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Fostering Safer Evacuations Aboard Commercial Aircraft: A Problem-Solution Analysis

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ABSTRACT

This problem-solution analysis analyzes factors impeding safe and orderly evacuations for the Federal Aviation Administration (FAA). Although rarely used, evacuation procedures are critical for keeping passengers safe during emergency situations. However, there are flaws in these procedures and many factors exist which make aircraft evacuations slow and dangerous. During a situation in which time is of the essence, these impediments can make the difference between an incident and a fatal accident. This report focuses on data gathered through full-scale evacuation simulations and analyzes shortcomings and strengths in three accidents. This information is then compared to current procedures and regulations that already govern the industry to highlight what improvements must be made. The findings of this report indicate that current aircraft certification standards are inadequate, exit locator systems are insufficient, and the current required preflight briefing for exit row passengers is ineffective. This report recommends that the Federal Aviation Administration amends its current aircraft certification standards to include more accurate evacuation demonstrations, require the implementation of enhanced exit indicators, and mandate preflight briefings for exit row passengers that provide vital safety information. Additionally, the FAA should research the feasibility of overhead bin locking systems and study the effects of more orderly evacuation commands.

INTRODUCTION

Background

Despite many obstacles over the years, the commercial air travel industry is growing. As more people take to the skies, operators around the globe are reminded of their principal duty to their customers: traveler safety. Strict regulation and comprehensive safety management systems such as Flight Operations Quality Assurance (FOQA) and the Aviation Safety Action Program (ASAP) make airlines some of the most safety-oriented organizations in the world. Similarly, lessons learned from tragedy and years of design experience have allowed the world's leading aircraft manufacturers to design exceptionally safe aircraft. However, the risk of being involved in an accident is still present, and every part of the industry must be prepared.

Interacting with the customers directly, commercial operators play one of the biggest roles in ensuring passenger safety. Standard operating procedures developed by industry experts allow flight crews to follow checklists and procedures proven to be effective in keeping their passengers safe. In addition, intense training protocols keep flight crews sharp and ready to act when the situation calls for it. Manufacturers have a similar role in this endeavor by designing their aircraft with specific safety features to keep their occupants safe in any number of emergencies.

Statement of the Problem

Although commercial aviation remains the safest mode of transportation globally, there are many emergency situations that can arise which require an aircraft to be evacuated. Whilst this is an increasingly rare occurrence, hundreds of people are evacuated from aircraft every

year. Built-in devices such as automatic evacuation slides, passenger-operated exits, and comprehensive lighting systems paired with extensive flight crew training should make it simple to clear an aircraft in 90 seconds, as prescribed by the Federal Aviation Administration. Yet despite these efforts, there are many difficulties that crews face when trying to direct an evacuation, and the industry has a tragic history of passengers who survive an aircraft accident just to perish as they attempt an escape. Concerningly, evacuating an aircraft proves to be much more difficult than it should be.

Objective

The purpose of this problem-solution analysis is to identify procedural changes and technical modifications that will make evacuations of commercial aircraft faster, safer, and more efficient. The FAA will be able to use these recommendations to introduce legislation that will ensure the safety of air travelers in the United States. The report will investigate lessons learned from previous accidents and compare them to current standard operating procedures used by operators today. Additionally, the report will rely on recordings from recent evacuations to highlight unsafe and potentially dangerous conditions that pose a direct threat to passenger safety.

Scope

The report will take the following areas into account:

1. Human behavior and psychology
2. Prior accidents
3. Current standard operating procedures

For the purpose of this report, I will be analyzing a wide variety of aircraft types. While I will not cover all aircraft currently operating in the United States, the recommendations I intend to make are general in nature and not limited to one aircraft type.

