

ASSESSING THE STATUS OF AIRLINE SAFETY CULTURE AND ITS
RELATIONSHIP TO KEY EMPLOYEE ATTITUDES

by

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ABSTRACT

The need to identify the factors that influence the overall safety environment and compliance with safety procedures within airline operations is substantial. This study examines the relationships between job satisfaction, the overall perception of the safety culture, and compliance with safety rules and regulations of airline employees working in flight operations. A survey questionnaire administered via the internet gathered responses which were converted to numerical values for quantitative analysis. The results were grouped to provide indications of overall average levels in each of the three categories, satisfaction, perceptions, and compliance. Correlations between data in the three sets were tested for statistical significance using two-sample t-tests assuming equal variances. Strong statistical significance was found between job satisfaction and compliance with safety rules and between perceptions of the safety environment and safety compliance. The relationship between job satisfaction and safety perceptions did not show strong statistical significance.

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CHAPTER I – INTRODUCTION

The first step in any endeavor designed to institute change is to establish definitively the present situation. In order to move forward, a starting point must first be determined. Many airline organizations are in need of a change in safety culture. To implement change it should first be determined whether or not change is necessary or desirable, and if so, then to assess the present situation and identify the conditions that influence that situation.

This study gathered data on the overall status of the safety culture in the airline industry and looked at how that status relates to other safety elements such as general attitude and procedural compliance, ultimately for the purpose of defining the need for safety culture change. In a prepared speech to the FAA's Shared Vision for Safety Conference, former FAA administrator J. Randolph Babbitt said, "The shared vision that brings us together is that safety is not a program but a *culture*" (Broderick, 2010). Much has been written about aviation safety culture in general, but not as much has been presented with regards to methods of quantifying the condition of the somewhat nebulous element of safety culture. Only in recent years has the definition of "Safety Culture" evolved and solidified into something fairly consistent and practically useful. For the purposes of this study, Safety Culture is about a set of enduring values and attitudes pertaining to safety issues that can be found throughout a given organization at every level (Patankar, Brown, Sabin, & Bigda-Peyton, 2012).

Consistently, some 70% to 80% of all aircraft accidents and incidents are attributable to human factor issues. The need to identify and mitigate those issues remains

great. If there are specific attitudes and perceptions that directly contribute to compliance or non-compliance with safety rules and regulations, they should be determined.

This study examined the correlation between the airline employee's attitude toward the airline and his or her tendency to comply with company standard operating procedures and safety rules and regulations in general. Job satisfaction and attitudes about one's job and company may not be exactly the same thing, but for the purposes of this examination they are treated as one.

While a great deal of work has been done attempting to establish the relationship between the attitude of employees and their performance level, very little of that work was in the aviation industry and virtually none of it has had to do with those in positions of responsibility in airline flight operations. It has long been established that there is a direct correlation between procedural compliance and safety in airline operations. Airline employees are still all too often guilty of willful noncompliance, often not buying into the culture of safety. If there is a direct linkage between airline employee attitudes and procedural compliance, it would be beneficial from a safety point of view to understand that link and to see if fostering certain attitudes would be worthwhile.

Much has been accomplished in the area of learning about the opinions and attitudes of potential airline pilot new-hires. For example, Dr. Carl Hoffmann and his associates at Human Capital Management & Performance have, through extensive surveys and other data collection methods at several major airlines, established baselines for identifying those pilots most likely to have little or no trouble progressing through training and becoming productive line pilots. Much of this data has to do with the

attitudes and opinions of the candidates. It is not, however, designed to identify the potentially safest pilot. This type of data could, nonetheless, be mined to do just that.

Literature Review

There is a vast amount of information available on the subjects of job satisfaction, safety culture, and safety compliance. There is not so much available, however, that looks specifically at how these concepts are correlated to one another.

Job satisfaction.

In an article entitled *Employee Attitudes and Job Satisfaction* (Saari & Judge, 2004) the authors discuss the causes of employee attitudes, the results of positive or negative attitudes, and how to measure and influence those attitudes. The article is not about pilots, airline employees, or even the aviation industry, but it does make some interesting points. And it does acknowledge that employee attitude is an issue that all companies in all industries should be concerned with.

This study does not attempt to identify the reasons for positive or negative job satisfaction ratings among employees, but in seeking to find correlations between job satisfaction and safety compliance, it is necessary to define to some extent what job satisfaction is. Saari and Judge in their article use a definition provided by E.A. Locke in *The Nature and Causes of Job Satisfaction*, a section of the *Handbook of Industrial and Organizational Psychology* by M.D. Dunnette. Locke's definition of job satisfaction says it is ". . . a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (Locke, 1976, p. 1304). Using this definition, the questions in the

survey for this study were designed to identify those who like their job and are satisfied with their work environment.

Saari and Judge go on to describe some of the issues that cause various levels of job satisfaction. Recognizing that there is an almost infinite number of variables forming a particular state of job satisfaction, they point out that one of the major factors may be personality. They note that there is evidence to indicate that identical twins reared apart, working at different jobs, tend to have statistically similar levels of job satisfaction. They suggest that if employers are concerned with the job satisfaction of employees, they should find ways to screen for the personality types most appropriate for the jobs offered.

The Saari and Judge article discusses the causes behind job satisfaction and how job satisfaction relates to performance. They point out that the debate over whether satisfied employees are more productive is still not settled. These concepts are not entirely germane to this study, which looks specifically at how job satisfaction is related to safety compliance, but the information is valuable in developing a basis for delineating what job satisfaction is. And, it provides a wealth of information and resources for where follow-ons to this study might proceed.

Compliance drift.

High levels of safety are achieved largely by recognizing threats and implementing procedures to counter those threats. Rules, regulations, and procedures are instituted to bring risks under control. Over a period of time, however, employees become desensitized to what they perceive as too many rules and regulations. They begin to let them slide. They may find that they can operate more efficiently if rules are bent a

bit. And initially, there may be no consequences to the bending or even breaking of safety rules. Employees may perceive this to mean the rules are not necessary.

In their article, *Controlling Practical Drift in High Reliability Organizations*, Stolte, Vogt and Weber (2010) point out that the tendency to move away from successful procedures is affected by employee attitude and could be controlled to some degree by preemptive measures to modify attitudes (Stolte, Vogt, & Wever, 2010). They present strategies for creating an awareness of unanticipated deviances when designing or redesigning safety rules, regulations and procedures. A model developed by Scott A. Snook in his book *Friendly Fire: The Accidental Shootdown of U.S. Black Hawks over Northern Iraq* (Snook, 2000) is referenced showing how practical drift develops in logistics of action over a period of time. In the “Designed” stage, procedures follow their original design. The “Engineered” stage follows in which the original procedures are fitted into the real world. As users apply the procedures in the “Applied” stage, unanticipated problems become apparent. Users adapt procedures to make them work. If adaptations are successful, actions remain in the “Applied” stage and work is driven by the task rather than the original design. Success is viewed as proof that the design margins of safety were too large or not needed. If adaptations are not successful, the “Failure” stage is entered right away. Management and others responsible for the original design of procedures may not be aware of the drift from what was intended until the “Failure” stage is reached. It is only then the need for redesign becomes apparent.

Stolte, Vogt and Weber present a proposal of three steps to controlling practical drift.

Step 1 – Raising the awareness of involved personnel

Step 2 – Constantly enriching the design cycle with operators

Step 3 – Implementing a feedback loop

The authors point out that in the proper environment, where employees have the right safety attitude, practical drift can be a positive effect, identifying better, possibly safer, ways of operating. They note that Step 3 of their proposed process is critical to practical drift becoming a positive effect. The importance of operators knowing why procedures are designed as they are was also emphasized. But the key to controlling practical drift, that steady movement toward non-compliance, lies, according to the authors, in recognizing the gap between how given tasks were designed to be done and how they are actually carried out.

