Generational Differences in Safety Attitudes Among Commercial Airline Pilots

by

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ABSTRACT

The objective of this study was to investigate the generational differences among US commercial airline pilots regarding their attitudes toward safety. A survey was distributed to three different US airlines: one major commercial airline, one regional airline, and one charter airline. A total of 106 pilots participated in this study. The pilots were categorized into three groups of generations based on birth years: Baby Boomers: 1946-1964, Generation X: 1965-1980, and Generation Y: 1981-2000. Through the use of one-way Analysis of Variance (ANOVA), the results of the analyses found that there was no significant difference between the generations of pilots regarding safety attitudes. In the subcategory of self-confidence, the results indicated no significant differences between the different generations of pilots. However, in the subcategories of risk orientation and safety orientation, significant differences were detected among the three generations of pilots. Baby Boomers were found to have the lowest risk tolerance, while Generation Y had the highest. Conversely, Baby Boomers were found to have the highest safety orientation, with the lowest being that of Generation Y.

DEDICATION

To my parents; for their undying support and prayers. Without them, I would never have gone this far. To my loving wife; for pushing me through. To my children; for leaving their childhood home for my betterment.

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Firstly, I thank God for this life and opportunity. Secondly, I owe a huge thanks to the Saudi government for sponsoring this venture. The Saudi Culture Mission provided support and funds to fulfill my lifelong dream. Also, I would like to thank Dr. Mary Niemczyk, for assisting me with every grueling detail of this assignment, and providing me with the resources and motivation necessary to carry on. Finally, thanks to Dr. Robert Nullmeyer and Professor Robert Gibbs for their comments and assistance.

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CHAPTER 1

Introduction

Background

Safety, especially in aviation industries, should be the number one priority. Each generation of pilots may have different attitudes that could influence flight safety. Therefore, it may beneficial for airlines to determine safety attitudes by generation in order to take unique and individualized actions based on the characteristics of the groups. Pilots are responsible not only for operating an aircraft, but also for obeying regulations and policies to ensure safe flights. The decision-making process which a pilot utilizes is one important factor that plays a role in the occurrence of aircraft accidents (Diehl, 1987).

A pilot's attitude can influence aeronautical decision- making, depending on his/her preference for safety. Berlin et al. (1982) stated that many decision errors are the result of a pilot's attitudes. According to FAA Advisory Circular (AC) 60-22 (1991), decision–making could be influenced by personal attitudes and, therefore, modifying those attitudes may improve safety in the cockpit.

Indeed attitude, as it is commonly defined, can be deemed positive or negative. Pilots with positive attitudes often show professionalism, pride in their work, and motivation; all of which results in a higher probability of safer flights. On the negative side, those pilots with perceived invulnerability may contribute to a disregard for safety measures, operational procedures, teamwork, and a higher probability of accidents (Helmreich, et al., 2001).

Attitude as a psychological factor is important in measuring the safety procedures of a particular culture. According to Gill (n.d.), researchers should focus on psychological factors such as attitudes to measure a safety culture. In addition, the workers' attitudes toward safety could influence safety performance as well. Bailey and Peterson (1989) stated better safety performance is associated with workers who have a positive safety attitude.

Differences in attitude could be a controversial issue because a generational gap which could cause greater differences in the workplace. According to Cole et al. (2002), each generation shares the social experiences, behaviors, and beliefs common to its specific era. Some studies such as Harber's (2011), The Society for Human Resource Management, (SHRM (2004)), and Fletcher et al. (2009) found that there are various differences in attitudes among generations in the workplace.

Several studies regarding younger and older workers have also been conducted to identify the differences in safety attitudes in high–risk industries such as nuclear, oil and gas and petrochemical fields. Studies conducted by Lee and Harrison (2000), Vindkumar and Bhasi (2008), Holden et al (2009), and Diaz and Cabera (1997) bore results which concluded that older and younger workers have opposing attitudes towards safety. Similarly, in aviation, studies have been conducted to determine the differences between younger and older pilots regarding hazardous attitudes and risk perceptions. Li (2003) stated that older pilots may actually have a reduced crash risk because of increased expertise and enhanced safety behaviors. O'Hare (1990) found younger pilots often rated the likelihood of being involved in accidents more highly than older pilots. Hunter (2002) stated that lower perception of risk was preceded by having more experience. Certain

studies contradict these results: Drinkwater and Molesworth (2010) concluded that older pilots are more likely to engage in risky behavior. Also, Wilson and Fallshore (2001) concluded that flight experience may lead to overestimate one's ability to both avoid and successfully fly out of Instrument Meteorological Conditions (IMC). Since no conclusive study (encompassing all generations of pilots) bore the same results, a conclusive study was necessary to bridge the gap.

According to Tolbize (2008), the progression of generations from Baby Boomers to Generation Y encompassed attitudes which inspired a greater desire for more personal time, and less allegiance and loyalty to authority and an organization. Because there were differences in attitude between older and younger employees in high-risk industries, researchers may wish to conduct more studies to determine the generational differences among pilots concerning safety attitudes.

Significance of Study

As stated previously, attitudes in general can be positive or negative. In addition, several studies found generations have different attitudes in the workplace. Therefore, these findings suggested it is imperative for any organization to assess their employees to understand the potential difference between each generation. Ultimately, this assessment may assist leadership in providing the employees what they need to perform more safely (Kogan, 2007).

In aviation, some studies have found differences between generations of pilots regarding risk behaviors, safety behaviors, and hazardous attitude. Rather than focusing on generational differences, these studies provided a foundation and supplement for

generational separation by highlighting differences among pilots from older to younger, using age separations that closely coincide with the age brackets by generation. Therefore, it is highly important to investigate pilot safety attitudes, as well as determining whether safety attitudes change positively or negatively in association with each generation. The results of this study may explain how flight safety can be affected by generational differences.

This study will fill a current void in research and scholarship regarding which variables may contribute either positively or negatively to a pilots' attitude toward safety. This study may also have a practical application for organizations, as they may have a better understanding of pilots' attitudes toward safety especially with each generation. This allows them to pay closer attention and initiate approaches unique to each generation as they have different characteristics if there is a difference in their safety attitudes.

Statement of Purpose

The purpose of this study is to investigate the differences in safety attitudes among pilots, specifically focusing on generational differences. This study will focus on three generational brackets: Baby Boomers (born between 1946 and 1964), Generation X (1965 - 1980), and Generation Y, or "The Millennials" (1981 – 2000).

Research Objective

The research objectives are:

1. To determine attitudes concerning safety adopted by Generation Y pilots;
2. To determine attitudes concerning safety adopted by Generation X pilots;

3. To determine attitudes concerning safety adopted by Baby Boomer pilots;
4. To analyze the differences in safety attitudes between these three generations

Research Questions

The main goals of this study are:

- Are there any differences in terms of self-confidence among different generations of pilots?
- Are there any differences in terms of risk orientation among different generations of pilots?
- Are there any differences in terms of safety orientation among different generations of pilots?
- Are there any differences in terms of safety attitude between different generations of pilots?

Hypothesis

For the study undertaken, the hypothesis is:

H_0: There is no difference in safety attitude between pilots based on each generation.

CHAPTER 2

Literature Review

This section will discuss the definitions and concepts surrounding the characteristics of attitudes towards safety. Additionally, it will define and explain the differences and similarities of generational characteristics. Furthermore, the differences in safety attitudes will be explored via high-risk industries. Finally, this section will discuss the safety attitude among pilots, and examine studies that relate to the differences between younger and older pilots in risk perceptions and hazardous attitude.

Attitude: Definition and Concepts

There is agreement among scholars and authors that "attitude" is a broad term, one that offers different forms of interpretations and meanings. For example, Allport (1935) defines attitude as "a mental and neural state of readiness, organized through experience, exerting a directive and dynamic influence upon the individual's response to all objects and situations with which it is related". Glendon, Clarke & McKenna (2006) define attitude as a "learned tendency to act in a consistent way toward a particular object or situation". Fishbein and Ajzen (1975), meanwhile, agree that the commonality of the definitions of attitudes can be taken on the ways the term can refer to a person's emotional response to and assessment of an idea or specific thing.

