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SAFETY CULTURE: AN ASSESSMENT OF A COLLEGIATE
AVIATION PROGRAM

by

Daniel Kwasi Adjekum
Bachelor of Science, Kwame Nkrumah University of Science and Technology 1997

A Thesis

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Master of Science

Grand Forks, North Dakota

August

2013

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To Yaa Asantewa, Nana and Maame

ABSTRACT

An assessment of the safety culture at an accredited four year collegiate aviation program was conducted. The Collegiate Aviation Program Safety Culture Assessment Survey (CAPSCAS) was used. Participants were drawn from flight students and instructors in the program. The survey captured the perceptions of participants on the status of the safety culture in the program. Generally the participants had a good perception of the safety culture in the program. There were significant variances in the perception of respondents on the safety culture by year groups and it was observed that respondents, who had spent more years in the program, had a better perception, on the safety culture. There were also significant differences in the perceptions of US resident students and international contract students, with the latter having a less favorable perception of the safety culture in the program. The results show that differences in national culture can have an effect on perceptions on safety culture. Risky personal attitudes of respondents that could influences safety behaviors were correlated with their perception on the safety culture and a safety risk prediction model was proposed.

CHAPTER I

INTRODUCTION

Modern aviation operations are growing ever more complex in times of increased demand for services with decreased resources (Wensveen, 2010). Organizational factors like safety culture and regulatory oversight play significant roles in the foundation of safety in high-risk systems (von Thaden, 2008). Several high profile accidents in the late twentieth century brought considerable attention to the role of organizational safety culture and regulatory oversight in accident causation (von Thaden, 2006) (Wiegmann, 2004). Accordingly, the Federal Aviation Administration (FAA) has established a comprehensive and integrated procedure to encompass a national standard of system safety, with the introduction of Safety Management System in aviation operations (FAA, 2008).

Safety Management Systems (SMS) is a top-down and businesslike approach to safety, that emphasize proactive and data driven management of safety, distinct from the traditional reactionary approach (FAA, 2008). SMS has become the next generation safety initiative and a new rule on SMS, as set forth in 14 CFR Part 121 operations, was supposed to come into effect on 04 September 2012 (FAA, 2010). The new rule would have made it mandatory for aviation service operators in the United States (US) to implement SMS in their operations. As at now the rule has since not come into effect.

The responsibility for operational safety lies with the aviation organizations, but the FAA will ensure that the organizations comply with their safety responsibilities (FAA, 2008). A good indicator for organizational safety culture requires the identification, analysis, and prioritization of information to mitigate hazards and risks. SMS will provide an organized approach to safety procedures/processes and performance management (von Thaden, 2008).

As aviation organizations strive to maintain economic viability in a varied global environment they must continually modify their business processes and even their workforce to provide services in times of accelerated aviation activity paired with diminishing resources (Wensveen, 2010). While it may be strategically advantageous to reengineer business processes from time to time in order to remain functional, ongoing and updated safety efforts must not be overlooked (von Thaden, 2008). As the aviation industry continues to evolve, safety efforts must also remain a business priority (FlightSafety Foundation, 2011). For example, high fuel costs can dramatically increased a collegiate flight program's operational budget, which can negatively affect financial resources allocated for safety programs.

In order to control costs, many airlines have had to schedule fewer flights; as a result this has also sacrificed revenue (Trejos, 2012). In fact, the ten largest airlines in the US posted a combined loss of \$1.07 billion as at the first half of the 2012 fiscal year (June, 2012), due largely to high fuel prices (Zacks , 2012) . While there are a number of economic concerns that may influence an airline's prioritization of safety, a difficult economic situation may lead an airline to redirect resources away from

functions that are essential to safe operations (Stolzer, 2011) thus pushing the limits of the current state of safety.

Managing safety has become increasingly more important as aviation organizations diversify (Patankar, 2003). Thus aviation has adopted Safety Management Systems (SMS) to espouse a quality management approach to complex aviation safety and business relationships (FAA, 2008; ICAO, 2009). SMS provides an organizational framework to effectively manage safety and serves as the very structure that generates a positive safety culture (von Thaden, 2008). SMS frameworks have shown effectiveness when not only adopted as part of a business, but when adopted as part of regulatory oversight operations (FAA, 2008).

The Federal Aviation Administration (FAA) issued AC 120-92A to introduce the concept of Safety Management System (SMS) to aviation service providers like collegiate aviation organization (Part 141) under FAA SMS Guidance; Order 8000.369 and Aviation Safety (AVS) Requirements Document; Order VS 8000.367. The Airline Safety and Federal Aviation Extension Act of 2010 (Pub. L. 111-216) directed the FAA to issue a final rule on SMS by July 30, 2012. The FAA is systematically working on establishing requirements for US aviation certificate holders to implement SMS.

The implementation of SMS and the sustenance of a positive safety culture in a collegiate aviation program can generate both economic and operational benefits. Moncton Flight College (MFC) in New Brunswick implemented SMS and realized a \$25,000 annual savings with a 22% reduction in insurance premiums along with a significant reduction in regulatory audit findings (Moncton Flight College, 2009). "SMS has been a critical factor in the success of MFC and had a significant influence on the number and

size of the training contracts signed” according to Michael Doiron, Principal and CEO of Moncton Flight College (Lu , 2011).

Continued research into proactive organizational safety culture provides a better understanding of organizational performance, accountabilities, policies and procedures surrounding safety (von Thaden, 2008). The aim of this new oversight relationship between aviation organizations and regulatory authorities is to shift away from a prescriptive era to one of proactive and systematic business oriented safety management (Stolzer, 2011). The aviation organizations must consider the nature and amount of information required to allow the FAA minimal policing yet optimal influence over organizational safety.

Adding to the well-known collection of voluntary self-assessment tools advocated by the FAA as complementary to traditional regulatory requirements (e.g., Advanced Qualification Programs (AQP), Aviation Safety Analysis Programs (ASAP), Flight Operations Quality Assurance programs (FOQA), and Line Operations Safety Audit (LOSA) etc.), the Commercial Aviation Safety Survey (CASS) has been developed by researchers at the University of Illinois Urbana –Champaign to serve as an aviation self-assessment instrument designed to aid operators in measuring indicators of their organization’s safety culture. The instrument targets areas that work particularly well and areas in need of improvement (von Thaden, 2008).

The CASS has been validated and improved over many years (Gibbons, 2006; von Thaden, 2008). The CASS enables collection of data and analysis of safety culture information, which allows aviation organizations to evaluate and strategize about the findings which would help to implement best practices for operation, and ultimately

yield the highest probable safety outcome (von Thaden , 2008). The CASS has four major scales, namely formal safety (reporting systems, response/feedback and safety personnel), informal safety (accountability, pilot authority and professionalism), Operations interactions (working relationship between pilots and supervisors/middle management) and organizational commitment (safety values, safety fundamentals and going beyond compliance).

Statement of the Problem

The successful implementation of an SMS initiative in a collegiate aviation program is strongly influenced by the safety culture status of front- line personnel like CFI's and flight students. The norms, perceptions, values and attitude toward safety of these groups of people will have an impact on the safety culture of the organization (Cooper, 2000). The problem that affects the continuous improvement of the SMS is how to assess the perception, attitude and behavior of students and flight instructors, in relation to safety after the implementation of a formal process of an SMS program , and to determine whether they have identified with objectives of the program.

Purpose of the Study

The International Civil Aviation Organization (ICAO) has identified a number of areas in which certain elements of aviation safety programs may be further supported and enhanced, through Safety Management Systems (ICAO, 2009). One important component for the successful implementation of an SMS program in any aviation organization is the positive status of the organizational safety culture. The purpose of this study is to use the Collegiate Aviation Program Safety Culture Survey (CAPSCUS), which is a modified form of the CASS, specifically for collegiate aviation program, to

assess the safety culture perception of commercial aviation students and certified flight instructors (CFI's). The study would be done at an accredited four year Part 141 collegiate aviation program in the North-Western part of the United States of America (USA).

The CAPSCAS will provide a baseline measure of the collegiate program's safety culture, thus obtaining a benchmark to judge critical movement and change in the aviation program's safety culture. The study will also use a consistent framework to find the strength of relationship between perceived state of safety culture and safety behavior among the commercial aviation students and CFI's. The study will also attempt to establish a safety culture assessment methodology, which could be replicated in other similar collegiate aviation programs for comparison of results and ultimately the continuous improvement of collegiate aviation safety.

Research Questions

1. What are the differences in perception among respondents [commercial flight students and certified flight instructors (CFIs)] on the status of the safety culture at an accredited four year collegiate aviation program?

2. What are the differences between the perception of international contract students and indigenous US students on the status of the safety culture at an accredited four year collegiate aviation program?

3. What is relationship between the perception of respondents (flight students and certified flight instructors) regarding the informal safety and operation interaction at an accredited four year collegiate aviation program?

4. What is the relationship between the perception of respondents (students and certified flight instructors) on the formal safety program and their safety behavior at an accredited four year collegiate aviation's program?

5. What is the relationship between the perception of respondents (students and certified flight instructors) on organizational commitment to safety and perceived attitudes that affects safety behavior at an accredited four year collegiate aviation program?

Literature Review

Positive organizational safety culture creates empowerment which gives responsibility and authority to all and to provide a horizontal safety hierarchy so as to treat every input equal to others (Bos, 2007). Wood (2003) commented that the feeling of involvement would motivate users of the SMS to contribute insights to safety performance. Effective safety management in the twenty-first century involves paying attention to human factors (PerezGonzalez, 2009). System components have as much potential to cause, or save, dangerous system states as technical components (Yule, 2008).

Lu (2005) states that by paying attention to human factors, aviation organizations can identify and capture potential hazards before they manifest as accidents. One method of achieving this is by measuring the state of safety through so-called 'leading' indicators such as safety culture or safety climate (Yule, 2008). These are seen as distinct from 'lagging' indicators of safety such as accidents as they offer insight into the state of safety without the need for retrospective analyses of negative safety outcomes (von Thaden , 2006).

Defining and Building up a Safety Culture

There is no single, universally-accepted definition of safety culture (Piers, 2009). Several academic articles have proposed definitions of safety culture, and there is a lively debate in professional circles regarding the distinction between safety culture and safety climate (Patankar, 2003). The term safety culture gained its first official use in an initial report into the Chernobyl accident (IAEA, 1986). This report introduced the concept to explain the organizational errors and operator violations that laid the conditions for disaster. For the purposes of this study, safety culture will be defined as “The set of enduring values and attitudes regarding safety issues, shared by every member of every level of an organization” (Piers, 2009). Safety Culture also “refers to the personal dedication and accountability of individuals engaged in any activity that has a bearing on the safe provision” (FAA, 2008). Without a doubt, the core accomplishment of SMS is to create a positive safety culture to maintain and further improve the entire system’s safety (IATA, 2011).

Summary of Safety Culture Studies in Commercial Aviation Operations

Wiegmann (2004) reported that ‘few formally documented efforts have been made to assess safety culture within the aviation industry, with the notable exception of military aviation’ Three studies reported a safety assessment using commercial aviation pilots. The Australian Transportation Safety Board (2004) and Evans (2007) reported on the development of a safety culture questionnaire, designed to gain insight into pilots’ perceptions of workplace safety (N= 1308). The questionnaire consisted of six safety factors, each with five items. These factors were based upon previous safety culture research and input from aviation safety experts. Data from half of the sample were used

in an exploratory factor analysis (EFA) that resulted in a three factor model of: management commitment and communication, safety training and equipment, and maintenance. A confirmatory factor analysis (CFA) on the remaining half of the sample showed the three factor model to be an adequate fit to the data.

Finally, the responses from different types of pilots (regular public transport, charter, or aerial work such as emergency medical services or agriculture) were compared on each of the four identified safety culture factors. No significant differences between the groups were found. The Australian Transportation Safety Board (2004) concluded that this was due to a single professional safety climate for pilots as a group, regardless of the organization for whom they worked.

Gibbons (2006) developed a questionnaire designed to assess safety culture within the context of airline flight operations. Gibbons' survey consisted of 84 items, grouped into five themes. The survey was designed by examining the content of safety culture questionnaires that have been used in other High Risk Organizations (HRO). A total of 503 responses were received from a single company. After discarding 29 items and using CFA, the analysis eventually resulted in a structure of four broad factors (organizational commitment, operations personnel, informal safety system, and formal safety system), with three sub factors in each.

Block (2007) reanalyzed the responses obtained from the 281 pilots from the Patankar (2003) previous Study. The purpose was to examine whether the data supported what Block, described as the purpose-alignment-control (PAC) model. A pair of experts recoded the Patankar (2003) survey items in accordance with the PAC model. The proposed factors were tested using a structural equation modeling methodology. The

main drivers of safety outcomes were organizational affiliation (similar to ‘pride in company’ from Patankar, 2003) and proactive management (partially derived from the ‘safety opinion’ factor from Patankar, 2003). Organizational affiliation was directly influenced by communication, and proactive management was influenced by training effectiveness and relational supervision.

The research and studies have all been done in the airline and maintenance organization (Patankar, 2003) (von Thaden, 2008) environment as well as in the Air traffic Control organization (Gordon, 2004) (Piers, 2009), but not much has been done in assessing the safety culture in flight training organizations, especially among flight students and flight instructors. This study intends to build up on the strong foundations built by parallel studies in other aviation organizations, to assess the safety culture among this particular subset of aviation operations.

SMS and Safety Culture in Collegiate Aviation in the United States

Even though presently SMS and safety culture assessment are not regulatory requirements in the United States for aviation training organizations like collegiate and university aviation programs (FAA, 2010), a number of SMS pilot programs are being run by some proactive university aviation departments due to the immense positive benefits that they stand to derive (Ullrich, 2012). SMS and a positive safety culture would be advantageous to collegiate aviation because they perform standardized activities towards established goals (FAA, 2012).

Collegiate aviation has areas of particular risk because students may have little or no prior experience, and because malfunctions and unusual situations have to be simulated in order to expose these students to the variety of elements, as part of their

routine flying activity (FAA , 2012). In other words, in flying training, pilots may perform maneuvers that should not be accomplished as part of normal flight with the added risk that this entails. Collegiate aviation has had its fair share of tragic accidents and incidents (Bird Strike Control, 2009).

There is an imperative need for controlling risk through an assessment of the prevalent safety culture inherent in the program (Patankar, 2003). There is no type specific framework for the assessment of safety culture in collegiate aviation and some of the few studies done have used modified survey tools more suited for airlines and airports (Bjerke, 2011). The safety culture assessment will provide the needed data and feedback to make changes that will continuously improve safety and ensure an integrated system wide safety net for training organizations (Mc Cune, 2012).

Management of Organizational Safety Culture in Aviation

In 2010, the Office of the Auditor of the City and County of Denver, Colorado conducted an audit on safety culture across different working units under the Department of Aviation (Audit Services Division, City and County of Denver, 2010). The itemized audit was based on SMS criterions and had revealed that safety culture is a positive element at Denver International Airport (DIA). DIA is responsible for the design of safety policy, implementation of safety training, job hazard analysis and creation of airport safety committee to identify, analyze and mitigate potential hazards (Audit Services Division, City and County of Denver, 2010).

The audit at DIA made recommendations for changes, such as ascertaining management commitment, improving employee collaboration, elevating the recognition of safety programs, building a no-fault near-miss reporting system, and identifying a

better way to collect and disseminate safety information (Audit Services Division City and County of Denver, 2010). A key indicator of management's commitment to safety is the adequacy of resources, including financial support and empowerment from the top management (Simon, 2009). A bottom-up support and participation from operational level personnel is equally critical (Schiff, 2006).

A 'visible' safety program helps to set the stage for improved employee attitude (Transport Canada, 2008). Periodic safety related training and inspections by top management help to convince employees that the program is not merely administrative program of the month, but is an item of real concern (IATA , 2011). The employee gets involved. Once that occurs, employees participate, supervisors usually take the initiative, and the program evolves into an active force in the organization (Patankar, 2003). At this stage, employees subconsciously develop the habit of planning ahead and examining the safety, production, quality, and cost aspects of the task before them (Roughton, 2002). Although the physical safe-guarding of the workplace is a real factor in safety, the mental attitude of the employee is the ultimate key to avoiding incidents (Roughton, 2002).

Establishing a management structure, assigning responsibility and accountability, and allocating appropriate resources must be consistent with the organization's stated safety objectives (FAA, 2010). Discussing safety must begin with the analysis and understanding of an existing culture (Gibbons, 2006). Safety is the status of a hazard-free condition (ICAO, 2009). Culture is a behavioral norm consisting of beliefs, attitudes, and common values of an organization (Cooper, 2000; Lu , 2005) and Figure 1 shows the three part model. The culture in an organization normally embraces the structures, practices, controls, and policies that an organization possesses and employs (Reason,

2003).

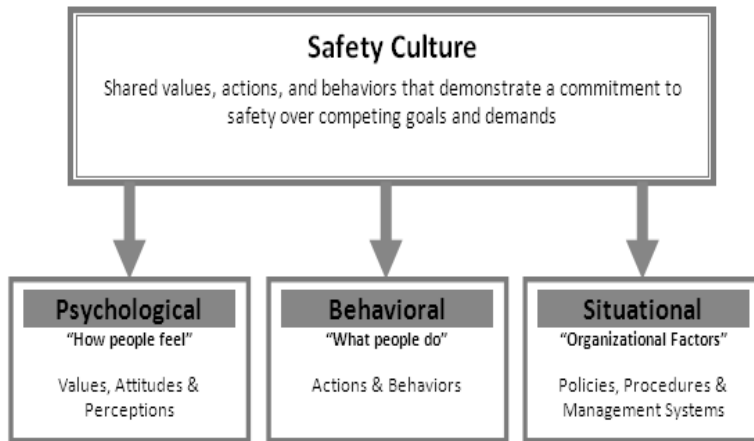


Figure 1. The Three Part Model of Safety Culture (Cooper, 2000)

Component of a Positive Safety Culture

A positive safety culture is the engine that drives the organization towards the goal of maximum attainable operational safety regardless of any formats of resistances, obstacles and pressures (ICAO, 2009). A positive safety culture promotes mutual respect among the employees and managers of the organization (Simon, 2009). A positive safety culture ensures that operational hazards and errors are anticipated (Stolzer, 2011). There are five components of a positive safety culture, namely informed, reporting, just cultures, learning and flexible cultures as outlined in figure 2.

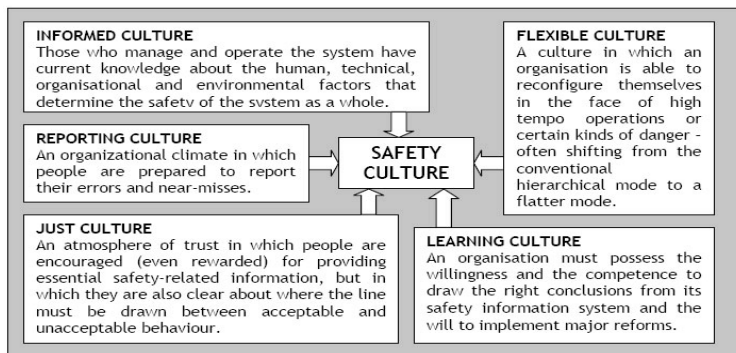


Figure 2. Safety Culture Components (FAA)

Informed Culture

In an organization with an informed culture, administration, management, and front-line employees are aware of the current status of operation (ICAO, 2009). An informed culture is a known process in which people are familiar with the elements of a company setting such as plans, policies, procedures, guidelines, programs, personnel, possible hazards, and, of course, safety expectations (Roughton, 2002). This informed culture also recursively measures the performance of the safety practice (Reason, 1997; Reason, 2003).