ICAO Doc 9859, *Safety Management Manual* (SMM) addresses practical drift in a limited manner. It also references Snook's theory of how baseline performance drifts slowly from its original design (ICAO, 2012). It is pointed out that original system design is based on three fundamental assumptions:

- The technology needed to achieve system goals is available
- The people are adequately trained to operate the technology
- Regulations and procedures will dictate system and human behavior

It is these assumptions that form the baseline for system performance. Initially, the system performs close to the baseline. However, after time, "real world" issues begin to nudge performance away from the baseline. Operators begin using techniques other than those of the original design.

Every system will experience some practical drift. How much drift and how rapidly it occurs will depend upon how well the system was designed. It may be that actual performance makes apparent a flaw in the technology. Procedures, as designed, may not work well under certain operational conditions. There may be regulations that do not apply within given limitations. Changes to the system might require certain adaptations at a local level. Operators learn to use “workarounds” to make the system function in spite of established procedures.

The tendencies toward practical drift and the causes of those tendencies can be studied to better understand how to design systems that do not invite unwanted drift. Knowing what influences operators to stray from baseline procedures will allow designers to establish better systems for the control and mitigation of safety risks.

Attitudes versus performance.

Substantial work has been done in looking for linkages between pilot attitudes and pilot performance. The University of Texas at Austin Human Factors Research Project focused in this area. As seen in the paper entitled *Flight Management Attitudes & Safety Survey (FMASS), A short Version of the FMAQ*, by Sexton, Wilhelm, Helmreich, Merritt, and Klinec (2001) much has been done to study the overall attitude of the professional pilot as it relates to aviation safety (Sexton, Wilhelm, Helmreich, Merritt, & Klinec, 2001). The FMASS evolved out of earlier versions called the Cockpit Management Attitudes Questionnaire (CMAQ) and the Flight Management Attitudes Questionnaire (FMAQ).

But even in its shortened form, the FMASS, while providing an astounding amount of information, is a bit too broad to pinpoint the issues of interest in this study. The FMASS questionnaire, comprised of 48 items, is two pages long (four pages if an optional section is used) and covers four imbedded scales associated with flight safety:

- Safety Culture: The extent to which individuals perceive a genuine and proactive commitment to safety by their organization.
- Job Attitudes: Essentially morale and job satisfaction – the level of satisfaction with the organization and the individual's reaction to his or her job experience.
- Teamwork: The level of satisfaction with the quality of teamwork and cooperation experienced with other crewmembers, and airline employees.
- Stress Recognition: The extent to which individuals acknowledge personal vulnerability to stressors such as fatigue, personal problems, and emergency situations.

The University of Texas Human Factors Research Project administered the FMASS as part of Line Operations Safety Audits (LOSA) in which normal line flight operations are observed from the cockpit jumpseat. It was for this reason that the FMAQ was condensed as it was recognized that pilot response rates to a long questionnaire would be low.

It was noted that Safety Culture, Job Attitudes, and Teamwork factors were moderately to highly correlated to each other, while Stress Recognition did not seem to

be related to the other factors. The four factors were looked at and depicted graphically across airlines and by regions of the world.

In a brief online article by Bernadette Gatien entitled *Analysis of the Flight Management Attitudes and Safety Survey* (Gatien, 2004), it was noted that the earlier versions of the FMASS were seen to be valid and reliable measures of flight management attitudes. Gatien points out, though, that the FMASS at that time had not been subjected to independent research and that a confirmatory factor analysis showed poor internal consistency.

Robert L. Helmreich, John A. Wilhelm, James R. Klinect, and Ashleigh C. Merritt in a paper called *Culture, Error, and Crew Resource Management* (Helmreich, Wilhelm, Klinect, & Merritt) describe some of the early concepts relating to safety culture and human error. They point out how the three cultures, professional, organizational, and national influence aviation safety. The impact of these cultures can be both positive and negative.

A good contrast is presented between the culture that existed in the early days of aviation, when flying was extremely dangerous, and that of the professional culture of today. Safety was not always the key element of aviation professionalism that it is today. Pilots were characterized by a sense of invulnerability in the early days of aviation. Even today the aura of the “right stuff” is not uncommon.

Helmreich et al. learned in these early studies that in general pilots like their jobs. Pilots from 19 different countries scored very high on job satisfaction. Their studies also

showed, however, that pilots have unrealistic self-perceptions with regards to those things that might cause deteriorations in safety performance.

In a related paper, *The Link Between Safety Attitudes and Observed Performance in Flight Operations* (Sexton & Klinec, 2001), presented at the Eleventh International Symposium on Aviation Psychology, it is stated that, “Although it has been hypothesized that a negative organizational culture poses a threat to safety, little (if any) empirical evidence has been found to support this view. Sexton and Klinec go on to make the case that both job attitudes and perceptions of the safety environment have an influence on flight performance, noting that of the two, safety perception is the stronger. The study discussed in this paper was based on the administering of the FMASS during LOSA observations as described above.

Safety culture.

Books that do a good job of defining what Safety Culture is and why we should attempt to establish and sustain a safety oriented way of “doing what we do” include, *Safety Culture: Theory, Method and Improvement* by Stian Antonsen (Antonsen, 2009). Chapter 5 of this book discusses the assessment of safety culture. It is pointed out that recently researchers have been moving toward qualitative research in this area. The degree to which surveys of any kind can predict whether or not an organization is likely to experience major accidents is addressed. In order for any survey to be effective in producing data with which to make those predictions, the survey must ask the right questions and it must ask those questions in the right way. In order to adequately study the safety culture of any organization, it is necessary to delve deeply into the informal

aspects of its work and organization. It is not enough just to look at formal procedures, rules, and regulation. It is important to understand not just what workers do but also why they do it and why they do it the way they do it.

Safety Culture: Building and Sustaining a Cultural Change in Aviation and Healthcare by Patankar, Brown, Sabin, and Bigda-Peyton (2012) also provides an in-depth discussion of Safety Culture Assessment. The authors reference a pyramid that builds from a base of Underlying Values and Unquestioned Assumptions, which makes up Safety Values. At the next level are Safety Strategies, consisting of Organizational Mission, Leadership, Strategies, Norms, History, Legends, and Heros. Above that is the Safety Climate, comprised of Attitudes and Opinions. These are capped by Safety Performance, the actual Behaviors.

A good discussion is presented of the various methods of safety assessment including case analysis, survey analysis (both quantitative and qualitative), field observations, artifact analysis, interviews, and dialogue. Patankar et al. conclude with some very practical suggestions for instituting Safety Cultural Transformation. The first on the list of essential steps is “Demonstrate the need for a cultural transformation.” If there is no need to change a safety cultural environment, then it will be very difficult to enlist the personnel and resources necessary to even start in the direction of change. If the need is there, it must be clearly demonstrated. In his book *Leading Change*, John P. Kotter details the need for creating a sense of urgency in order to facilitate a transformation of the way things have always been done (Kotter, 1996). “Establishing a Sense of Urgency”

is the first in his Eight-Stage Process of Creating Major Change. Employees must believe there is a need for change and that it needs to be done in short order.

In the introduction section of *Implementing Safety Management Systems in Aviation* edited by Stolzer, Halford, and Goglia (2011, p. xlvi), it is noted that “Talking about developing a positive safety culture and doing it are two very different things; it is no easy task.” This book, a collection of works by a number of aviation safety experts, is primarily about the practical application of processes designed to implement an effective Safety Management System (SMS), whereas their earlier work, an authored book entitled *Safety Management Systems in Aviation* (Stolzer, Halford, & Goglia, 2008) dealt more with the conceptual study of SMS. But this book also emphasizes the importance of establishing a positive safety culture. The definition of safety culture as set forth by the Federal Aviation Administration (FAA) is used, stating that it is: “The product of individual and group values, attitudes, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, the organization’s management of safety. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by the confidence in the efficacy of preventive measures” (FAA, 2006, pp. Appendix 1, p. 3).