Attitude Components

Cognitive, affective and behavioral components constitute the commonly held definition of attitude. According to Robbins and Coulter (2005), cognitive relates to beliefs, opinions, and knowledge; affective relates to emotional (like-dislike); and

behavior relates to the intention to behave in a specific way. Knowledge of these three components is essential, as these could reflect the ways individuals with positive attitudes react well to a wide spectrum of issues, while those with negative attitudes, respond negatively across these components (Al-Juhiam, 2008).

Attitudes of Generations in the Workplace

Definitions of generations. For the purpose of this study, the act of defining age groups by generation will consist of categorizing individuals into groups based on their birth years. Each generation has different characteristics. Cole et al. (2002) states each generation participates in the social experiences, behaviors, and beliefs widespread at that time. Generations are typically categorized as follows: Veterans, Baby Boomers, Generation X, and Generation Y. However, this study will focus only on three generations: Baby Boomers, Generation X, and Generation Y. Most Individuals from the Veteran category have exceeded the maximum age requirements per the FAA and are therefore not considered in this study.

Baby Boomers. This generation consists of those born between the years 1946 and 1964 (Lancaster & Stillman, 2002). Self-confident and independent, the Boomers are "competitive in the workplace and work with the hierarchal structures" (Harber, 2011). They like to stay with their current employer. According to Deal (2007), Baby Boomers are more loyal than the X and Y generations. They believe that the road to success and personal fulfillment stems from diligent efforts in the workplace (Glass, 2007).

Generation X. Members of Generation X were born between 1965 and 1980 (Lancaster & Stillman, 2002). They often have had chances to interact with other cultures, which was perhaps an advantage not granted to the Baby Boomer generation.

They are considered more highly educated than the Baby Boomers; approximately 60% have secondary educations (Kane, 2010). They are willing to change their jobs, partially because they are less committed or loyal to any one employer. Some organizations are critical of Generation X employees not being interested in doing their work and complain this generation often works to meet rather than exceed expectations like required hours. Consequently, they have been characterized as the 'slacker' generation (Jenkins, 2007). However, regardless of work ethic, special notice is given to the ways this generation has included women to be contributors in the workplace.

Generation Y. Generation Y, also referred to as the Millennial Generation, was born between 1981 and 2000 (Lancaster & Stillman, 2002). Indeed, they have grown up with technology such as cell phones, laptops, videogames, and more. Moreover, this generation typically spends hours upon hours using the Internet and maintaining contact with their friends via social-networking sites such as Facebook, Twitter, and MySpace. According to Niemiec (2000), Generation Y can be equated with excessive personal freedom and a boundless array of technological methods of communication and entertainment. Perhaps this technology may affect their characteristics and perceptions on life and work. These kinds of technologies have given them more freedoms in their lives than any other generation. As a result, there are many differences in their work values compared with Generation Y and the Baby Boomers. Smola & Sutton (2002) stated Gen Y likes to have a generous balance between work and other interests. Also, Grohol (2010) suggested Generation Y, more than other generations, wants a job with simple steps and ample vacation time. Furthermore, in industries such as aviation, Niemczyk & Ulrich

(2009) found that members of Generation Y actually desire a workplace that delivers greater personal freedom and less managerial intervention.

Harber (2011) compared and contrasted generations, and found Baby Boomers have greater experience in the area of customer service and possessed a unique loyalty to an organization. Both of those generations make it a priority to keep their company successful and continue to be employed through their retirement age. The younger Generation Y was noted as having no desire to put in extra effort in traditional ways compared to the older two generations. They were actually more likely to end work on time for recreation rather than tenaciously complete tasks.

The Society for Human Resource Management (SHRM) surveyed its members in 2004 about the different generations in the workplace. The study concluded that workplace characteristics occurring the most frequently with Baby Boomers included giving maximum effort, accepting authority figures in the workplace, plans to stay with the organization over the long term. The characteristics infrequently found among them were informality, respect of hierarchy within an organization, and the need for supervision (SHRM, 2004).

The results show the workplace characteristics most associated with Generation X are being technologically savvy, informality, learning quickly, and embracing diversity, but the characteristics found infrequently included respect of organizational hierarchy, structure, and the plans to stay with the organization over the long term. Generation Y in this study showed in the workplace characteristics of being technologically savvy, prioritizing informality, embracing diversity, learning quickly, and the need for supervision; however, the least found characteristics were respect of organizational

hierarchy, demand for structure, and plans to stay with the organization over the long term (SHRM, 2004).

The study published by SHRM in 2004 stated that different generations working together could foster a disaster, but it also provides several benefits for both the organization and the workers themselves. Managing the generational differences in characteristics can lead to more advantages for any organization.

Fletcher et al. (2009) conducted a survey of 834 Central Kentucky employees of various industries to investigate the relationship between generational cohorts and their attitudes towards work related issues. The study concluded Baby Boomers are significantly more likely than Generation X to be more work-focused than family-focused and demand comprehensive health insurance. Baby Boomers prefer in-person communication, valuing a company-funded retirement plan and loyalty to their organization more than Generations X and Y.

The study found that Generation X is significantly more likely than Baby Boomers to be encouraged by competition, prefer group projects, believe that teams are more operative than individuals, and feel that it is essential to have a strong voice in decision-making. Generation X is significantly more likely than Generation Y to have a balance between work and family, and crave challenges at work. Also, they were more likely than Baby Boomers and Generation Y to consider job opportunities at another organization while continuing to value loyalty to their present employer (Fletcher et al., 2009).

Generation Y is significantly more likely than Baby Boomers to see teams as more effective than individuals, time off from work is a strong encouragement, and suggest close supervision would enhance their performance. Generation Y is significantly more likely than Baby Boomers and Generation X to value the importance of opportunity for competition, tuition support, and tangible rewards such as money and high status.

As shown, various researchers have found several significant differences found among the generations. These differences in attitudes and beliefs might not unify an organization, and they can lead to conflict and harm organizational performance and effectiveness. Therefore, leaders should be aware and understand these differences in order to create a positive work culture.

Pilot and Human Factors/Errors

Several factors may contribute to aviation accidents. One of these factors is human error. The definition of human error is "inappropriate human behavior that lowers levels of system effectiveness or safety, which may result in an accident or injury". (Wickens, Gordan, & Liu, 1998). In the field of aviation, human errors are considered the most frequent factor contributing to aircraft accidents. Human errors may include the errors of pilots, maintenance staff, air traffic controller, or others who have a direct effect on flight safety. Approximately 80% of aircraft accidents are a result of human errors and most of these accidents are caused by pilot errors (Shappell & Wiegmann, 1995).

The central task for pilots is the operation of the aircraft. A close second is the necessity for pilots to recognize safety as an essential job function for them to complete

the operation of the aircraft. According to Diehl (1987), once the government licenses a pilot, he/she is expected to obey the regulations and refrain from any actions which may impact the safety of others. As the regulations note, the pilot should be the final authority for the safe operation of the aircraft. The pilots should be responsible in behaviors and utilize "good judgment" in all situations.

Jensen and Benel (1977) noted the pilots' activities could be divided into three categories: procedural, perceptual-motor, and decisional. According to Diehl (1987), procedural activities are management of power plants, fuel, aircraft configuration, autopilot, displays, navigation and communication. Perceptual activities encompass aircraft control, judgment of distance, speed, altitude, hazard detection, and geographic orientation. The decisional activities include self-assessment of skills, knowledge, physical and psychological capabilities, hazard assessment, navigation planning, and flight priority adjustment.

Pilot errors can happen regardless of intention or skill, but rather, when they make quick decisional errors. Diehl (1987) describes "their skills or luck is often sufficient to get them out of situations resulting from poor judgment". Decision-making is a process of collecting information in memory and applying an action. Attention and access to information stored in memories are required to complete this process (Dutcher, 2001). According to Carrick (2001), cognitive biases, physical condition, and attitudes can affect the success of the decision-making process. Some researchers such as Gibbs and Olson (2008), Nullmeyer et al. (2005), and Shappell et al. (2007) conducted studies to analyze

the causes of aircraft accidents and most of them found that decision making played a major role in these accidents.

