Free research proposal about purpose of the study

Engineering, Aviation

Part #1: Introduction

Aviation safety is a concern to many stakeholders in the aviation industry. Air accidents occur because the technological advancements in preventing the accidents are not sufficient (Tetteh, 2006). The recent accidents in Russia and some European aircraft crushing on African soil confirm this (Pyadushkin, 2013). The paper presents a proposal for evaluating and solving the safety issues of passengers while on board and in the air. It analyzes how the changes in technology will help to lower the accident rates further to the lowest possible level.

The increasing safety issues of passengers during air travel has alarmed the world; especially in more recent years. The challenging question is not about increasing safety issues on aircrafts since safety in aircrafts has actually improved. This research looks at the technological tools that can be used to further eliminate the aircraft accidents in the country. The latest aircraft and air traffic management technologies can help solve the challenges that face the industry. If the technological advancements are adopted better, aircraft can be monitored from a central point where air traffic controllers can foresee issues that can cause accidents and take steps to prevent them.

Statement of the Problem

Many people die due to aircraft accidents, occurring for a number of reasons. However, most of the aircraft accidents occur because the technology used in the aircraft industry does not match the expectations of the industry. The recent Russian aircraft accident is one of the major examples of technology that failed leading to an aircraft accident (Pyadushkin, 2013). This low level

of technology in one of the most important areas of the aircraft industry presents a problem that warrants research (Taneja & Wiegmann, 2002). This research aims at analyzing aircraft accidents that occur due to low systems technology and attempts to derive solutions to prevent future accidents.

Assumptions in the Study

- The research will assume that the technology used across all aircraft is identical in capability, and performance.
- The research will assume that all the owners and operators of aircrafts are willing to adopt new technologies to help lower the number of aircraft accidents.
- The research will assume that all aircraft operators have the resources to adopt new technologies to help lower the number of aircraft accidents.
- The research will assume that the aircraft operators have the required technology to implement the new technologies effectively.

Justification of the study

The research into the safety of airline passengers and crews is more motivated in aircraft-related accidents. Many aircraft in use today use old out-dated technology. This suggests that the technology used is one of the major factors involved in aircraft accidents. This problem is worthy of investigation for a number of reasons. Firstly, one possible solution to decreasing the number of aircraft-related accidents lies in the decisions that people make in terms of the technology used (Bowling et al, 2002). This means that a decision to use updated air traffic systems technologies could be a valid solution to the issue. Furthermore, new technology has the added

benefit of efficiency in terms of saving on costs. This means the aircraft market will be interested in the technology as a way of lowering costs as well as safety issues.

The hypothesis of the study looks at a scenario where aircraft accidents may increase if the technology is not supplied enough. The null hypothesis proposes to adopt new technologies in the industry while the alternative hypothesis maintains the status quo using the existing technology (Learmount, 2005). The research will mainly analyze the relationship between the aircraft accidents and the technology used in the aircrafts.

Objectives of the study

Research Questions

- How do low technological levels contribute to the occurrence of aircraft accidents?

- How can the latest aircraft and air-traffic system technologies help in reducing the number of aircraft accidents?

- What is the level of education, expertise, and technical knowledge among aircraft staff members?

- How will the level of education affect the adoption of new technology in the aircraft industry?

Limitations of the Study

- Financial limitation

The researchers will be faced with many financial constraints, as the money needed to carry out the research is likely to exceed the financial capability of the researchers.

- Sampling challenge

There is a wide range of sampling strategies that can be applied in the

aircraft industry and their selection will be a major challenge to the

researchers

- Scope

The scope of applying these studies to aircraft firms and the technical

possibilities involved are vast. Only the appropriate sampling strategy will

help to solve this problem.

Definition of terms

Aircraft-An aircraft is a machine capable of flight by gaining support from the

wind, or, in general, the atmosphere of a planet.

Technology- Technology is usage, modification, and implementation of new tools and systems to solve a phenomenon.

Aviation- aviation entails the use of aircrafts, the technology in aircraft

operations, and the development of systems used in aircraft development.