It describes the work done by the Global Aviation Information Network (GAIN) in which Working Group E, in a report called *A Roadmap to a Just Culture: Enhancing the Safety Environment*, sets forth the five systematic components of a safety culture

(GAIN, 2004). The GAIN report cites work done by James Reason (Reason, 1997) and presents the five components as:

- Informed culture – people are knowledgeable about the system
- Reporting culture – people share within the system
- Just culture – people are held accountable to the system
- Flexible culture – people adapt to the system
- Learning culture – people improve the system

In chapter five of this book entitled *Safety Culture in Your Safety Management System* (McCune, Lewis, & Arendt, 2011), the evolution of safety culture is described. It begins with the pathological stage in which participants do not care as long as they do not get caught. From there it moves to the reactive stage where participants take action only in response to incidents and then to the calculative stage wherein the approach to safety is systematic. It then moves to the proactive stage in which steps are taken to deal with safety issues before incidents occur. And finally the safety culture evolves to the generative stage, the point where participants begin to say, “safety is how we do business.”

A different perspective.

An interesting study is provided by John W. Dutcher in *Attitudes Toward Flight Safety at Regional Gliding School (Atlantic)* (Dutcher, 2001). The study presents some contrasts in that it was conducted using participants in the Royal Canadian Air Cadet Gliding Program (RCACGP). As such, it presents a different perspective on how attitudes affect flight safety, since most studies of this nature have been accomplished at the airline

or military level. Participants in the study were operating at perhaps a more basic level. In general, they were younger and as such did not have hardened attitudes that might have affected their responses to the survey questions.

Another significant difference in the RCACGP study is the manner in which the survey was administered. Participants were selected from a fairly small population, consisting of those “who successfully completed the Gliding Scholarship Course at RGS (A) between 1995 and 2000 and/or were employed as an Officer in a flight capacity.”

Survey questionnaires were mailed to these specific individuals with postage free return envelopes provided. The survey, based on the *Flight Management Attitudes Questionnaire 2.0* (Helmreich, Merritt, Sherman, Gregorich, & Wiener, 1996) was conducted on a purely volunteer basis and the questionnaire responses were anonymous.

The results of this study indicated that the overall attitude of participants toward Human Factors in aviation safety was “good” but not particularly high. The internal consistency of the study data, as indicated by the application of Cronbach's Alpha test, was not very high at $\alpha = 0.55$. It was noted that a *t*-test showed that the attitudes of those who reported some sort of involvement in a safety related occurrence related to human error indicated a significant difference in attitude toward human factors safety concepts, with those having had an occurrence showing a better attitude.

Summary.

While the amount of literature available on this subject is substantial, much of it does not specifically address the questions presented in this study. Often the studies described seem to take an overly broad approach to the question of safety culture

influences rather than attempting to target specific factors that influence these issues. The body of work previously accomplished in this area only serves to indicate just how difficult some of these factors are to identify and quantify. Many of the articles and books reviewed discuss the problems involved in attempting to objectively quantify what the industry refers to as aviation human factors.

Research Objectives

Attempting to identify and quantify factors that have some degree of control over compliance with safety rules and regulations can be monumentally frustrating. Often the approach used is overly expansive, collecting massive amounts of data that are difficult to decipher and manipulate. The factors influencing any specific action can be somewhat nebulous. In this study, only two causal factors were considered in looking for those things that influence safety compliance.

This study examined the following questions:

1. Is there a significant correlation between the airline employee's attitude toward the company (job satisfaction) and his/her compliance with safety rules and regulations?
2. Is there a significant correlation between the airline employee's attitude toward the company and his/her perception of how the company approaches the issue of aviation safety?
3. Is there a significant correlation between the airline employee's perception of the airline's safety culture and his/her compliance with safety rules and regulations?

Figure 1 presents a graphic presentation of the relationships between these factors.

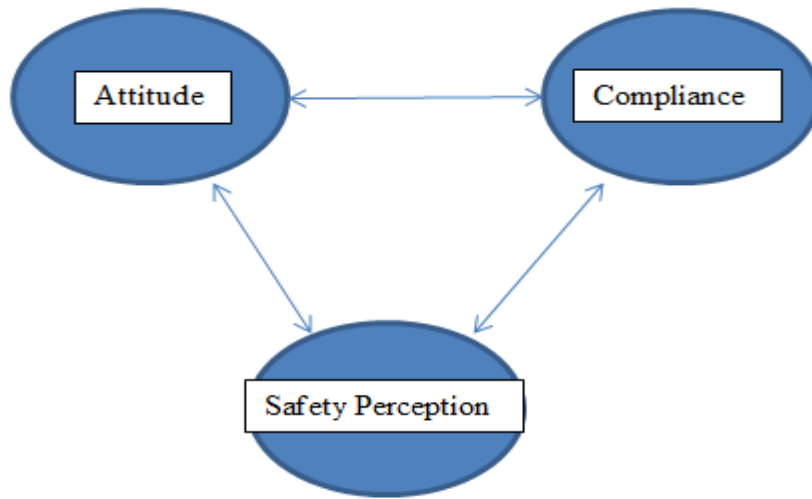


Figure 1: Relationship of factors examined

CHAPTER II – METHODOLOGY

The nature of the study was such that it was desirable to acquire input from as many airline employees working in flight operations as possible. The survey seeking to gather this information was totally voluntary and the responses were completely anonymous. Inasmuch as the study was conducted using survey procedures aimed at a broad population of airline employees, an exemption was obtained pursuant to 45 CFR 46.101(b) (2), as shown by IRB Protocol Number: 14-027 (see Appendix A).

Participants

All airline employees working in flight operations were invited, via advertisements and emails, to participate in the study survey. Sixty random samples were selected from those responding from this population. Data was gathered and analyzed from this sample group.

Originally it was thought to survey airline pilots only as, in the end, aircraft accidents and incidents are mostly attributable to human factors associated with those in direct control at the time of the occurrence. However, it was recognized that the factors influencing attitudes are significantly affected by others at all levels of flight operations and that unsafe situations are the result of the attitudes and actions of all those involved. The survey was, therefore, opened to all employees in airline flight operations.

Though it was desirable to keep the population as large as possible, some restrictions were implemented. Most airlines require a one-year probationary period for new hires. Opinions and attitudes during this period of probation might be subject to a certain degree of pressure that could unduly influence responses. Also, a lack of maturity

in the job could well skew opinions in a negative way. Therefore, while responses were taken from all employees, only those from employees having been on the job for more than one year (off probation) were used in the data analysis.

Instruments

In order to study the issue at the operational level for airline employees, data was gathered on both attitudes and compliance. A survey was conducted using a questionnaire designed around a Likert scale to quantify the degree to which employees have a positive or negative attitude about the company (see Appendix B). The questionnaire also established the level to which the airline employees comply with SOP and regulations, and measured the employees' perception of the overall safety culture at their airline.

The sensitive nature of the information gathered for this study made the anonymous survey a good instrument for this purpose. Airline employees are not likely to be forthcoming with information that they perceive could be used against them in any way. Questions concerning compliance with safety rules and regulations are not likely to be answered honestly if there is even a chance that the answers are not totally de-identified. Even the answers to questions related to job satisfaction are likely to be significantly skewed if the respondent thinks those in authority over him or her might gain access to the information.

The totally voluntary, completely anonymous online survey probably offers a level of discretion not found in any other method of data collection, but it also has its weaknesses. Since the survey is anonymous, there is no way to verify the credentials of the person taking it. It was the intent of this study that the survey be administered to

airline personnel in flight operation only, but there is no way to know who actually took it. Someone with a passing interest but no knowledge of the subject could take the survey and skew the results.

The fact that the survey was voluntary made any kind of aggressive promotion of the survey impractical. The best that could be done was to advertise in areas often viewed by the target population (see Appendix D) and to encourage participation via personal contact and email campaigns. There was no leverage of any kind to compel or even significantly encourage employees to take the survey. That situation will virtually always result in relatively low response rates. But it also contributes to a higher reliability rate. When samples are coerced in any way to participate, there is a high likelihood that some respondents will answer flippantly with little or no thought to the questions. This is particularly so if the survey is totally anonymous.

While the samples responding to the survey were probably fairly representative of the overall airline employee population, it can be argued that those voluntarily responding to the survey are of a somewhat stratified group. It could be that those with a tendency to respond to safety surveys in general are also those who tend to have higher safety regulation compliance ratings.