Research Methodology

The idea of studying aircraft evacuations is not a new one and many experiments have been conducted to understand natural human behavior in such emergencies. I utilized the report *Effect of Passenger Behaviors and Psychological Characteristics on Emergency Evacuation* by Du, Zhang, and Yang and the article "Effects of Motivation and Cabin Configuration on Emergency Aircraft Evacuation Behavior and Rates of Egress" published in *The International Journal of Aviation Psychology* for their data gathered through full-scale evacuation simulations. I also looked at a comprehensive report by the American investigative agency the National Transportation Safety Board (NTSB) titled *Emergency Evacuation of Commercial Aircraft.*

While tragic, past accidents allow me to analyze specific failures of evacuation attempts and identify potential solutions to stop them from reoccurring. For the purposes of this report, I will be using *Air Accident Report 8/88* published by the British Air Accidents Investigation Branch on British Airtours Flight 28M and *Aircraft Accident Report - Air Canada 797* released by the NTSB. Additionally, living in the digital age has provided me with several videos inside aircraft accidents filmed by fleeing passengers. I used one taken onboard Spirit Flight 3044 published on YouTube, a video-sharing website, called *Spirit Airlines Crew Evacuates Plane Due to FIRE*.

To accurately understand current industry procedures, I used a collection of aircraft emergency manuals from an Airbus A320, an Embraer 145, and an Airbus A330. I supplemented

this research with a document titled *Getting to Grips with Cabin Safety* published by Airbus Flight Operations, a document containing emergency guidance from Airbus for operators of its aircraft. Using such resources will ensure that my recommendations are worthwhile and are built upon up-to-date standards. This research will allow the FAA to create new regulations that will usher in a new era of passenger safety for millions of travelers arriving in, departing from, and traveling within the United States.

DATA ANALYSIS

Human Behavior

Emergency situations can bring out irrational human behavior even when passengers have been prepared. Time and time again, those needing to act quickly to survive act in a way that is seemingly counterproductive. One of the most vital areas of aviation safety research is therefore trying to predict, understand, and shape the way people respond to any given scenario. This sort of research falls under the more comprehensive field of human factors, which is one of the most complex yet highly invested in areas of the industry. Human factors has applications across every facet of aviation and its research can be seen everywhere from the ground to the sky. It is important to note that all of the research into human behavior is, for the most part, imperfect. While it is possible to simulate aircraft accidents with extreme detail and conduct invaluable studies, it is impossible to predict a given reaction without being actively involved in the necessary scenario. With this in mind, it must be acknowledged that the subsequent studies are purely speculative in nature and do not ensure a given outcome.

One of the most important studies ever conducted on aircraft evacuations followed a failed evacuation of a British Airtours aircraft in 1985 (see section two). In the wake of the tragedy, a study was conducted by officials from the Department of Applied Psychology of Cranfield University and the Australian Bureau of Air Safety Investigation on the impact of motivation on aircraft evacuation behavior. In this extensive experiment, 1,558 volunteers took part in 134 simulated and highly scrutinized aircraft evacuations. One of the shortcomings of many prior experiments was the failure to instill a realistic sense of urgency in the volunteers. In seeking to replicate this ethically, the researchers promised financial compensation for the first

50% of volunteers who made it out of the aircraft. This incentive dramatically influenced the results when compared to control evacuations that were conducted without the financial motivation. Their results showed that the introduction of the compensation was detrimental to rates of egress and significantly slowed the time it took for an aircraft to be evacuated completely. This issue was mostly the result of volunteers trying to force themselves past existing blockages of people and contributing to an already significant bottleneck at exits. These results are important to consider when current evacuation standards tests conducted by the FAA do not take motivation into account (Appendix J to Part 25 - Emergency Evacuation, 2004). In addition, a high percentage of passengers demonstrated a remarkable delay in their reaction to the evacuation command, another phenomenon that was not present in the non-compensated trials. Another notable observation was that a majority of passengers chose to exit from two doors in the middle of the cabin, as opposed to the numerous exits situated across the aircraft and the doors through which they entered (Muir, Bottomley, & Marrison, 1996). This outcome supports the hypothesis that people tend to follow the path of others in an emergency, even if it means ignoring a safer and more obvious exit choice. After this report was published in 1996, it was highly regarded as one of the most important studies into evacuation behavior and was cited by numerous agencies, including the FAA.