Gibb and Olson (2008) conducted a study to analyze 124 U.S. Air Force aviation mishaps from 1992 through 2005, using the Department of Defense Human Factors Analysis and Classification System (HFACS). Most types of mishaps included controlled flight into terrain (CFIT), loss of control, spatial disorientation, and midair collisions. Out of the study arose two categories regarding CFIT: in flight and approach and landing accident (ALA). The authors defined controlled flight into terrain (CFIT-1) as an in-flight collision with terrain, water, trees, or man-made obstacles during forward flight. Also, they defined CFIT-2/ALA as an airworthy aircraft unintentionally colliding with terrain, water, trees, or a man-made obstacle during controlled flight in the approach and landing phase of flight. The study concluded that with the combination between CFIT accidents (CFIT-1 & CFIT-2/ALA), 48 of the total 124 mishaps can be attributed to CFIT. Midair collisions had 42 mishaps out of 124, spatial disorientation (SD) with 19, and Loss of control (LoC) with 15. Also, the study found that decision-making errors were the reasons for 26 of the 31 mishaps for CFIT-1, and 14 of the 17 mishaps for CFIT-2/ALA.

Another study was conducted by Nullmeyer et al. (2005) to analyze human mishaps for C-130, MH-53, F-16, and A-10 Class A (1995-2004). The scale that was used in this study to gauge each human factors element is: (4)-causal; (3)-major contributor, (2)-minor contributor, (1)-minimal contributor, or (0)-present but not a factor. The study concluded pilot/crew error was a contributing factor in most accidents. In the C-130, risk assessment as decision – making type was causal in four of the nine

mishaps and contributed to four other factors. The authors discussed "behaviors included both a lack of deliberate risk assessment during pre-mission planning and lack of real-time risk assessment inflight when an external event enforced a deviation from the original plan". Also, the course of action as a type of decision-making process was a causal or major contributor in six of the nine mishaps, and the study mentioned without risk assessment, there was only one mishap. In the H-53 mishaps, the study found overconfidence to be a contributing factor in over half of the mishap reports, especially in situations with a highly experienced crew flying routine missions that were trying iterations with increased speed based on lack of difficulty in previous maneuvers and flying into an unrecoverable situation without assessing the situation.

Another study conducted by Shappell et al. (2007) analyzed the accidents associated with two types of commercial aviation (air carrier and commuter/ on-demand) using (HFACS) from 1990 through 2002 and by using databases of the National Transportation Safety Board (NTSB) and the FAA's National Aviation Safety Data Analysis Center (NASDAC). A total of 1,020 accidents, of which 181 involved air carrier aircraft and 839 involved commuter/on-demand aircraft, were submitted to further analysis. Table1 shows the analysis results of the unsafe acts of the operator.

Table 1

Analysis of Results of the Unsafe Act of the Operator

HFACS Category	Air Carrier	Commuter/ On-Demand	Total
	(N = 181)	(N = 839)	(N = 1020)
Unsafe Acts of the Operator			
Skill-based errors	77 (42.5%)	499 (59.5%)	576 (56.5%)
Decision errors	71 (39.2%)	303 (36.1%)	374 (36.7%)
Perceptual errors	10 (5.5%)	56 (6.7%)	66 (6.5%)
Violations	31 (17.1%)	205 (24.4%)	236 (23.1%)

Note. From "Human Error and Commercial Aviation Accidents: An Analysis Using the Human Factors Analysis and Classification System" S. Shappell, C. Detwiler, V. Holcomb, C. Hackworth, A. Boquet, and D. Wiegmann, 2007, *Human Factors and Ergonomics Society*, *49*(2), p.232.

The study showed that 56.5 % associated issues to skills- based error, 36.7 % related to decision-making, and 23.1% contributed to violations. However, some have argued that decision making and violations are the same. According to Lindvall (2011), one reason for accidents was that people occasionally decide to deviate from safe operating procedures, or rules. Therefore, it might make sense to combine violations of rules with decision-making. For this reason, in cases of both Air Carrier and Commuter/On-Demand situations, decision-making processes combined with violations would be one of the most prominent reasons for accidents.

It is important to note that human errors can be widely determined in the ways that pilots are mostly affected in application of their judgments. Berlin et al. (1982) stated a pilot's decisional errors were attributed to a pilot's attitude, with the cause originating with pilots selecting inappropriate actions in light of additional information-information that might have convinced them to select another option. Therefore, airlines should probably wish to focus on these pilots' attitudes and their modifications as a way to improve flight safety. According to the FAA Advisory Circular (AC) 60-22 (1991), decision-making could be influenced by personal attitudes and safety may be improved in the flight deck by modifying those attitudes,

Safety Attitudes

In high-risk industries, safety culture plays a major role in ensuring safety. Safety culture is defined as "the attitudes, beliefs, perceptions and values that employees share in relation to safety" (Cox and Cox, 1991). The U.K. Health and Safety Commission (HSC) defined safety culture as "the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management" (HSC, 1993).

Attitude is one of the factors used to measure a safety culture. According to Gill (n.d.), researchers should focus on psychological factors such as attitude and values about safety for measuring a safety culture. Cox and Cox (1991) proposed that employee attitude is considered one of the important measurements of safety culture, because they are often influenced by other features of the working environment. Lee (1995) stated that

safety attitude is a basic component of a safety culture. Any safety interventions might fail if the safety attitude is not taken into account (Williamson et al., 1997). Attitudes toward safety can be widely determined by comparing the psychological factors that affect the employees' mentality and behavior. Thus, the definition of safety can be based on the ways the employees consider safety in accordance to their thoughts and actions. Pidgeon (1991) suggests "safety attitude refers to individual and collective beliefs about hazards and the importance of safety, together with the motivation to act on those beliefs". Some researchers such as Reason (1997) and Ginnett (1997) suggest that the key to promoting safe behaviors and a decline in accidents is to establish a strong foundation of safety culture. Guest, Peccei, and Thomas (1994) concluded in their study regarding the British Rail's employees that a more positive attitude toward safety leads to lower rate of accidents. Also, Bailey and Peterson (1989) found in their study at the U.S railroad industry that better safety performance was practiced by \employees who had a positive safety attitude.

According to the aforementioned studies by Harber (2011), Fletcher et al (2009), and the Society for Human Resource Management (2004), differences in generation may lead to different attitudes toward the workplace. This may provide the results that generations play a role in workers' safety attitude. However, the majority of the studies conducted in high-risk industries such as the nuclear, oil and gas, and petrochemical industries, focus on differences between older and younger employees rather than the differences between generations. Though the following studies do not discriminate between generations, but rather, offer workplace differences between older and younger

employees, the age groups in which they are separated coincide with generational separations as well.

Lee and Harrison's study (2000) focused on assessing safety culture in a nuclear power station. Three nuclear power plants were selected to determine employees' safety culture by measuring their attitudes and behaviors toward safety. They utilized 120 items focusing on eight domains of safety: confidence in safety, contractors, job satisfaction, participation, risk, safety rules, stress, and training. Total participation included 683 employees. Their ages were divided into four groups which were comprised of people 16-30, 31-40, 41-50, and 50+ years old. The study concluded that the youngest age group (16-30) scored most positively among the age groups, regarding the eight domains. However, the next age group, those between 31 and 40 years of age, scored the least from all eight domains.

Vinodkumar and Bhasi (2009) tried to determine the safety climate factors in the chemical industry in Kerala, India. The survey questionnaire was conducted among 2,536 workers in chemical industrial units in Kerala. In this study, the workers divided into 3 groups of age. The first group, A1, consisted of ages up to 35 years, the second group was between 36 to 50 years, and the last group was individuals above 50 years. The study concluded that the younger workers had more positive scores toward safety. Scores dropped for the middle-aged participants; however, they increased with the older respondents. According to the researcher, this conclusion illustrated how younger workers with shorter length of services began their jobs with respect for safety measures and then slipped to meet the norms of their job type and age group. However, the improvement seen in the older group might come through support of their experience.