Reporting Culture

A positive safety culture of an organization is also a reporting culture that can only be achieved by creating an atmosphere of trust in which people are willing to divulge their errors as well as near misses (Simon, 2009). Utilizing the analogy of an iceberg, it has been determined that top management is aware of only about 4% of the significant safety problems, with line managers aware of only 9% and supervisors aware of about 74% (ICAO, 2006; Gordon, 2004). Thus, identifying untold safety deficiencies is essential to having an accurate view of the safety system of an organization (Gardiner, 2000).

It is by collecting, analyzing, and disseminating information about past events and close calls, can the organization locate where boundaries between safe and unsafe acts originate (Reason, 2003; Lu, 2007). In a reporting culture, management needs to implement protection for employees (Flightsafety Foundation, 2005). The process of data collection and analysis, feedback, appreciation, and ease of making a valid report are critical (Reason, 1997; Reason,

2003; Wood, 2003; Dekker, 2007). The drawback in a reporting culture is that sometimes, personnel turn in overly aggressive reports associated with adverse conditions, and these reports are not given adequate attention and response by management (IATA, 2011).

Just Culture

A culture is just, when there is a clear difference between unintentional and intentional acts (Flightsafety Foundation, 2005). Procedural non-compliance warrants a punishment approach (Frankel, 2006), while procedural unintentional errors require a non-punitive resolution (Dekker, 2007). The positive recognition in addition to punitive measures should be clearly established to facilitate the growth of a reporting culture and a firm belief of fairness (IATA, 2011).

Creating a trustworthy and just environment will promote safety performance and efficacy and should be one of the organization's goals and objectives (Lu, 2006; Reason, 1997; Reason, 2003; Dekker, 2007).

Even with a just culture, there are many barriers to overcome before a reporting culture can be fully shaped (Flightsafety Foundation, 2005). The first barrier is the natural attitude of ridicule (Dekker, 2007). The second barrier is the suspicion that the report may go on record and act as a form of potential backlash (Flightsafety Foundation, 2005). The third is skepticism of the data application (Galloti, 2006). If one makes an observation on a weakness, people want to know that management will respond to the submission (Ullrich, 2012). The fourth barrier is resignation, which is a feeling of lack of empowerment or

contribution (Dekker, 2007). With this in mind, effective feedback loop and process integrity must be in place (Stolzer, 2011).

Learning Culture

A culture is a learning (adaptive) culture when both reactive and proactive measures are used to guide continuous education and wide-reaching system improvements rather than mere local fixes (ICAO, 2009). A learning culture is ineffective without reporting, informed, and just cultures so as to acquire current data and monitor past trends that may recur (Stolzer, 2008). A learning culture is always aware of the potential risks and is aware of the past risks associated with any given procedure (Reason, 1997).

Flexible Culture

A Flexible culture means an organization has the capacity to reconfigure itself to continue running safely, even in times of stress or high tempo operations (United States Airforce, 2004). A flexible sometimes requires changes in an organizational transformation of a company's beliefs (Wald, 2010;IATA , 2011). It involves the changing of values and norms among employees in order to improve productivity (Simon, 2009). A safety policy should first be adopted to provide a fundamental guideline and blueprint that will be embraced within an organization (Walton, 1985;Manuele, 2001). A safety policy further defines the organization's commitment to safety and overall safety vision (ICAO, 2006; FAA, 2010).

ICAO further requires the identification of an accountable executive from the top executives (an identifiable person having the responsibility for the effective and efficient performance of the organization) (Transport Canada, 2005). This person has

the authority to assign resources to fulfill the obligations of the Safety Management System with resources for this SMS leadership position (ICAO, 2009). Implementing a culture change is introspective, so imposing a cultural change in an organization may meet with substantial resistance (In Wells, 2003).

Management Commitment

It is also essential to commit resources for the long term and to clearly identify a phased implementation approach of a positive safety culture (Ullrich, 2012). Using existing forms, structures, manpower and active roles from the bottom-up within the organization could ease some of the resistance (Bos, 2007; Lu, 2008; Wood, 2003).

Meanwhile, management must continue showing strong support for SMS which reinforces safety behaviors to be fully embraced as a norm (Piers, 2009). Due to Hawthorne Effect (Landsberger, 1958) there could be temporarily increased safety awareness and safety climate simply because the employees are aware of the ongoing supervisor's involvement (Lu, 2008).

von Thaden (2008) stated that culture cannot be created overnight; thus changing the mindset and behavioral norm would take some time and needs continuous communication between management personnel and employees. Hudson (2001) also believed that what the eyes and ears observe, the mind and heart will gradually follow to get the momentum developed to initiate the cultural change.

Commercial Aviation Safety Survey (CASS)

Researchers at The University of Illinois at Urbana-Champaign (UIUC) developed a measure associated with safety culture in high reliability organizations (Gibbons, 2006). Since 2000 the Commercial Aviation Safety Survey (CASS) has been

distributed globally in the aviation industry to large and small airlines and repair stations alike (von Thaden , 2006). The instrument has been refined to a four-factor model reflecting Organizational Commitment, Formal Safety programs, Operations Interactions, and Informal Safety programs (Figure 3) (Weigmann, 2004; Gibbons, von Thaden & Wiegmann, 2006; von Thaden, Gibbons & Li, 2007, von Thaden, 2008). The CASS identifies the respondents' perception of the current state, as well as the strengths and weaknesses, of the safety culture in an organization.

Dimensions of Safety Culture Model of CASS

There are some dimensions which define the indicators of a safety culture in any aviation organization and they are scaled in the four factor model of safety culture (von Thaden, 2008). These indicator scales are organizational commitment (OC), Operation interaction (OI), Formal safety indicators (FS) and Informal safety indicators (IS). The four scales are correlated with Safety Behavior (SB) which includes the perception of the organization's risk (OR) and individual personal risk (PR) (von Thaden , 2008).

Organizational Commitment (OC)

Organizational commitment is reflected in three major areas: Safety Values (SV) the attitudes and values regarding safety expressed, in words and actions, by leadership; Safety Fundamentals (SF) the compliance with regulated aspects of safety such as training requirements, manuals, etc.; and Going Beyond Compliance (GBC) wherein priority is given to safety in the allocation of company resources (e.g., equipment, personnel time) even though they are not required by regulations.

Operations Interactions (OI)

Operations Interaction is reflected in the working relationships between pilots and middle management, supervisors, and other distributed operations personnel (e.g. chief pilots, instructors/trainers, ground personnel, maintenance, dispatch, etc.) It takes into account involvement in and concern for safety on their part. This entails the priority given to safety by operations personnel and their regard for the actual risks and issues associated with flying the line.

Formal Safety (FS)

Formal safety indicators are reflected in three areas: Reporting System (RS) which refers to the accessibility, familiarity, and actual use of the aviation operator's formal safety reporting program; Response and Feedback (RF) which entails the timeliness and appropriateness of management responses to reported safety information and dissemination of safety information to employees; and Safety Personnel (SP) the perceived effectiveness of and respect for persons in formal safety roles (e.g., Flight Safety Officer, Director of Safety).

Informal Safety (IS)

Informal safety indicators are reflected in Accountability (ACC) the consistency and appropriateness with which individuals are held accountable for unsafe behavior; Authority (AU) which entails employee involvement and empowerment in safety decision making and Professionalism (PRO) reflected in areas such as peer culture for safety, pilot professionalism.

Safety Behavior (SB) has subscales of personal risk (PR) and organizational risk (OR) and shows the perceived personal risk of personnel and the overall organizational

risk and how they are interrelated. The perceptions of personnel on their risky attitudes and at risk attitudes of others in the organization can have an effect on the safety behavior in the organization (Cooper, 2000). A graphical representation of the CASS is showing the organizational indicators of safety culture, can be seen in Figure 3.

Organizational Indicators of Safety Culture

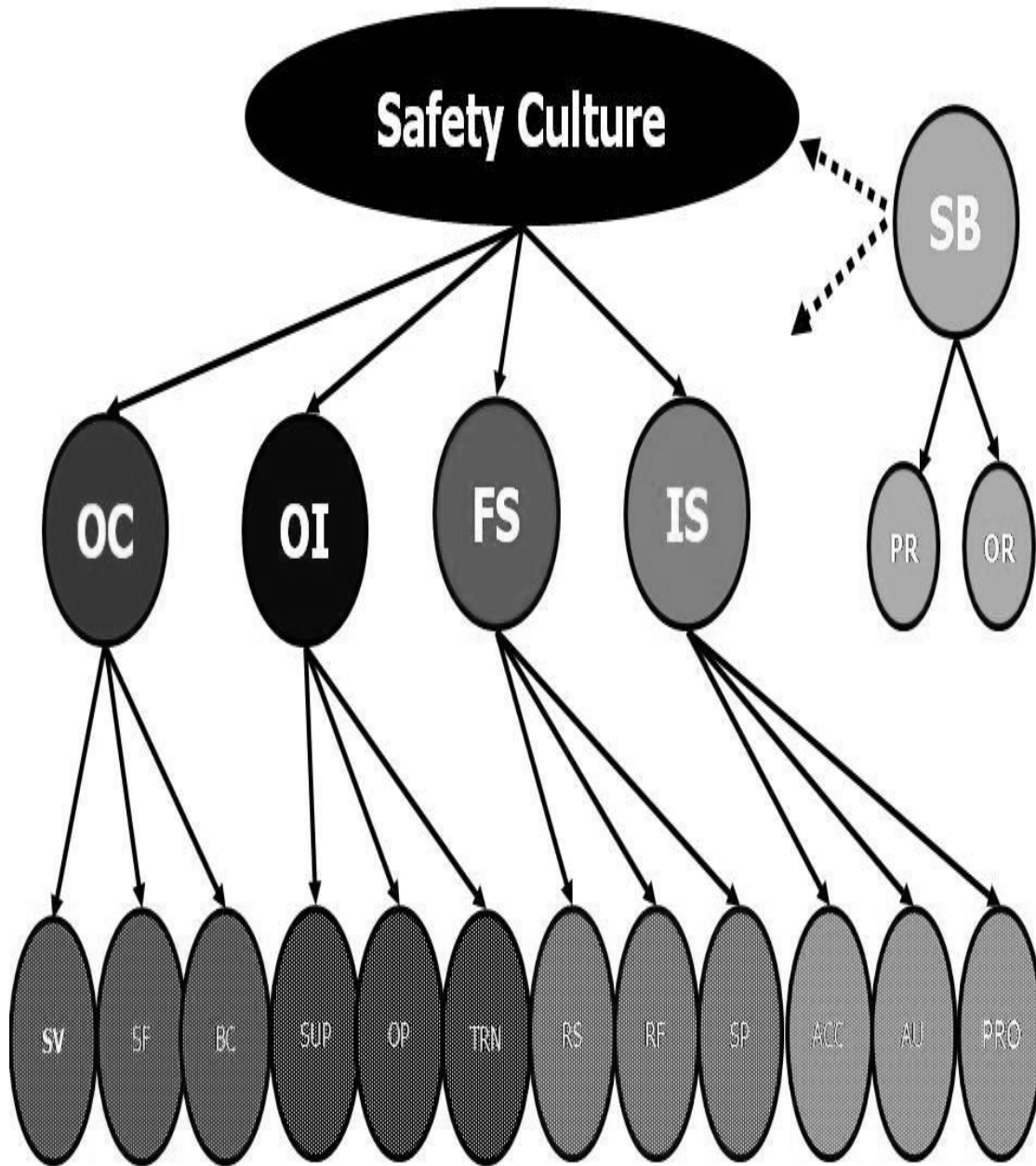


Figure 3. Four factor model of safety culture in the CASS (vonThaden, 2008.)

CHAPTER II

METHODOLOGY

This chapter discusses the study population, sample, and design in detail. The Collegiate Aviation Program Safety Culture Survey (CAPSCUS) was developed by adapting the CASS and modifying it to specifically assess the safety culture in the flight operations of an accredited collegiate aviation program (Creswell, 2009). A screen shot of the survey is attached as Appendix A. The adaptation and modification was done with permission (von Thaden, 2012;Creswell, 2009).

Validity

A factor analysis in the form of Principal Component Analysis (PCA) was conducted on the modified questionnaires in the survey to check the content validity. Content validity assesses the degree to which individual items represent the construct being measured (Field, 2009). PCA is normally used to develop questionnaires and is concerned with only establishing which linear components exist within the data,and how a particular variable might contribute to that component (Tabachnick, 2007).

Reliability

Reliability check for all scales were run using the Cronbach alpha coefficient. This is a common measure of reliability of scales and is based on the correlation between items that can be found on a scale and the length of the scale (Field,2009). The value of alpha can range from zero to one,but standards regarding it's size depends on a factor.

Table 1. Scales Inventory for the CAPSCUS as Modified From the CASS.

CAPSCUS Major factor Scales	Sub-factor Scales
Formal Safety Program	Reporting System Response and feedback Safety Personnel
Informal Safety Program	Accountability Pilot Authority Professionalism
Operations Interaction	Supervisor of Flight/Lead Flight /Chief Flight Instructor Dispatch/Ground and Ramp Personnel
Organizational Commitment	Safety Values Safety Fundamentals Going Beyond Compliance

Population

The CAPSCUS was used to survey the perceptions of collegiate flight students and certified flight instructors of the safety culture at an accredited CFR Part 141 flight training and four year degree awarding collegiate aviation department of a university in the North Western region of the United States of America (N= 945). The anonymous voluntary survey was delivered online in the English language. Participants were assured of the confidentiality of their responses (Appendix B). The population for the study included all four (4) year groups of commercial aviation students, international contract flight students and certified flight instructors at the university.

The researcher sent a cover email invitation letter to all the participants' mailboxes with the internet web link of the survey. The participants had access to the site and web link through a user name and password. Once securely logged in, participants responded to items in the survey instrument using a five (5) point Lickert scale (strongly disagree, disagree, neither disagree nor agree, agree, strongly agree) and a non-applicable option (Creswell, 2009). There was also an allotted space for respondents to include any additional comments. The data were collected and stored on a secure server of the University.

Sample

Sample participants were drawn from commercial aviation students, international contract flight students and certified flight instructors (CFIs) who are engaged in flight training at the aviation department. Air Traffic Control (ATC) students, Aviation Management students, Unmanned Aerial Systems (UAS) students and Graduate students at the aviation department were excluded from the study because the focus was on flight personnel (Pilots). This was done to avoid any confounds (Creswell, 2009).

Study Design

Sample participants were recruited in several ways. First, an e-mail (Appendix C) was sent to a mailing list of all commercial aviation students in the aviation department through the assistance and permission of the chair and the various aviation students' association leadership. An online advertisement was placed on the aviation department and students' association website. Paper flyers were placed on notice boards in the Aviation Department on campus and the airport. The researcher sought permission from faculty to personally conduct class by class awareness drive for the survey.

Students Participation

The assistance of the various aviation student associations was requested to publicize, the survey at meetings and through their website. This personal outreach was to further provide guidelines to any problem that will be encountered in trying to access the website and links. It also afforded the researcher an opportunity to clarify any issue on the survey. All the methods included a description of the study and the Internet hyperlink.

On line Survey Tool

The survey was administered through an online survey tool called Qualtrics®. The survey was administered online to allow for simplicity of delivery and anonymity for the participants. In addition, this online method of delivery allowed participants to complete the survey at their own leisure. Once the participant loaded the survey, the first page included a description of the research and instructions on how to complete the survey.

Response Period

The survey was available from any computer with internet and link to the aviation department's secure website. The survey allowed participants to have plenty of opportunity to provide more information if they wished to do so and some open ended questions were asked to specifically explore the nature of these activities. There were thirty questions broken into the following sections: Formal safety, Informal safety, Operational interactions, Organizational commitment, Safety behavior and lastly demographics.

The survey was active from the winter operational period of early February till the first week of March. After the response period was over, the submitted responses were downloaded from the secure site for analysis. Some of the submitted responses from the survey were excluded, from the total responses during analysis by the SPSS ® software due to missing data. These comprised of the responses from participants, who failed to answer any question beyond the consent page or did not answer any of the survey questions for that section.

Methods and Data Collection

The aim of this study was to use both quantitative and qualitative data of the perception of flight students and flight instructors to assess the safety culture in a collegiate aviation program. These are the questions that the data and analysis will seek to answer:

1. What are the differences in perception among commercial flight students and certified flight instructors (CFIs) on the status of the safety culture at an accredited four year collegiate aviation program?
2. What are the differences between the perception of international contract students and indigenous US students on the status of the safety culture at an accredited four year collegiate aviation program?
3. What is relationship between the perception of respondents (flight students and certified flight instructors) regarding the informal safety and operation interaction at an accredited four year collegiate aviation program?

4. What is the relationship between the perception of respondents (students and certified flight instructors) on the formal safety program and their safety behavior at an accredited four year collegiate aviation's program?
5. What is the relationship between the perception of respondents (students and certified flight instructors) on organizational commitment to safety and perceived attitudes that affects safety behavior at an accredited four year collegiate aviation program?

Participant's responses were received via the online survey tool and saved when the participants completed the survey. When the survey collection period ended, the responses were exported into Statistics Program for Social Sciences (SPSS) ® and securely given to the researcher for analysis.

Protection of Human Subjects

Participants volunteered their time and responses for this survey on their own free will and there was no form of coercion. Every effort was made to protect participants from harm. The survey received approval from the Institutional Review Board of the University of North Dakota. All subjects were informed that participation was voluntary and that they need only answer the questions they felt comfortable answering. Any response received in the essay format questions that could identify any specific person was de-identified by the researcher. The online survey tool collected no data that could link any specific survey to a participant.

CHAPTER III

RESULTS AND DATA ANALYSIS

Data Analysis

Quantitative data was imported into the SPSS ® software and analyzed. All the additional comments and responses were coded manually by the researcher for themes and analyzed using SPSS. Significant values were set at the 0.05 alpha levels (2-tailed). The survey was tested for content validity and reliability of scale. The major scales of the CAPSCUS were Formal Safety Program, Informal Safety Program, Operations Interactions and Organizational Commitment. There was also an aspect of Safety Behavior and responses were then correlated with components of the major scales.

Content Validity

A Principal Component Analysis (PCA) was conducted on the 61 items with orthogonal rotation (varimax). The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis, KMO = .84 and all KMO values for individual items was > .85, which is well above the acceptable limit of .5 (Field, 2009). Bartlett's test of sphericity $\chi^2(1891) = 6304, p < .001$, indicating that correlation between items were sufficiently large for PCA. Thirteen components were extracted and had Eigen values greater than Kaiser's criterion of 1 and in combination explained 73.90% of the variance.

Reliability

All the four major scales of the CAPSCUS (Formal Safety, Informal Safety, Operations Interaction and Organizational Commitment) showed high reliabilities. Test reliability refers to the consistency or reliability of a questionnaire items (Stevens, 2002). A reliable scale is one that will yield the same score for two different individuals with the same true level of the trait or attitude being measured, or for one individual tested twice (assuming that no changes have occurred between tests) (Cronbach, 1951; Cortina, 1993). Within a scale, items that assess the same underlying dimension are related or correlated with one another (Fields, 2009; Creswell, 2009). The values for reliability are outlined in Table 2 and show the Cronbach's alpha values for all major scales.

Table 2. Cronbach's alpha for CAPSCUS.

Major Scale	Number of Items in scale (N)	Cronbach's α
Formal Safety Program	15	.90
Informal Safety Program	14	.85
Operations Interaction	19	.87
Organizational Commitment	14	.86
Total for CAPSCUS	62	.96

Demographic Information

At the end of the response period, (N= 234) responses were obtained from the survey and comprised of fully (N= 142) completed responses representing 61% return rate. About 51.7% of the respondents provided comments in the text boxes provided for extra comments. There were some missing data in the responses and could not be used

for analysis due to the fact that the respondents decided not to answer those questions. The SPSS software was used to sort out the data with missing components and it was reported in the analysis. The breakdowns of the various responses are outlined under the major scales.