A further study into this "herd behavior" was pursued by three students at Beihang University, China, for the Third International Symposium on Aircraft Airworthiness in 2014. By conducting two full-scale evacuations of a Comac ARJ21B aircraft, they sought to analyze the psychological factors that delay successful evacuations. Participants were then given surveys once they had left the aircraft asking for their personal information, how much they cared about safety information, and why they chose the exit they did. A brief quiz on the safety information

presented before the evacuation was also included. Their research showed that a high percentage of people did not know where the exit doors were located and many had no recollection of the evacuation process. There was a high amount of confusion and many delayed their escape until others were already on their way. This contributed to heavy congestion as people would force themselves into a queue forming in the aisle. Additionally, this confusion and panic contributed to a great deal of herd behavior (Du, Zhang, & Yang, 2014). The simulations suggested that people who are panicking and confused tend to abandon any attempts at independent reasoning and just follow where the crowd seems to flow, which is why many had no recollection of the door from which they left - they never actually chose one. This can cause significant congestion and contribute to delays when usable exits are inevitably overlooked.

While aircraft manufacturers can design exceptionally safe aircraft and implement robust safety features, aircraft can only become safer if their occupants can utilize the safety devices correctly. This principle is what makes human factors so important, as even the safest of aircraft can become deadly in extreme circumstances. The data collected from studying evacuations show passengers are quick to overlook seemingly obvious exits in favor of ones that are being used by a crowd. If additional exits were made more obvious, passengers may be less likely to ignore them. Also, delays in passenger reaction to an evacuation command contribute to congestion in the aisles and doorways, impeding the fast egress of passengers. A potential solution to this issue is to conduct a study on how passengers respond to stern, active commands compared to more calm and relaxed commands. Research suggests that if passengers feel calmer, they will act in a quicker, more rational manner.

Lessons Learned From Prior Accidents

Aircraft accidents are always regrettable and highly often preventable. To ensure that the loss of an aircraft does not go in vain, highly skilled investigative authorities from across the globe analyze every detail that occurred leading up to an accident. With this data, investigators aim to gain valuable insight into what brought down an aircraft, why it brought down the aircraft, and what can be done in the future to prevent it from happening again. Though tragic, lessons learned throughout the past century are what make aviation so safe today. With mistakes identified and shortcomings rectified, many causes of the world's deadliest accidents will never occur again. Thanks to the extensive record-keeping of the world's investigative authorities, accident reports are available from as far back as 1942 (National Transportation Safety Board, n.d.). Using these reports, an analysis of failed and successful evacuations can occur and recommendations can be made on how to make them safer.

One of the most poignant accidents involved British Airtours Flight 28M, a charter flight originating in Manchester, England, and terminating in Corfu, Greece. Shortly after initiating the takeoff roll, the aircraft suffered an uncontained failure of the number 1 engine and a violent fire soon followed (Air Accident Investigation Branch, 1988). Whilst dramatic, engine fires are relatively common and very rarely fatal (National Transportation Safety Board, 2000). Though the captain quickly followed the standard procedure and initiated an evacuation, 53 passengers and 2 crew members were not able to escape and perished, mostly due to smoke inhalation (Air Accident Investigation Branch, 1988).

Commented [RW1]: In aviation, the F is capitalized: Flight 28M.

One cause cited by the Air Accident Investigation Branch (AAIB) for the disaster in Manchester was confusing information provided to passengers sitting in the exit row. One survivor testified that they assumed crew members were responsible for opening the overwing

exits as illustrations in the safety information card showed a crew member operating the hatch (1988). The section in question is shown in Figure 1. Another survivor recounted to the AAIB how she tried to open the exit but ended up getting trapped under the hatch when it fell inward unexpectedly, despite this being the correct procedure (1988).