Part #2: Literature Review

Several studies have been done recently to find ways to prevent airline

accidents. The Pasztor (2013) study focuses on determining the cause of

aircraft accidents. Aircraft security is a major concern for the people who

frequently travel by air and should not be taken lightly. Aircraft security is

important in a number of ways. Secure air travel enforces confidence in

passengers and crewmembers involved in air transport and helps to increase

passenger capacity (Stapleton, 2008). Furthermore, improving air transport

security helps develop healthier transport systems such as providing methods to prevent hazards such as suffocation. Pasztor (2013) states that the security of people on aircraft is a major cause for setbacks in aircraft transport. It further states that any improvement in the security of the airlines would help greatly in winning back the confidence of the people and help airlines to work at full capacity again.

Since 1985, there have been a large number of aircraft accidents. At least 10 aircraft accidents occur in the transport sector every year causing 200 fatalities on average (MacPherson, 2002). Statistics involving this many fatalities give reason to investigate the cause of these accidents. The main goal in investigating these aircraft accidents is to identify and then eradicate the causes and contributing factors to the accidents. Research shows that 50 % of the aircraft accidents in recent years are caused by turbulence and poor technology used in the aircrafts (MacPherson, 2002). Technological issues may be solved through improving the equipment and technology used in the aircrafts.

Measures to lower aircraft accidents have been made in the past, although some of them have not been as effective as they could have been. Nolan (2010) study suggests a number of research solutions for alleviating these situations. Firstly, the aircraft environment should be improved. For example, the latest aircraft and air traffic system technologies will help to enhance the security of aircraft by supporting new air navigation systems, hence lowering accidents in the sector. By boosting the new air navigation systems, the latest aircraft and air traffic system technologies will help in the adoption and installation of aviation ground technology and monitor technology,

thereby significantly improving aviation environment and safety (Nolan, 2010).

Another other step that can be taken in resolving aircraft issues is improving aviation safety systems and improving services. Aviation safety systems have received a lot of condemnation and scrutiny, as they do not take care of the safety of the people to the maximum. Failure of the aircraft safety systems is the main cause of aircraft accidents, yet it is one of the easiest to deal with (Pasztor & Michaels, 2010). The latest aircraft and air-traffic system technologies will help in improving the aviation and aircraft safety systems by monitoring aircraft systems, with increasing benefits as aircraft and air-traffic system technologies improve. Improvement of the monitoring systems will lower the number of accidents by providing effective mechanisms for monitoring activities in the aviation systems.

The latest aircraft and air-traffic system technologies will help to improve the security of the aircraft by improving the operational safety of the aircrafts. In most cases, supervision can help increase efficiency as pilots and airlines operators do their best, knowing that they are being monitored and evaluated. The latest aircraft and air traffic technologies will help to monitor activities, and the adoption of these technologies by all the aircraft companies will help to encourage the adoption of new technology in the sector. Aircraft operators are likely to be more cautious, as the monitoring will help to " weed out" operators who do not comply with the aircraft security technologies and policies.

In some cases, the lack of competence and skills of the aircraft specialists and operators is the root cause of the accidents. Through the latest aircraft

and air traffic system technologies, the aircraft operators can be monitored and their weaknesses exposed by management. This will foster training which has the potential of improving the operators' competence. Consequently, the accidents due to lack of competence will be minimized and eventually eradicated. According to Muir and Thomas (2004), the systems will also help in boosting the safety and security of the people during aerial leisure activities. While travelling, people may engage in leisure activities that put their lives at risk. Through the latest aircraft and air-traffic system technologies, aircraft operators can monitor and control these leisure activities, thereby lowering the number of activity-related accidents. However, the most efficient system that will be used in lowering the aircraft accidents is the monitoring of the states and conditions of the aircrafts. These systems can be used to determine the state of the aircrafts, resulting in fewer numbers of accidents due to technical issues (Andy, 2004).