Years in Flight Program

34% of respondents identified themselves as freshmen, 5% were sophomore, juniors were 17%, seniors were 22% and CFI/others were 21%. This number represents respondents who answered the demographic question about their status in terms of years spent in the flight program as students and CFI at the university. Those respondents who did not answer this question were removed by the SPSS® program. The total is found in Table 3 and figure 4.

Table 3. Category of Respondents

Category	Number (N)	Percentage (%)
Freshmen	46	34
Sophomore	7	5
Junior	23	17
Senior	30	22
CFI/Others	28	21
Total	134	100

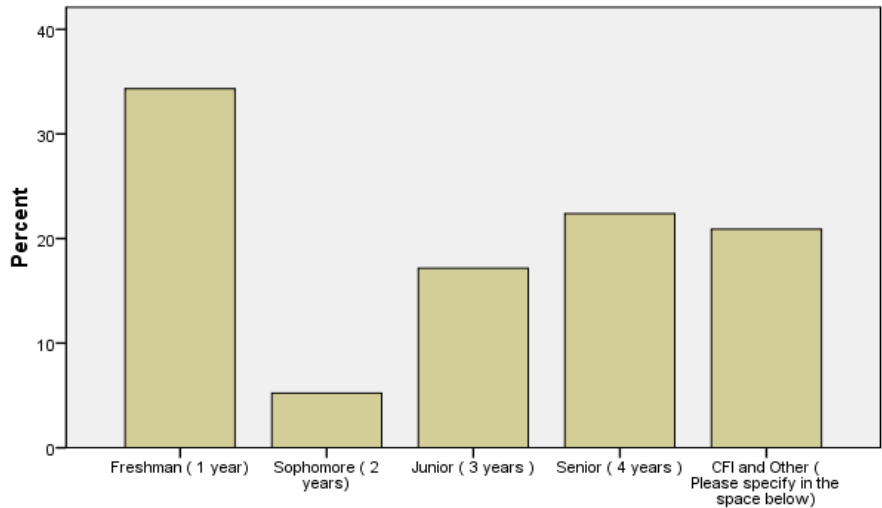


Figure 4. Category of respondent (years spent in the flight program).

Gender

The total respondents to this question was (n= 134) and it was predominantly males.93% reported males with 7% female, showing an under representation. Table 3 shows the responses.

Table 4.Gender Distribution of Respondents.

Gender	Number	Percentage
Male	125	93
Female	9	7
Total	134	100

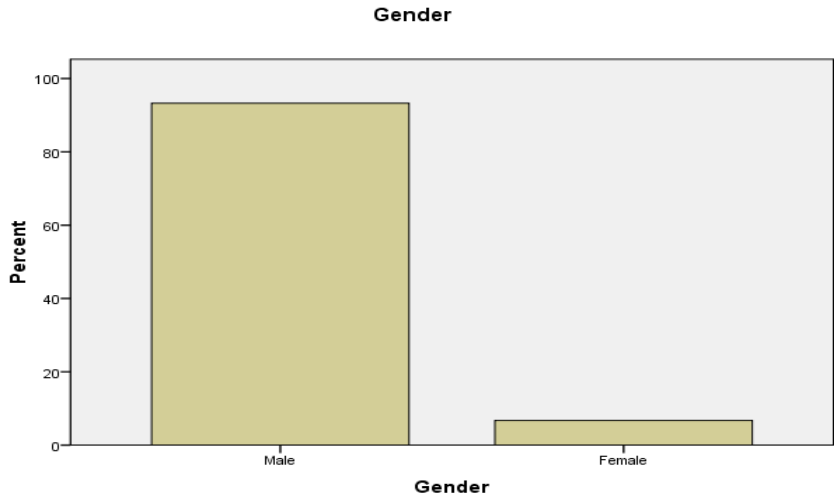


Figure 5. Gender of Respondents

International Contract Students

The respondents were asked about their status as either resident US students or International contract students in the university’s flight program. This was to find out how many international contract students responded to the survey. The flight program at the university has a number of international contract students from predominantly Asia and the Middle East, whose national culture and perception about the safety culture of the flight program of the university may not be the same as resident US students. One of the aims of the study was to find out if there was any difference in the perception on the status of the safety culture of the flight program by the two groups. Table 5 gives an overview of respondents.

Table 5. International Students Status.

International student Status	Number (n)	Percentage (%)
Yes	39	29
No	95	71
Total	134	100

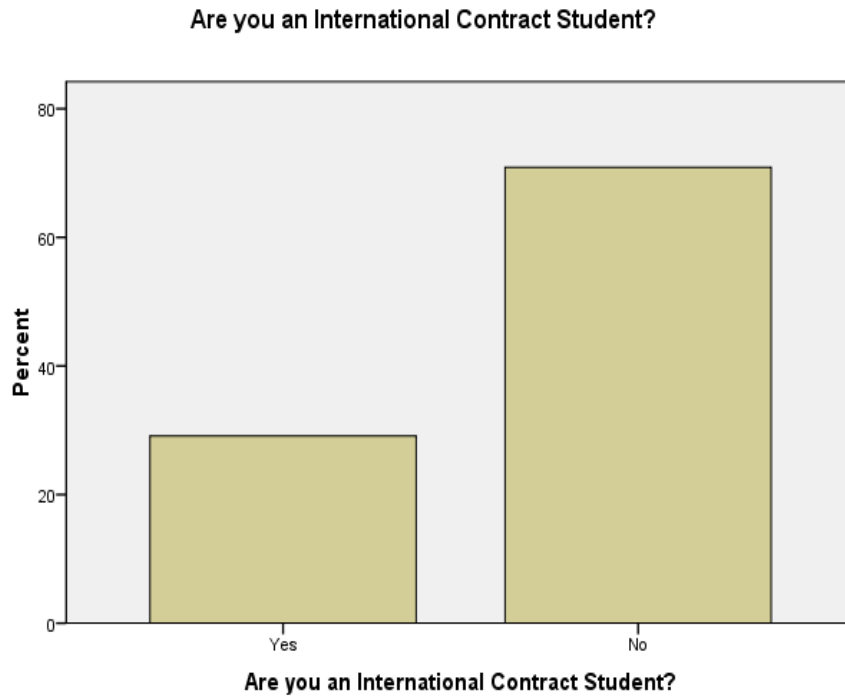


Figure 6. International Student Status.

Age Group

Respondents were asked to give their age range. 12% reported that they were below 20 years, 79% between 20-30 years, 4% were 31-40 year group, 1% was 41-50 year group, 4% was 51-60 year group and 1% reported over 60 years. The year group summary is given below in table 6 and figure 8. It shows that the group with the greatest number was the 20-30 year group, which is normal, since the sample consisted mostly of flight students.

Table 6. Age Group of Respondents.

Age Group	Number (N)	Percentage (%)
Below 20	16	12
20-30	106	79
31-40	6	4
41-50	1	1
51-60	4	3
60+	1	1
Total	134	100

Figure 7 shows the graphical summary of the age distribution of respondents.

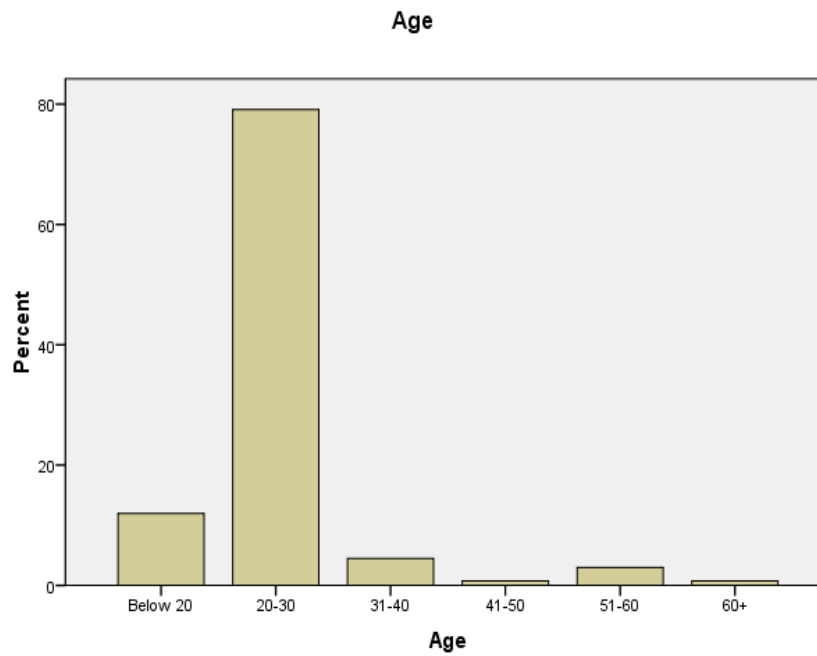


Figure 7. Age Distribution.

Airman Certificates and Ratings of Respondents

Respondents were asked to provide the highest airman certification (FAA) and ratings acquired. 13% were student pilots, 39% private, 5% commercial–single engine, 15% commercial-multiengine, 3% CFI, 11% CFII, 6% MEI, 7%ATP, 5% mixed certificates. Most of the mixed certificates were those who chose to include their commercial and air transport pilot certificates to their flight instructor certificates. Table 7, highlights the certificates and ratings.

Table 7. Airman Certifications and Ratings.

Airman Certificates/Ratings	Number (N)	Percentage (%)
Student	18	13
Private	52	39
Commercial Single-Engine	7	5
Commercial Multi-Engine	20	15
CFI	4	3
CFI (Instrument)	15	11
Multi-Engine Instructor (MEI)	8	6
Air Transport Pilot (ATP)	3	7
Others/Mixed Certificate	7	5
Total	134	100

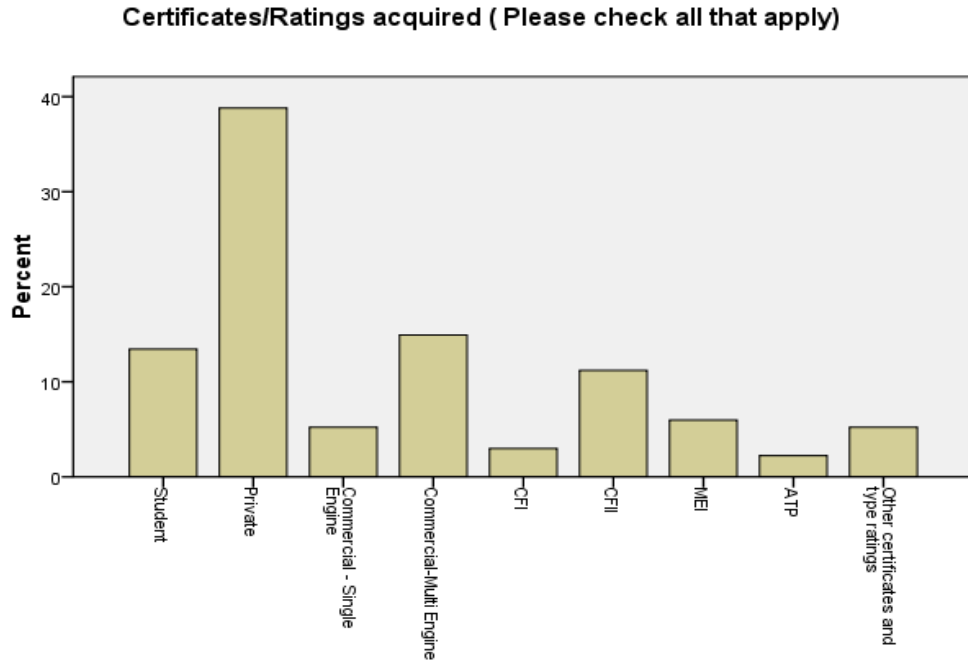


Figure 8. Airman Certification and Ratings .

Safety Reporting

Respondents were asked whether they have ever reported any safety problems or occurrence in the flight program at the university. This was to get an idea of how their perceptions correlated with their safety reporting behavior. 38% of the respondents said Yes and 62% replied No. The summary of the responses are outlined in the table 8 and figure 9.

Table 8. Reporting of Safety Problems .

Reporting Safety Problems	Number (N)	Percentage (%)
Yes	50	38
No	83	62
Total	133	100

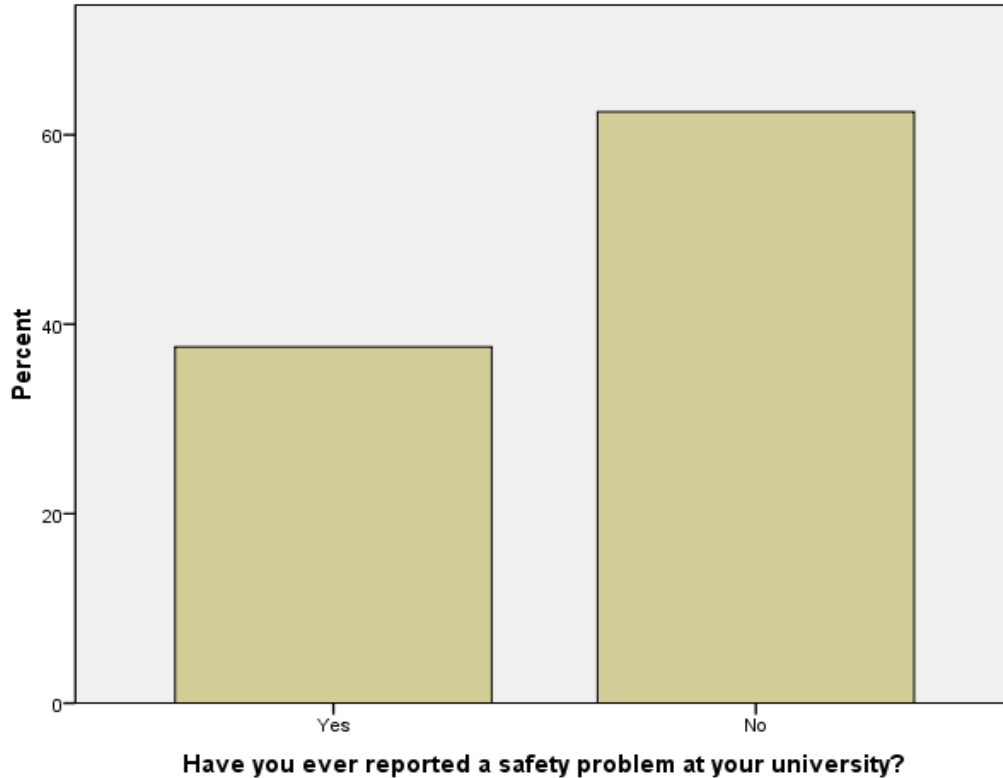


Figure 9. Reporting of Safety Problems.

Summary of the Survey Results

A Five (5) point Likert Scale gave respondents, the choice to select their response as either strongly disagree, disagree, neither agree/disagree, agree, strongly agree and non-applicable/no response. Values (1, 2, 3, 4 and 5) were assigned to responses in that order. The value (0) was assigned to non-response and (6) assigned to non-applicable. The scale mid-point was neither agree/disagree (3) and negatively worded items were reverse coded using SPSS, to obtain a standardized and comparable reading for the data. The scale reflected, that higher measurement values, represented higher quality of safety culture.

Formal Safety Scale Indicator

Out of the total responses submitted (N= 234) at the end of the survey period, (N=71) responses were excluded, by the SPSS program, because either there was no response or the non-applicable option was selected by respondents for that section. The usable responses were (N= 163). The mean (M= 3.65), and Standard Deviation (SD = 0.53) perception of respondent on the Formal Safety program of the university was above the neutral point value of 3 (Neither agree nor disagree) on the 5 point Likert scale. This shows that on the average respondents had a good perception of the program as reflected on the indicator scale. The sub scales for Formal Safety were Reporting Systems, Response and Feedback and Safety Personnel.

Reporting Systems

The Reporting system sub scale (N= 123) had five items. The highest mean (M= 4.16, SD = 0.97) perception was for the question ‘The safety reporting system of the university is convenient and easy to use’. A simple bar graph and box plot was used to for analysis of the result. Box plots are able to visually show different types of populations, without any assumptions about the statistical distribution (Field, 2009). The spacing between the different parts of the box helps to indicate variance and skew and to identify outliers.

The box itself contains the middle 50% of the data. The upper edge (hinge) of the box indicates the 75th percentile of the data set, and the lower hinge of the box indicates the 25th percentile. The line in the box indicates the median value of the data. If the median line within the box is not equidistant from the hinges, then the data is skewed. The ends of the vertical lines or "whiskers" indicate the minimum and

maximum data values, unless outliers are present in which case the whiskers extend to a maximum of 1.5 times the inter-quartile range. The points outside the ends of the whiskers are outliers or suspected outliers.

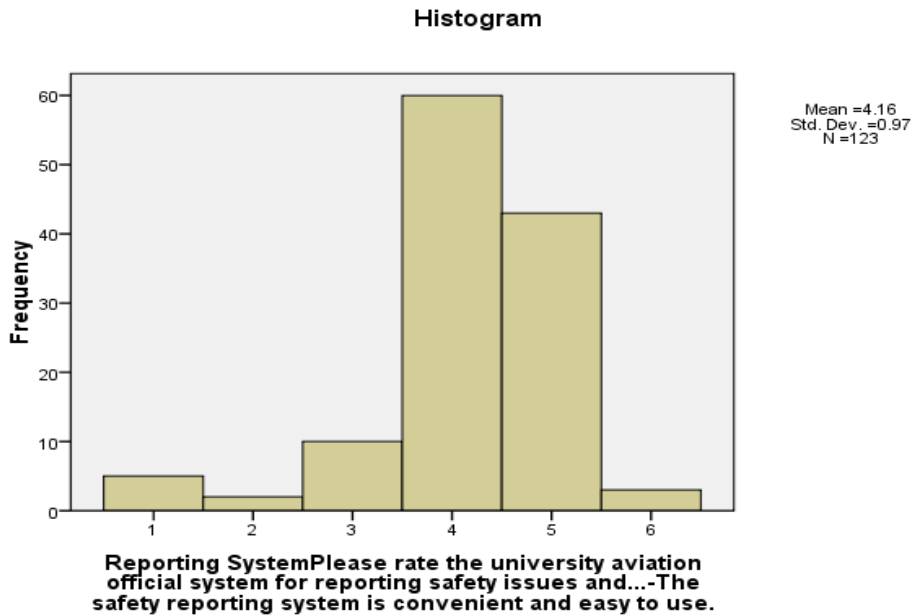


Figure 10. Histogram showing responses for ‘Safety system is convenient to use’.

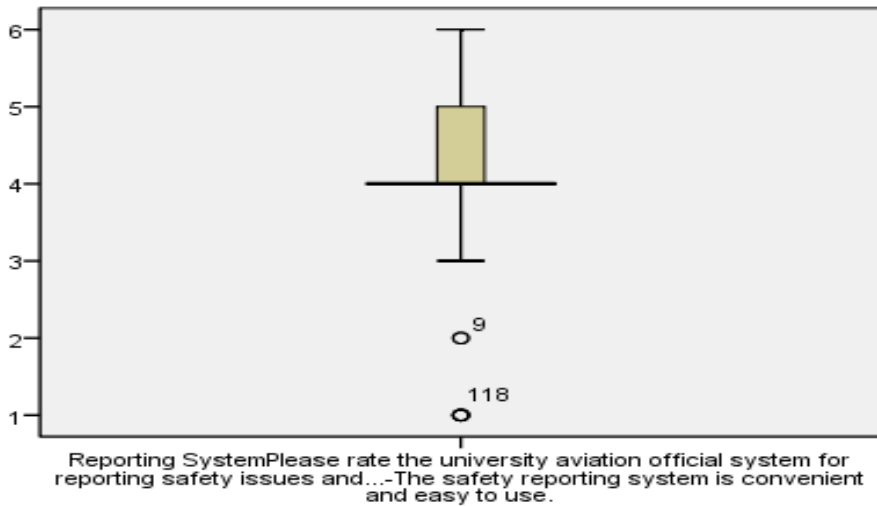


Figure 11 . Box plot of responses for ‘safety reporting system is convenient to use’.