Study Design

A quantitative survey using an electronic questionnaire form administered via the Internet was used to gather the required data. The questions were designed to elicit responses indicating employee levels of job satisfaction, perception of the company safety environment, and compliance with safety rules and regulations.

The researcher has on numerous occasions observed airline employees taking surveys of various kinds. Often these surveys, while designed to gather very valuable data, are lengthy and complicated. Some required considerable writing. Others, though needing only checked answers, required substantial training in how to take the questionnaire. Several of these surveys, some more than five pages long, were observed to have been completed in less than thirty seconds, as employees chose not to exert the effort to do the questionnaire accurately but wanted to turn something in. That the validity of data gathered, from a survey that was not read or read very hastily, suffered greatly is self-evident.

Because of the highly safety sensitive nature of the work they do, airline employees, especially pilots, are solicited on a regular basis for input about their safety environment. Recognizing that the population in general and airline employees in particular tend to be reluctant, if not unwilling, to participate in lengthy, time-consuming surveys, the questionnaire for this research survey was kept short and as easy to use as possible. It was designed to, in an unobtrusive manner, measure the general attitude, perception of safety, and the compliance rate of the overall airline employee population.

Anonymity was of the utmost importance in this situation, since airline employees would not answer honestly or at all if there was even a hint that the information might be used against them in any way. The electronic form via the Internet offered that shield. The data collection form carried guarantees of confidentiality.

The introduction to the questionnaire had the respondent, by advancing to the survey portion, acknowledge his or her understanding that all information would be kept

confidential, used for no other purpose, and that respondents would remain totally anonymous. The introduction also pointed out that a lack of participation would not incur any repercussions and that respondents could discontinue the survey at any time without penalty (see Appendix B).

Data collection via the electronic survey method was relatively easy compared to some other methods, although the promotion of the survey and the persuading of employees to take the survey proved to be somewhat difficult and time consuming. It was noted that when promotional efforts ebbed, so did response rates. Tabulating, sorting, and formatting data from automated forms presented few obstacles. The cost of conducting this study electronically was fairly low.

To test the validity of the questionnaire, personal interviews of selected individual airline employees, using primarily the same format as the online questionnaire, were conducted with paper copies initially. Subsequent to that, selected individuals were invited to take the survey online in its final form. The questionnaire was administered to less than ten subjects in the test phase. Responses from these test subjects were used to determine how well the questionnaire worked, whether it was understandable or not, and whether it captured the desired perceptions or not. No data was collected from these subjects on the research questions during this test phase.

Based on comments from the test group, the number of questions on the survey questionnaire was reduced from 42 to 34, as test respondents felt the length was critical to getting good participation and reliable data. While the overall length was reduced, some questions were added in the general information section. It was felt that individuals enjoy

providing de-identified data on themselves and would tend to feel somewhat invested in the questionnaire by the time they got to the survey portion. They would, therefore, be more likely to finish the questionnaire once started. And, though the general information is not a part of the data to be examined for the study, it would help to identify any areas contributing to internal inconsistencies.

Also, the proportions of the questions were adjusted somewhat in that the test respondents felt that establishing the degree of job satisfaction and safety regulation compliance was fairly simple and straight-forward, while ascertaining the perceptions of the safety culture was a bit more nebulous. Questions in the “Satisfaction” and “Compliance” sections were reduced in favor of more “Perceptions” questions.

Procedures

The group to be studied was already pre-selected in that the population consisted of all airline employees associated with flight operations. The only exclusion from this group was those who had been on the job for less than one year as it was felt that responses from someone on probation, though anonymous, might be biased toward positive comments about the company. This exclusion was not noted on the survey, but the samples fitting this criteria were eliminated from the analysis.

The electronic survey form was posted to a dedicated website at SurveyMonkey.com. Advertising and promotion of the survey was done online through various professional pilot websites and forums and airline employee groups (see Appendix D). In addition, an email campaign using personal and YourCaptainSpeaking.net address books was employed to encourage airline employees to

visit the website to take part in the survey. A standard promotional announcement was used in each case with slight variations if the recipient was known to the researcher (see Appendix E).

The online form allowed data to be filtered for several factors including completeness, date, and types of questions. All data from the survey was electronically uploaded to a spreadsheet on the researcher's computer where mathematical calculations and analysis was performed.

There was no actual deception involved in the survey, but it should be noted that the true target of the questionnaire was not overly emphasized. The introduction to the survey clearly states that the purpose of the study was to look for relationships between job satisfaction, safety perceptions, and compliance with safety rules and regulations, but the questionnaire was intentionally designed to have the feel of focusing on satisfaction and perceptions rather than looking for causal factors driving compliance. This was because it has been observed that airline employees tend to become apprehensive if they perceive they are being assessed on their ability to comply with safety regulations.

Ultimately, all data was combined into a single data base for ease of analysis and manipulation. Three different software applications were used to examine the data. They were Microsoft Excel®, IBM SPSS®, and SYSTAT®.

Time Schedule

The study was conducted over a period of five months. In the first two weeks, the survey questionnaire was finalized and tested in a small group of participants. IRB approval was then obtained in week nine. At the beginning of the tenth week, the survey was uploaded to the website and promotion begun. Advertising the survey, by continuously updating postings at various websites and by sending emails to all contacts known to have airline connections, was pursued vigorously even as chapters one and two were prepared. Data collection and promotion continued until week fifteen when data analysis and manipulation began. Weeks sixteen and seventeen entailed the finalization of the working spreadsheet, in which all the collected data were summarized, and the preparation of chapters three and four. In weeks nineteen and twenty, final preparations were made. The final research report was submitted at the end of week twenty (see Appendix C).

CHAPTER III – DATA ANALYSIS

Responses were received from 76 airline employees during the time frame allotted for the survey. Of those, sixty were selected for analysis, the others being eliminated for incompleteness, a disqualifying response in the general section, or suspicious trends in the answers. The sixty respondents represented 18 known airlines and ten airlines listed as “other” as shown in Table 1.

Table 1:

Airlines of respondents

Airline	Response %	Number
Air Canada (CA)	3.33%	2
American Airlines (US)	8.33%	5
Atlas Air (US)	1.67%	1
Continental Airlines (US)	1.67%	1
Delta Airlines (US)	13.33%	8
Ethiopian Airlines (ET)	1.67%	1
Evergreen International (US)	1.67%	1
FedEx (US)	20.0%	12
Gulf Air (BH)	3.33%	2
Jet Blue Airways (US)	1.67%	1
KLM (NL)	3.33%	2
Pinnacle Airlines (US)	1.67%	1
Qantas (AU)	1.67%	1
Southern Air (US)	1.67%	1
Southwest Airlines (US)	3.33%	2
TACA (SV)	1.67%	1
United Airlines (US)	6.67%	4
UPS (US)	3.33%	2
US Airways (US)	3.33%	2
Other – US Passenger	8.33%	5
Other - Cargo	1.67%	1
Other – Non-US Passenger	5.00%	3
Other – Non-US Cargo	1.67%	1
Total		60

Most of the respondents were pilots as shown in Figure 2. This is likely because most of the researcher’s contacts were pilots, and the various locations and websites used for advertising were predominately frequented by airline pilots.