The author suggested that the management should give a special attention to the middle age group to for safety improvement.

Holden et al. (2009) conducted a study to examine the differences in safety culture among professional groups at four US Air Force ambulatory care facilities (clinics) from the midwestern United States. The Safety Attitudes Questionnaire was utilized. The study concluded that there were no significant differences among the professional groups on the total patient safety score. However, there were significant differences on total safety scores based on age. Those younger than 31 years had scores lower on safety perception than others. The youngest age group also had the lowest scores of teamwork climate, safety climate, perception of management, and job satisfaction.

Safety Attitudes in Aviation

Occupational awareness related to aviation is considered crucial to safety. People who work in the aviation industry should be widely concerned with how they can be safe while at work. Pilots specifically have the task of placing safety as their main priority. Their attitudes toward safety, on the other hand, should lead them towards applying the rules of safety in the appropriate manner. It is important to note there will be cases of accident and human error, such as in the case where Martinussen & Hunter (2010) explain that pilots' attitude combined with knowledge and experiences gauge their likelihood to experience hazardous circumstances as well as survive desperate situations if they occur.

Safety attitudes, as one of the measurements of a safety culture, may mean the avoidance of hazards and safety violations and, therefore reduce accidents. Sexton and Klinect (2001) stated pilots with high safety culture attitudes were less likely to make a violation than pilots with low safety culture attitudes. Helmreich et al. (2001) showed some positive and negative influences of pilots' professional culture on safety. Pilots' positive attitude can lead to professional pride motivation and higher probability of safe flight. On the negative side, perceived invulnerability may lead to a disregard for safety measures, operational procedures, and teamwork and can lead to higher probability of accident. Flin (1997) suggested that any changes or attempts to change actions or behaviors should originate from an identification of the foundational attitudes. One demographic factor to consider when researching safety is generational and the potential it has to change our behaviors in both positive and negative ways, which may influence safety performance and accident rates.

In the aviation field, though there are not a substantial number of studies measuring pilots' safety attitudes in relation to generation differences, there are numerous studies conducted measuring the differences between older and younger individuals. These studies relate to hazardous attitude and perceptions toward risk among pilots.

In a study conducted by O'Hare (1990) a sample of licensed pilots was asked to take the AJRQ, or Aeronautical Risk Judgment Questionnaire (AJRQ). This questionnaire, meant to obtain data on pilot perception of their own abilities, willingness to take risks, hazard awareness and judgment was then used in conjunction with the Visual Flight Risk (VFR) to conduct the study. AJRQ results showed "relatively low

levels of risk and hazard awareness combined with a generally optimistic self-appraisal of abilities by this sample of general aviation pilots." The results from the VFR showed that those who actually proceeded with the flight after assessing the risks were those who rated themselves as "having a greater willingness to take risks," and were typically younger and had higher total hours than those that rejected risk.

In another of Hunter's studies (2002), risk perception and risk tolerance were evaluated and compared amongst individual pilots. Participants were again recruited from a pool of visitors to an FAA sponsored web site. There were 642 participants who completed at least one exercise in the study, while 400 completed the study in its entirety. The results of the study indicated that pilots with low risk perception have a higher tolerance of risk. In addition, a lower level of risk perception was related to higher levels of experience.

Drinkwater and Molesworth (2010) looked at how fifty-six different participants of the study reacted to a risky flight scenario involving a search for a parachutist with minimal fuel onboard the aircraft. The participants were students enrolled in the Bachelor of Aviation program at University of New South Wales, and the mean age of those involved was 20.02 years. The purpose of this study was to determine whether attitude, risk perception, flight experience, age and other similar variables were able to predict the pilots' abilities to acquire and utilize risk management skills. The study concluded that "older pilots are more willing to engage in risky behaviors".

In a study by Wilson and Fallshore (2001) looking at optimistic and ability biases in pilots and its effect on their decisions and perception of risk through Visual Flight

Rules (VFR) into instrument meteorological conditions (IMC), it was found that experience in flying may lead to overestimates of one's ability to both avoid and fly out of IMC.

The authors concluded:

> It should also be noted that estimates of the chances of successfully flying out of IMC appear to be mediated by the wisdom of age. We could only wish that the estimates of being able to avoid the situation in the first place were also mediated by age. Were that the case, perhaps there would be fewer poor decisions which seem to lead to these types of accidents.

Another study conducted by Li et al. (2006) examined age-related differences in the prevalence and patterns of pilot error in air carrier accidents in the United States between 1983 and 2002. The study concluded that of the 558 air carrier accidents, turbulence was most likely the reason for accidents involving (occurred) by older pilot, while taxi events were most likely cause for the accidents involving younger pilots. In addition, pilot error was a contributing factor in 34%, 38%, 35%, and 34% of the accidents involving pilot ages 25-34 year, 35-44 year, 45-54 year, and 55-59 year, respectively. It was concluded in this study that there was no change with age in regards to prevalence or patterns of pilot error involving air carrier accidents. They suggested "the lack of association between pilot age and error may be due to the "safe worker effect" resulting from the rigorous selection processes and certification standards for professional pilots".

Dutcher (2001) conducted a study to examine attitudes toward flight safety in the Royal Canadian Air Cadet Gliding Program (RCACGP). There were 69 surveys that were completed. The study found that there are no significant attitudinal differences existing between officers and cadets.

Diaz and Cabrera (1997) developed evaluation measures for safety attitudes and climate in three separate airport companies, categories including ground handling, fuel, and authority. It was identified that the younger age had a more positive attitude. Age and attitude demonstrated a possible relationship causing a "higher element of change familiarization and adaptation to risk by company workers." Diaz and Cabrera (1997) noted a positive correlation between time working for a company and age of the workers. Younger-aged workers were found to have higher safety scores.

Conclusion

This chapter discussed the definition and concept of attitude, defined three generations and showed studies that found differences in their attitude toward the workplace. The chapter also showed the types of human error in the aviation field. In addition, this chapter discussed safety culture and attitude concepts and how differences between older and younger workers may play a role in impacting their attitudes toward safety via studies conducted in high risk industries. The studies concluded that younger workers have more positive attitudes toward safety, while other studies showed the older workers to have more positive safety attitudes. In the aviation field, most studies have been conducted by researchers to identify the differences in hazardous attitudes, and

perception of risk between older and younger pilots. The results of these studies differ greatly and, in turn, conflict one another's results. Because these studies showed the differences in attitude between generation toward the workplace and other studies showed the differences in safety attitude between older and younger workers in high-risk, it would be advantageous to conduct further studies in the future to investigate the differences in safety attitude between pilots based on generation.

CHAPTER 3

Methodology

Participants

A total of 137 pilots participated in this study from three different US airlines. One was a major commercial airline, one was a regional airline, and one was a charter airline. However, 31 participants were deleted because some parts of the survey were left incomplete. Pilots were categorized into three groups of generations based on birth years: Baby Boomers: 1946 – 1964, Generation X: 1965– 1980, and Generation Y: 1981 – 2000. There are data of 106 pilots in total: 32 Baby Boomers, 31 from Generation X, and 43 from Generation Y.

Materials and procedures

The purpose of this study is to determine whether there are differences in terms of safety attitude among pilots in commercial airlines among and between generations. In order to accomplish this goal, the Aviation Safety Attitude Scale (ASAS) that was developed by Hunter (1995) (used with permission) was used (Appendix A). The data was collected using a website, Survey Methods, and submitted to airlines after gaining permission to contact their pilots for survey distribution. The survey was used to answer research questions. Those addressed are listed as follows:

- Are there any differences in terms of self-confidence among different generations of pilots?
- Are there any differences in terms of risk orientation among different generations of pilots?

- Are there any differences in terms of safety orientation among different generations of pilots?
- Are there any differences in terms of safety attitude among different generations of pilots?