The figure shows that almost 75 % of respondents had a highly favorable perception about the convenience and ease of use of the university safety reporting

system that was above the mean perception (4.16). The lowest mean perception for responses to a question in this sub-scale was (M= 3.14, SD= 1.83) ‘Pilots do not bother reporting near misses or close calls, since this event does not cause real damage’. Note this mean perception is still above the neutral point of the scale.

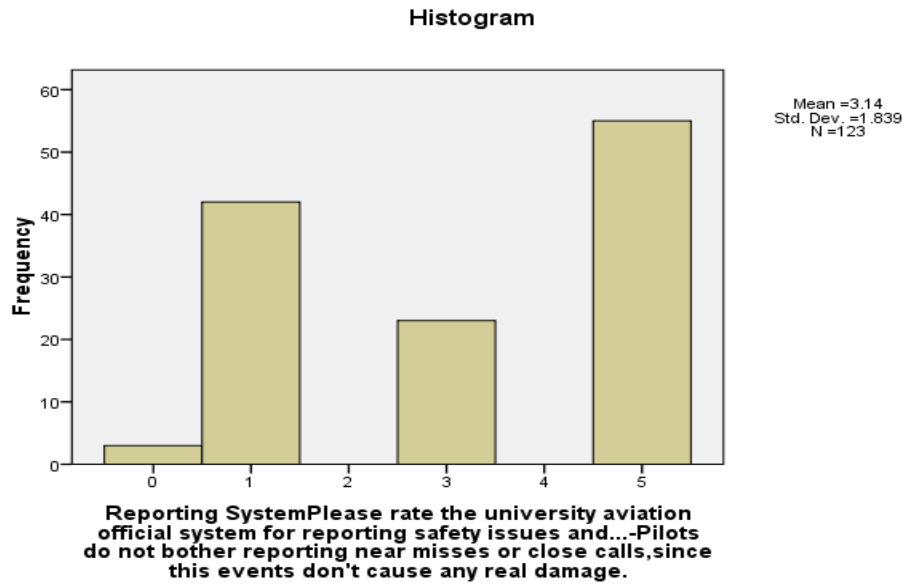


Figure 12. Histogram of responses for ‘Pilots do not bother reporting near misses or close calls’.

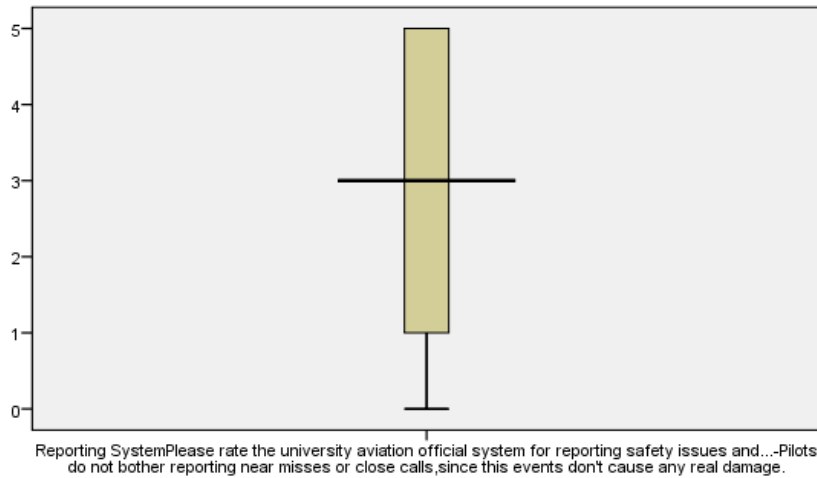


Figure 13. Box –plot of responses to ‘pilots do not bother reporting near misses or close calls’.

The box plot shows a negatively skewed distribution with more than 50 % of the respondents having an unfavorable perception that ‘pilots do not bother reporting near misses or close calls, since these events don’t cause any real damage’.

Response and Feedback

The subscale (N= 123) had five items and the response for ‘My university keeps confidential data base of responses and feedback’ had the highest favorable mean perception rating of (M= 4.02, SD = 1.20). Figures 14 and 15 show the responses to the subscale.

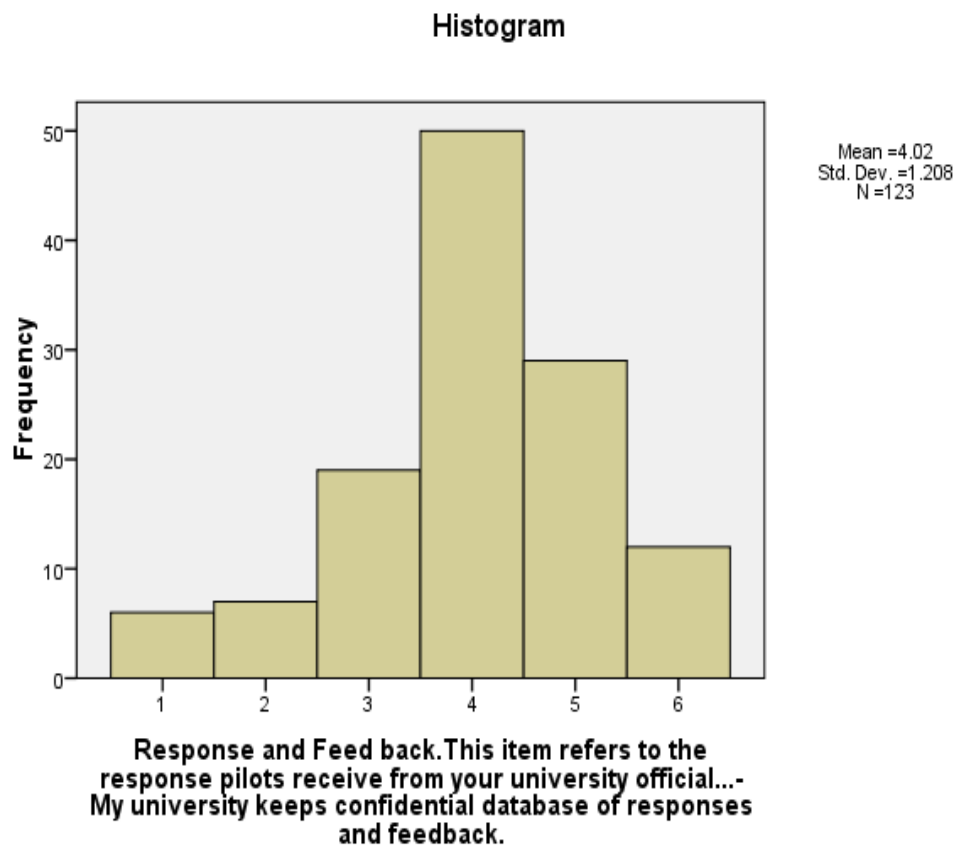


Figure 14. Histogram of responses for ‘My university keeps confidential database ’

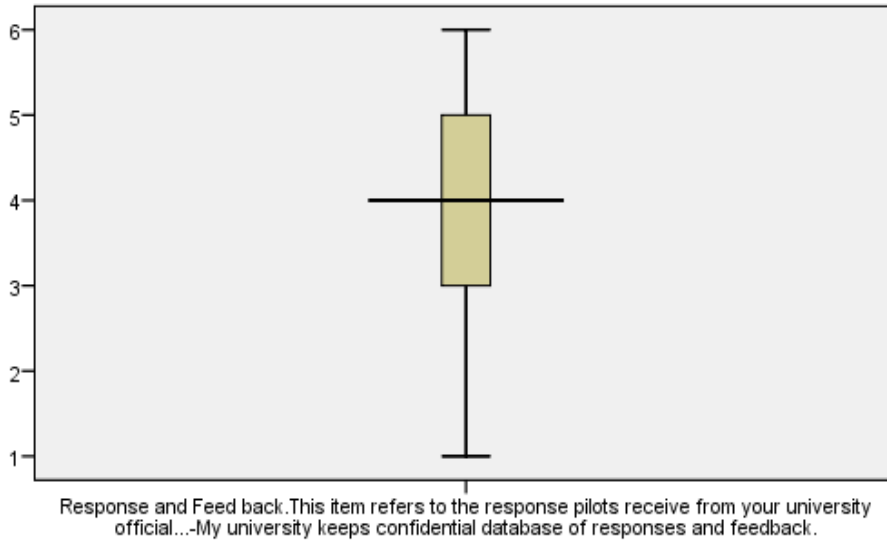


Figure 15. Box Plot of Responses to ‘My University keeps confidential database ’.

For this subscale, the least favorable mean perception was on the response for ‘My University only keeps track of major safety problems and overlooks routine ones’. The mean perception was (M= 3.52, SD= 1.72). Figures (16, 17) show the histogram and box plot of responses respectively.

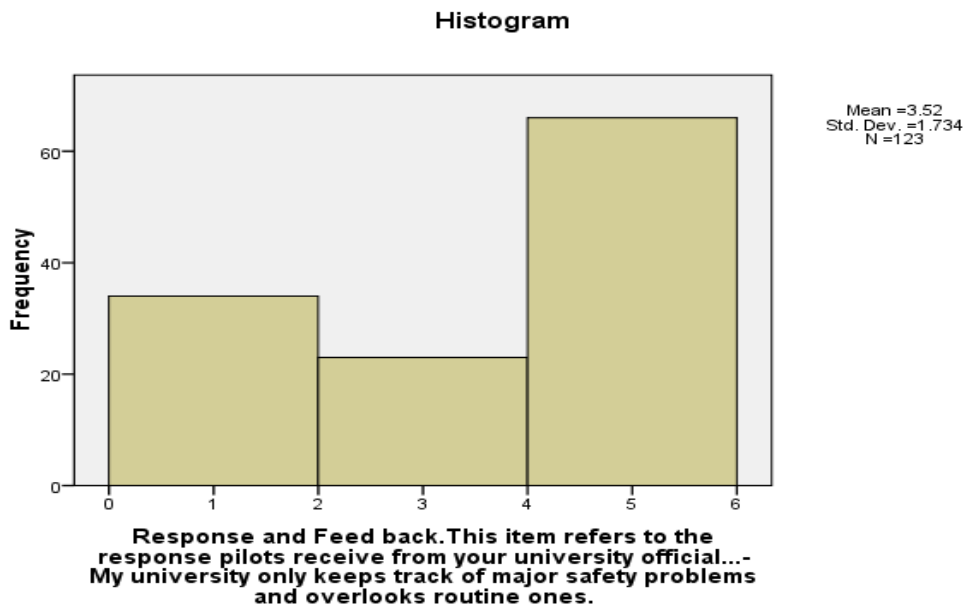


Figure 16. Histogram of responses for ‘My University only keeps track of major safety problems and overlook routine ones.... ’.

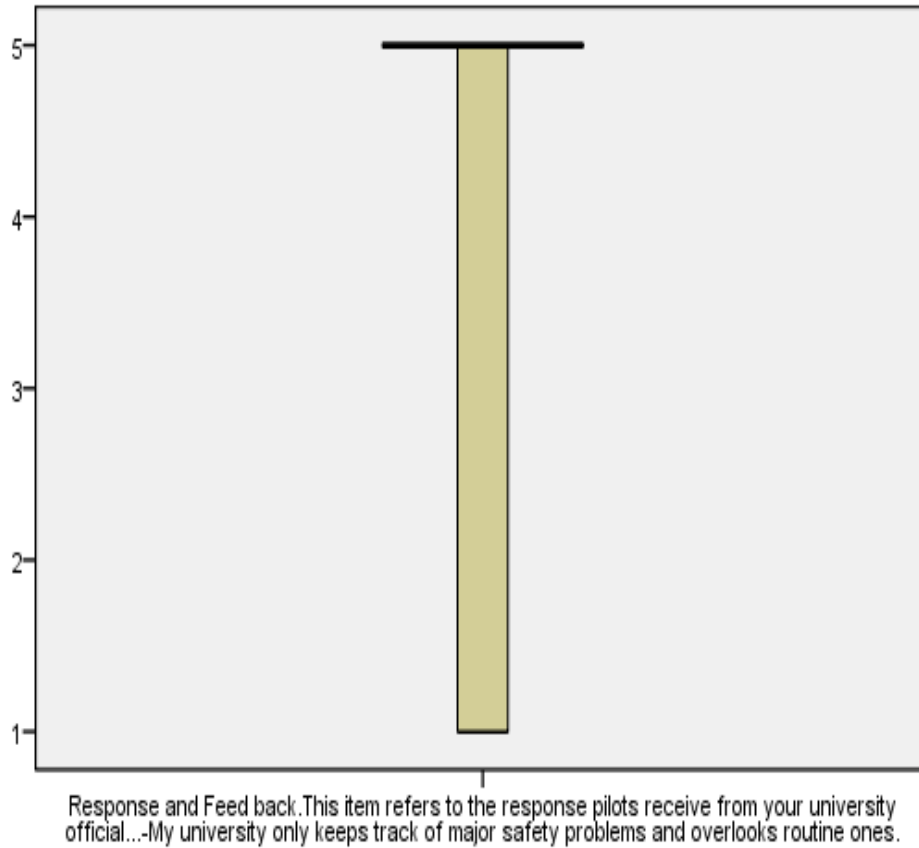


Figure 17. Box plot of responses to ‘My University only keeps track of major safety problems and overlook routine ones ’

Safety Personnel

There are five items in this subscale (N= 123). The response with the highest mean was ‘Personnel responsible for safety have a clear understanding of the risk involved in flight training’. The responses showed that most respondents perceived that safety personnel had a clear understanding of the risk involved in flight training. The mean value of this perception was (M= 4.21, SD= 1.72).Figure 18 and 19 shows the histogram and box plot of the responses.

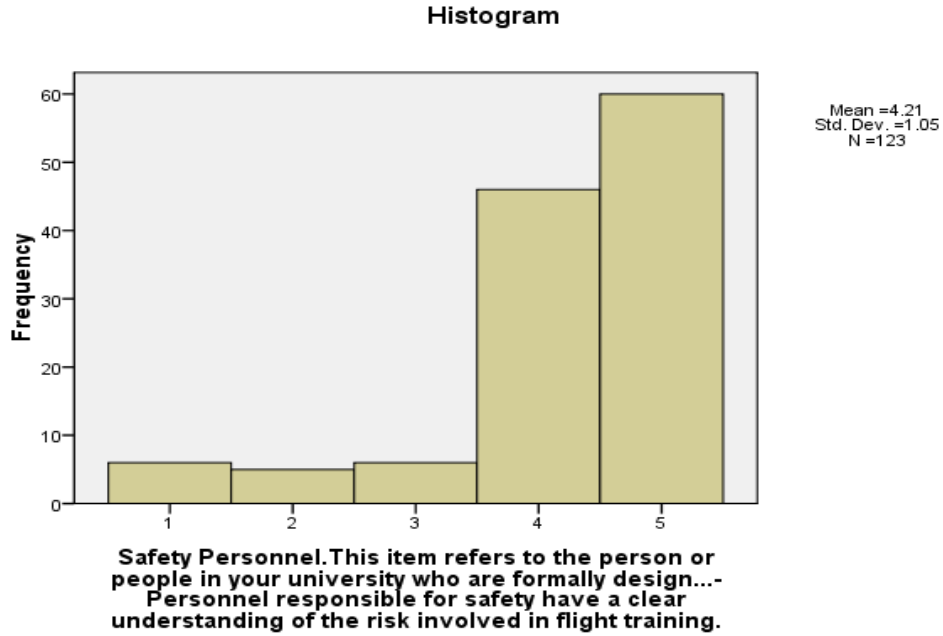


Figure 18. Histogram of responses to ‘Personnel responsible for safety have a clear understanding of risk in flight training ’

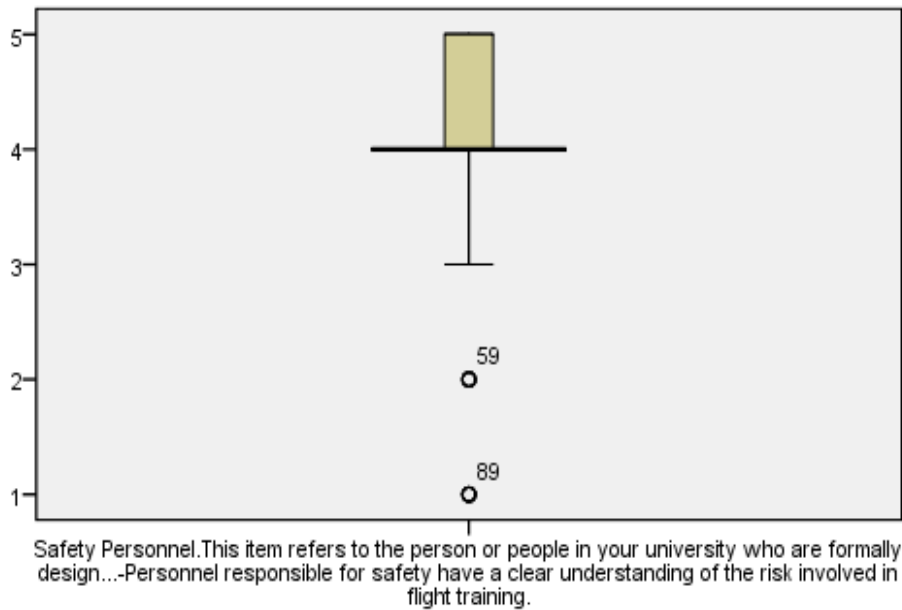


Figure 19. Boxplot of responses to ‘personnel responsible for safety have a clear understanding of risk in flight training’

Even though, the mean response was above the midpoint of (3), there are indications, that some respondents had a perception that safety personnel had little or no

authority compared to operational personnel. The response for this statement yielded the least mean ($M= 3.75$, $SD= 1.72$). Figures 20 and 21 shows the histogram and box plot of the responses respectively.

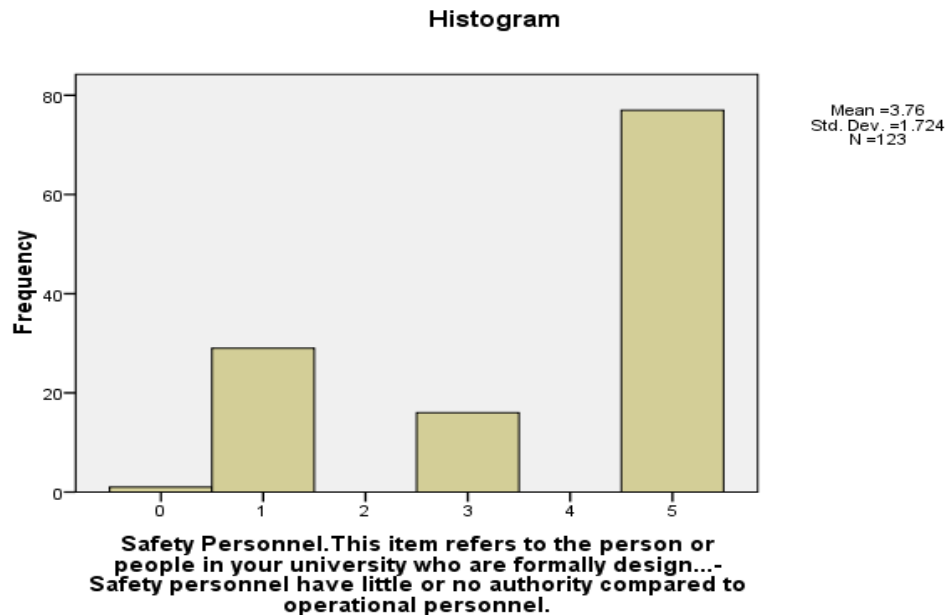


Figure 20. Histogram of responses to ‘Safety personnel have little or no authority compared to operational personnel.’

