Women in the Aviation Industry

MAUREEN MUTISYA

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_____
David L. Young, Brigadier General, USAF (Ret).
Thesis Chair

_____
Samuel Smith, Ph.D.
Committee Member

_____
Kurt Reesman, M.A.S.
Committee Member

_____
Marilyn Gadomski, Ph.D.
Assistant Honors Director

_____
Date

Abstract

The Aviation industry has developed extensively since its establishment by the Wright Brothers in 1903. Over time, the highly male-dominated industry experienced significant changes to incorporate female aviators. Determined women initiated this process through participating in the aircraft engineering sector and pursuing careers as pilots. However, these women faced various challenges, which resulted in setbacks to their effective growth in the industry. In fact, vital issues encountered in the past are still present and often overlooked in today's aviation industry. Therefore, identifying these problems and proposing solutions with effective corrective measures is necessary to increase and motivate female pilots globally. A time of consideration and re-evaluation is imminent.

Women in the Aviation Industry

In the mid morning hours of December 17, 1903, a powered flying machine successfully took off, traveled one hundred and twenty feet in the air, and landed under the control of its pilot. Orville Wright's twenty-two second flight initiated what would become an era of aerial transportation development in the United States and the world. In fact, man's intense motivation to test the skies extensively brought forth a faster, more efficient and effective means of transportation. Not only would aircraft utilization facilitate better warfare techniques and execution, but the earth would also be rapidly and vastly explored.

The beginning of flight established an industry that captivated many men, who dedicated their time and effort in the construction of different aircraft models and invented various flying activities. Women also showed great interest in the developing aviation industry and yearned to learn, participate in, and enjoy the diverse experiences it offered. However, faced with a variety of setbacks, women aviators found accomplishing successful flight careers a difficult task.

In today's more egalitarian age, women pursuing flying careers still encounter challenges that hinder their optimum growth in the industry. Although various solutions have been promoted to increase the percentage of female pilots in aviation, a spectrum of questions and issues remain evident. Did female pilots in the twentieth century have any impact on the development of the aviation industry? If so, why has the growth of female aviators been significantly slow? It appears that a greater analysis of the history and development of female pilots is imperative. Thereafter, proposing more effective solutions to identified problems can promote the growth of women pilots globally.

History of Women Pilots in the United States

Flying, Family, and Femininity in the New Industry

After the Wright brothers' invention of the Wright Flyer in 1903, women found themselves willing to exchange their traditional roles to become pilots and explore the new opportunities in the aviation industry. However, between the mid 1900s and early 1920s, an aircraft was not yet perceived to be a reliable means of transportation (Corn, 1979). It was considered to be an exciting machine–"but somewhat useless toy"–that could be used for sport and leisure activities (Corn, 1979, p. 558). Therefore, women venturing into flying careers focused on improving their flying techniques, participating in air races, and flying circuses (Corn, 1979).

The challenge of holding women's flying records for speed, attitude, and endurance also motivated other young women to attempt flight. For instance, women aviators: Amelia Earhart, Louise Thaden, Harriet Quimby, and Blanche Scott were consistently determined to achieve greater successful flying missions and challenged other interested women to do the same (Furgurson, 2010). Encouragement was particularly necessary in a period when pilots had to be "intrepid birdmen; demonstrating extraordinary energy, courage, a quick eye, clear judgment, and great physical dexterity" (Corn, 1979, p. 559). Requiring this *hero* personality trait for an aviator created a misconception that women did not possess that unique character and capabilities. Consequently, a stereotype that prompted women to act more assertively developed and revealed their aviator potential and proficiency to a skeptical audience.

Marriage also created an important advantage for women in the early aviation industry. Well-known female aviators Amelia Earhart, Jacqline Cocharn, Louise Thaden,

and Phoebe Omelie were married women. In addition, one in five of 100 women pilots in the 1930s were married to male pilots. A flying wife created the impression that she was capable of successfully carrying out the domestic and professional roles simultaneously. Support from their flying husbands also reduced feelings of discrimination, which were still prevalent in the emerging industry (Corn, 1979). Women pilots purposefully conformed to feminine norms in order to retain their careers. While they exhibited courage and skill in flight missions, they also portrayed minimal mechanical know-how and maintained a domestic demure (Haynsworth & Toomey, 2000).

Early female aviators developed and adapted additional coping mechanisms. They wrote books and short stories on flying and described the freedom and equality the skies provided. Through their writings, women also rebutted the prevalent criticism that considered female flying unwomanly. They emphasized their ability to successfully enter the male world of aviation and not lose their natural femininity (Lebow, 2002). The Ninety-Nines, an all-women pilot's group founded by Amelia Earhart, also helped protest the various forms of discrimination women experienced in their work environment. For instance, the Air Commerce Department grounded women pilots during their menstruation periods as they were considered to be weak and less efficient during this time. Women pilots groups met and proposed solutions to such regulations while encouraging others to remain committed to their passion for flying (Corn, 1979).