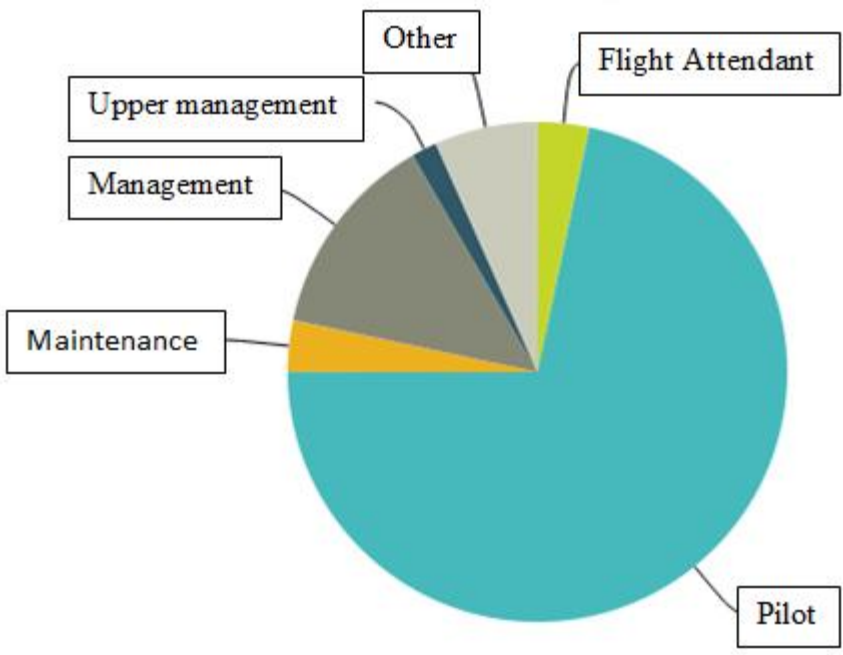


Figure 2: Position with airline

The largest part of the responses came from those having been employed with their airlines for from one to five years. The next highest range was six to ten years (see Figure 3). No significant correlation between years with the airline and responses to survey questions were noted.

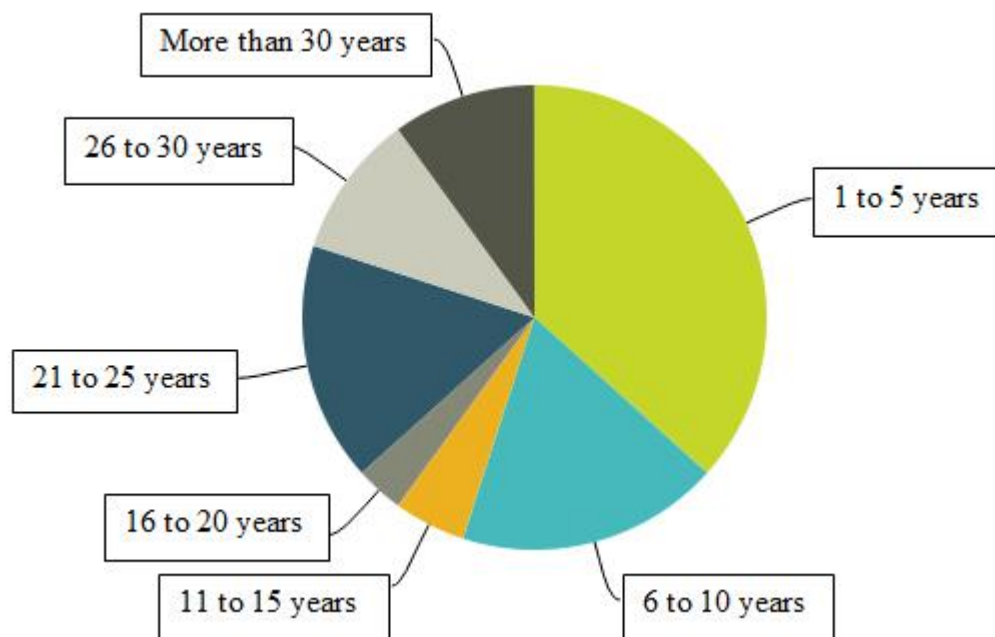


Figure 3: Years with present airline

As shown in Table 2, approximately 8.5% of the surveys came from females, which is in keeping with statistics on the airline industry as a whole. In a CNN article entitled *Why Aren't More Women Airline Pilots*, it is pointed out that women make up only about 5% of the 53,000 members of the Air Line Pilots Association (Pawlowski, 2011). Considering that the study survey covered more than just pilots but was responded to mostly by pilots, the ratio seems in line with the percentage of females in the overall airline employee population.

Table 2:

Gender

Answer Choices	Responses	Number
Male	91.53%	54
Female	8.47%	5
Total		59

Of the pilot responses, about 54% came from captains, while 44% was from first officers. One flight engineer responded (see Figure 4). There were no apparent relationships between seat positions and survey responses.

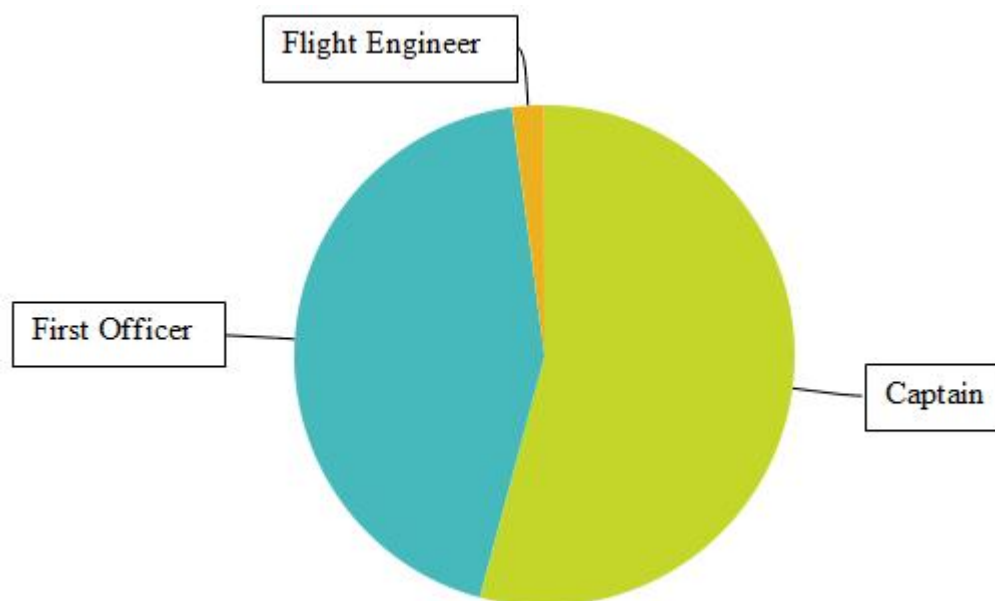


Figure 4: Seat position currently flying

The responses to the job satisfaction questions indicated that airline employees are on the whole satisfied with their jobs with an overall average response of 2.313, with a standard deviation of 0.820, where three is neutral and anything lower shows greater

satisfaction. Perception questions produced an average of 2.344 with a standard deviation of 0.741 and compliance questions an average of 1.706 with a standard deviation of 0.528 (see Table 3).

Table 3:

Descriptive statistics

	AVERAGE_S	AVERAGE_P	AVERAGE_C
N of Cases	60	60	60
Minimum	1.000	1.111	1.000
Maximum	5.000	4.389	2.667
Median	2.200	2.222	1.667
Arithmetic Mean	2.313	2.344	1.706
Standard Deviation	0.820	0.741	0.528

Techniques

The data from the questionnaire were tabulated on a purely numerical basis with the numerical value indicating the degree of satisfaction or dissatisfaction, compliance or non-compliance, and perceived safety environment. Answers from the electronic forms used for the questionnaire were converted to numerical values in keeping with the following format according to the type of question:

Very much agree	1	Very satisfied	1
Agree	2	Satisfied	2
Neutral	3	Neutral	3
Disagree	4	Dissatisfied	4
Very much disagree	5	Very dissatisfied	5
Very helpful	1	Always	1
Helpful	2	Almost always	2
Neutral	3	Neutral	3
Burdensome	4	Almost never	4
Very burdensome	5	Never	5

Questions, though randomized on the electronic survey in order to reduce position bias, were grouped into categories by intent for analysis according to the following:

Job satisfaction.

- S1: My overall satisfaction with my job is:
- S2: My satisfaction with my pay is:
- S3: My satisfaction with my time off is:
- S4: My satisfaction with my working conditions is:
- S5: I would rather be working for another airline.

Safety perceptions.