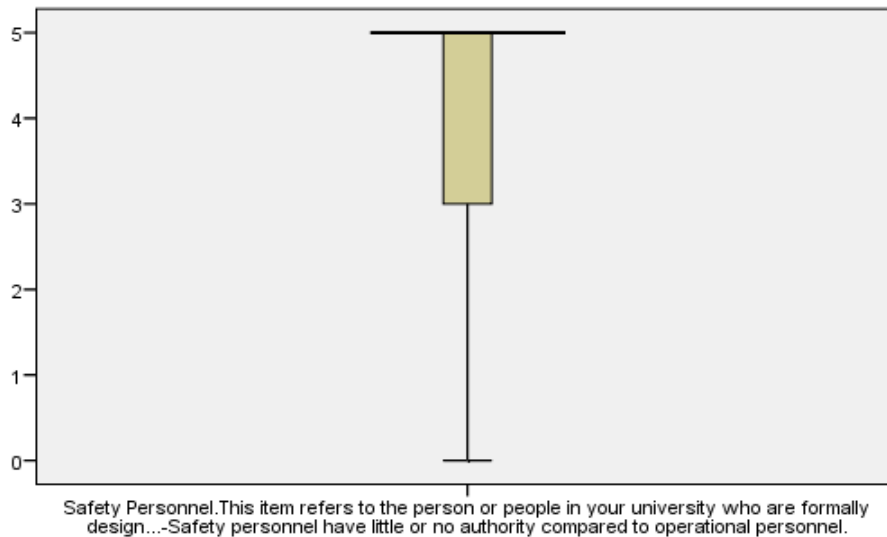


Figure 21. Box plot of responses to ‘Safety personnel have little or no authority compared to operational personnel.’

Informal Safety Scale Indicator

Ninety three (93) responses were excluded by the SPSS software, representing 39.7% of submitted responses and the useable responses (N= 135) was 60.3 %. The mean (M= 3.30, SD = 0.36) was also above the neutral point of 3 on the 5 point Likert scale. This showed a favorable perception of respondents to the informal safety program of the university. The Informal Safety (IS) had three sub-scales namely Accountability/Just Culture, Pilot Authority and Professionalism.

Accountability/Just Culture

The sub-scale had five items and the highest mean perception of respondents was on the item ‘Standards of accountability are consistently applied to all pilots in the university’ (M=3.78, SD=1.82). This shows that respondents generally had a good perception on the item. The respondents however had a rather poor perception about the item ‘University management shows favoritism to certain pilots’ (M= 2.87, SD= 1.82). This shows a lingering perception that some level of favoritism occurs. Figures (22, 23) show the Histogram and Box plot of the item respectively.

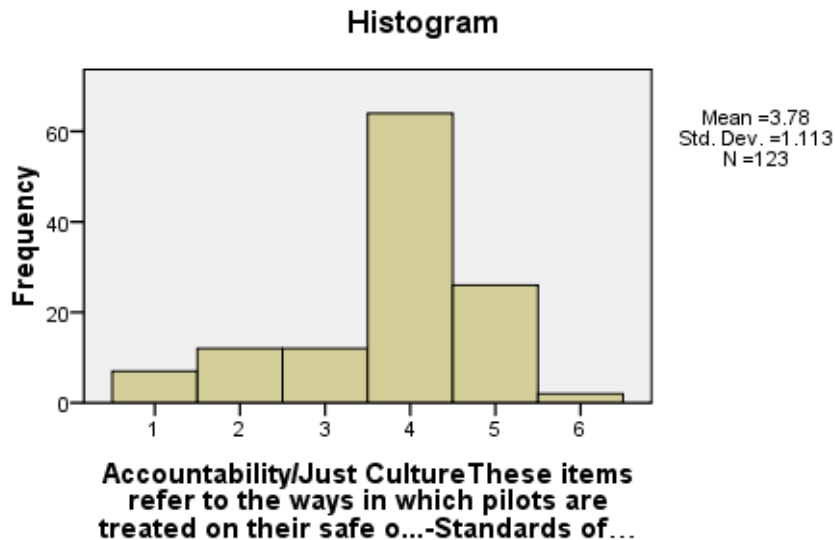


Figure 22. Histogram of ‘Standards of accountability are consistently applied to all pilots’.

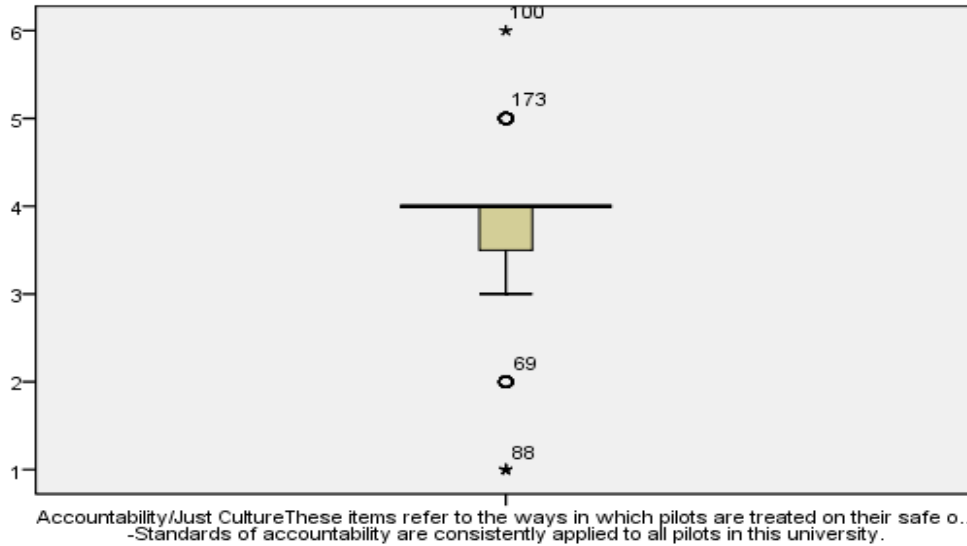


Figure 23. Box-Plot of ‘Standards of accountability are consistently applied to all pilots’.

Pilot Authority

The sub-scale (N= 123) had five items and the item with the highest mean was ‘Pilots have little real authority to make decision that affect safety of normal flight operations’ (M= 3.50, SD= 1.87) .This shows that generally there was a perception that respondents had real authority to make decisions that affect safety of normal flight. Figures (24, 25) show the histogram and box-plot of the responses in this sub-scale.

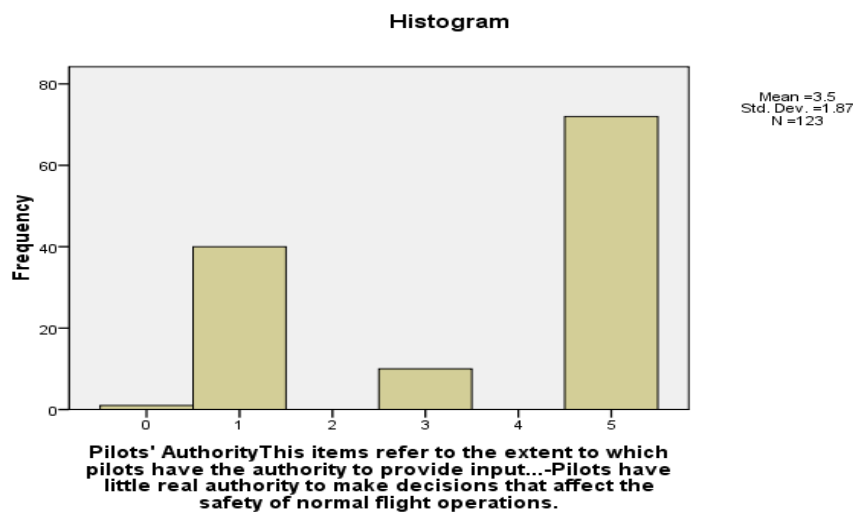


Figure 24. Histogram of ‘pilots have little real authority to make decisions that affect the safety of flight’.

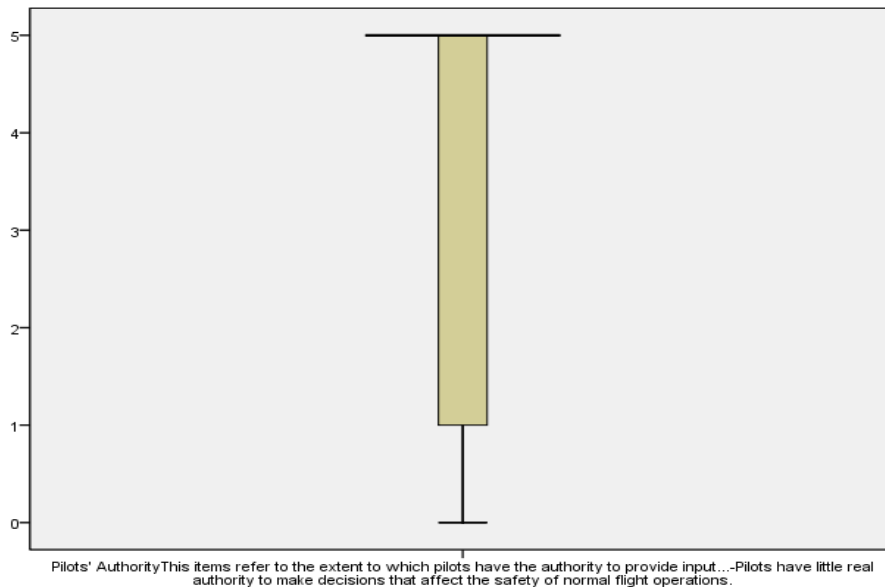


Figure 25. Box-plot of ‘pilots have little real authority to make decisions that affect the safety of flight’.

Respondents were however strong in their perception that ‘Pilots are seldom asked for input, when university aviation procedures are developed or changed’ ($M=2.61$, $SD= 1.76$) by agreeing to the item. This shows how they perceive their role in review and change of operations procedures. This was the lowest mean in this sub-scale. Figures (26, 27) show the histogram and box-plot of the item.

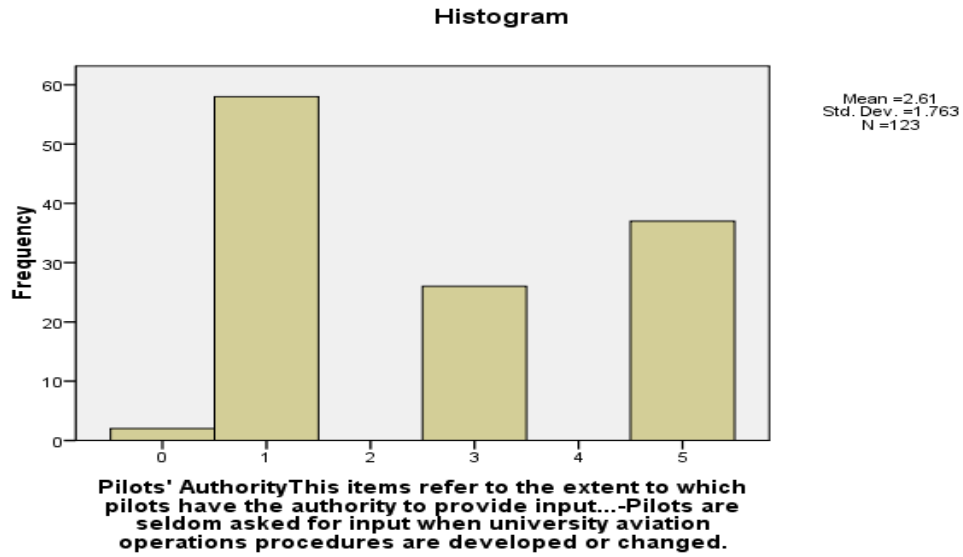


Figure 26. Histogram of 'Pilots are seldom asked for input, when university aviation procedures are developed'.

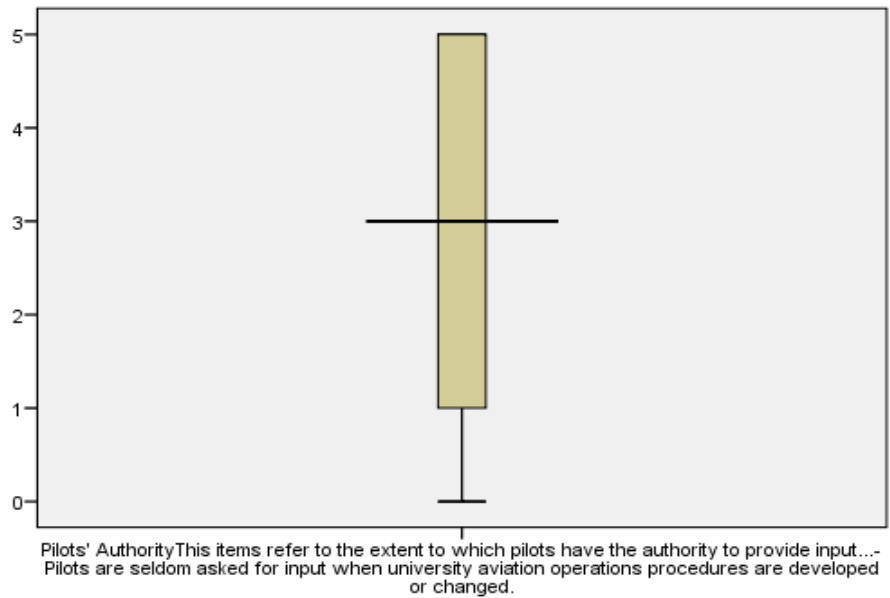


Figure 27. Box-plot of 'Pilots are seldom asked for input, when university aviation procedures are developed'.

Professionalism

The sub-scale of Professionalism had five items and the item ‘pilots who do not fly safely quickly develop a negative reputation among other pilots’ had the highest mean (M= 3.71, SD= 1.04). This consolidates the perception that respondents don’t compromise unsafe acts and actions detrimental to safety of flight. Figures (28, 29) show the histogram and box plot of the responses to the item. This is one item that shows the level of peer to peer influence over the safety behavior and personal risk assessment of individual pilots. It consolidates the organizational safety culture and how far it has been imbibed by personnel.

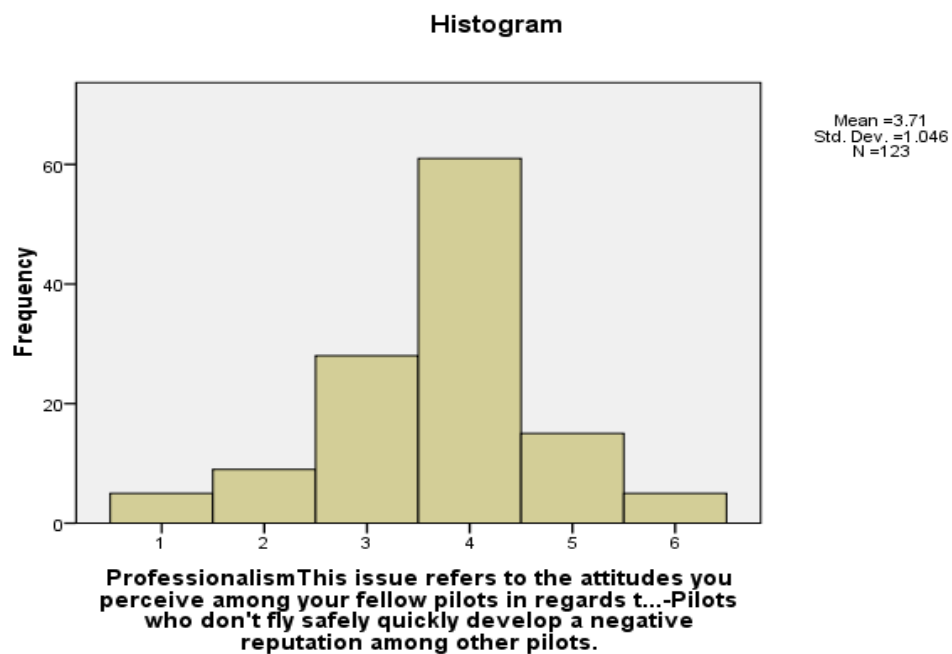


Figure 28. Histogram of ‘Pilots who don’t fly safely quickly develop a negative reputation among other pilots’.

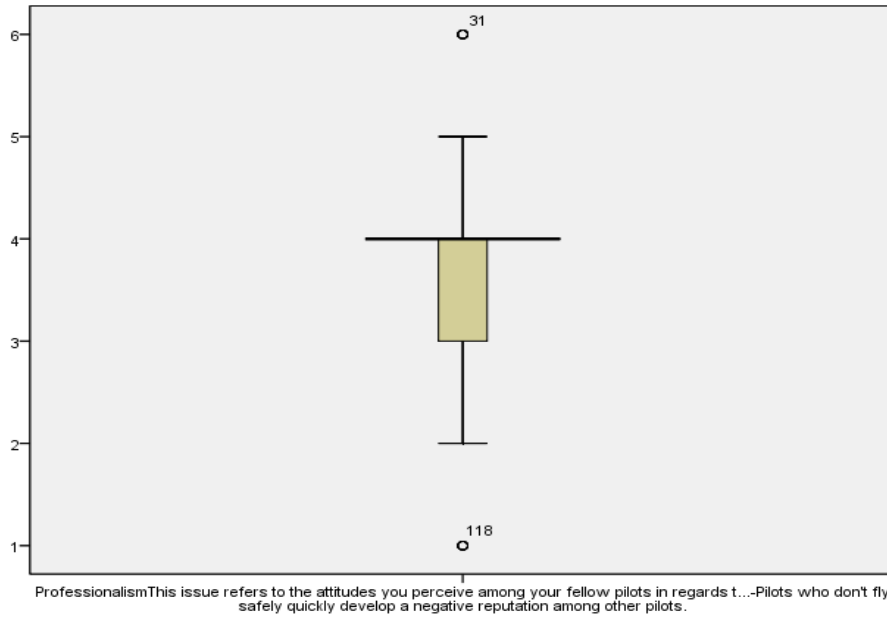


Figure 29. Box-Plot of ‘Pilots who don’t fly safely quickly develop a negative reputation among other pilots’.

The item ‘Pilots never cut corners or compromise safety regardless of the operational pressure to do so’ had the lowest mean ($M=2.77$, $SD= 1.17$). There was however a strong perception that pilots will cut corners and compromise safety when under operational pressure to do so. Figure 30 and 31 shows the histogram and box-plot of the items.