The Selling of Aviation

It was not until the late 1920s when a commercial perspective on airplane utility urbanized. The historic non-stop, transatlantic solo-flight by Charles Linbergh in 1927 provided the needed transition into air transportation advancement and commerce. The

construction of airports, airliners, and aircraft having the capacity to carry goods and people, quickly and safely over long distances followed. However, the public maintained high skepticism regarding the safety of flight when support for aeronautical growth and engineering was vital. During this period the need for women pilots increased and they found jobs advertising and selling airplanes to the available market (Corn, 1979). It was often said that "if 'incompetent' women could do it, man-made machines must truly be fail-safe and all-forgiving" (Corn, 1979, p. 560). Even though this stereotypical perception discriminated against female aviators, it helped them gain more flying experience as they advertised airplanes (Corn, 1979).

Aviation offered freedom, excitement, and monetary gain, which matched the courage, confidence, and enthusiasm of female pilots. Marketing aircraft in the early 1930s also provided women with the opportunity to motivate others (Lebow, 2002). In 1932, five of the fifteen women listed as professional pilots in the American directory sold aircraft for private production companies. Their public appearances with aircraft created substantial business profits for aircraft manufactures. During aircraft demonstration tours, female pilots also addressed various women's groups about flying. However, aspiring women pilots were challenged by costs and prejudice evident in flight training schools. Female flight students lacking mechanical experience had to pay higher costs for training than their men counterparts, who highly dominated the aircraft engineering sector (Corn, 1979).

Although aircraft sales and air show activities promoted the rise of female pilots, their growth was later stalled by a changing aviation industry. The public's interest in private flying had declined and businesses no longer loaned airplanes to women for races

and long-distance flights (Davies, 1964). These activities, though vital for the growth of women pilots, were reduced in importance with the rise of passenger air travel. Obtaining a transport license for airline jobs was also not feasible for female pilots in the late 1930s. Retiring from a growing industry due to lack of job opportunities consequently dimmed the hopes of many women aviators. The deaths of renowned women pilots such as Amelia Earhart, Harriet Quimby, and Phoebe Omelie during flying missions also left some aspiring lady fliers discouraged (Corn, 1979).

World War II and the rise of Women Airforce Service Pilots

The entrance of the United States into World War II on December 8, 1941 came with new opportunities for women pilots. Since the nation's military required combat pilots to ferry aircrafts, gateways for women to pursue military aviation were established. Organizations such as the Women Flyers of America, Civil Aeronautics Association, and the Ninety-Nines International Women Pilots Association quickly responded to the new climate of military aeronautical activities. They recruited young women pilots who aspired to serve their country in any capacity, and sponsored those who could not afford training. A pay-as-you-go system also allowed women to obtain their private pilot training at a total cost of $275. Thus, the availability of more affordable ground and flight training made the possibility of successfully pursuing an aviation career more feasible (Douglas, 1990).

The Women Airforce Service Pilots (WASP) was the primary source of well trained and qualified ferry pilots for the United States military during the war. Mothers, dancers, teachers, nurses, and actresses left behind traditional roles and exchanged them for high-powered military aircraft. The WASPs flew over 60 million miles and over 77

types of military aircraft, some of which had dangerous reputations as heavy bombers with design and safety problems. Their flying missions included ferrying aircraft from factories to bases, towing targets, test-piloting new and refurbished planes, flying military personnel, and piloting bombers to train navigators, gunners, and bombardiers. They were also willing to participate in general aviation and its administrative duties (Merryman, 1998).

Although women successfully flew intimidating planes and broke gender barriers in the military, prejudice, and incidents of bias also existed. The WASPs were often assigned improperly maintained aircraft and incidents of sabotage were suspected at various bases. Moreover, even though women performed the same ferrying tasks as their male counterparts, they obtained two-thirds of the pay the men received. Complaints regarding these incidents and equal pay disparities were ignored, and the belief that women were emotionally and physically fragile remained prevalent (Frisbee, 1995).

Discrimination and Racial Segregation

Segregation across the U.S. also affected the progress of aspiring African-American female pilots. For instance, U.S. flight schools rejected Bessie Coleman because she was black. However, undeterred, she traveled to Paris to pursue her flight training and became the world's first African-American licensed female pilot in 1921 (Furgurson, 2010). Racial discrimination also became apparent within the military and WASP program. America's first black military airmen, also known as the Tuskegee airmen, were privileged to train and fly single and multi-engine combat aircraft at home and abroad during WWII (Tuskegee Airmen, 2006). However, African- American female pilots were not invited to join the WASP, as the military leaders were not ready to cross

the race and gender barrier with them. Submitted applications were never accepted and competent black female pilots had to consider other career options (Stewart-Smith, 1981).