- P1: Company operating procedures (SOP) are:
- P2: Federal Aviation Regulations are:
- P3: My airline seriously promotes an environment of safety.
- P4: My airline does a good job of promoting aviation safety.
- P5: The overall safety level at my airline is high.
- P6: My airline has an excellent safety record.
- P7: There are many things in need of change to improve safety at my airline.
- P8: My direct supervisor presents a good example of safe operations.
- P9: When safety issues are brought forward, our managers make certain they are addressed promptly.
- P10: My direct supervisor appreciates my coming forward with safety problems.
- P11: In my work, I always consider the risks associated with every task.
- P12: I am never pressured to compromise safety for the sake of speed.
- P13: I am encouraged to report incidences that might possibly have resulted in unsafe operations.
- P14: When unsafe practices are recognized, measures will be implemented quickly to prevent reoccurrence.

P15: I can report my safety mistakes without fear of reprisal.

P16: Overall, my airline has a good safety culture.

P17: My airline has a good record for compliance with safety regulations.

P18: Our management is very concerned with safety issues.

Safety compliance.

C1: I follow company operating procedures (SOP):

C2: I follow Federal Aviation Regulations:

C3: I never refrain from reporting safety issues.

Two of the questions (S5 and P7) were intentionally phrased in an alternative manner to reduce position bias. The responses to these two questions were inverted in order to be consistent with the scaling of the other questions.

Questions S1 through S5 were designed to indicate the level of job satisfaction with a lower score representing a higher level of satisfaction. Questions P1 through P18 provide an indication of the employee's view of the overall safety environment at his or her airline, with a lower score demonstrating a more positive view. Questions C1 through C3 measure the rate of SOP/FAR compliance with a lower score indicating a higher rate of compliance.

A composite of all responses was tabulated to provide a numerical answer to the research questions on the broad scale (Are there correlations? Do the numbers move in a consistent relationship to one another?). All of the responses having to do with job satisfaction were grouped together and an average response score found for each participant. Likewise, all safety perception questions were grouped for an average score in that category, and the same for compliance questions.

Then, all responses were grouped into three categories, job satisfaction (S), safety perceptions (P), and safety compliance (C), but since only two groups of data were considered at one time for statistical significance, *t*-tests were performed on each of the three individual pairs. Data for each of the cases to be examined were submitted to Two-Sample *t*-tests assuming equal variances to determine the degree of statistical significance in each set.

In the first set, looking for the correlation between the airline employee's attitudes and his/her compliance with regulations, the following hypotheses were used:

Null Hypothesis: There is no correlation between employee attitudes (S) and compliance with safety rules and regulations (C).

Alternative Hypothesis: There is a significant correlation between the airline employee's attitude toward the company (job satisfaction)(S) and his or her compliance with safety rules and regulations (C).

As shown in Table 4, the resulting *p*-value of 4.17E-06 would indicate strong statistical significance at 95% probability.

Table 4:

*Statistical significance between job satisfaction and safety compliance**t*-Test: Two-Sample Assuming Equal Variances

	<i>Avg. (S)</i>	<i>Avg. (C)</i>
Mean	2.313333	1.705556
Variance	0.671684	0.279065
Observations	60	60
Pooled Variance	0.475374	
Hypothesized Mean Difference	0	
Df	118	
t Stat	4.828227	
P(T<=t) one-tail	2.09E-06	
t Critical one-tail	1.65787	
P(T<=t) two-tail	4.17E-06	
t Critical two-tail	1.980272	

In the second set of data, looking for the relationship between the airline employee's attitudes and his or her perceptions of the safety environment, the following hypotheses were used:

Null Hypothesis: There is no correlation between employee attitudes (S) and employee perceptions of the company safety environment (P).

Alternative Hypothesis: There is a significant correlation between the airline employee's attitude toward the company (job satisfaction)(S) and his or her perception of how the company approaches the issue of aviation safety (P).

As shown in Table 5, the resulting *p*-value of 0.832765 would indicate little or no statistical significance at 95% probability.

Table 5:

*Statistical significance between job satisfaction and safety perception**t*-Test: Two-Sample Assuming Equal Variances

	<i>Avg. (S)</i>	<i>Avg. (P)</i>
Mean	2.313333	2.343519
Variance	0.671684	0.549016
Observations	60	60
Pooled Variance	0.61035	
Hypothesized Mean Difference	0	
Df	118	
t Stat	-0.21162	
P(T<=t) one-tail	0.416383	
t Critical one-tail	1.65787	
P(T<=t) two-tail	0.832765	
t Critical two-tail	1.980272	

In the third set of data pairings, examining the correlation between the airline employee's perception of the airline's safety environment and his or her compliance with regulations, the following hypotheses were used:

Null Hypothesis: There is no correlation between employee perceptions of the company safety environment (P) and compliance with safety rules and regulations (C).

Alternative Hypothesis: There is a significant correlation between the airline employee's perception of the airline's safety environment (P) and his/her compliance with safety rules and regulations (C).

As shown in Table 6, the resulting *p*-value of 3.06E-07 would indicate strong statistical significance at 95% probability.

Table 6:

Statistical significance between safety perception and safety compliance

t-Test: Two-Sample Assuming Equal Variances

	<i>Avg. (P)</i>	<i>Avg. (C)</i>
Mean	2.343519	1.705556
Variance	0.549016	0.279065
Observations	60	60
Pooled Variance	0.41404	
Hypothesized Mean Difference	0	
df	118	
t Stat	5.430438	
P(T<=t) one-tail	1.53E-07	
t Critical one-tail	1.65787	
P(T<=t) two-tail	3.06E-07	
t Critical two-tail	1.980272	

CHAPTER IV – DISCUSSION

Data Interpretation

The study was designed to look for correlations between factors that influence, at the most basic levels, airline employee's compliance with safety rules and regulations. The predictors considered were the employee's general overall attitude about his/her company (satisfaction) and how the employee perceived the company's safety culture (perception). The relationship of these two factors to safety compliance was the primary focus of the study as indicated by research questions 1 and 3. Research question 2 sought to identify the relationship between job satisfaction and safety perceptions only because, if safety perceptions influence compliance, it would be of benefit to understand what drives safety perceptions and thereby safety compliance.

This study did not attempt to determine if compliance with SOP and safety rules and regulations was a defining parameter of an overall safety environment, though this assumption could be made. Other studies have indicated this to be the case. Nor did this study endeavor to establish what the relationships between causal factors actually mean. It was intended only to show whether or not those relationships exist.

A strong correlation between airline employee's job satisfaction and attitude toward the company and compliance with safety regulations was found. Therefore, the answer to the first research question, "Is there a significant correlation between the airline employee's attitude toward the company (job satisfaction) and his/her compliance with safety rules and regulations?" is affirmative. It could be anticipated that positive attitudes in one area foster positive attitudes in another, but the significance here is that an attitude

corresponds to an action (compliance). If the overall goal of airline safety is to develop a safety culture that results in safety compliance, then employee job satisfaction needs to be addressed as a factor influencing the end result.

The relationship between employee attitudes and their view of the company safety environment did not show strong significance. The answer to the second research question, “Is there a significant correlation between the airline employee’s attitude toward the company and his/her perception of how the company approaches the issue of aviation safety?” is negative. This is useful information in that it indicates that just because employees are happy with their work, they are not necessarily unduly influenced to think highly of the company safety environment. It would be important to know that employees can independently look at safety issues regardless of how they view the company as a whole.

In the third research question, it is asked, “Is there a significant correlation between the airline employee’s perception of the airline’s safety culture and his/her compliance with safety rules and regulations?” The data indicated a strong relationship between these two categories. While the survey was designed to identify the employee’s perceptions of the company safety environment, rather than what the safety environment is in actuality, it can safely be assumed one drives the other. Therefore, it would behoove airlines to look at those issues that make employees have a sense of, a perception of, a healthy safety environment in order to move toward a condition of high compliance with safety rules and regulations.