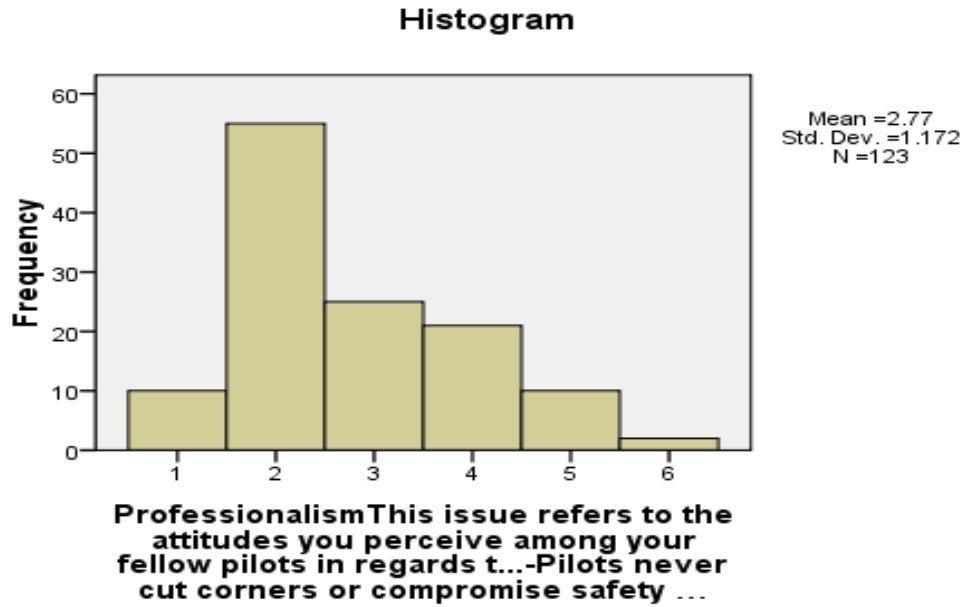


Figure 30. Histogram of 'Pilots never cut corners or compromise safety regardless of pressure to do so'

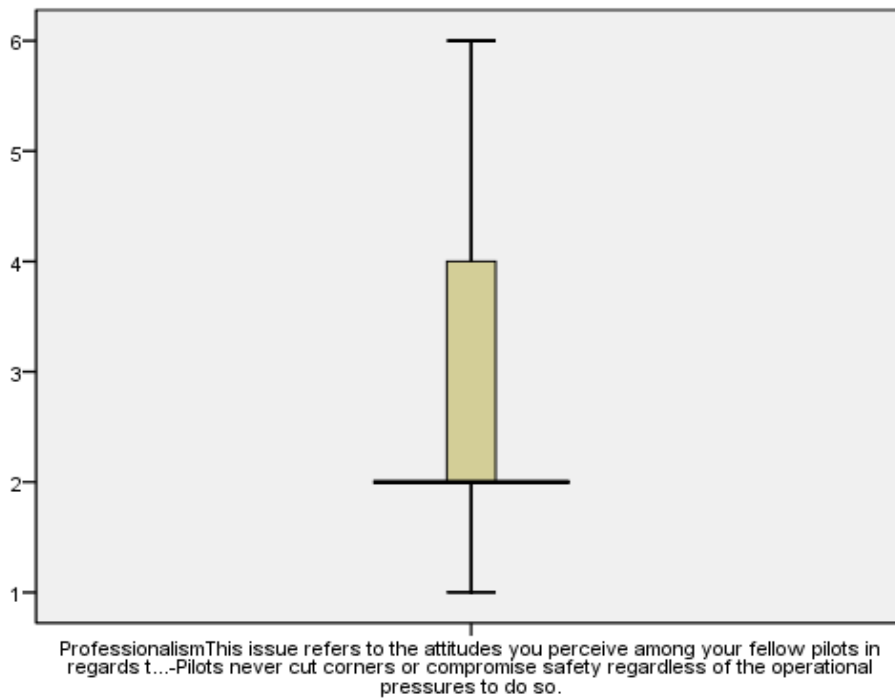


Figure 31. Box-Plot of 'Pilots never cut corners or compromise safety regardless of pressure to do so'

Operations Interaction Scale Indicator

The total responses for this section was (N=135) representing 57.7 % of useable responses.93 responses representing 42.3% were excluded by the SPSS software due to missing data components. The mean value for the perception of respondents was (M=3.30, SD =0 .71).This mean was above the neutral point of 3 on the 5 point Likert scale used. The result shows a fairly good perception of the operational interaction scale indicator of the university’s flight program. The scale had four sub-scales namely, Supervisor of flight/Chief CFI/Lead CFI, Dispatch, Instructor/Trainers and Ramp Operations.

Supervisor of flight/Chief CFI/Lead CFI

This sub-scale (N=123) had five items and respondents had high perception that ‘SoF/Chief CFI/Lead CFI has a clear understanding of the risk associated with flight operations’. The item had the highest mean (M=4.13, SD= 0.96).Figures 32 and 33 shows the responses for this item.

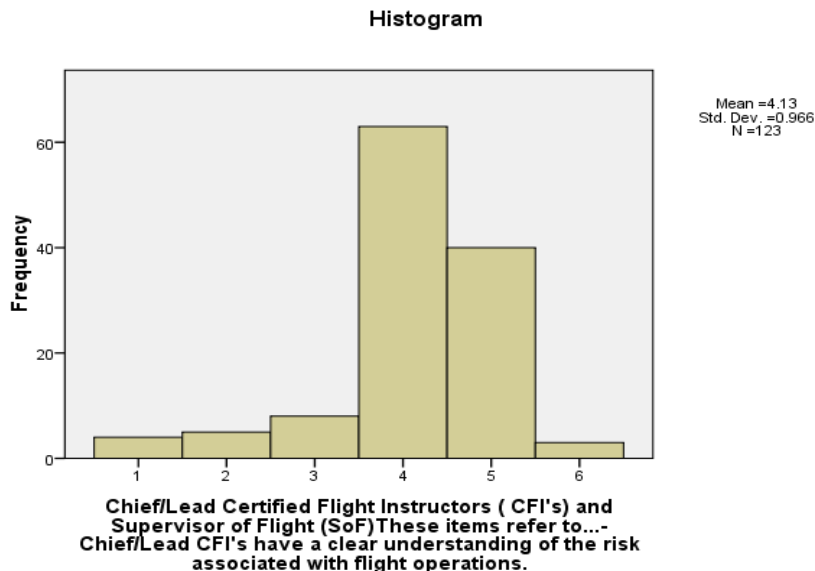


Figure 32.Histogram of ‘Chief/Lead CFI/SoF have a clear understanding of the risk associated with flight’

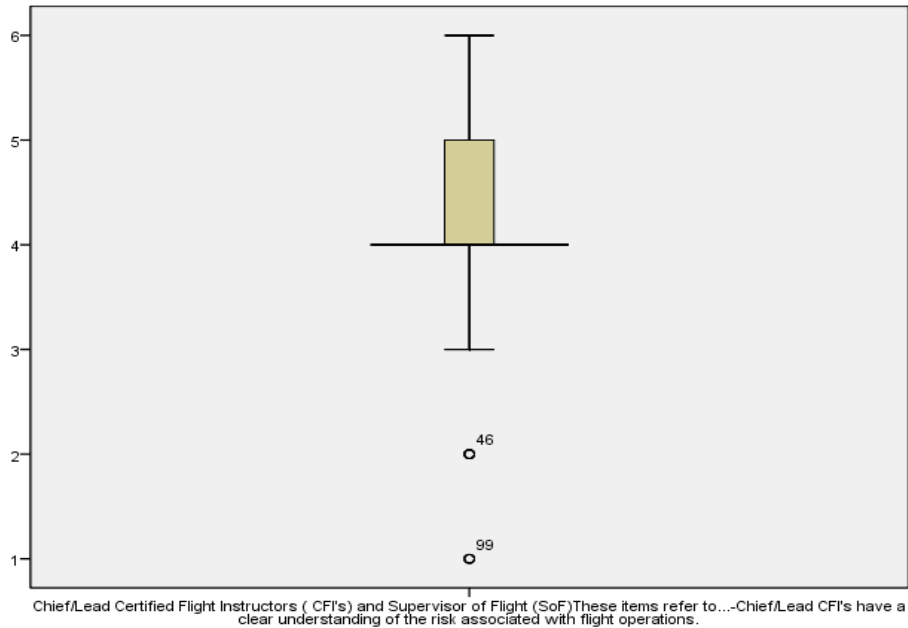


Figure 33. Box-Plot of 'Chief/Lead CFI/SoF have a clear understanding of the risk associated with flight'

There was a high perception that pilots reported their safety concerns to their CFI and Lead CFI rather than the safety department. This was evident in the evident in the low mean for this item ($M= 2.17$, $SD= 1.53$). This was one of the items that were reverse coded. Figures34 and 35 shows the histogram and box-plot of this item.

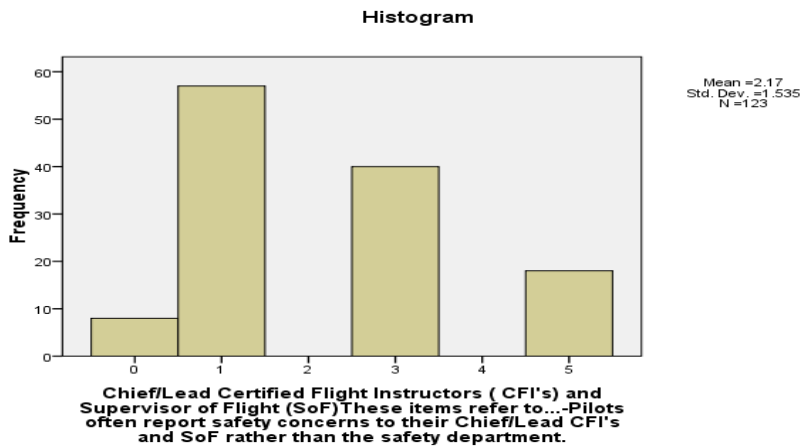


Figure 34. Histogram of 'Pilots often report safety concerns to their Chief/lead CFI/SoF than the safety department'.

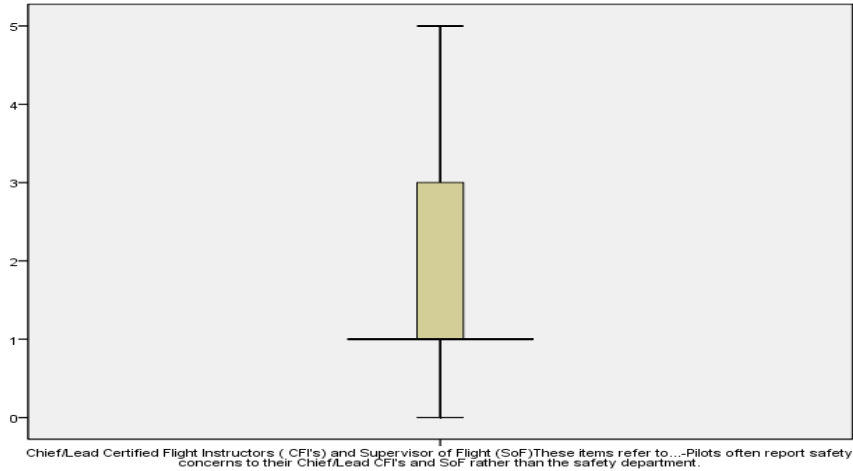


Figure 35. Box-plot of 'Pilots often report safety concerns to their Chief/lead CFI/SoF than the safety department'.

Dispatch

The sub-scale had four items and gave the perception of respondents to the activities of flight dispatch. The highest mean was for the item 'Dispatch is responsive to pilots concern about safety' (M= 3.90, SD= 1.13).The item shows a positive perception of the operations of dispatch. Figures (36, 37) show the histogram and box-plot of the item.

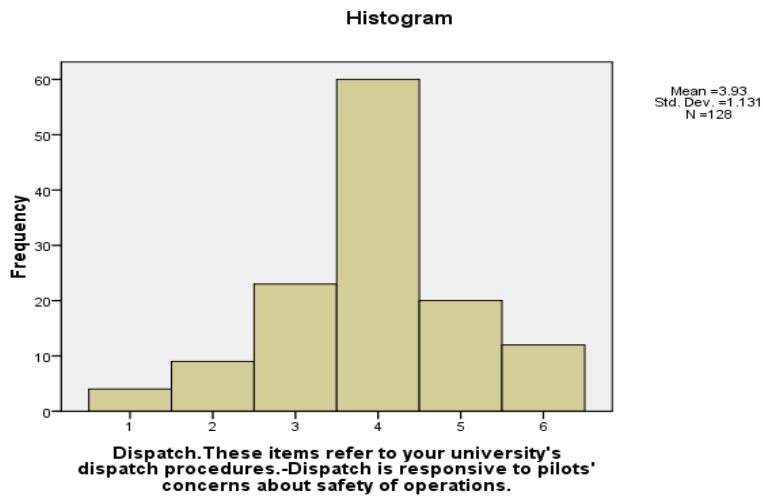


Figure 36. Histogram of 'Dispatch is responsive to pilots concern about safety of operations'.

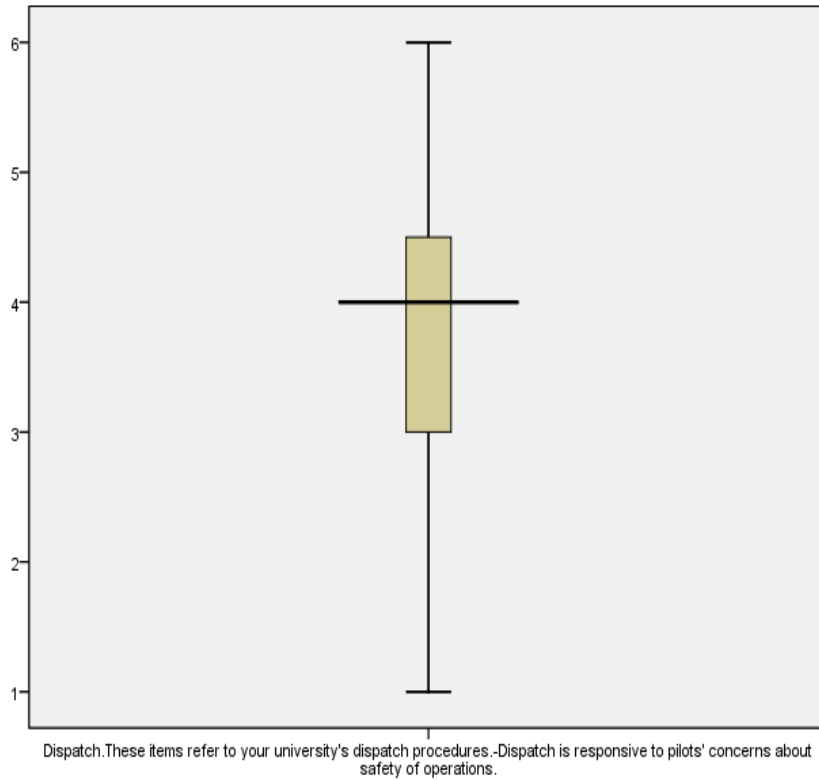


Figure 37. Box-Plot of 'Dispatch is responsive to pilots' concern about safety of operations'.

The lowest mean for this sub-scale (N= 128) also showed a good perception of dispatch procedures. The item 'Dispatch would rather take a chance with safety than cancel a flight' (M= 3.62, SD= 1.81) showed that respondents generally had a perceived confidence in the dispatch procedures, since this was one of the reverse coded items.

Figures (39, 40) show the histogram and box-plot of the item respectively.

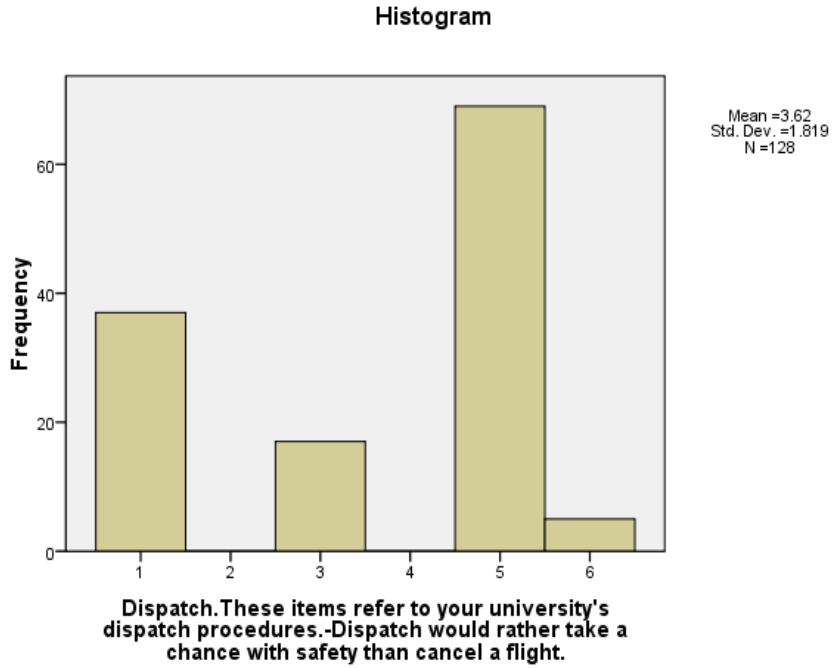


Figure 38. Histogram of 'Dispatch would rather take a chance with safety than cancel a flight'

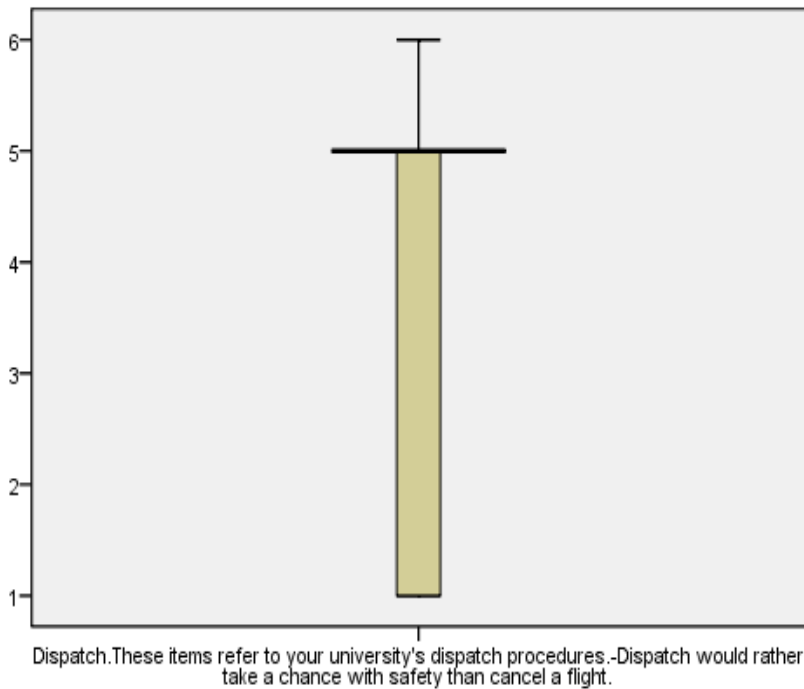


Figure 39. Box-Plot of 'Dispatch would rather take a chance with safety than cancel a flight'

Instructor/Trainers

The sub-scale (N= 128) had four items and all items were above the neutral point (3) on the 5 point Likert scale used. The sub-scale was an overview of the perception of respondents on the trainers and instructors in the flight program of the university. There was a very good perception that these trainers and instructors consistently emphasized safety during training at the university. ‘Safety is consistently emphasized during training at my university’ (M = 4.23, SD= 0.87). Figures (40, 41) show the histogram and box-plot of the item respectively.