The WASPs experienced greater discrimination when Congress denied their request for military service. Establishing a permanent presence for women in the American society was a difficult task because of the perception that programs for women in military aviation were experimental. The WASP program was perceived as a project: it could not be submitted for militarization until enough experience had been obtained to determine the usefulness of the women pilots (Douglas, 1990). Ninety percent of women were willing to stay in the military after the war and requested to be retained. However, male pilots protested against military and veteran status for women, claiming it would deter many assignments for men. Hence, with the end of World War II, the WASP was deactivated and women pilots had to seek other job opportunities. Moreover, no benefits were provided to the WASPs for their service, and they had to wait an additional thirty-five years before their recognition would occur (Stewart-Smith, 1981).

WASPs found job opportunities as flight attendants and in general aviation administrative duties after the war. Women also found themselves participating in the non-traditional fields of production and maintenance. Seventy-six percent of all female employees in aircraft production worked in airframe plants, predominantly in precision bench and electrical assembly. Their manual dexterity, attentiveness, and meticulous characteristics were considered appropriate for the fine assemblies of aircraft parts (Sato, 2000). Organizations such as the Civil Air Patrol, the National Intercollegiate Flying Association, and the Ninety Nines also helped women pursue piloting careers in general

aviation. These organizations worked hard to create new flying possibilities for women and remove the restrictions imposed on women pilots. However, poor reaction to women's career potential and the lack of effective policies to encourage their presence in commercial aviation prolonged growth for several decades (Douglas, 1990).

History of International Women Pilots

Prejudice against early female pilots was not only rampant in the U.S., but also observed in other developing nations. There were approximately one to two thousand women aviators worldwide in the 1930s, 500 of whom were Americans. The growth of women pilots was slower internationally and they experienced setbacks similar to those in the U.S. In France, most early women aviators came from high income level families. Marrying fellow airmen or engineers also provided a family unit support, and portrayed a female domestic reserve, which reduced sexual tensions. Through participating in sport flights and aircraft publicity activities French female fliers became heroines and role models for young girls. Nonetheless, after contributing to the French military during World War II, women pilots found no flying opportunities in commercial aviation, except as stewardesses. They were consequently banned from French aviation activities (Reynolds, 1989).

In Nazi Germany, early women pilots could only obtain sport licenses and fly a very limited range of aircrafts. During WWII, the Luftwaffe–a branch of the German air force–appointed and permitted women to fly only during *appropriate* weather conditions to ferry airplanes and operate as glider, instructor, and motor non-combat pilots. Despite female pilots' patriotism and determination, strict Nazi gender role regulations marginalized their contribution to general aviation. It was not until the end of the

twentieth century that women would be employed in the Luftwaffe as combat pilots (Zegenhagen, 2009).

In Africa the thought of women pilots remained implausible throughout most of the twentieth century. With colonization influencing the industrialization of many African nations, aviation growth in commercial and military aviation was significantly slow. However, independence paved the way for the establishment and development of national military and airline operations. As women maintained more traditional roles, males dominated air forces and widespread air travel organizations. For instance, it was not until the late 1990s when women were accepted into the Kenya Air Force and airlines (E. Njagi, personal communication, January 6, 2010). Thus, a slower growth of international women pilots may have been influenced by the sluggish economic development rates.

Statistics and Growth of Female Aviators

The number of female aviators in the United States has gradually increased over the past four decades. Gaining access to jobs and increasing roles in all areas of aviation – military, commercial, and general – helped initiate expansion. Air force women pilots rose from “2% in 1972 to 16% in 1995” (Burrelli, 1996, p.1). Female airline pilots also increased from 0.027% in 1975 to 6% in 2005 (McFadden, 1996., & Women in Aviation, International [WAI], 2007). A graph analysis of these statistics below reveals that although the overall growth of female pilots has increased, the military sector has grown at a faster rate than the commercial aviation industry.