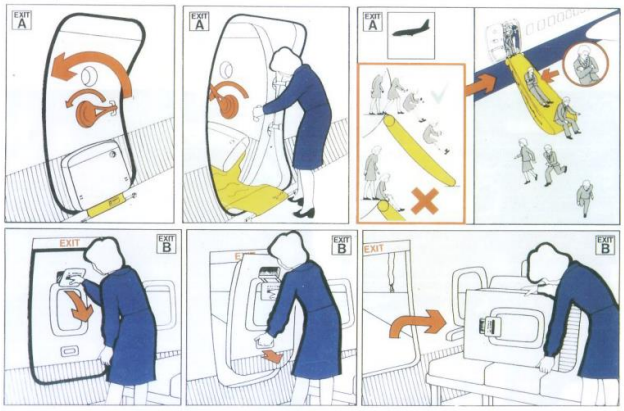

Figure 1. British Airtours 737 safety card excerpt

(Air Accident Investigation Branch, 1988)

Both of these accounts support NTSB data that a majority of passengers do not pay attention to safety briefings and read safety-related material (National Transportation Safety Board, 2000). In a survey conducted of exit row passengers, only 24% of respondents reported paying attention to safety briefings and reading the provided safety card (see Figure 2).

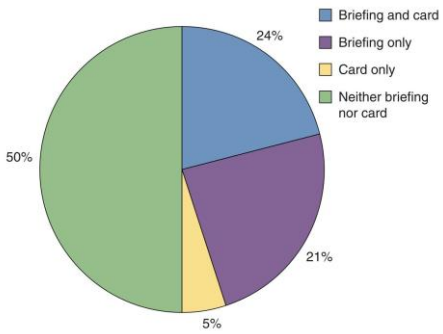

Figure 2. Exit row passenger safety attention statistics

(National Transportation Safety Board, 2000)

One notable detail was the passenger's choice of which exit to use. Although the left overwing exit was the nearest usable exit for 100 people and the first usable exit for 76, only 26 people actually evacuated through it (Air Accident Investigation Branch, 1988). The 53 remaining survivors utilized the two doors at the front of the cabin, one of which wasn't opened until 70 seconds after the evacuation had been initiated. A seating chart (Figure 3) created by the AAIB shows the seat location of every passenger and the door through which they evacuated. The chart depicts multiple passengers seated extremely close to the right overwing escape hatch who still didn't manage to escape. Being so close to the exit yet not escaping suggests that they did not attempt to utilize the exit. Many survivors were even shown to proceed past the right overwing escape hatch and evacuate through a door much further than necessary. One passenger was even sitting directly in front of the exit yet he or she decided to instead use a door eight rows away.

Commented [RW2]: American English wants "usable."

Commented [RW3]: They weren't sitting where the fire was, right? I think I asked you that before.

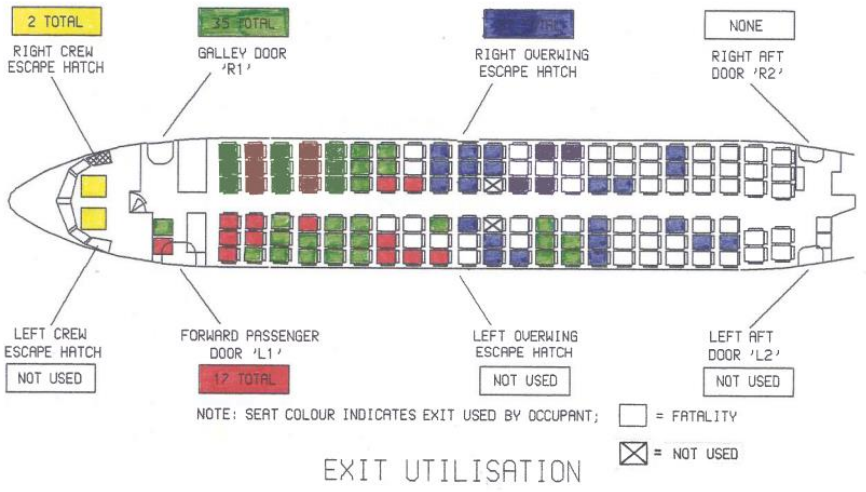

Figure 3. Passenger location and door usage (if applicable)

(Air Accident Investigation Branch, 1988)

As with all aircraft certified for flight in the United States, the aircraft involved had to demonstrate the successful evacuation of all occupants within 90 seconds (Appendix J to Part 25 - Emergency Evacuation, 2004). Despite this, the full evacuation sequence lasted nearly six minutes before the last passenger escaped and the remaining 55 occupants were overcome by fire and smoke. Clearly, something went majorly wrong as this should have been a survivable incident. To further evaluate why, a series of evacuation tests were conducted by officials from the University of Cranfield and the Australian Bureau of Air Safety Investigation (mentioned in section one).