Results

The study found significant correlations between job satisfaction, perceptions of the safety environment and compliance with safety rules and regulations. A weak relationship between job satisfaction and perceptions of the safety environment was noted. The study indicated an overall high level of job satisfaction among airline employees, returning an average score of 2.313 on a five point scale where the lower score denotes a higher level of satisfaction. Likewise, perceptions of the overall safety environment were scored high at 2.344 on a five point scale. Scoring the highest in the three categories was compliance with safety rules and regulations at 1.706. It should be noted that respondents are likely to be reluctant to answer “never” or “almost never” when asked how often they comply with safety rules. The responses would, therefore, tend toward the high end. But they would tend toward the high end for all respondents, even those more prone toward non-compliance.

Limitations

Though it remains probably the best means of collecting usable information, the voluntary survey method of obtaining data remains problematic. Most airline employees want to do a good job and they want to do it safely. This segment of employees is likely the same segment as those who take voluntary surveys. But there is a segment of the airline employee population that is not as concerned about the quality of their work and don't always follow safety rules and regulations. Hopefully this segment is small, but it is also likely to be the segment that does not participate in voluntary surveys. Yet data from this segment is important if the overall data is to be reliable.

Airline employees are bombarded with requests to participate in surveys of various sorts. That may be one of the reasons that the response rate to surveys like the one used in this study is traditionally very low. Promotional material for this survey was seen by many thousands of airline employees and yet, only seventy six responses were received in the six weeks that the survey was available. It was noted that during periods when the researcher was not actively encouraging participation via emails, in person, and by telephone, the response rates dropped off to almost zero.

Concerns about possible repercussions from the answers provided on surveys also likely keep airline employees from responding in large numbers. Though many assurances of anonymity and confidentiality were provided with this survey, as is the case with most surveys of this type, it remains that employees perceive that they have little to gain and potentially much to lose by taking the survey.

Though it would be expected to receive more responses if the survey were kept open over a longer period of time, the validity of the quantitative data would suffer with the longer time frame. The design of the survey was such that the variables studied were limited to three categories for more accurate analysis, however, in reality, the components influencing human factors are almost limitless and would vary significantly over a longer period of time.

The ease of use of the voluntary survey is, to a large extent, offset by the fact that the survey cannot be influenced in any way. If respondents are put into a situation where they feel coerced in any way to take the survey, the responses are likely to lose validity in

a corresponding fashion. The more they are pressured to take the survey, the less likely the answers are meaningful.

Further Research

There is a significant need to identify those elements of airline operations that provide a positive influence on the safety environment and ultimately the safety culture at an airline. Whether those elements lie in human factors, aircraft design, systems design, organizational structure, or any other aspect of airline operations, they need to be found and utilized to shape a healthy safety culture.

Methods need to be developed to capture untainted data from all of the airline employee population, including those who are not prone to taking voluntary surveys. In other studies, questionnaires were presented to airline crews as a part of a Line Operations Safety Audit (LOSA). As noted before, many of these questionnaires were somewhat lengthy and time-consuming. The FMASS for example gathered valuable information, but pilots were reluctant to take it in the LOSA scenario (Helmreich, Merritt, Sherman, Gregorich, & Wiener, 1996). Just before an actual flight, pilots are busy and don't have time for extraneous duties. During the flight they don't need to be distracted, and after the flight they are eager to wrap things up and move on to home or a hotel room. There is little time for lengthy questionnaires.

In the age of notebook computers, short questionnaires could be developed to be administered at any point during a LOSA flight without significantly interfering with the duties of the pilots. The questionnaire, pre-loaded on the notebook, could simply be

handed to the pilots who would very likely be willing to take a few seconds to answer a half dozen questions or so if they knew that the submission would be anonymous.

Airline pilots undergo recurrent training usually once every six months.

Depending upon the airline's stage in the Advanced Qualification Program (AQP), and to some degree the desires of the airline, the time interval might be as long as twelve months. Whatever the interval might be, the airline pilot will on a regular basis visit a training center for in-depth, relatively intense training and checking. The pilot is something of a captive audience during this time. Particularly during the ground school portion of recurrent training, there are excellent opportunities to administer short surveys to gather data. The Classroom Response System (or Audience Response System) described in an article on Vanderbilt University's website offers an excellent means for gathering data in this environment (Bruff, 2013). Though administered in a somewhat public setting (the classroom), responses to questions are, nonetheless, anonymous in that the devices (clickers) used to submit answers are not identified with an individual. Valuable data could be obtained in an unobtrusive manner.

The Aviation Safety Action Program (ASAP), which is designed to allow and promote the reporting of potentially unsafe situations by pilots and ground personnel without fear of punitive action, provides a huge amount of safety data. The reports are de-identified and as such often contain, in the narrative portion, some indication of the reporting party's mind-set (attitude) at the time of the incident, although this is certainly not the case in every situation. Although this is a very sensitive area and saddled with heavy regulatory compliance issue, it would be possible to interject responses into the

reporting forms that would provide a better indication of the reporting party's attitudes, safety perceptions, and normal compliance with safety regulations. This data would have to be recognized as potentially skewed in that it is generated by someone with a safety related situation to report, nonetheless, it could provide a wealth of information about what molds safety cultures.

Huge volumes of quantitative data are gathered via the Flight Operational Quality Assurance (FOQA) program. Modern aircraft have the capability to monitor and record a myriad of information pertaining to every aspect of its operation. Through this voluntary program, FOQA data is analyzed at the airline level and it is provided to the FAA providing a direct method of identifying unsafe trends. The raw data can not in any way show the thought process leading to a given incident or accident, but it can make known non-compliance with a regulation or procedure. Though, again, this information is very sensitive and every effort is made to de-identify it, the raw data could be mined to look for cross correlations with reported job satisfaction and perceived safety environment.

These programs, LOSA, ASAP, and FOQA, each providing information in a different way, are invaluable safety tools. But none of them tell us very much about the pilot's motivation for a given action (or inaction). If, however, a method could be developed to better capture information about general attitudes and perceptions of pilots and other airline employees at the time of a non-compliance, then perhaps a correlation could be established between attitudes and compliance and systems created to shape those attitudes.

Recommendations

Much has been accomplished in the area of learning about the opinions and attitudes of potential airline pilot hires. For example, Dr. Carl Hoffmann and his associates at Human Capital Management & Performance have, through extensive surveys and other data collection methods at several major airlines, established baselines for identifying those pilots most likely to have little or no trouble progressing through training and becoming productive line pilots. Much of this data has to do with the attitudes and opinions of the candidates. It is not, however, designed to identify the potentially safest pilot. The data could, nonetheless, be mined to do just that.

The airline industry is past the point of needing more general information about what drives a safety culture. The mountains of data obtained from LOSA, ASAP, FOQA, and seemingly limitless surveys of various sorts need to be reduced to the base level in order to build processes for changing the ultimate outcome of safety procedures. Specific pieces of the data need to be mined to assist in developing specific actions targeted at changing a safety culture more to the positive.

Many elements of the human factors that so influence aviation safety are difficult to accurately quantify. Fatigue, experience levels, judgment, decision making, team building, and even technical proficiency are among those items that can be somewhat subjective when attempts are made to measure them. Nonetheless, though they may be the most subjective of all, attitudes, opinions, and perceptions matter in safety compliance. Better methods of identifying these characteristics and quantifying the degree to which they influence safety need to be found. To do that, still more, but more

specific, data needs to be gathered. The tools developed for this purpose need to be short, simple, and unobtrusive in order to produce useful, reliable information. And although it might take years to change a company's safety culture, the safety environment is dynamic, changing every day. The instruments employed to measure these influences need to be flexible and used regularly on a continuing basis.

Changing a safety culture is a difficult and lengthy process. Like any major change at a large organization, it takes time and commitment. And while identifying elements that provide a positive influence on safety is important, doing something with that knowledge is equally important. As noted in the introduction, John Kotter, in his book *Leading Change* (Kotter, 1996), puts the necessity of creating a sense of urgency as the first item in his eight stage process for instituting major change. It is the first priority in order to induce the beginning of any major change. Those involved in the process, particularly those in leadership positions, have to believe the change needs to be done and that it needs to start immediately. Otherwise it is not likely to begin at all.