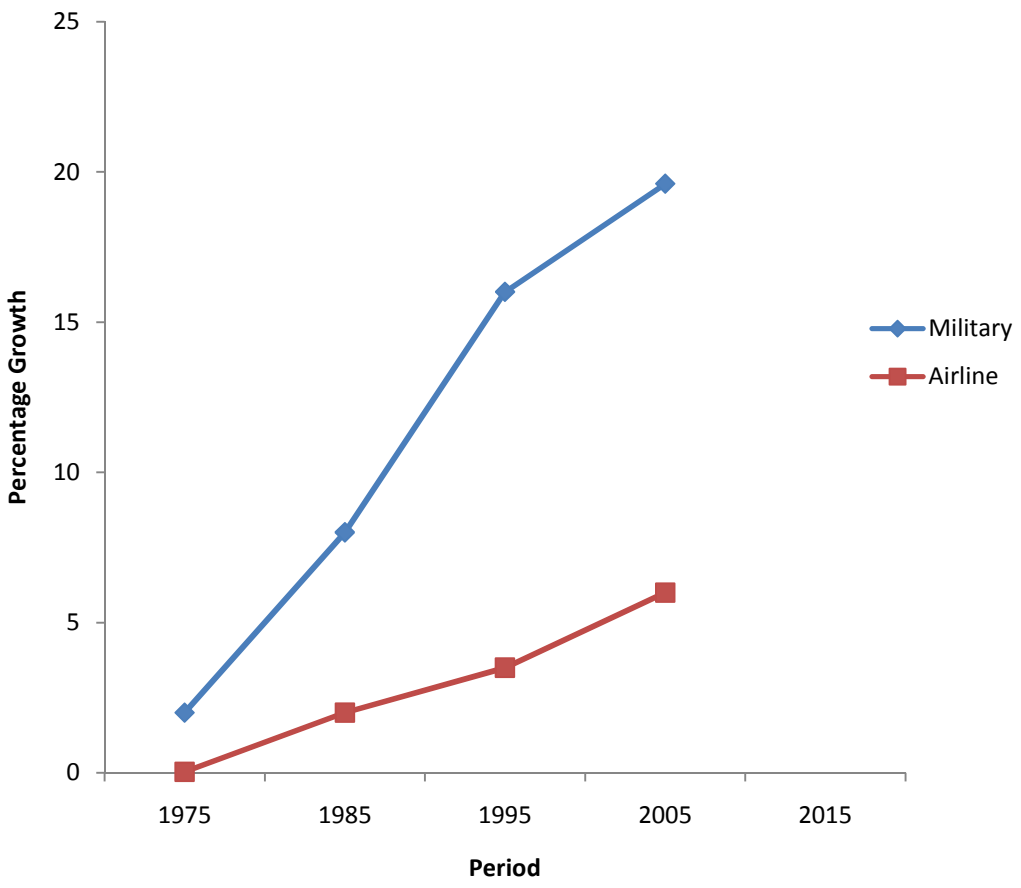

Figure 1. Growth of U.S. female aviators

It is also evident that the percentage growth of female pilots annually has been relatively low. An approximate annual growth rate of 0.1% and 0.8% in commercial and military aviation respectively, from the 1970s to 2005, reveals that there is need for greater recruitment and retention of women in the U.S. aviation industry (see Figure 1). The number of women holding student and private pilot certificates has also decreased, while women holding non-pilot FAA certificates have increased annually (Bednarek & Bednarek, 2003). Therefore, despite the overall growth of women in the aviation industry, the absolute increase of female pilots is challenged. Studies on whether past challenges for women in aviation careers are present and stalling growth are necessary.

An evaluation of pre-existing barriers that may be influenced by cultural, technological, financial, and social factors would also be beneficial.

The overall percentage growth of female pilots worldwide has been significantly lower than that of women in the U.S. Rates of female success and interests remain considerably lower than for men. Furthermore, many international airlines in developed nations still prefer hiring pilots with military training. For instance, El Al Israel Airlines has no female pilots and requires prospective pilot applicants to have served in the Israeli Air Force (IAF; Gilmartin, 1992). This requirement continues to present a challenge for aspiring female pilots because although Israeli women have served in the Air Force, only one recently graduated as a fighter pilot (Israel Women's Network, 2010). Therefore, a growth of international female aviators in non-traditional combat flying roles could boost their career prospects in the airline industry in specific nations.

In developing countries most female pilots are involved in general aviation and come from civilian backgrounds. The military sector continues to maintain a high male dominated population and therefore needs to initiate methods for increasing the number of female pilots. Cultural, social, and economic factors continue to play a major role in the growth of international women pilots (J. Asiro, personal communication, January 10, 2010). Thus, studies providing measurable growth rates and primary issues affecting female pilots in developing countries are essential for trends analysis.

Challenges Faced by Female Aviators

Sexual Harassment and the Tailhook Scandal

Women aviators faced challenging beginnings while adapting to the different duties and stresses of a rapidly changing aviation industry. First, sexual harassment was a

sensitive issue to address particularly in military aviation. After twenty years of women's incorporation into the U.S. air force academies, reports of sexual harassment increased by 50% (Ogden, n.d.). This issue was later magnified by the Tailhook Association annual symposium in 1991, where 25 women naval aviators were forced to run a gauntlet (walk briskly between two rows) of men and encountered various sexual assaults (Burrelli, 1996). Such behavior not only increased fear and anxiety in women aviators, but also revealed that their integration into combat aviation roles involved overcoming ethical and moral issues. Although the Tailhook Association scandal was addressed and reported, controversial standards for men and women in the aviation community remain evident (Ogden, n.d.). Despite the implementation of conduct policies, charges of sexual harassment have not disappeared. In 2009, female students from the U.S Naval Academy reported being sexually assaulted while on training assignments (White, 2009).