Part 3: Procedures

Research Design

The researcher will use casual research design. This is a non-experimental design, which explores the relationship between variables. It determines the reasons or the causes of the status of the phenomenon under study. The design will help the researcher to compare groups without manipulating independent variables and solely identify variables worth experimental investigation. The researcher will also engage the longitudinal research design that tracks changes over time and its studies are repeated over an extended period. The researcher will engage in inductive and deductive reasoning methods in order to track the performance of the independent

variables, evaluating how they arrive at their generalizations and specific objectives of the study.

Sampling strategy and procedural details

The sample size will be made of 100 aircraft companies from different areas. The researcher will use the stratified random sampling method. The population is divided into sub-groups called Strata from which a sample is selected in a probabilistic sampling method. The listed companies in the aircraft sector are divided into 10 categories thus, the researcher has 10 strata. The researcher will consider the proportional method of picking items since each element has an equal chance based on the proportion. From the 10 categories, the researcher needs a sample size of 10 companies to create equal chances from each category. In consequence, the researcher will pick elements based on the items in each category.

The researcher will use systematic random sampling in the strata after establishing how many items to pick from each category. The researcher will pick the ' nth' member of each category where its elements are many. The random starting point or skip interval will be given as follows:

Skip Interval = Size of each category ÷ Desired sample size per category

The aggregate sample size collected will be thus studied thereby reducing systematic bias and the sampling errors. However, the limitation of the sampling and procedures is that some of the elements may not be well spread hence errors can still occur.

Research Instruments

Data Collection Tools and Techniques

The researcher will use both primary and secondary data sources.

Primary Sources of Data

The researcher will approach the management of the sampled companies to interview them and get the required information. The researcher will use general interview guide approach, which ensures that the same general areas of information are collected from each interviewee. It provides more focus than other approaches.

The researcher will also use other primary sources of data like:

- Questionnaires

- On-site Observations

Secondary Sources of Data

The researcher will use secondary data from various sources.

- Newspaper Cuttings

- Journals

- Archive records

- Internet

The primary and secondary sources of data are relevant to the study because as much as the primary sources will provide information on the present conditions in the aircraft market, the secondary sources will help to know the past scenarios and the expectations of the people.

Reliability and Validity

Data Reliability

Data obtained from research will be reliable. This is because the researcher works to eliminate some of the causes of unreliability, mainly the random error like:

- Fatigue – the researcher will ensure that the interviewee is not tired by asking fewer and relevant questions.

- Bias – by selecting companies from different categories, the researcher will ensure that the respondents do not give answers to suit situations but give genuine and honest responses.

- Inaccurate Coding – through repeated data analysis, the researcher will ensure that data given is recorded accurately.

Data Validity

The researcher validates information gained from the research using the following major ways:

- Test-retest technique

- Internal Consistency Form

The researcher considers people in the same or related ranks in the sample companies. By doing this the quality of information gathered is likely to be equal or within range.

In view of the above, information gathered from the research is of high level of reliability and validity.

Data Analysis

In analyzing the data obtained from the field, the researcher will employ

various techniques depending on the source from where the data was
obtained.

Analysis of Questionnaires

The researcher reviewed all the questionnaires, analyzing every response
individually. The questionnaires should be analyzed in three major steps:

- Similar responses will be grouped together as they give information of
congruence and that is relevant for comparison.

- Highly differing responses will be tested against the independent variables
in each of the firms to determine the causes of deviation.

- In case of suspicion of bias, information from a particular respondent will be
analyzed more critically.

Analysis of Interviews

During the course of research, all interviews will be recorded for later
analysis. In analyzing interviews, various precautions will be observed;

- Avoid responses that are outright bias.

- Arguably, biased information will be subjected to further testing.

- Fair statements will be weighted more than seemingly bias statements.

- All interviewees will be treated equally and fairly.