Accumulating all the data in the world will not advance the cause of aviation safety in any way whatsoever if that data is not put to a useful, specific purpose. Attitudes and perceptions that cause or influence actions have to be identified and processes developed to enhance those that are positive and eliminate or mitigate those that are negative.

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APPENDICES

Exemption Letter



August 8, 2013

Edward Owen, Dr. Wendy Beckman
Department of Aerospace
elo2f@mtmail.mtsu.edu, Wendy.Beckman@mtsu.edu

Protocol Title: "Airline Flight Operations Safety Perceptions"

Protocol Number: 14-027

Dear Investigator(s),

The exemption is pursuant to 45 CFR 46.101(b) (2). This is because the research being conducted involves the use of educational tests, survey procedures, interview procedures or observation of public behavior.

You will need to submit an end-of-project report to the Compliance Office upon completion of your research. Complete research means that you have finished collecting data and you are ready to submit your thesis and/or publish your findings. Should you not finish your research within the three (3) year period, you must submit a Progress Report and request a continuation prior to the expiration date. Please allow time for review and requested revisions. Your study expires on **August 8, 2016**.

Any change to the protocol must be submitted to the IRB before implementing this change.

According to MTSU Policy, a researcher is defined as anyone who works with data or has contact with participants. Anyone meeting this definition needs to be listed on the protocol and needs to provide a certificate of training to the Office of Compliance. **If you add researchers to an approved project, please forward an updated list of researchers and their certificates of training to the Office of Compliance before they begin to work on the project.** **Once your research is completed, please send us a copy of the final report questionnaire to the Office of Compliance.** This form can be located at www.mtsu.edu/irb on the forms page.

Also, all research materials must be retained by the PI or **faculty advisor (if the PI is a student)** for at least three (3) years after study completion. Should you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

Andrew W. Jones

Compliance Office
615-494-8918
Compliance@mtsu.edu

Safety Perceptions Survey

Airline Flight Operations Safety Perceptions

Introduction

Thank you in advance for participating in this survey. The purpose of the research is to look for correlations between factors that might influence compliance with airline safety rules and regulations. The results of this survey will be analyzed to help develop a better understanding of how perceptions of safety cultures are formulated and what that means to safety performance.

Participation in this survey is completely voluntary. A lack of participation will not incur any repercussions whatsoever. Your responses to the survey questions will remain confidential and will not be used for any purpose outside of the research being performed. Participants will remain anonymous. No personally identifiable information, including your computer's IP address, will be collected and you may discontinue the survey at any time without penalty.

Any concerns or questions you may have about the survey and/or research should be directed to the researcher, Edward L. Owen, at Middle Tennessee State University by email at elo2f@mtmail.mtsu.edu or to Dr. Wendy Beckman at Wendy.Beckman@mtsu.edu. Additional questions regarding this research or the Institutional Review Board (IRB) approval process should be directed to the Middle Tennessee State University Compliance Office at Compliance@mtsu.edu.

Selecting the "NEXT" button below indicates your understanding of and agreement with the terms and conditions stated above. Your participation is important and very much appreciated.

NEXT

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General Information

1. Your position with the airline:

2. Years with Present Airline:

3. Your Age:

4. Your Gender:

5. Your Airline:

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Pilot Information

This section for pilots only. Others skip to survey.

6. Total Flight Time:

7. Seat position currently flying:

8. Gross takeoff weight of present equipment:

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Survey

9. When safety issues are brought forward, our managers make certain they are addressed promptly.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. I never refrain from reporting safety issues.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. My airline seriously promotes an environment of safety.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. In my work, I always consider the risks associated with every task.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. I would rather be working for another airline.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. My airline has an excellent safety record.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Overall, my airline has a good safety culture.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. My direct supervisor appreciates my coming forward with safety problems.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. I am encouraged to report incidences that might possibly have resulted in unsafe operations.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. My overall satisfaction with my job is:

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. I follow Federal Aviation Regulations:

Never	Almost never	Neutral	Almost always	Always
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20. There are many things in need of change to improve safety at my airline.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. I can report my safety mistakes without fear of reprisal.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. Company operating procedures (SOP) are:

Very burdensome	Burdensome	Neutral	Helpful	Very helpful
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. Federal Aviation Regulations are:

Very burdensome	Burdensome	Neutral	Helpful	Very helpful
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. My direct supervisor presents a good example of safe operations.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25. I am never pressured to compromise safety for the sake of speed.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

26. Our management is very concerned with safety issues.

Very much disagree	Disagree	Neutral	Agree	Very much agree
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27. My satisfaction with my time off is:

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

28. I follow company operating procedures (SOP):

Never	Almost never	Neutral	Almost always	Always
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

29. My airline has a good record for compliance with safety regulations.

Very much disagree	Disagree	Neutral	Agree	Very much agree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

30. My satisfaction with my pay is:

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

31. My airline does a good job of promoting aviation safety.

Very much disagree Disagree Neutral Agree Very much agree

32. When unsafe practices are recognized, measures will be implemented quickly to prevent reoccurrence.

Very much disagree Disagree Neutral Agree Very much agree

33. The overall safety level at my airline is high.

Very much disagree Disagree Neutral Agree Very much agree

34. My satisfaction with my working conditions is:

Very dissatisfied Dissatisfied Neutral Satisfied Very satisfied

Prev Done

Time Schedule

Week 1: Formed faculty committee.

Week 2: Prepared research proposal.

Week 3: Prepared survey.

Week 4: Beta tested survey.

Week 5: Updated survey.

Week 6: Further Beta tested survey.

Week 7: Updated survey.

Week 8: Presented proposal for approval.

Week 9: Acquired project and IRB approval.

Week 10: Submitted survey to website. Promoted.

Week 11: Collected data. Promoted.

Week 12: Prepared chapter one.

Week 13: Collected data. Promoted.

Week 14: Prepared chapter two.

Week 15: Prepared chapter three.

Week 16: Analyzed and manipulated data.

Week 17: Prepared chapter four.

Week 18: Submitted chapters one and two.

Week 19: Submitted chapters three and four.

Week 20: Prepared and submitted final report.

Internet Resources

Survey questionnaire was posted at:

www.SurveyMonkey.com

Promotional announcements were posted at:

<http://www.urcaptainspekin.com/>

<http://www.urcaptainspekin.com/blog/>

<http://www.aviationbull.com/>

<http://www.acaptainslog.blogspot.com/>

<http://30000feet.blogspot.com/>

<http://www.chickenwingscomics.com/forum/index.php>

<http://www.airlinepilotforums.com/>

<http://www.pilotpointer.com/>

<http://www.flyingnews.com/>

<http://www.flightcrewzoo.com/>

<http://www.pprune.org/index.php>

<http://airlineforums.com/>

<http://usaviation.com/usa/>

<http://www.askcaptainlim.com/>

<http://www.crewstart.com/site/index.php>

<http://www.facebook.com/>

<http://www.linkedin.com/>

Promotional Material

Invitation/Posting

Airline Flight Operations Safety Perceptions

A survey of airline employees working in flight operations is being conducted to assess various perceptions of the overall safety environment of airline companies. We need your input.

If you are an airline employee working in flight operations, we would very much appreciate your taking the time necessary to complete this questionnaire. It should take less than 10 minutes. Please answer the questions as honestly as possible. Participation in this survey is completely voluntary. You may withdraw from the survey at any point without any repercussions. Your responses to the survey questions will remain confidential and anonymous. The data collected will be used solely for this study and any extensions thereof. No data (personal or otherwise) beyond the survey questions will be collected. You will receive no further contact as a result of having participated.

Please access the survey at the following link: <https://www.research.net/s/87D7CZ9>

Thank you in advance for your participation.

Sincerely,

Captain Edward L. Owen

Aerospace Department

Middle Tennessee State University

Any concerns or questions you may have about the survey and/or research should be directed to the researcher, Edward L. Owen, at Middle Tennessee State University by email at elo2f@mtmail.mtsu.edu or to Dr. Wendy Beckman at

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Tennessee State University Compliance Office at Compliance@mtsu.edu. IRB Approval

Number: 14-027.