Pregnancy and Motherhood

Aspiring women aviators often desire to be wives and mothers as well. Nonetheless, women have faced complexity when attempting to balance family and flying career aspirations. Before 1995, a naval aviator who became pregnant would be expelled from a U.S. academy, unless the pregnancy was terminated in a month. This policy was eventually changed and women were allowed a one-year leave of absence at the academy, but would thereafter have to reapply for admission. Though more effective than the latter, it was apparent that a pregnancy would partly stall the progress of women aviators in the military (Burrelli, 1996).

One-year leave of absence policies were not only present in the military, but also in modern commercial aviation sectors. For instance, commercial female pilots currently

working in Kenya Airlines must take one-year maternity leaves, after which medical and flying currencies must be re-evaluated. Airline management personnel also have fears regarding the costs of replacing women pilots who have taken maternity leaves and later decide to resign, thereby increasing turnover (E. Njagi, personal communication, January 6, 2010). The task of regaining currency after a one year leave of absence can also be costly for an aviator. Extra time and resources must be spent on flight reviews before regular flight operations can take place.

Health and Disease Prevalence among Female Pilots

In a highly male dominated aviation industry, little is known as to whether commercial flying has had specific health impacts on women. Fears regarding the increased risk of breast, cervix, and skin cancers for female aviators have been observed. However, a study conducted in 2002 on disease prevalence of females in four U.S. air lines revealed that cases of breast cancer had specifically increased with flight attendants (Nicholas, Butler, Padgett, Hoel, & Mohr, 2002). Cases of non-cancerous diseases such as hypertension and high cholesterol were also observed. However, it is important to note that flight attendants are greater in number than female pilots in commercial aviation. According to the 2007 Federal Aviation Administration's aviation statistics, female flight attendants were 80.5% of all flight attendants, as compared to 6.17% commercial women pilots in the industry (Federal Aviation Administration [FAA] Aeronautical Center, 2007). Thus, greater cases of non-cancerous and cancerous diseases in flight attendants may be related to the population statistics. Furthermore, a much larger study of female aviators is necessary to ensure more precise statistics and information on disease prevalence.

Another important health concern for women pilots is the effect of cosmic radiations encountered at jet cruising attitudes during flight. Long-haul flying and routes traversing regions nearer to the poles have higher radiation concentrations than short, regional flights. Although these radiations do not pose an immediate hazard on aircrew, critical health hazards on pregnant flight crew are possible.

> Since a fetus' whole body consists of rapidly growing, rapidly dividing cells, a given dose of radiation will kill-off a much higher percentage of cells in a fetus than in an adults' body of more slowly dividing cells. If enough radiation exposure is received early in pregnancy, this could even cause sufficient damage to the embryo to result in a miscarriage, possibly even before the pregnancy was known. Fertility problems in flight attendants have already been identified, with radiation exposure mentioned as one of several likely causes. (May, n.d., para. 3)

Therefore, radiation exposure may pose a great hazard for pregnant flight crew members and careful considerations with obstetricians are necessary to ensure that the decision to fly during pregnancy is based on solid information. An analysis of flight durations and routes is important when deciding whether to fly during pregnancy. However, it would also be beneficial for a pregnant pilot to consider taking medical leave when long-haul flights at high attitudes are frequent and potentially hazardous to her unborn child (May, n.d.).

Personality Traits and Aviator Characteristics

A variety of personality and aviator attributes, such as aptitude, spatial, and cognitive abilities, differ among sexes and impact flight operations. For instance, studies show that men tend to possess greater visual-spatial abilities, while women are more

verbally fluent and pay extra attention to details and precision (Halpern, 1986). Questions arise as to whether these personality variations have any considerable effect on specific flight operations and collaboration among crews of opposite gender. Research also shows that female student pilots are less agreeable, more neurotic, and emotional than mid-career female pilots (King, Callister, Retzlaff, McGlohn, 1997). Therefore, it may be plausible that female pilots change personalities to some degree across their career to suit their work environment and ethics.

Determination of female psychological fitness and the ability to perform tactfully in specific flight situations are important issues. Studies show that female pilots in the Air Force have been concerned about potential exploitation from their male counterparts, which has at times reduced their capacity to perform well. Male pilots have also presented concerns about their proclivity to protect the female pilots in combat, perhaps to the detriment of the mission and safety (McGlohn, King, Butler, Retlaff, 1997). Misunderstandings in regards to proper procedures for executing a task or the intentions of the opposite sex can create conflict and divert focus on flight safety. Consequently, challenges of teamwork, co-operation and trust arise and affect the performance and relationships of pilots in the aviation industry.