With cameras now in everyone's pockets, never-before-seen footage of real aircraft evacuations now exists. One of the most viewed recordings comes from a passenger onboard Spirit Airlines flight 3044. After encountering a bird strike on takeoff in Atlantic City, the aircraft suffered severe engine damage and a fire quickly broke out in the right-hand engine

(NBC New York, 2021). The pilot rejected the takeoff and quickly ordered an evacuation when he realized that it could not be fought by the aircraft's onboard extinguishing systems. All 109 occupants were evacuated safely from the aircraft with just two injuries resulting from the steep evacuation slides. One passenger seated over the wing recorded the entire evacuation sequence and one main concern arises: nearly every passenger tried to bring their carry-on baggage (Your Favorite News Network, 2021). Despite commands from the flight attendants to leave everything behind, almost every overhead bin was opened for baggage retrieval and one passenger can even be heard asking, "Are we taking our bags?" (Your Favorite News Network, 2021). Though everyone made it out safely in this case, passengers stopping to grab luggage is an obvious impediment to orderly passenger egress. If the situation was any direr, lives could have been lost as a result of the delay.

In a 2000 report by the NTSB, a majority of 409 evacuation survivors reported attempting to bring their luggage with them as they evacuated. Additionally, 24 of 36 flight attendants agreed that carry-on baggage was a major obstruction in evacuation progress. In the two decades since that report has been released, major developments in portable technology have been made that could possibly contribute to higher rates of baggage retrieval than reported by the FAA. With cell phones and laptops costing as much as they do, it is not unreasonable for a passenger to feel inclined to bring a bag containing such devices with them. However, this does not excuse the behavior as it is still life-threatening. One potential solution to this problem is to include a system that locks overhead bins when an evacuation is initiated. While a system like this has never actually been studied, many people feel that it would actually slow down an evacuation as people waste time trying to unlock the bins. Additionally, Ian Scoley, vice president of industrial design at Zodiac Aerospace, claims that:

> Generally, the regulations drive us to make sure we can always get the bin doors open, with multiple redundancies like secondary release systems in case of mechanical failures. This is mainly due to the large variations in cabin configurations where emergency equipment could be stored in overhead bins—things like life rafts, ropes, first aid kits, etc. The risk in this scenario is that something that might be critical to a passenger's survivability gets locked away. (Garcia, 2018)

The concern about potentially life-saving equipment is a valid one. There is always potential for systems to fail and history has taught that redundancy is always essential. However, to dismiss the concept entirely is illogical. Scoley mentions the wide variety of cabin configurations, but as the manufacturing firm for these units, they have the direct ability to modify the system for the customer's needs. Additionally, there is no need for the entire cabin to receive locks. Only overhead passenger bins would need to be fitted, and even then, some can be designated for emergency equipment and not receive locks at all. Another potential solution would be to include a mechanical bypass that allows a flight attendant to unlock the bin. Most modern aircraft include evacuation command alarm systems that must be activated by a flight crew member before an evacuation can take place. If an overhead bin locking system was connected to this button, the bins would only ever be locked in case of an actual evacuation. The International Civil Aviation Organization (ICAO), the aviation body created by the United Nations, has urged aviation regulators across the globe to study this more, but the research has yet to be completed (International Civil Aviation Organization, 2019).

It would be disrespectful to the many victims of aircraft accidents if the true cause of their fate was not investigated. Even more, it would be irresponsible if potential lessons were never uncovered and life-saving measures never implemented. Lessons learned from the