Analysis of Secondary Sources of Data

Sources of data, which will be checked and validated, should be trusted except:

- Where there is suspicion of creative accounting

- Personal records of individuals

- Individuals data denoted as " confidential"

- Private information

Research Ethics

In gathering information for the research, the researcher will maintain the following ethics in respect to the participants and fellow team members:

- Ethical Treatment of participants – the researcher will conduct interviews and receive responses through questionnaires in a manner that the respondents do not suffer any embarrassment or lost privacy. The researcher will do this through the following guidelines:

- Respondent's Consent – the researcher will first start by explaining the purpose of the survey clearly to the respondents. He or she will also disclose to the respondents all the procedures that will be involved in the interview. After ensuring that the respondents have well understood what is required of them and the need for them to provide honest responses to the questions asked, the researcher will seek the consent of the respondents to continue with the interview.

- Benefits – The researcher will discuss the benefits of the survey with the respondents. While at it, he or she will be careful not to either overstate or understate the benefits of the study to the respondents. Discussing the benefits with the respondents will help them to be at ease and will motivate the respondents to answer the questions truthfully. In the case of an interview, the researcher will begin by introducing himself or herself by name, a brief description of the purpose and benefits of the research.

- Rights to privacy – the researcher will respect the respondents' rights to privacy. This is mainly to retain the validity of the research and to protect the respondents. The researcher will protect the respondents' confidentiality

through:

- Obtaining signed nondisclosure documents

- Revealing respondent information only with written consent

- Nondisclosure of data subsets

- Research and Team Members – the researcher will also have unethical responsibility with their team's safety as well as their own.

- Safety – the researcher will design a project to ensure safety of all the team members including the interviewers and observers. The researcher will ensure that the team members are accompanied for safety purposes whenever they enter an environment where they feel physically threatened.

- Ethical behavior of assistants – the team members will also comply with research ethics. The assistants will be expected to carry out the sampling plan, to interview and observe respondents without bias and to accurately record all the necessary data. All research assistants will be well trained and supervised. The behavior of the assistants will be under the direct control of the responsible researcher.

- Protection of anonymity – the researchers and assistants will protect the confidentiality of the respondents' information and the anonymity of the respondents. Each researcher handling data will be required to sign a confidentiality and nondisclosure statement.

Conclusion

The aircraft accidents have increased in the recent years hence the need to research into the causes of mitigation factors is even greater. Various researches have come up showing the deficiency in safety and the aircraft system. This research proposal will be used to evaluate the technology that

can be applied in solving the aircraft accidents. However, the research basics must be followed keenly in order to get accurate results from the research.

Annotated Bibliography

Andy, P. (2004, Oct 27). Boeing, FAA launch probe of older planes; scratches on outside of 737s could lead to safety problems, may affect other aircraft. Wall Street Journal. Retrieved from http://search. proquest. com/docview/398954201? accountid= 45049Boeing is thinking of developing and presenting a plan to the stakeholders on tackling any scratches in future. . The FAA accepts the suggestions and moves to make them top on priority as soon as they can come. Most airlines will need to inspect planes within 4, 500 takeoffs and landings or at least four to five years since the date of their initial repainting. The planes bearing any marks of scratches will be checked every month more strictly in order to make sure they maintain the aircraft standards. Planes with scratches will get follow-ups. The subsequent scheme shows how deformed surfaces can result to aircraft accidents; a maintenance worker uses a sharp tool during prep work and repainting tem with aluminum. Scratches on the planes reduce the balance and flight capacity due to the air weight opposition that comes due to the scratches. In this regard, elimination and checking on the scratches makes flight easier and more secure than the former.

Bowling, S. R., Kaewkuekool, S., Khasawneh, M. T., Desai, R., &Gramopadhye, A. K. (2002). Confined space work in aircraft maintenance industry: Scope for improving safety and reducing errors. IIE Annual Conference. Proceedings, 1-5. Retrieved from http://search. proquest. com/docview/192462534? accountid= 45049the environment in which a

worker is performing a function greatly influences their performance, management, and productivity. The safety and sustenance in the aircraft industry mainly involves inspection and productivity management. These inspection and maintenance activities often require a huge level of commitment and competency in their undertaking. Competency cannot be compromised because many aircraft activities are carried out in space. This paper evaluates the need for pursuing confined space study while providing a guideline for pursuing confined space research.