An additional concern is the physical differences between male and female aviators and their effect on performance, technology, and aircraft design. In the early days, strength tests and minimum height requirements were used for women's performance and anthropometry evaluations (International Society of Women Airline Pilots [ISWAP], n.d.). However, civilian and defense aircraft have traditionally been built to accommodate male anthropometry. Since women tend to be shorter, have smaller

limbs, and less upper body strength, some may experience difficulty in reaching controls and operating certain types of existing aircraft systems and equipment effectively. The accommodation of female physique differences becomes increasingly difficult when more than one physical dimension is involved, and several different dimensions have to be considered in combination. In commercial aviation where there is a wider variation in age, height, weight, and physical limits of pilots than the military, adequate representation of female anthropometric data may not occur. Moreover, modifying cockpit designs would involve additional manufacturing costs and subsequently higher customer prices. A focus on cost management by commercial aviation may therefore contribute to minimal concerns of gender-bias cockpit design factors (Weber, 1994).

Pilot Error and Female Aviators

Today, it is often said that it is safer to fly in a commercial airliner than to drive a car or walk across a busy street. Still, a variety of adverse aircraft accidents have been observed, and research reveals that “70 to 80 percent” of aircraft crashes are related to human error (Wiegmann & Shappell, 2003, p. 3). Although commercial aviation accident reports have declined overtime and safety measures improved, human factors errors have resulted in the unsafe actions of airline pilots. Errors represent the mental or physical activities of individuals that fail to achieve their intended outcome. Skill-based, decision, and perceptual errors along with routine and exceptional rule violations have been committed by aircrew (Wiegmann & Shappell, 2003).

Questions have been raised as to whether gender differences have any significant relationship with pilot-error, flight safety operations, and accident cases. However, a study analyzing the differences between male and female pilot-error accident rates

revealed that neither sex was a safer pilot group (McFadden, 1996). Thus, ensuring that pilot-error incidents and accident cases are genuinely evaluated without gender prejudices is important. Greater research, recommendations, and educative programs on human error factors and safety are also needed.

Financial and Cultural Factors

The cost of flight training has risen dramatically over the past century. Training costs for obtaining a private pilot license have increased from “an average of $300 in the 1930s” to $7000 or more today (Douglas, 1990, p. 9). Although loans have helped flight students pay for their training, the high costs can cause potential female pilots to pursue other cheaper careers. General Aviation trend statistics have also revealed that the total student issuances for pilot certificates have decreased by 27% between 2007 and 2008 (Aircraft Owners and Pilots Association [AOPA], 2008). The decrease in certificates may partly be influenced by the present economic crisis and financial difficulties. Flight training costs have also become a major challenge in developing nations where student loans are unavailable and pre-paid training is required. This can cause prospective students from lower income families to digress from flying ambitions (J. Asiro, personal communication, January 10, 2010).

Culture also plays a major role in the development of women pilots globally. The perception of women’s roles in society varies among nations and can consequently affect the growth in the number of female pilots. For instance, three private aviation organizations in Kenya do not accept female pilots’ applications due to religious factors and varying conservative perspectives on roles of women. Such cultural influences can discourage women from pursuing flying careers. Also, those who may aspire to fly for

certain companies may not have the opportunity to make career advancements where strict cultural preferences prevail (J. Ngige, personal communication, January 6, 2010). Equal job opportunity proposals for women need to be promoted in private and gender-biased organizations.

Culture, social norms, and narrow outlooks on women's career opportunities may influence the choices women make on pursuing aviation careers. For instance, where technical careers are concerned, several African societies continue to associate women with risk and liability. The girl child in rural areas is often forced into early marital arrangements, as boys are empowered to attend school. Neither the family unit, nor government institutions promote education for young girls effectively. Therefore, young, aspiring female pilots in societies challenged by reserved cultural and regime norms may lack the opportunity, motivation, and support to pursue a preliminary education and aviation career (J. Asiro, personal communication, January 10, 2010).

Women professionals in aviation careers can also be perceived as having violated societal role expectations. Professional women pilots in conservative cultures may be challenged by the structural and attitude barriers related to marriage, motherhood, and climbing the aviation corporate ladder (Turney, Bishop, Karp, Sitler, & Green, 2002). In fact, various cases in East Africa have been reported of women pilots submitting to sexual favors in exchange for flying jobs, proficiency check passes, or career advancements. However, after the women carry out demeaning favors, training and career progression promises remain unfulfilled. If a society portrays a norm that discourages equal career opportunities and advancements for women, negative attitudes

and narrow perspectives become a progress impediment for women in aviation careers (J. Asiro & E. Njagi, personal communication, January 10, 2010).

Proposals for the Retention and Growth of Female Aviators

Personality and Self-Assessment Tests

The aviation industry has crucial factors to consider towards achieving and benefiting from higher retention rates of women pilots now and in the future. First, personality assessment plays a vital role in the pilot selection process, particularly within military and commercial aviation. Thus, ensuring that female pilots admitted into the aviation industry have the right personality and behavioral traits is vital. Aviator characteristics such as, aggressiveness, emotional stability, and positive coping skills should be effectively identified during pilot selection processes. Implementing a selection system that is cost effective and decreases attrition would also benefit the employment sectors of the industry. Effective selection or screening systems, orientations, and character traits assessments can ensure women possessing skills compatible with aviation career requirements are selected. This would also reduce the expenses the industry incurs as a result of unexpected turnover and decreasing retention rates (Ganesh & Joseph, 2005).