Manchester disaster show that details as seemingly insignificant as illustrated clothes on a safety card can dramatically impact passenger survival in an emergency situation. Special care must be taken to ensure vital information is clear and cannot be interpreted incorrectly. It must also be acknowledged that passengers may not always use the most obvious exit. Research suggests that this is primarily due to herd behavior, but the requirement of enhanced exit location signs and more descriptive path lighting may help to mitigate the situation. Alongside this, personalized briefings for exit row passengers could be implemented to guarantee those responsible for safety understand their responsibility and how to carry it out properly. Briefings like these were shown to have great success in aiding passenger survival after Air Canada Flight 797 suffered an inflight fire and diverted to Cincinnati, Ohio. Before executing an emergency landing, the flight attendants took it upon themselves to brief exit row passengers on the operation of the exit door beyond what was required by federal regulations at the time (National Transportation Safety Board, 1986). This was cited by the NTSB as an action that directly contributed to passenger survival (1986). A mandate by the FAA for US airlines to implement such a briefing could prove to help the situation. The Spirit Airlines evacuation demonstrates the severity of the carry-on bag issue and provides a strong warning of what could come. The FAA should heed the advice from ICAO that calls for studies into overhead bin locking systems as they could be a potentially life-saving addition.

Current Standard Operating Procedures

Standardized operating procedures (SOPs) are one of the core concepts that contribute to aviation safety. By ensuring procedural items are executed in a specified manner, operators can create standard and predictable environments that eliminate many hazards. SOPs used by

operators globally are developed by experts in the field working with manufacturer recommendations and cover all possible scenarios from small discrepancies to full-scale disasters. One of the procedures covered by every operator is, without fail, an evacuation procedure. By analyzing common practices throughout these procedures, insight can be gained into what most operators are doing to overcome hazards.

It is clear from the evacuation experiment conducted at Beihang University that reaction time is of utmost importance in guaranteeing the rapid egress of passengers. Hamburg Airways, a small German charter airline, includes guidelines for how flight attendants can effectively direct passengers to evacuate. According to *Hamburg Airways A318/A319/A320/A321 Cabin Crew Operating Manual*, "The actions and commands of the cabin crew will influence the performance of the passengers during the evacuation…The commands used by the cabin crew should be assertive, positive, short, loud, and clear. Note: The cabin crew must be assertive and be in complete control of the evacuation" (Airbus, 2012). The manual also notes that flight attendants must be prepared to use physical force, if necessary. This guidance contradicts the findings at Beihang University which found that commands which are too assertive instill panic in passengers, which causes confusion and delays reaction time. These findings are backed up by the Effects of Motivation study which showed rates of egress slowed as passengers panicked more. However, the same recommendation of loud, assertive, and stern commands is found almost universally across many different aircraft types and procedures. In *Getting to Grips with Cabin Safety*, an article by Airbus on operational safety for their passengers, Airbus themselves stress the importance of commands that follow the same guidelines (2015). Interestingly, the video of Spirit Airlines Flight 3044 showed evidence of passengers completely ignoring commands from flight attendants who were obeying such guidelines.

Commented [RW4]: Report or article?

Another issue is that commands may be confusing. Vietnam Airlines requires their flight attendants to utilize the command “COME THIS WAY” when directing an evacuation (Boeing Company, 2008). In an already noisy environment, this sort of command has a great potential to confuse passengers. On many aircraft types used today, certain exits are intended for operation by passengers (overwing exit hatches, for example). In an emergency, passengers may forgo these exits in favor of exits with a flight attendant shouting at them to “Come this way”. In a situation where rational thinking is already degraded, additional confusion can be fatal.

Commented [RW5]: shouting at them, "Come this way."

Current FAA regulations on exit row briefings are vague and do not require specific instruction from any member of the flight crew (Exit Seating, 2018). In the case of privately operated aircraft, many requirements are omitted completely. In addition to eligibility to be seated in the exit row, the current regulations state that a safety card must be provided which states exit row duties and criteria, a flight attendant must verify everyone meets the criteria, and the safety briefing must include a section that directs exit row customers to read their safety card. There is no federal requirement to include a safety briefing on specific exit row duties. Freedom Air, an American regional airline, provides a standard briefing for exit row passengers:

> You are seated in an exit row. Please look at these requirements. (Show briefing card and point to exit row requirements) Are you willing to meet these requirements? Do you have any condition that will prevent you from performing these duties? Will you suffer any harm from performing these duties? Do you not wish to perform these duties? (Aviation Services LTD, 2010)

This short briefing is standard among U.S. airlines and omits any information on exit operation.