The survey includes two main sections. The first section required respondents to provide demographic information such as date of birth, gender, flight hours, position, and work experience. The second part included statements for measuring the safety attitudes by using Hunter's survey (1995). For each statement a Likert 5-point scale was used. The format of the scale was "strongly agree", "agree", "neutral", "disagree" and "strongly disagree". Each member of the study sample group was requested to identify the extent of agreement for each statement on the scale.

The original survey had 27 questions. However, one question was eliminated since it was not a reliable item, as was also done by Hunter (1995). The survey questions had three different factors that helped to determine the safety attitude. The first factor, including 14 questions, was to measure self–confidence. The second factor included eight questions that measure risk-orientation. The last factor was to measure safety orientation and included four questions. The mean score for each measure (each part of the survey can be seen as a measure) was used for data analysis.

The participants were categorized into groups that represented their membership to a particular generation. The data collection from the survey underwent a statistical analysis to determine whether statistically significant differences exist between generations in terms of attitude to safety.

A quantitative analysis was used to approach the results of this study. A quantitative analysis is defined as a method utilizing a hypothesis, which is a statement of an estimate related to observable phenomena that is either approved or disproved through empirical testing. The role of a hypothesis is to guide the direction of the study, recognize significant facts, suggest a proper research design, and provide a structure for conclusions (Cooper & Schindler, 2003). In line with the quantitative approach of this study and determined to provide empirical support for the statement that difference between generations in terms of attitude to safety, the null hypothesis will be tested:

H_0: There is no difference in safety attitude between pilots based on each generation.

The Statistical Package for the Social Sciences (SPSS) was used for the data analysis. The one-way analysis of variance (ANOVA) method was used to answer the four research questions.

CHAPTER 4

Results and Discussion

A total of 137 pilots participated in the Aviation Safety Attitude Survey. However, 31 participants were deleted because some parts of the survey were left incomplete. The respondents are categorized into three groups based on the generations that they belong to; namely, Baby Boomers (N=32), Generation X (N=31), and Generation Y (N=43).

This chapter is divided into two sections. The first section explains the demographic information of the survey participants, while the second section highlights their responses to the questions with respect to each particular generation.

Demographic Information

Table 2 shows the percentage of participants based on generation. As shown in this table, generation Y (N=43) had the highest representation with 40.57% . Baby Boomers (N=32) and Generation X (N=31) had relatively low representation with 30.19%, and 29.25%, respectively, when compared with Generation Y participants.

Table 2

Percentage of Participants by Generations

	Baby Boomers	Generation X	Generation Y
Participants	30.19%	29.25%	40.57%

Regarding gender, all survey participants were male. The participants were also asked to identify their job position and 99 of the 106 participants responded to this

question. Of the participants, 55.55 % identified themselves as captains, while 44.45% identified themselves as first officers. Figure 1 shows the distribution of the position held within each generation. Baby Boomers had a higher percentage of captains than first officers. The opposite applies to Generation X and Generation Y participants, with a higher percentage of first officers than captains.

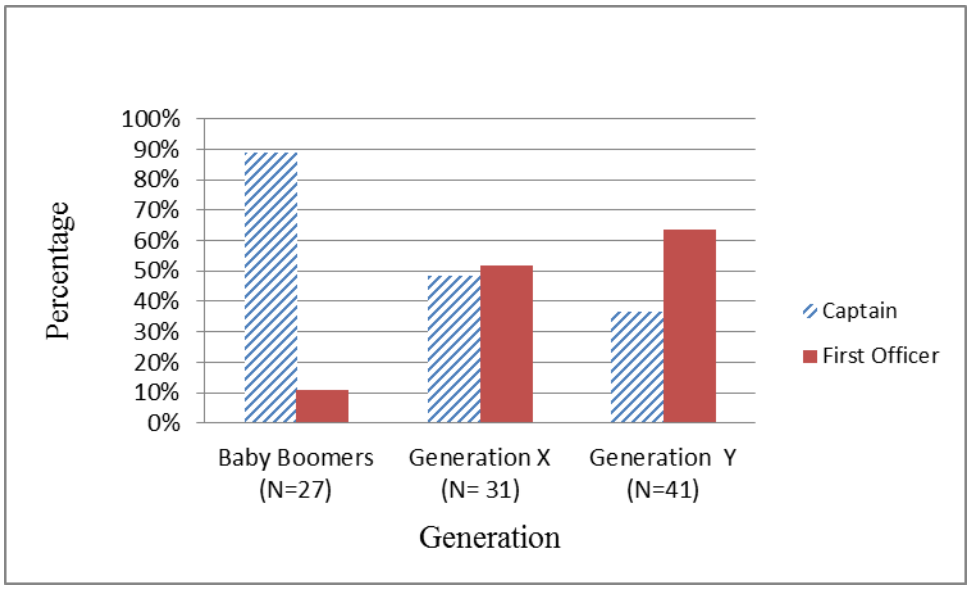

Figure 1. Distributional representation of participants' job position based On Generations.

The question regarding years of experience were categorized into four sections: 1-10 years, 11-20 years, 21-30 years, and more than 30 years. This question was answered by 105 of the 106 survey participants. Figure 2 represents the distribution of participants based on years of experience and generation to which they belong.

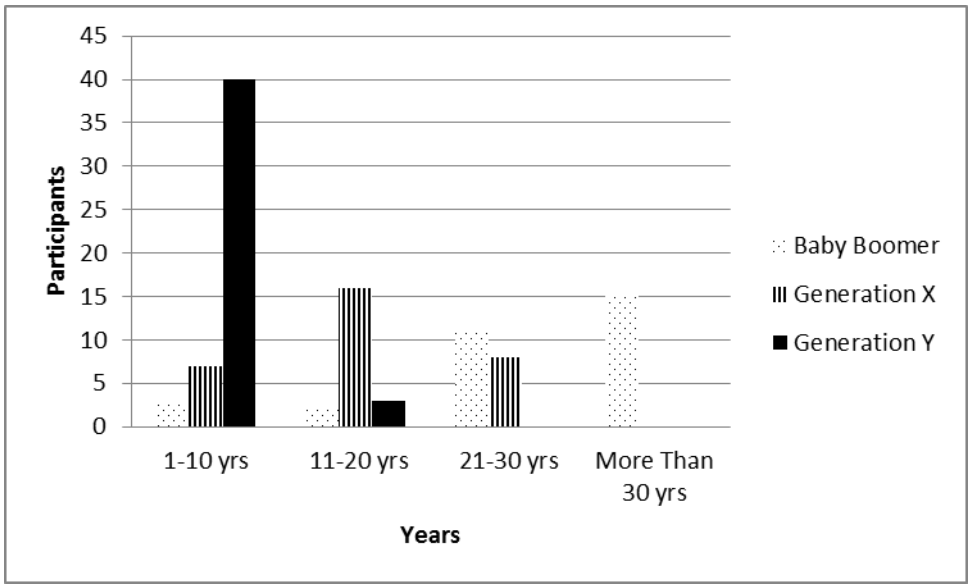

Figure 2. Number of participants based on experience grouped by generations.

Of those with 1-10 years of experience, the most participants were from Generation Y, following by Generation X, lastly with Baby Boomer. Of those between 11 and 20 years of experience, Generation X was the most, while Baby Boomers were the last. Of those with 21-30 years of experience, Baby Boomers had the most participants. No participants from Generation Y had the appropriate experience to fit into this category. Only Baby Boomers accounted for those with over 30 years of experience.

Survey Responses

The survey consisted of 26 items (Appendix A) related to safety attitude scale with answers attributed to a 5-point likert-scale. There were 14 items related to self-confidence (2, 4, 6-10, 13, 17, 19-22, and 24), eight items to risk orientation (1, 5, 12, 15, 18, 23, 25, and 26), and four items to safety orientation (3, 11, 14, and 16). The likert-scale categories were as follows; “strongly disagree” was coded as 1, “disagree” as 2, “neutral” as 3, “agree” as 4, and “strongly agree” as 5 in items 2, 3, 4, 6-11, 13, 14, 16,

17, and 19-22, respectively. Items 1, 5, 12, 15, 18 and 23-26 were coded using "strongly disagree" as 5, "disagree" as 4, "neutral" as 3, "agree" as 2, and "strongly agree" as 1, respectively. Table 3 shows the means of overall scale and the means of subscales based on generation.