It is often difficult to identify a person’s inner thoughts and reasoning processes in stressful situations because people react differently under pressure. The numerous tasks and flight operations performed can result in cases of aircrew stress. Personality trait variations can lead to variable reactions of pilots in stressful situations, some of which produce more in-flight errors than others. Also, life stresses such as the death of a family member, or positive events like being promoted to captain can induce pilot anxiety and a

change in flight performance. Therefore, in addition to screening, self-assessment tests should be done by women to ensure that they are physically and mentally prepared for a flying career and its challenges. As pilots they must establish their own personal minimums applicable to all flight situations as their personal risk management tool. It would be unfair to passengers, management, and female pilots themselves if they ignored personal issues they knew would be hazardous or deter them from having successful flying careers (Jensen, 1995).

Health Management

In today's society, chronic diseases are major causes of serious ailments, disability, and death. Therefore, female aviators must be cautious of the various environmental and behavioral factors that can be detrimental to their health and career advancement. For instance, they can suffer performance decrements as result of fatigue and sleep deprivation. Studies have shown that while both male and female aviators are compromised by inadequate sleep, the effects on simulated flight performance and mood are not differentially accentuated or diminished as a function of gender. Therefore, female aviators need to be as much aware of their physical performance abilities as men. They must have accurate perceptions of their alertness and capabilities when sleep deprivation has progressed due to long flight operations and elevated workloads. If ignored, these factors can cause further flight operational strain and create hazardous in-flight work environments (Cadwell & Leduc, 1998).

Taking effective health care steps that include practicing good nutrition and regular fitness exercises can also increase energy and improve immune systems. Exercise is not only good for physical health, but it is also considered to be one of the most

effective stress coping styles for women pilots in the military (McGlohn, Callister, King & Retzlaff, 1997). Commercial aviation can consequently benefit from greater physical fitness promotions and activities. Female aviators should also limit alcohol intakes and avoid cigarette smoking. Taking preventative measures for physical and mental health can improve stamina and reduce medical leave cases (May, n.d.). These measures would have a positive long-term impact on the retention and flying career advancement of women globally.

Aviation Learning Styles

Implementing effective learning techniques throughout aviation theory and practical training processes can help meet the needs of students successfully. Since research has shown learning styles between men and women are different in aviation programs, accommodating such differences would be beneficial (Backer & Yelich, n.d.). Incorporating learning techniques that relate to a student's own learning style is vital for retaining women aviators in the industry. Because pilots are accommodators, assimilators, divergers or convergers at different stages of their learning process, using aviation training programs that consider such differences are necessary. Female aviators would be able to obtain the appropriate learning styles at various stages of their training, thus, increasing their confidence and performance (Kanske, Brewster, & Fanjoy, 2003).

In addition, motivating women pilots to be constantly learning from their experiences and those of others is important. Good judgment skills in flight will develop and feedback from new experiences create better and safer learning environments. Continual evaluations of flight training programs, human factors, and pilot-error effects on new-hires can also uphold the safety of training pilots and aircraft. Utilizing

systematic training programs rather than traditional *trial-and-error* methods would help pilots learn good decision-making skills quickly and safely. Exposing students to effective simulated situations and teaching techniques can also advance flight judgment, operations, and safety (Jensen, 1995).

Age, Experience, and Professionalism of Women Pilots

Identifying whether the age and experience of female pilots has any impact on their growth numbers in the aviation industry is important. A study done on airline pilots found that the average age and total flying hours of female airline pilots were less than male pilots. However, the fact that women pilots have only recently re-entered the aviation industry should be considered. The majority of male pilots in the U.S. acquired initial training through the military, while most females accumulated hours through civilian levels (McFaden, 1996). Therefore, the differences in training backgrounds between male and female pilots should also be observed in measuring aeronautical performance and pilot hiring standards.

Professionalism also plays a major role in the progress of women in commercial aviation. In fact, being competent and carrying out successful flight operations can assist women in climbing the airline corporate ladder effectively (Whittaker, 2003). Furthermore, women pilots should be dedicated to their careers even when experiencing domestic challenges. Those willing to continue flying, while pregnant and after child birth, should be do so if their health permits (May, n.d). Not only do these actions portray their commitment to employers, but they also create a positive image to aspiring women pilots. Awareness that family and career management is possible in the aviation industry is critical.