Learmount, D. (2005, Sep). European Union nudges forward with foreign aircraft safety rules. Flight International, 168, 11. Retrieved from http://search. proquest. com/docview/225098086? accountid= 45049The Safety of Foreign Aircraft act formalizes safety checks on third-country aircraft using European airports and the collection and sharing of information on the findings, and all member states are required to comply with it by April 2006.

MacPherson, J. (2002). Aircraft accidents slip to five-year low, but fatalities up. Alaska Journal of Commerce, 26(8), 9. Retrieved from http://search. proquest. com/docview/219645169? accountid= 45049

Muir, H., & Thomas, L. (2004). Passenger safety and very large transportation aircraft. Aircraft Engineering and Aerospace Technology, 76(5), 479-486(8). Retrieved from http://search. proquest. com/docview/213775930? accountid= 45049Future very large transport aircraft (VLTA) represents an exciting and important development in civil aviation. The emergency evacuation of VLTAs in the event of a survivable crash poses a challenge for aircraft manufacturers and certification

authorities. The information, which has been gained from previous evacuation research, has been re-evaluated for VLTA. This included consideration of the aircraft configuration, crew factors and passenger issues.

Nolan, J. (2010, Jan 17). UAV advocates want test-flying airspace closer: Civilian authorities fear technology for unmanned aircraft cannot assure air safety. McClatchy - Tribune Business News. Retrieved from http://search. proquest. com/docview/458852474? accountid= 45049The industry mainly involves following the suspicions and the senses of the person. UAV insists that whenever one senses the aircraft has maintenance and aviation issues, they must avoid it in order to keep their lives safe. This is the best way to keep the aircrafts safe as the inspectors will spot the aircrafts avoided hence initiate investigations on them.

Pasztor, A. (2013, May 05). Dreamliner prompts new look at aircraft safety reviews. Wall Street Journal (Online). Retrieved from http://search. proquest. com/docview/1348556276? accountid= 45049a report suggests that FAA has limited capacity and that it must handle the priorities at hand first. Clay Jones, who was retiring as CEO of aircraft-parts-maker Rockwell Collins Inc., said his industry should come out stronger and undertake inspection to take advantage of the gap in the past decade.

Pasztor, A., & Michaels, D. (2010, Apr 12). World news: Clues sought in crash of polish plane --- many russian jets lack safety equipment common on western commercial aircraft; no engine problems reported. Wall Street Journal. Retrieved from http://search. proquest. com/docview/399151225? accountid= 45049Commercial jets built in the U. S. A, Europe, Canada, and

Brazil normally are equipped with high definition ground-collision warning systems that give pilots repeated alerts -- including a very loud computer-generated voice, which advises them to " pull up" any time a plane is imminently headed for a collision. Advanced ground-collision warning systems became standard on major Western-built aircraft, crashes of properly functioning jetliners into mountains or while descending toward airports have all disappeared since the mid-1990s.

Stapleton, R. (2008). Governor signs bill approving loans for aircraft safety equipment. Alaska Journal of Commerce, 32(16), 9. Retrieved from http://search. proquest. com/docview/219660581? accountid= 45049Theequipment have multi-function screens that give the pilots a view of the environment they are moving through. The screens also give the pilots a view of the graphical weather, terrain of the land, and all relevant flight information. This helps to inform the pilots of what to expect and it may influence the precautions that the pilot takes during the flight.

Taneja, N., & Wiegmann, D. A., PhD. (2002). Analysis of injuries in fatal aircraft accidents: Implications for designing more crashworthy aircraft. IIE Annual conference. Proceedings, 1-2. Retrieved from http://search. proquest. com/docview/192471147? accountid= 45049An abstract of a study analyzing patterns of injuries sustained by pilots involved in fatal general aviation airplane accidents is presented. The federal administration retrieved all the important information and even carried out autopsy on the victims in the general aviation airplane accidents from 1995 to 1999.