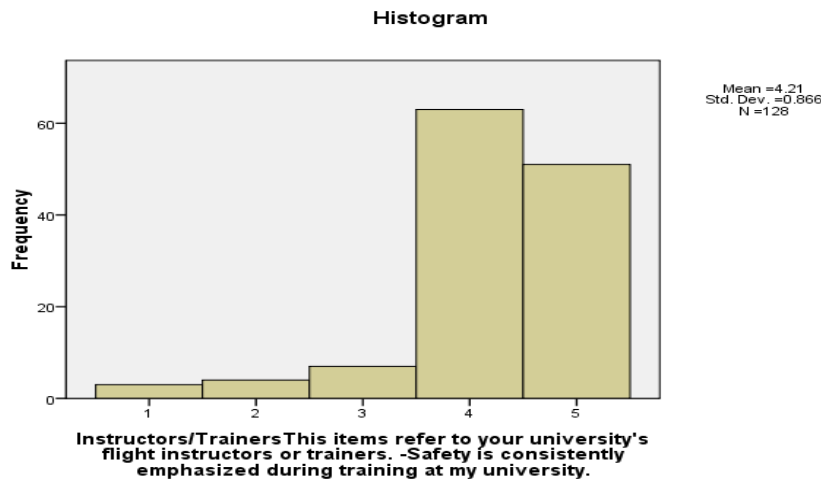


Figure 40. Histogram of ‘Safety is consistently emphasized during training at my university’.

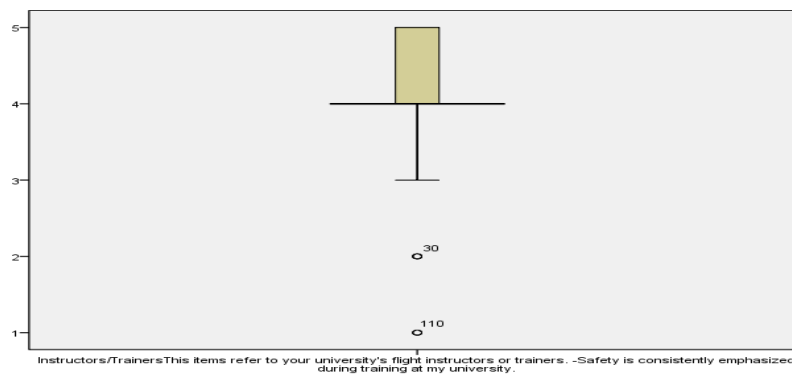


Figure 41. Box-Plot of ‘Safety is consistently emphasized during training at my university’

The least value for this sub-scale was ‘Instructors and trainers teach shortcut and ways to get around safety requirements’ (M= 3.66, SD= 1.75), which was a good perception. Figures (42, 43) show the histogram and box-plot respectively of the item.

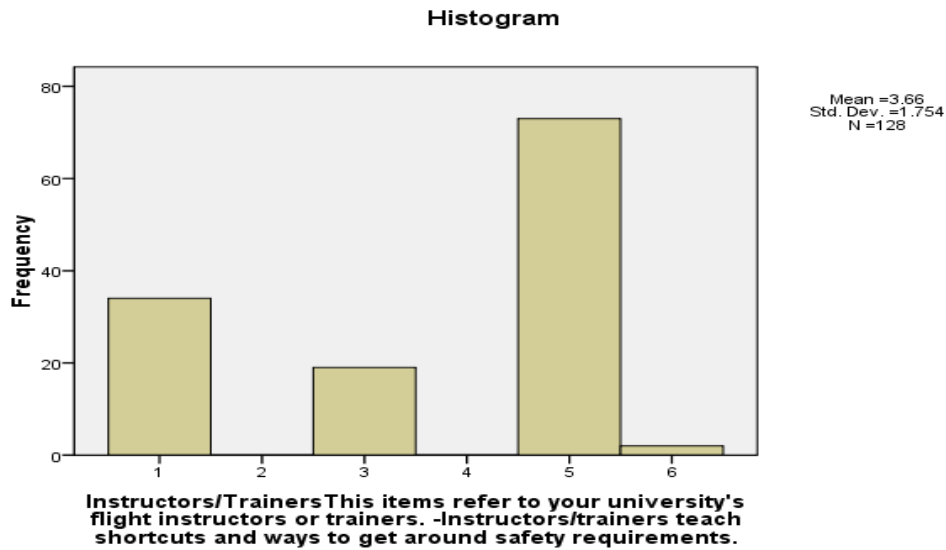


Figure 42. Histogram of ‘Instructors/trainers teach shortcuts and ways to get around safety requirement’

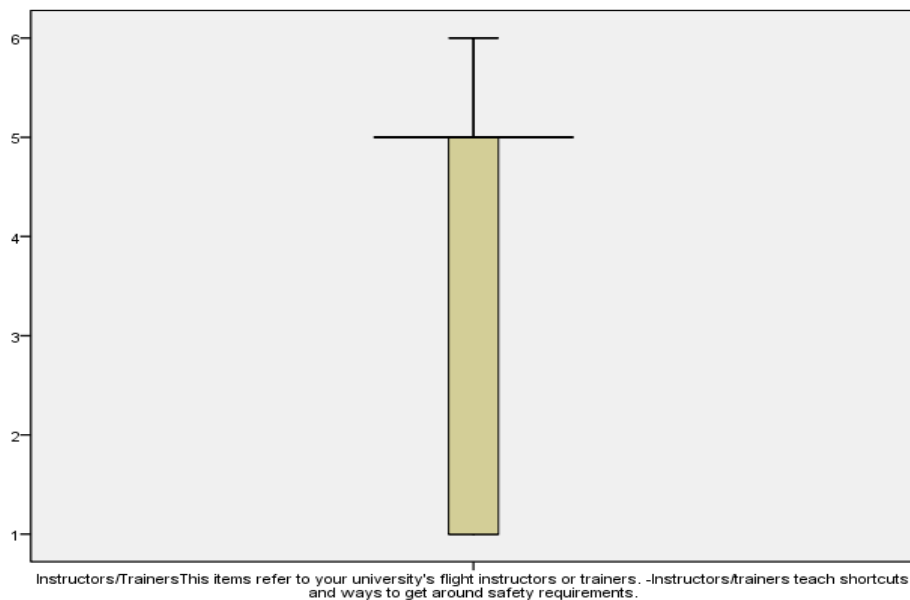


Figure 43. Box-Plot of ‘Instructors/trainers teach shortcuts and ways to get around safety requirement’

Ramp Operations

This sub-scale (N= 128) had six items and all the items scored above the neutral point (3) on the 5 point Likert scale used. The sub-scale highlighted the role of ramp personnel and activities in the flight program. Respondents had a very good perception about the activities of ramp personnel. The item ‘Ramp personnel are careful about positioning of equipment (e.g. fuel truck, power carts) that poses potential safety hazards (M= 4.09, SD= 0.86) had the highest mean and shows the perceived confidence that respondents have in ramp operators. Figures (44, 45) show the histogram and box-plot of the item respectively.

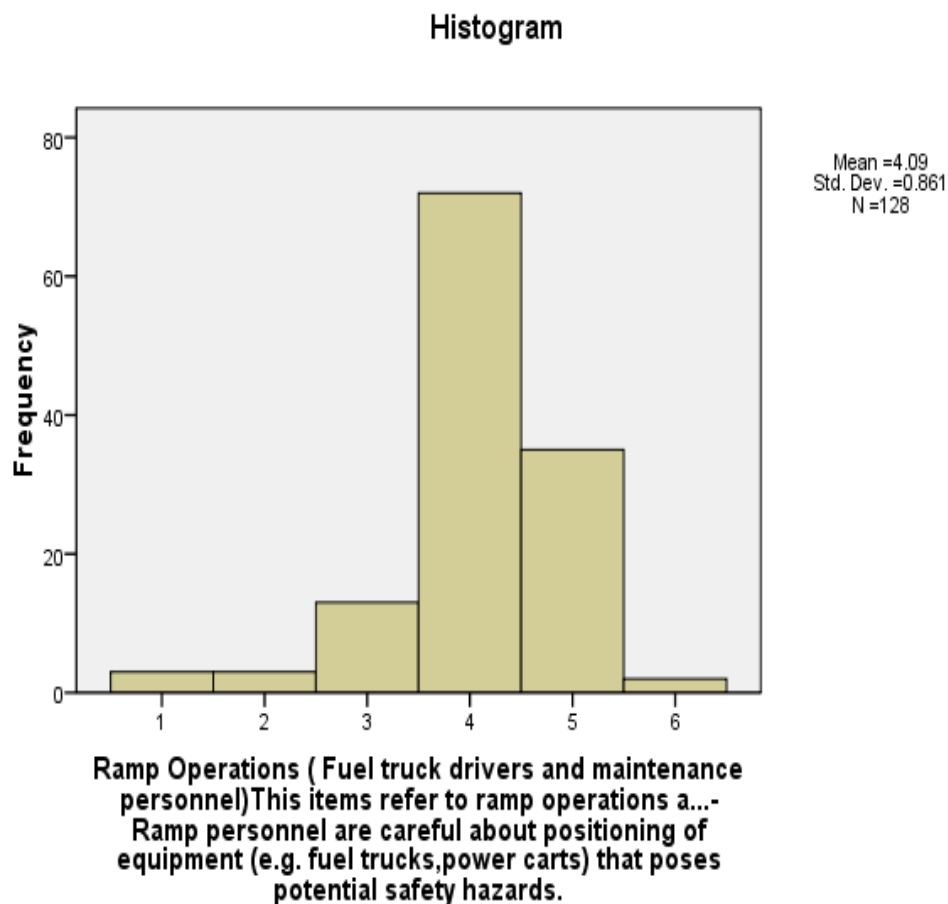


Figure 44. Histogram of ‘Ramp personnel are careful about positioning of equipment’

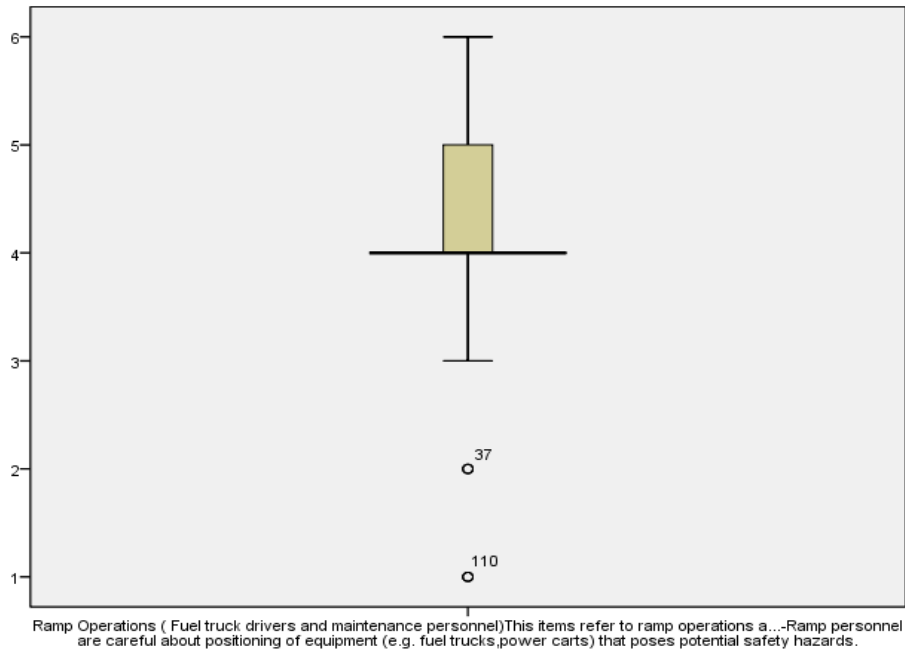


Figure 45. Box-Plot of ‘Ramp personnel are careful about positioning of equipment’

The lowest mean for this sub-scale was the item ‘Lack of communication between pilots and ramp personnel frequently lead to incidents at the flight line’ (M=3.78, SD=1.75) and Figures (47, 48) shows the histogram and box-plots of the item.

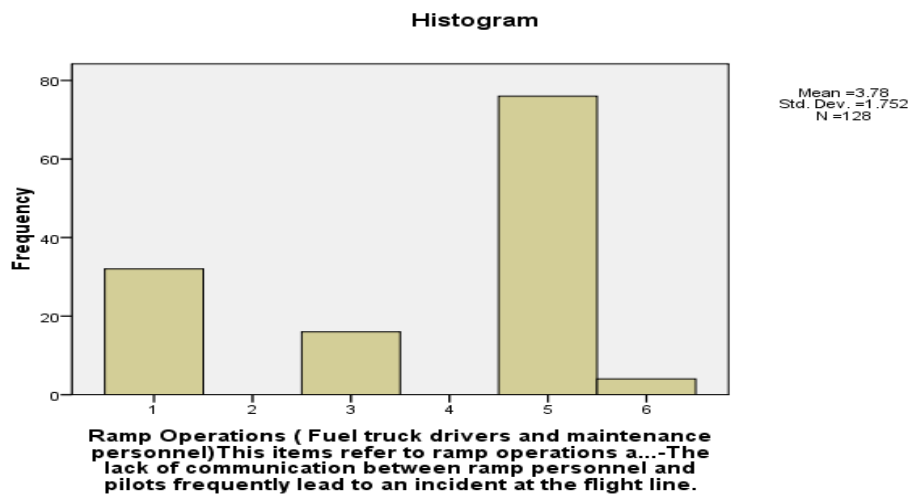


Figure 46. Histogram of ‘The lack of communication between ramp personnel and pilots contribute to incidents.’

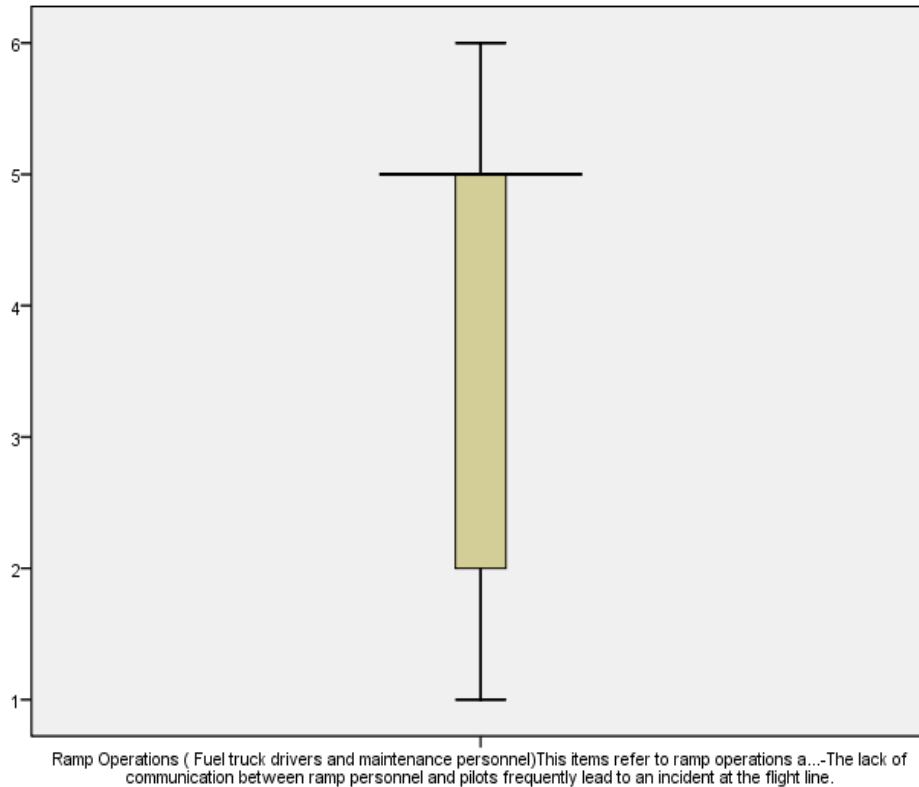


Figure 47. Box-Plot of ‘The lack of communication between ramp personnel and pilots contribute to incidents.’

Organizational Commitment Scale Indicator

A total of 133 responses were useable and 101 responses were excluded by the SPSS software from this scale. The mean value ($M = 3.60$, $SD = 0.73$) was also above the neutral point on the 5 point Likert scale used. This scale had five sub-scales namely safety values, safety fundamentals and Going beyond compliance.

Safety Values

The sub-scale Safety Values looked at the core values of safety in the university flight program. There were five items and the perception of respondents on item ‘Safety is a core value in my university’s scored the highest mean ($M = 4.46$, $SD = 0.87$). This shows a high level of perceived confidence in the university’s safety values by

respondents. Overall all items in this sub-scale scored above the neutral point of 3. Figures (48, 49) show the histogram and box plot of the item.

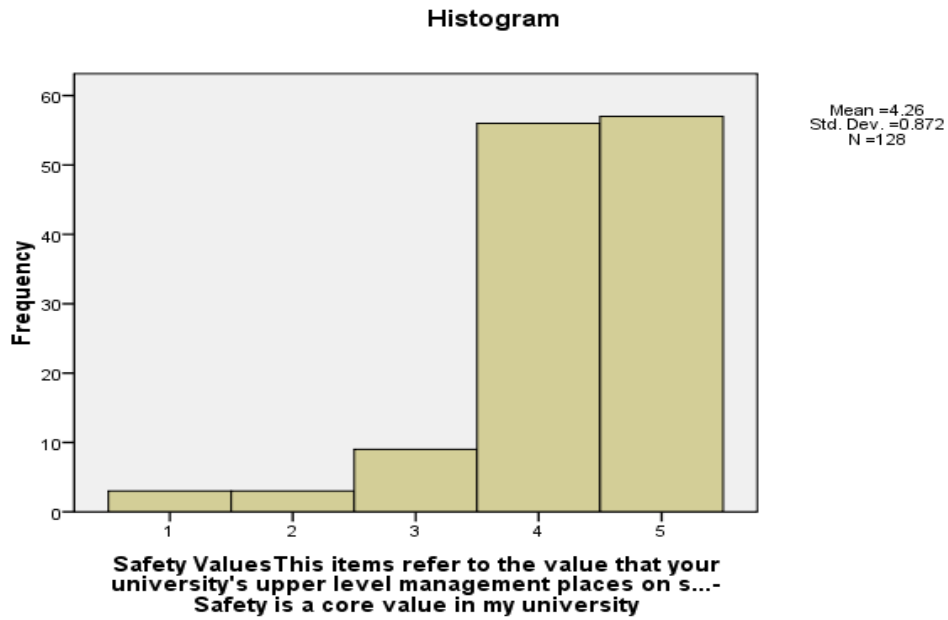


Figure 48. Histogram of 'Safety is a core value in my university'

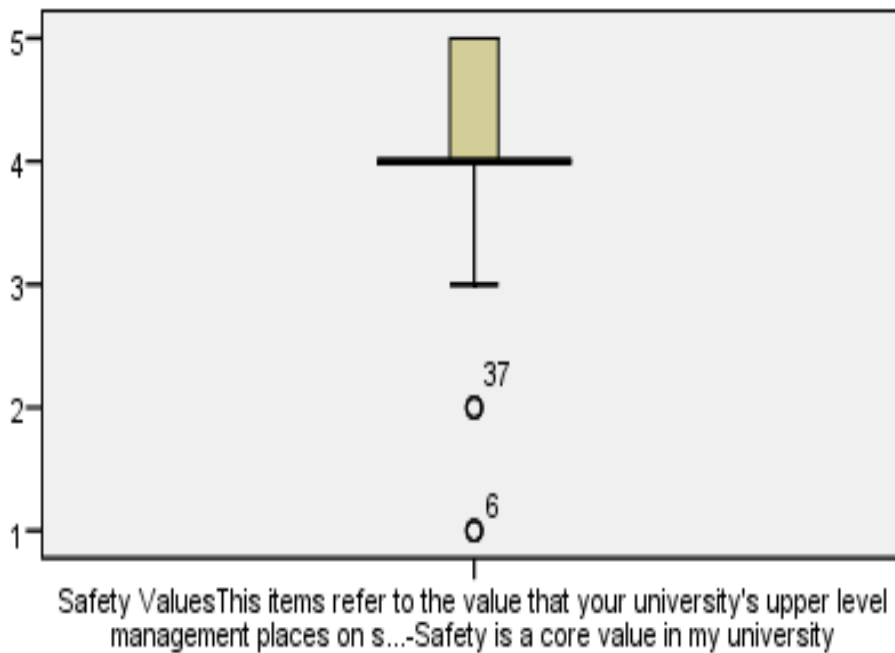


Figure 49. Box-Plot of 'Safety is a core value in my university'

The lowest mean was on the item ‘Management expects pilots to push for on time performance, even if it means compromising safety’ (M= 3.34, SD = 1.76). Since the mean response is closer to the neutral point, there are indication that some respondents perceive that there are times when management push pilots for on time performance, even if it will affect safety. Figures (50, 52) show the histogram and box-plot of the item.