Commented [RW6]: U.S.

As discussed, a majority of exit row passengers do not read the safety card and therefore have no idea what their duties entail. Most operators do require flight attendants to provide exit row

passengers with specific operation information in the event of a planned emergency landing. However, the NTSB found that a majority of evacuations in the U.S. are unplanned and therefore passengers would never get a briefing (2000).

Standard operating procedures used today are based not only upon expert determination but also on lessons learned in prior accidents. They are fluid and must be updated if new safety recommendations arise. Based on certain prior accidents and studies conducted on aircraft evacuations, it is clear that the SOPs used by many operators today do not create the safest environment for passengers. This is partly due to relaxed regulations by the FAA which do not require operators to fulfill duties that would directly contribute to passenger safety. These insufficient regulations must be re-evaluated and subsequently updated to ensure operators are keeping their customers safe. With that, more research must be done into how passengers react to different commands and if the active, stern commands used today are the most effective.

CONCLUSION

As discussed, there are numerous factors that hinder the safe evacuation of aircraft in the United States. Most of these pitfalls stem from human factors issues but some are the direct result of insufficient regulation from the Federal Aviation Administration and poor aircraft design by leading manufacturers. By addressing these deficiencies, the FAA will create an environment that ensures safer travel for every air traveler in the United States.

Recommendations for the Federal Aviation Administration

To foster safer aircraft evacuations in the United States, the FAA should heed these recommendations:

1. **Modify the Standard for Conducting Aircraft Certification Evacuation Tests**

   At present, the FAA requires that all aircraft must prove they can be evacuated within 90 seconds. Though regulations mandate that certain conditions be met such as 50% exit availability and low ambient light levels, there is no requirement to simulate any evacuation motivation. Studies show that evacuation simulations in which passengers are motivated to leave take considerably longer compared to simulations where no motivation is given. These modified evacuations are much more accurate and provide an opportunity to demonstrate an evacuation that better reflects a real-world application. With this in mind, the FAA should require manufacturers to simulate motivation when conducting evacuation demonstrations for the purposes of aircraft certification.

2. **Research the Potential Benefits of Overhead Bin Locking Systems**

   The issue of passengers stopping to collect carry-on baggage during aircraft evacuations has proven to be a significant threat to safety. As the problem continues to get worse, the FAA and other regulatory bodies have ignored ICAO and expert advice to research overhead bin locking systems on commercial aircraft. The FAA should conduct serious research into whether or not this is a feasible solution and implement the findings as necessary.

3. **Require the Use of Enhanced Exit Indicators**

   Studies have shown that passengers evacuating an aircraft in an emergency demonstrate considerable amounts of "herd behavior" and do not act in a reasonable manner. Accidents such as the British Airtours 28M disaster show that passengers tend to ignore available exits for ones that have the potential to endanger them. To account for this issue, the FAA should require manufacturers to include exit indicators beyond traditional exit signs. Arrows on exit path lighting systems should be implemented to show the path to the nearest exit and attention-grabbing light systems should be installed at available exits. With these devices, it will be less likely that a passenger will pass right by them without noticing if herd behavior is encountered.

4. **Require More In-Depth Exit Row Briefings**

   Current regulations do not require passengers to be briefed on the operation of emergency exits before a flight. Considering statistics that show a majority of passengers do not voluntarily pay attention to safety information, a specific briefing directed at exit row passengers should be implemented including the following components:

   1. Exit row eligibility criteria

2. When to open the exit
3. How to open the exit
4. What to do if the exit is unusable
5. A verbal confirmation of understanding

With such a briefing, flight crews ensure that those seated in the exit row will be able to properly assist in an evacuation without endangering themselves or others. This briefing should replace the older, insufficient briefing already required.

5. Study the Use of Calmer Evacuation Commands

Many airline standard operating procedures call for evacuation commands that are assertive, loud, and direct. However, research has shown that panic slows reaction time, creates confusion, and slows rates of passenger egress. The FAA should study the use of calmer and less aggressive commands to see if they lower rates of panic among passengers while still inducing the necessary motivation to evacuate. If findings show that such commands help speed up evacuations, their use should be mandated.

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