Table 3

Means of Overall Scale and the Subscales by Generations

	Safety Attitude (All 26 Items)	Self Confidence (14 Items)	Risk Orientation (8 Items)	Safety Orientation (4 items)
Baby Boomers (N=32)	3.86	3.76	3.96	3.99
Generation X (N=31)	3.83	3.85	3.79	3.88
Generation Y (N=43)	3.78	3.85	3.69	3.72

Self-Confidence

The means of each of the self-confidence items are listed in Table 4. This table clearly displays that none of the means for items in self-confidence subscale was less than 2. The item *"I am capable of instrument flight"* had the highest means for all generations. The items "*It is very unlikely that a pilot of my ability would have an accident*" and "*I never feel stressed when flying*" had the lowest means. The means of items 6, 10, 17, 20, 21 and 24 increased from Baby Boomers to Generation X to Generation Y. The means of items 2, 9, 13, 19 and 22 increased from Baby Boomers to Generation X, and then decreased from Generation X to Generation Y. In items 4 and 7, the mean decreased from Baby Boomers to Generation X, and then increased from Generation X to Generation Y. Only in item 8, the mean decreased from Baby Boomers to Generation X to Generation

Y. Baby Boomers had the highest mean in only item 8. Generation Y had the highest mean in seven items (4, 6, 7, 10, 17, 20, 24), and Generation X had the highest mean in six items (2, 9, 13, 19, 22). In item 24 which was coded using 5 as "strongly disagree" and 1 as "strongly agree", Generations X and Y leaned toward disagree. However, Baby Boomers leaned more toward neutral.

Table 4

Mean of Self-Confidence Items by Generations

Item	Baby Boomers	Generation X	Generation Y
2. I am capable of instrument flight.	4.63	4.81	4.79
4. I never feel stressed when flying.	2.50	2.48	2.72
6. I am a very capable pilot.	4.44	4.45	4.47
7. I am so careful that I will never have an accident.	2.53	2.52	2.72
8. I am very skillful on controls.	4.44	4.23	4.09
9. I know aviation procedures very well.	4.28	4.29	4.12
10. I deal with stress very well.	4.00	4.03	4.21
13. I have a thorough knowledge of my aircraft.	4.38	4.39	4.28
17. I find it easy to understand the weather information I get before flights.	3.84	3.97	4.19
19. It is very unlikely that a pilot of my ability would have an accident.	2.50	2.77	2.42
20. I fly enough to maintain my proficiency.	3.91	4.32	4.42
21. I know how to get help from ATC if I get into trouble.	4.53	4.55	4.56
22. There are few situations I couldn't get out of.	3.34	3.52	3.35
24. I often feel stressed when flying in or near weather.	3.34	3.55	3.60

Note. Strongly disagree is coded as 1, disagree as 2, neutral as 3, agree as 4, and strongly agree as 5 for all items except the item 24 in which strongly agree is coded as 1, agree as 2, neutral as 3,disagree as 4, and strongly disagree as 5.

One-way analysis of variance (ANOVA) was utilized to evaluate the means within generational differences of pilots in self-confidence subscale. The results as shown

in table 5, indicates that the $p > .05$, which is greater than the type 1 error. Therefore, there were no statistically significant differences between generations of pilots and self-confidence.

Table 5.

ANOVA Results for Self-Confidence

Source	*Df*	*SS*	*MS*	*F*	*P*
Generations	2	0.178	0.089	0.819	0.444
Error	103	11.182	0.109		
Total	105	11.360			

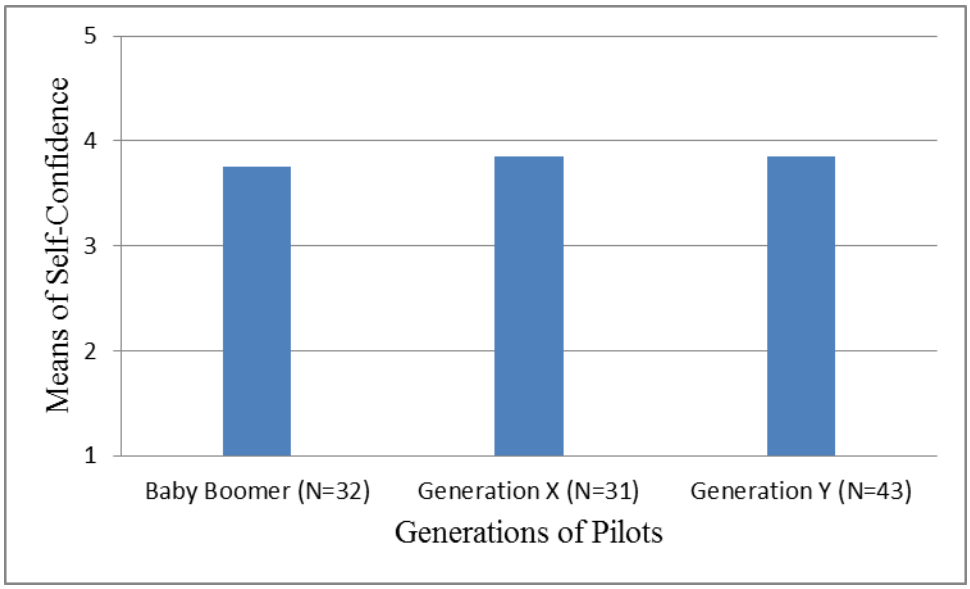

Figure.3 Mean plot of generations of pilots and self-confidence.

Risk Orientation

The means of each risk orientation item are listed in Table 6. This table clearly declares that none of the means for items in self-confidence subscale was less than 2. The item *"Speed is more important than accuracy during an emergency"* had the highest mean for all generations. The item "*The pilot should have more control over how he/she*

flies" had the lowest means. The means of items 1, 5, 7, and 18 decreased from Baby Boomers to Generation X to Generation Y. The means of items 15 and 23 increased from Baby Boomers to Generation X and decreased from Generation X to Generation Y. In items 25 and 26, the means decreased from Baby Boomers to Generation X, and then increased from Generation X to Generation Y. Baby Boomers had the highest mean in items 1, 5, 18, 25, and 26. Generation X had the highest mean in items 15 and 23. In item 12, the highest mean was tied between Baby Boomers and Generation X. In no item did Generation Y have the highest mean.

Table 6

Mean of Risk Orientation Items by Generations

Item	Baby Boomers	Generation X	Generation Y
1. I would duck below minimums to get home.	4.69	4.35	4.23
5. The rules controlling flying are much too strict.	3.72	3.68	3.35
12. Most of the time accidents are caused by things beyond the pilot's control.	3.97	3.97	3.93
15. The pilot should have more control over how he/she flies.	2.59	2.71	2.53
18. You should decide quickly and then make adjustments later.	3.97	3.32	3.16
23. If you don't push yourself and the aircraft a little, you'll never know what you could do.	3.53	3.68	3.56
25. Sometimes you just have to depend on luck to get you through.	4.50	4.23	4.30
26. Speed is more important than accuracy during an emergency.	4.69	4.39	4.44

Note. Strongly agree is coded as 1, agree as 2, neutral as 3, disagree as 4, and strongly disagree as 5 for all items.

One-way analysis of variance (ANOVA) was utilized to evaluate the means of pilots' generational differences in risk orientation subscale. The results as shown in Table 7, exhibit that the $p<.05$, which is less than the type 1 error. Therefore, there were significant differences between the generations of pilots and risk orientation. From Table 3 and figure 4, Baby Boomers had the highest mean, followed by Generation X, and then lastly, Generation Y. Namely, with a higher mean came less risk tolerance.