Management Support

In the 1980s, the airline employees who showed the greatest support for commercial women pilots were flight attendants. The airline companies did little to facilitate the integration of women and other minorities. Thus, women had to take the responsibility of encouraging themselves when they experienced tension based on gender issues (Douglas, 1990). Moreover, a recent study of challenges facing European female commercial pilots in 2000 revealed that women have had to continue adapting to the male culture to survive. Women pilots perceive they have much to lose by challenging a change in the cockpit culture, and adaptation becomes *a rite of passage* requisite in their early airline careers (Davey & Davidson, 2000). Today, there is a need for airline management to foster a greater supportive environment for female pilots. Crew Resource Management (CRM) seminars which incorporate gender sensitivity training sessions would be beneficial (McFadden, 1996). This would help reduce existing gender conflicts and facilitate better management and employee work relationships.

CRM training is a never-ending process that should involve the sharing of information across the world as new ideas are assessed and developed (Jensen, 1995). Therefore, effective systems for addressing crew behavior and grievances experienced in critical situations are necessary to ensure high female retention rates in the aviation industry. Remedies, such as enforcing policies for sexual harassment and injury, need to be implemented to ascertain how well female pilots are protected from perpetrators. Also necessary are improved counseling programs and legislative actions for victims. These programs and laws will ensure redress for harassment of women aviators is available,

hence assuring safety and improving confidence and performance levels (Sagawa & Campbell, 1992).

Student pilots spend large sums of money on flight training costs with hopes that a well paying flying occupation will cover the financial and opportunity costs incurred. However, the number of people pursuing a career as an airline pilot has decreased significantly because of the high costs of training, low initial pay, and uncertain career prospects (Air Line Pilots Association, International [ALPA], 2009). Therefore, management needs to implement improved marketing and operational strategies to cope with economic factors. Increase in financial stability and profitability would ultimately improve working conditions, compensation, and benefits. Such initiatives could also draw more female pilots with the passion, motivation, and required flying competency into aviation organizations.

Research and Development

Equal employment opportunity movements in the 1980s helped prod members of Congress in the U.S. to lift various caps placed on women in military aviation. In fact, it was the blurred distinction between Air Force roles and activities that influenced the re-evaluation of passed bills (Ogden, n.d.). Similar re-assessment procedures need to be incorporated by nations which have restrictive social and cultural perspectives on female roles. Government support on ways of improving employment opportunities for women in conventional environments is necessary. Governmental education proposals should consider ways of reducing flight training, theory, and practical examination costs through providing financial assistance grants and scholarships.

Continuous research on ways of eliminating barriers for female pilot advancements globally is essential. A key setback is the limited awareness of the diverse career opportunities and benefits for women in technical fields. For instance, the small percentage of women pilots in Canada has been linked to observations that most women have never thought of an aviation career (Air Transport Association of Canada [ATAC], 2001). Research and development on creating broad awareness and promoting the benefits for women to pursue aviation careers is essential. Pre-existing problems must be identified in order to ensure effective solutions are created to benefit future women pilots and the aviation industry as a whole.

Greater research and modifications on aircraft cockpit design and development to accommodate female pilots is crucial. Various economic and political factors have influenced regulating accommodation in defense and civilian aviation. Whereas the accommodation of women pilots in military aircraft depends on the relative power of interest groups and political directives, the commercial sector is influenced by the intersection of technological capability, labor relations, and profit margins. Further, airframe manufactures may not be compelled to accommodate female anthropometry into cockpit design engineering because aircraft customers have not proposed such preferences. Litigation and customer demand for altering cockpit technology would be a preliminary source of change (Weber, 1994).

Mentoring and Motivational Program Developments

Current retention rates of women pilots are very low, as ineffective training facilities and motivational programs continue to influence the industry. Consistent mentoring and motivational programs can create better adaptation processes for women

because most drop rates occur before women adapt. Studies show that less than 10% of science and engineering programs have focused on the retention and recruitment of women (Matyas & Malcolm, 1991). Therefore, implementing programs that motivate, mentor, and appeal to women pilots would decrease the drop rates experienced particularly in early and difficult stages of flight training.

Retention can also be increased through listening to problems presented by female pilots and taking corrective measures early. Retention programs that promote increased diversity and ensure competent and experienced female pilots are recruited are vital (Turney, 1995). Mentoring and motivational measures would not only facilitate the present aviation industry, but would also help secure its future by providing effective opportunities to women pilots globally.

Benefits of the Growth of Women Pilots

Women pilots have played a central part in the development and success of the aviation industry over the past century. In today's industrialized societies, it is essential that continued support towards women aviators occurs. Accommodating initiatives would help prospective women pilots to achieve their career aspirations and promote the development of more egalitarian nations. Additionally, proposing methods of enhancing female aviator growth globally would encourage future generations to follow suit. Examining various physical, psychological, social, cultural, and economical factors affecting international women aviators and thereafter implementing explicit proposals is paramount. Contentment from the ability to pursue career dreams effectively would occur and a consistently growing aviation industry observed.

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