inventory development and analysis (2010)	Environmental Modelling & Software(3.11 4)	The availability of this real time aviation emission database, environmental Analysts and aviation experts will have an indispensable source of information for making timely decisions Regarding expansion of runways, building new airports, applying route charges based on environmentally Congested airways, and restructuring air traffic flow to achieve sustainable air traffic growth.	1.Runway Expansion 2.Congestion 3.Environment 4.Aviation Emission 5.Speed Altitude 6.Latitude 7.Longitude 8.Altitude 9.Time 10.Volume 11.Acid Rain 12.Chemical Reactions

29	Aviation And Externalities: The Accomplishments And Problems (1999)	Transportation Research Part D(1.659)	This paper presents an overview of the impacts of civil aviation on the environment. In particular, it considers some of the important technological and institutional innovations, that have been implemented in the sector over time in order to simultaneously increase Its efficiency and decrease the negative impacts on the environment	1.Environment 2.Noise 3.Technology 4.Efficiency
30	Aviation And Global Climate Change In The 21st Century(2009)	Atmospheric Environment(3.465)	Studies examine the substantive reductions in aviation fuel usage are possible only with the introduction of radical technologies. Incorporation of aviation into an emissions trading system offers the potential for overall co_2 emissions reductions.	1.Aerosols 2.Aviation Emissions 3.Aviation Trends 4.Climate Change 5.Radioactive Forcing 6.Aviation Fuel
31	Cabin Safety And Emergency Evacuation: Passenger Experience Of Flight Ci-120 Accident(2011)	Accident Analysis And Prevention(1.867)	Aircraft evacuation effectiveness is a critical but challenging issue in the civil aviation industry. This paper explores the cabin safety perceptions of passengers from their emergency evacuation experiences in an actual aviation accident. A questionnaire survey and in-depth interviews were conducted with china airlines flight CI-120 passengers.	1.Cabin Safety 2. Accident Analysis 3.Passenger Safety Education 4. Training
32	Aviation Gas Turbine Alternative Fuels: A Review (2011)	Proceeding Of The Combustion Institute(3.16)	This paper discuss about to produce alternative aviation fuel.	1.Aviation Fuel 2.Technology 3.Security 4.Cost
33	Explosives Detection Systems (Eds) For Aviation Security (2003)	Signal Processing(1.5)	In this paper some technologies are discussed for the purpose of aviation security. The checks are Performed on passengers, their carryon luggage, checked baggage, and	1.Security 2.Safety 3. Technology 4.Screening

			cargo containers.	
34	Air Passenger Perceptions On Exit Row Seating And Flight Safety Education(2008)	Journal Of Safety Research(1.75)	This paper investigates passenger perceptions about exit row seating limitations and obligations and about the effects of Flight safety education given to the general public.	1.Flight Safety Education 2.Air Passenger 3.Air Worthiness
35	Safety-Relevant Mode Confusions—Mode lling And Reducing Them(2005)	Reliability Engineering And System Safety(1.770)	A new classification of mode confusions by cause leads to a number of design recommendations for shared control systems. These help in avoiding mode confusion problems.	1.Vertical Speed 2.Flight Path Angle 3.Psychology 4.Community
36	Measuring Safety Climate In Aviation: A Review And Recommendations For The Future(2011)	Safety Science (1.402)	This paper examine safety climate within commercial and military aviation. It is recognized from the studies that the accident rate in commercial aviation Is too low to provide a sufficiently sensitive measure of safety performance.	1.Safety Climate Factors 2.Lagging Indicators 3.Leading Indicators 4.Safety Culture 5.Equipment And Maintenance 6.Risk Management

Table 2. Informational Framework

S.No.	Major Dimensions	Variables
1.	Environmental factors	1. Weather 2. Environmental radiations 3. Wind conditions 4. Climate change
2.	Human Factors	5. Pilot capabilities 6. Staff training 7. Intoxication of liquors 8. Health

		9. Mislead information 10. Situational awareness 11. Communication 12. Airworthiness
3.	Airspace & Airport Infrastructure	13. Airport capacity 14. Icing 15. Time 16. Runway excursion 17. Runway conditions 18. Runway overrun 19. Traffic conjunctions 20. Fuel 21. Flight altitude 22. Airframe Hours
4.	Economical factors	23. Cost 24. Inadequate Staff 25. Fuel prices 26. Market crisis 27. Overtime 28. Government Policies
5.	Technical and maintenance	29. Automation 30. Aircraft design

		31. Aircraft noise 32. Material and geometric parameters 33. Altitude 34. Mechanical failure 35. Efficiency
6.	Foreign object damage	36. Bird strike 37. Runway debris 38. Volcanic Ash
7	Miscellaneous	39. Passenger's safety 40. Mid-air collision 41. Terrorism 42. Chemical reactions