Table 7

ANOVA Results for Risk Orientation

Source	*Df*	*SS*	*MS*	*F*	*P*
Generations	2	1.320	0.660	4.079	0.020
Error	103	16.665	0.162		
Total	105	17.985			

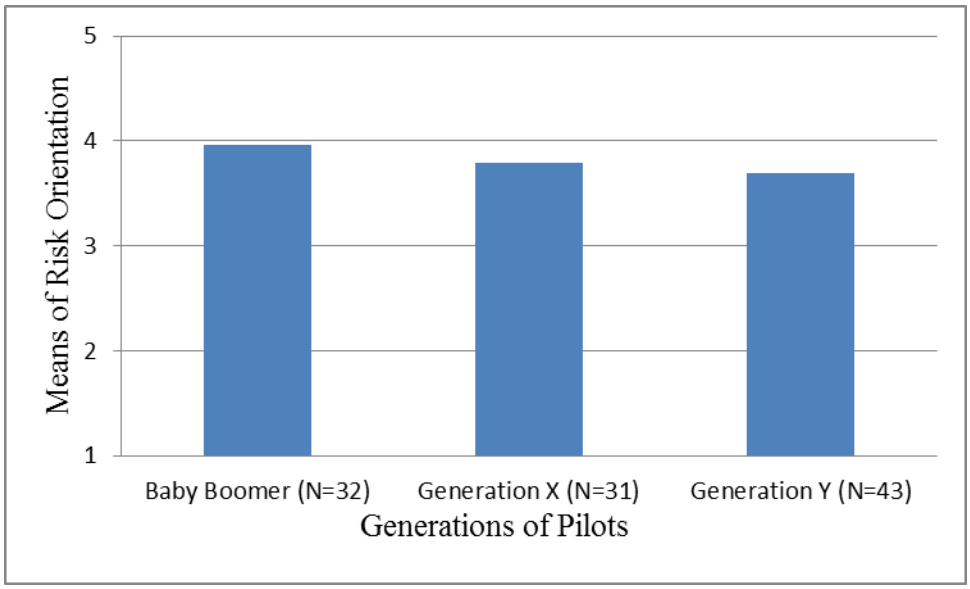

Figure.4 Mean plot of generations of pilots and risk orientation.

Safety Orientation

The means of each safety orientation item are listed in Table 8. In this table, none of the means for items in safety orientation subscale was less than 3. The item *"I am a very careful pilot"* had the highest mean of all generations, while the item "*It is riskier to fly at night than during the day"* had the lowest overall mean. The means of items 3, 14, and 16 decreased from Baby Boomers to Generation X to Generation Y. In item 11, the means increased from Baby Boomers to Generation X, and then decreased from Generation X to Generation Y. Baby Boomers had the highest mean in items 3, 14, and 16. Generation X had the highest mean in item 11. Generation Y had no item as the highest means.

Table 8

Mean of Safety Orientation Items by Generations

Item	Baby Boomers	Generation X	Generation Y
3. I am a very careful pilot.	4.72	4.45	4.33
11. It is riskier to fly at night than during the day.	3.34	3.55	3.14
14. I am a very cautious pilot.	4.44	4.19	4.16
16. Usually, your first response is the best response.	3.47	3.32	3.26

Note. Strongly disagree is coded as 1, disagree as 2, neutral as 3, agree as 4, and strongly agree as 5 for all items.

One-way analysis of variance (ANOVA) was utilized to evaluate the means of pilots' generational differences in safety orientation subscale. As shown in table 9, the results indicated that the $p < .05$. Therefore, there were significant differences between the generations of pilots and safety orientation. From Table 3 and figure 5, Baby Boomers

had the highest mean, following was Generation X, and lastly was Generation Y. Namely, with a higher mean came a higher safety orientated.

Table 9

ANOVA Results for Safety Orientation

Source	*Df*	*SS*	*MS*	*F*	*P*
Generations	2	1.389	0.695	4.191	0.018
Error	103	17.071	0.166		
Total	105	18.460			

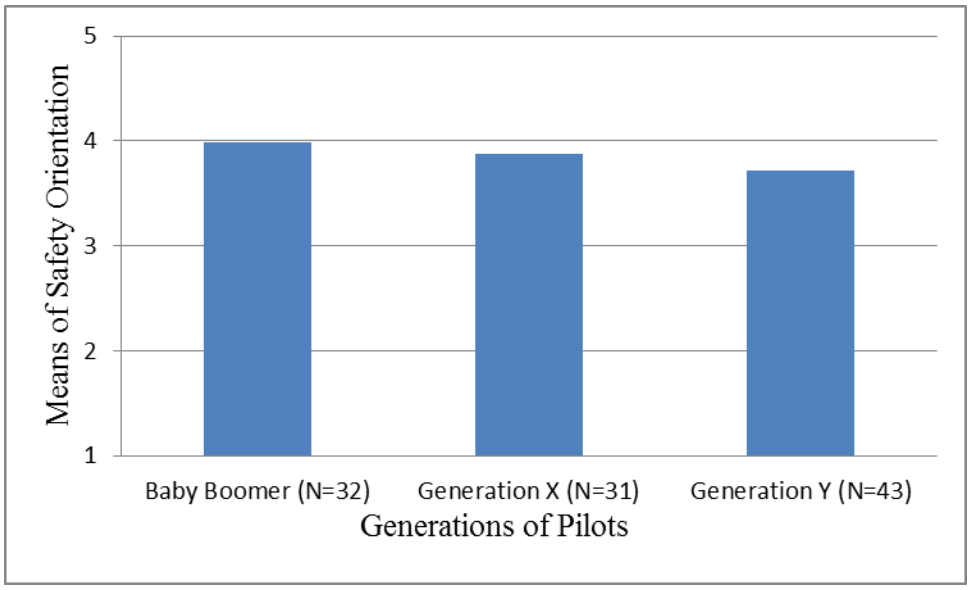

Figure.5 Mean plot of generations of pilots and safety orientation.

Safety Attitude

For the overall of safety attitude scale, 17 items (2, 3, 4, 6 -11, 13, 14, 16-17, and 19-22) used a scale of 5, 4, 3, 2, and 1 to record the responses: “strongly agree”, “agree”, “neutral”, “disagree”, and “strongly disagree”, respectively. The remaining nine items (1, 5, 12, 15, 18, and 23-26) used a reverse approach, making 5 indicate a response of

"strongly disagree", 4 with "disagree", 3 with "neutral", 2 with "agree", and 1 with "strongly agree".

One-way ANOVA was conducted to evaluate the mean differences of generations of pilots on the scale for all items of safety attitude. As shown in table 10, the results indicated that the $p > .05$. Therefore, there were no significant differences between the generations of pilots and safety attitude.

Table 10

ANOVA Results for Safety Attitude

Source	*Df*	*SS*	*MS*	*F*	*P*
Generations	2	0.114	0.057	.902	0.409
Error	103	6.511	0.063		
Total	105	6.625			

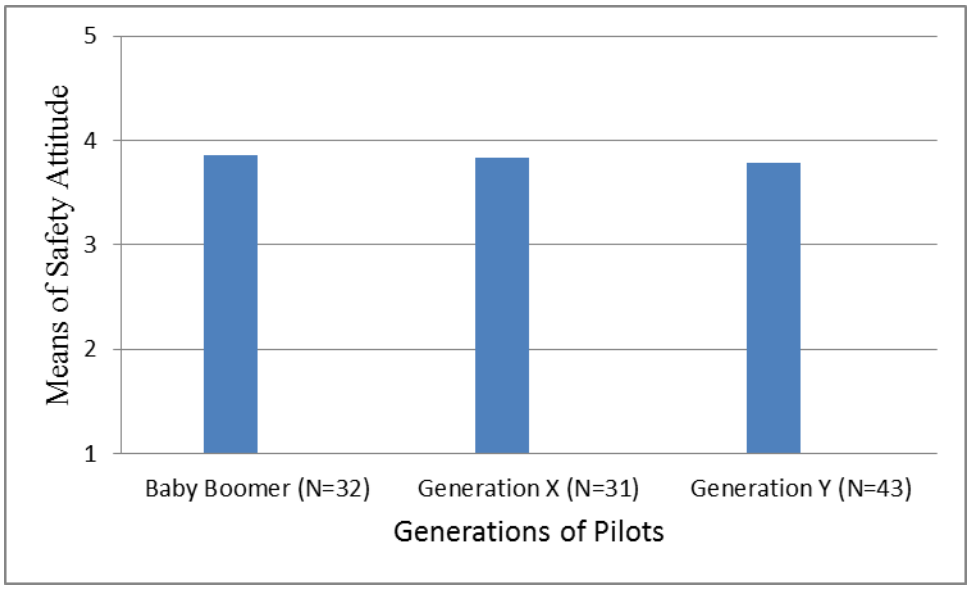

Figure.6 Mean plot of generations of pilots and safety attitude.