Tetteh, E. G. (2006). Human factors analysis of commercial aircraft accidents in the United States: 1960-2000. IIE Annual conference. Proceedings, 1-6.

Retrieved from http://search. proquest. com/docview/192452772? accountid= 45049nowadays, the factor more likely to cause an aviation accident is aircraft mechanical fallibility. Thus, the majority of research on aviation safety has focused on designing better systems. With the advancement in aircraft technology, providing extremely capable aircrafts, human error is now the leading cause of aviation accidents compared to mechanical failure. Understanding and preventing human error in aviation disasters is now the principal challenge within aviation safety community. Major effort has been devoted to devising ways to improve aviation safety through improvement in pilot's training. This study has taken advantage of 1960-2000 National Transportation Safety Board (NTSB) archival data to investigate the impact of human factors on the safety of air traffic. Results suggest that pilot's flight time, pilot's age, and the severity of the event have a considerable impact on the NTSB rating category of aircraft accidents such as human error, mechanical failure, and natural cause. Factors that have been found to pose problems to aviation safety were reviewed and directions were offered for the creation of better pilots training programs with potential to increase pilot's safety awareness.

References

Andy, P. (2004, Oct 27). Boeing, FAA launch probe of older planes; scratches on outside of 737s could lead to safety problems, may affect other aircraft. Wall Street Journal. Retrieved from http://search. proquest. com/docview/398954201? accountid= 45049

Bowling, S. R., Kaewkuekool, S., Khasawneh, M. T., Desai, R., & Gramopadhye, A. K. (2002). Confined space work in aircraft maintenance

industry: Scope for improving safety and reducing errors. IIE Annual conference. Proceedings, 1-5. Retrieved from http://search. proquest. com/docview/192462534? accountid= 45049

Learmount, D. (2005, Sep). European Union nudges forward with foreign aircraft safety rules. Flight International, 168, 11. Retrieved from http://search. proquest. com/docview/225098086? accountid= 45049

MacPherson, J. (2002). Aircraft accidents slip to five-year low, but fatalities up. Alaska Journal of Commerce, 26(8), 9. Retrieved from http://search. proquest. com/docview/219645169? accountid= 45049

Muir, H., & Thomas, L. (2004). Passenger safety and very large transportation aircraft. Aircraft Engineering and Aerospace Technology, 76(5), 479-486(8). Retrieved from http://search. proquest. com/docview/213775930? accountid= 45049

Nolan, J. (2010, Jan 17). UAV advocates want test-flying airspace closer: Civilian authorities fear technology for unmanned aircraft cannot assure air safety. McClatchy - Tribune Business News. Retrieved from http://search. proquest. com/docview/458852474? accountid= 45049

Pasztor, A. (2013, May 05). Dreamliner prompts new look at aircraft safety reviews. Wall Street Journal. Retrieved from http://search. proquest. com/docview/1348556276? accountid= 45049

Pasztor, A., & Michaels, D. (2010, Apr 12). World news: Clues sought in crash of polish plane --- many Russian jets lack safety equipment common on western commercial aircraft; no engine problems reported. Wall Street Journal. Retrieved from http://search. proquest. com/docview/399151225? accountid= 45049

Pyadushkin, M. (2013). Crash victim.(crash of a Russian aircraft Tu-204). Aviation Week & Space Technology, (5)40.

Stapleton, R. (2008). Governor signs bill-approving loans for aircraft safety equipment. Alaska Journal of Commerce, 32(16), 9. Retrieved from http://search. proquest. com/docview/219660581? accountid= 45049

Taneja, N., & Wiegmann, D. A., PhD. (2002). Analysis of injuries in fatal aircraft accidents: Implications for designing more crashworthy aircraft. IIE Annual conference. Proceedings, 1-2. Retrieved from http://search. proquest. com/docview/192471147? accountid= 45049

Tetteh, E. G. (2006). Human factors analysis of commercial aircraft accidents in the United States: 1960-2000. IIE Annual conference. Proceedings, 1-6. Retrieved from http://search. proquest. com/docview/192452772? accountid= 45049