Summary

This chapter provided analyses results as to whether there are any significant mean differences among the generations of participants with the overall category of safety attitudes and subcategories including those of self-confidence, risk orientation, and safety orientation. The results indicated that there are no significant mean differences among the generations of pilots for the overall category of safety attitude and the subcategory of self-confidence. However, it showed that there is a significant mean difference in the risk orientation and safety orientation subcategories. In both risk orientation and safety orientation, Baby Boomers had the highest mean, while Generation Y had the lowest. This indicates that Baby Boomers were less risk tolerant and more safety oriented. Following was Generation X, and lastly was Generation Y.

CHAPTER 5

Conclusion and Recommendation

Conclusion

The objective of this study was to analyze the generational differences in safety attitudes among US commercial airlines pilots. A total of 107 pilots were surveyed from three different generations: the Baby Boomer generation (born between 1946 and 1964), Generation X (born between 1965 and 1980), and Generation Y (born between 1981 and 2000). A total of 26 questions were used in the survey, but were divided for further analysis into three subcategories: self-confidence, risk orientation, and safety orientation. The subcategory of self-confidence encompassed 14 questions, while eight questions accounted for risk-orientation, and the remaining four were with respect to safety orientation. The one-way ANOVA was used to analyze the differences between the three generations within the subcategories. Results concluded that significant differences were only present with risk orientation and safety orientation. However, the study found no significant differences between generations in regards to self-confidence. Also, the one-way ANOVA was used to analyze the original 26 questions in totality for any differences in safety attitudes between generations. No significant difference was found.

The degree of differences in regards to risk orientation between generations showed that the Baby Boomers were less risk tolerant, while Generation Y was most risk tolerant. In safety orientation, the Baby Boomers had the highest safety orientation, and Generation Y had the lowest.

Recommendations

Because the most significant differences were seen regarding risk and safety orientation, it is paramount for US airlines to shift their focus and add further emphasis to those categories. These modifications should be made with special attention to Generations X and Y because these generations account for the future of the aviation industry.

Safety training is a necessity at the airlines, however, during this training, the airlines may wish to acknowledge different generations of pilots, who may have different characteristics and attitudes. It may be also be beneficial to account for these differences in the management of the individual generations of pilots, as well.

For the Baby Boomers, it may be beneficial to use them as mentors to each other as well as the younger generations. The Baby Boomer generation values discussion and reflection over academic stimulation, and can therefore use the experiences of their peers as learning tools (Cekada, 2012). When regarding Generation X, hands on learning may be most influential. This will supplement their original learning with out-of-field experience, and give them the opportunity to simulate different scenarios before they experience them in the air (Cekada, 2012). This method would also be beneficial for Generation Y, as well as directing them to digital and social media such as blogs and online journals with statistics regarding fatalities and accidents due to risky or careless behavior (Cekada, 2012).

Limitations

There are some qualities of this study that provide some limitations to the results. The accuracy of the results would be more precise given there was a larger sample population. Time constraints prevented further outreach to more commercial airline pilots that could have provided more accurate results to the study. Additionally, the answers provided highly depend on the honesty and character of those taking the survey. Some airlines also implemented certain restrictions and barriers that complicated the distribution of surveys among their pilots. Moreover, this study did not acknowledge that different airlines may adopt different airline cultures; including necessary requirements to achieve status, personal relationships among pilots, and influence of authority.

Future Studies

This approach should provide a strong foundation for future researchers looking to supplement the established separations with more concrete information. Further studies should involve a larger number of participants to improve the accuracy of the results. Additionally, time constraints should be extended to establish contact and maintain communication between airlines and the researchers. Also, it would benefit airlines to conduct a longitudinal study. For example, in another five years, if this study is redistributed among pilots, it may show whether any improvement occurred within the Generation Y. This would grant airlines the ability to view the characteristics of new and emerging generations, as well as track the evolution of safety attitudes by generation over the years.

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APPENDIX A

SURVEY

Generational Differences in Safety Attitudes Among Commercial Pilots

February 12, 2013
Dear Participant,

I am Emad Gashgari, a graduate student under the direction of Dr. Mary Niemczyk in the Aviation Management and Human Factors program in the College of Technology and Innovation at Arizona State University.

I am conducting a research study to investigate generational differences in attitudes toward safety among commercial airline pilots. I am inviting your participation, which will involve about 10 to 15 minutes of your time.

The survey consists of two sections. The first section asks for demographic information that is used solely to place respondents into groups for analysis purposes, while the second section includes questions with a 5 point scale to rate your agreement with the specific issue.

Your participation in the study is voluntary. You can skip questions if you wish. If you choose not to participate or to withdraw from the survey at any time, there will be no penalty. You must be 18 years of age or older to participate in this study. There are no foreseeable risks or discomfort to your participation.

Your responses will be anonymous and the results of this study may be used in reports, presentations, or publications but your name will not be used. Results will only be used on the aggregate form. Also, please know that you will not receive any financial compensation or benefits by participating in this study.

If you have any questions concerning the research study, please contact the research team at Mary.Niemczyk@asu.edu (Primary Investigator) or egashgar@asu.edu (Co-Investigator). If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Chair of Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.
Return of the questionnaire will be considered your consent to participate.

Sincerely,
Emad Gashgari

I. Demographics Information:

The following information will be used for research purposes only. Please, choose the appropriate answer.

1. Date of Birth:

__ Before 1946 __ 1946- 1964 __ 1965-1980 __1981-2000

2. Gender:

____ Male _____ Female

3. Position:
_____ Captain _____ First Officer

4. Airline / Organization

_____

5. Aviation Work Experience:
_____ 1-10 yrs _____ 11-20 yrs _____ 21-30 yrs _____+30 yrs

6. Total Flight Hours:
_____

II. Questionnaire

Please choose the answer that best reflects your opinion.

Item Number	Question	Strongly Agree	Agree	Natural	Disagree	Strongly Disagree
1	I would duck below minimums to get home.					
2	I am capable of instrument flight.					
3	I am a very careful pilot.					
4	I never feel stressed when flying.					
5	The rules controlling flying are much too strict.					
6	I am a very capable pilot.					
7	I am so careful that I will never have an accident.					
8	I am very skillful on controls.					
9	I know aviation procedures very well.					
10	I deal with stress very well.					
11	It is riskier to fly at night than during the day.					
12	Most of the time accidents are caused by things beyond the pilot's control.					
13	I have a thorough knowledge of my aircraft.					
14	I am a very cautious pilot.					
15	The pilot should have more control over how he/she flies.					
16	Usually, your first response is the best response.					
17	I find it easy to understand the weather information I get before flights.					
18	You should decide quickly and then make adjustments later.					
19	It is very unlikely that a pilot of my ability would have an accident.					
20	I fly enough to maintain my proficiency.					
21	I know how to get help from ATC if I get into trouble.					
22	There are few situations I couldn't get out of.					
23	If you don't push yourself and the aircraft a little, you'll never know what you could do.					
24	I often feel stressed when flying in or near weather.					
25	Sometimes you just have to depend on luck to get you through.					
26	Speed is more important than accuracy during an emergency.					