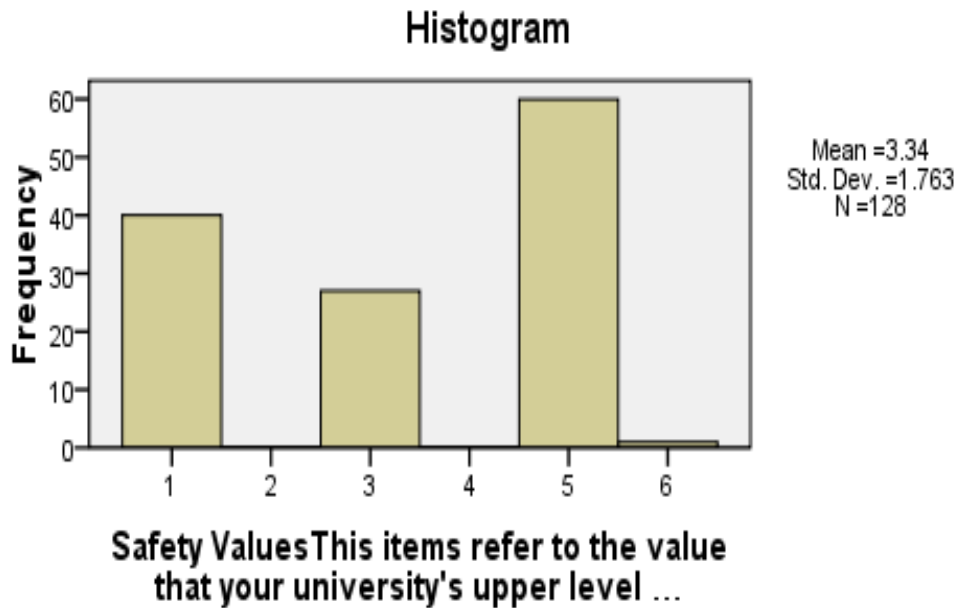


Figure 50. Histogram of ‘Management expects pilots to push for on time performance’

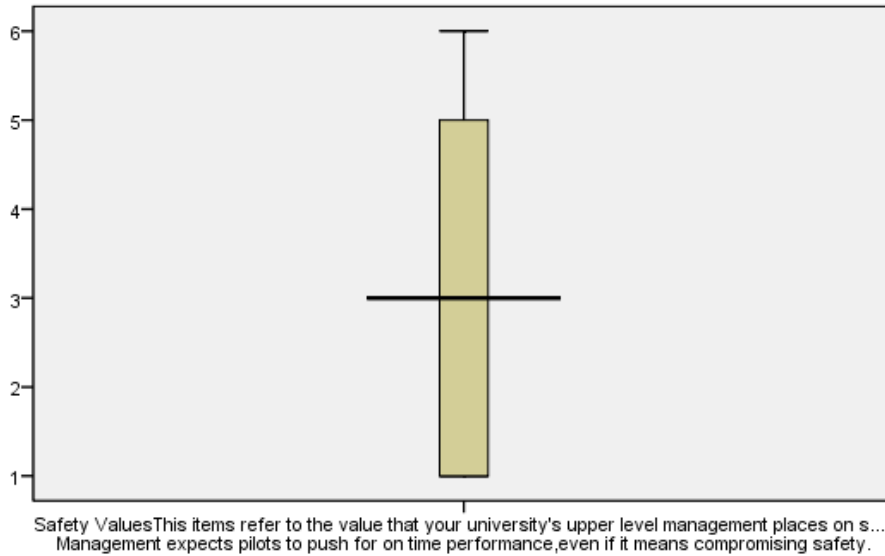


Figure 51. Box-Plot of 'Management expects pilots to push for on time performance'

Safety Fundamentals

The sub-scale (N= 128) had five items and all of them scored above the neutral point of 3. The highest mean of the items was the perception about 'My university ensures that maintenance on aircraft are adequately performed and the aircraft is safe to operate' (M = 4.42, SD = 0.84). This shows a very good perception about the maintenance and safety of university aircraft for flight operations. Figures (52, 53) outline the histogram and box-plot of the item.

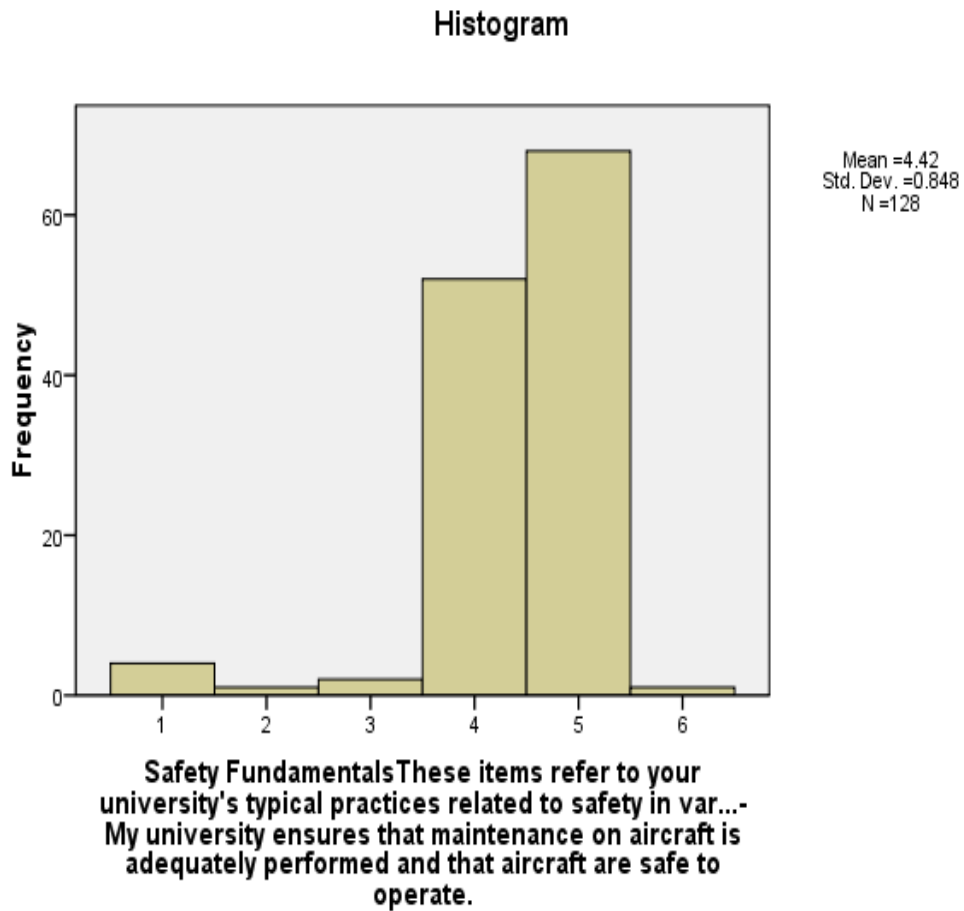


Figure 52. Histogram of 'My University ensures that maintenance on aircraft is adequately performed'

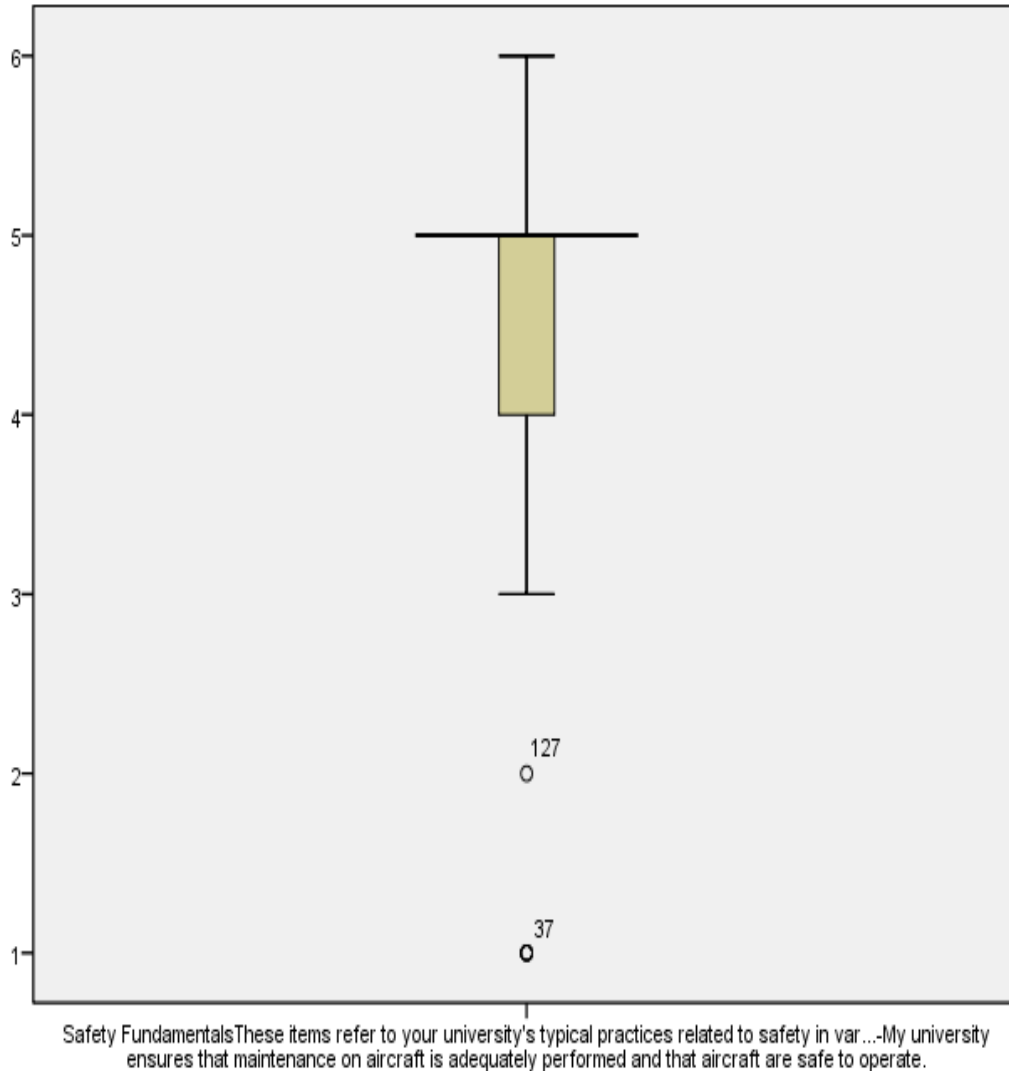


Figure 53. Box-Plot of 'My University ensures that maintenance on aircraft is adequately performed'

The lowest mean for the sub-scale was on the item 'Checklist and procedures are easy to understand' ($M= 3.95$, $SD = 0.96$). The item also show that perception that some respondents had problem understanding the checklist and procedures of the university.

Figures (54, 55) show the histogram and box-plot of the item.

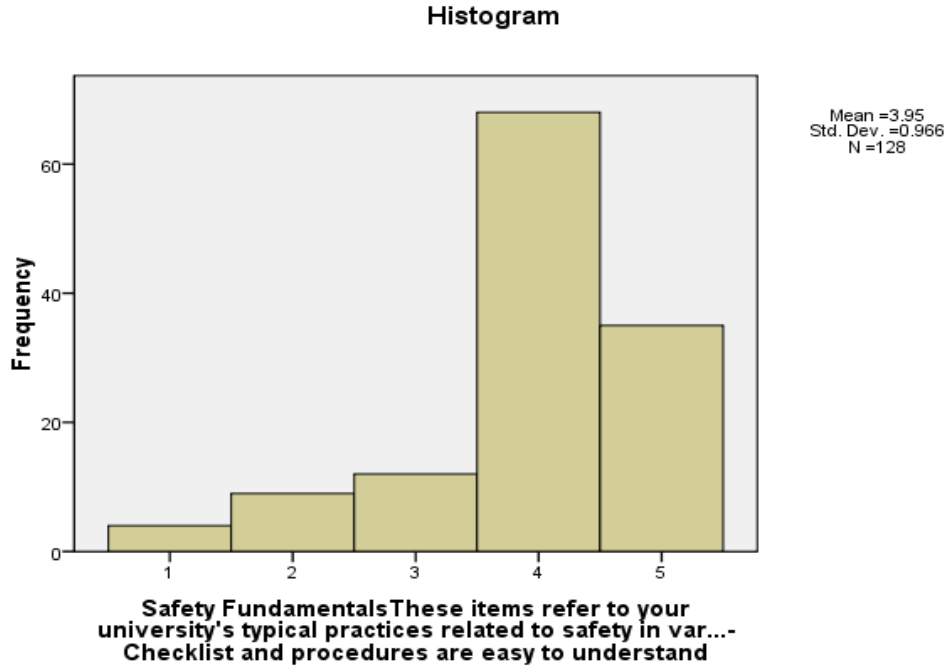


Figure 54. Histogram of 'Checklist and procedures are easy to understand'



Figure 55. Box-Plot of 'Checklist and procedures are easy to understand'

Going Beyond Compliance

The sub-scale Going beyond Compliance (N= 128) had four items and all of them scored above the neutral point of 3 on the perception scale. The item with the highest mean was ‘Management views regulations violations very seriously, even when they don’t result in any serious damage or injury’ (M= 4.02, SD = 1.01). Figures (56, 57) shows the Histogram and Box Plot of the item.

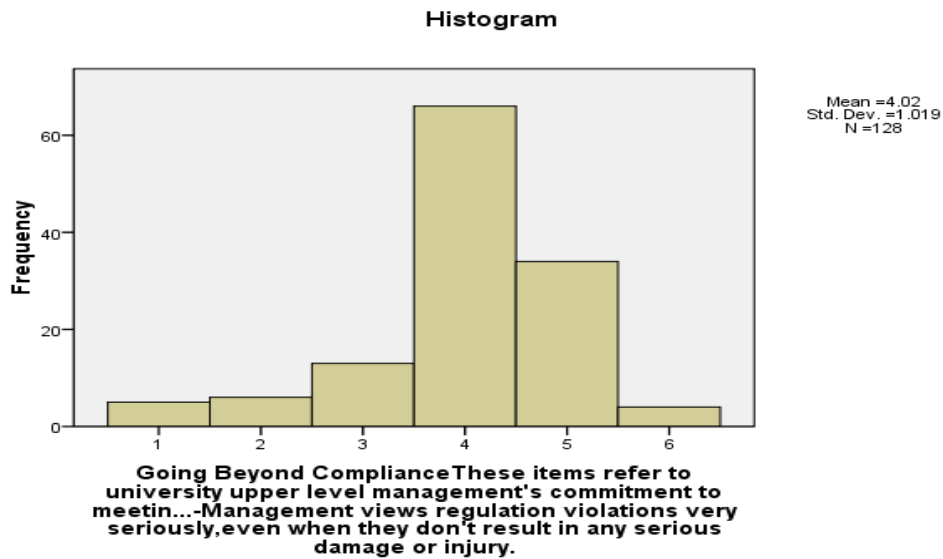


Figure 56. Histogram of ‘Management views regulation violations very seriously, even when they don’t result in any serious damage.’

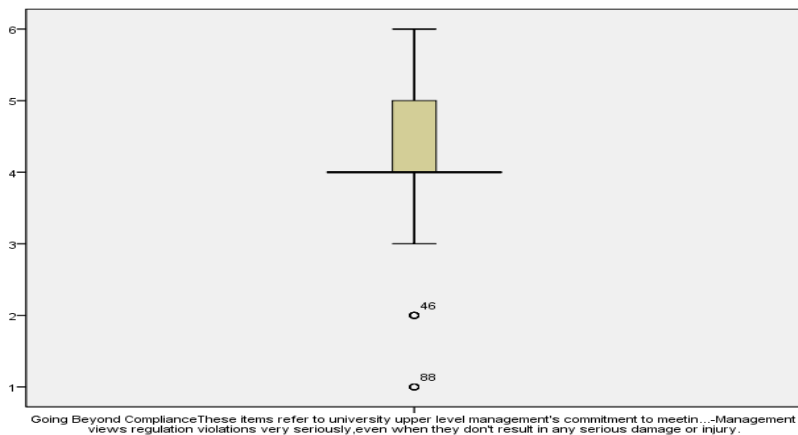


Figure 57. Box-Plot of ‘Management views regulation violations very seriously, even when they don’t result in any serious damage’

The item with the lowest mean was the perception of respondents on 'Management schedule CFI's as much as legally possible, with little concern for their sleep schedule or fatigue' (M= 3.23, SD= 1.80). This was interesting as it showed perception among some of the respondents that sleep schedule and fatigue to CFI's was compromised and a potential safety issue. Figures (58, 59) show the histogram and box-plot of the item.

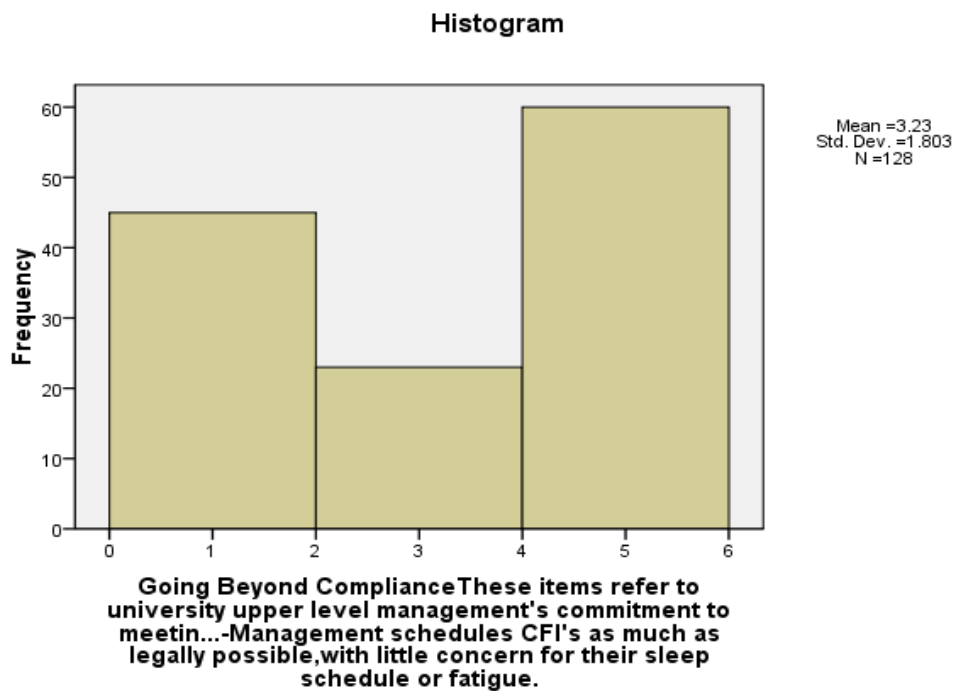


Figure 58. Histogram of 'Management schedule CFI's as much as legally possible '

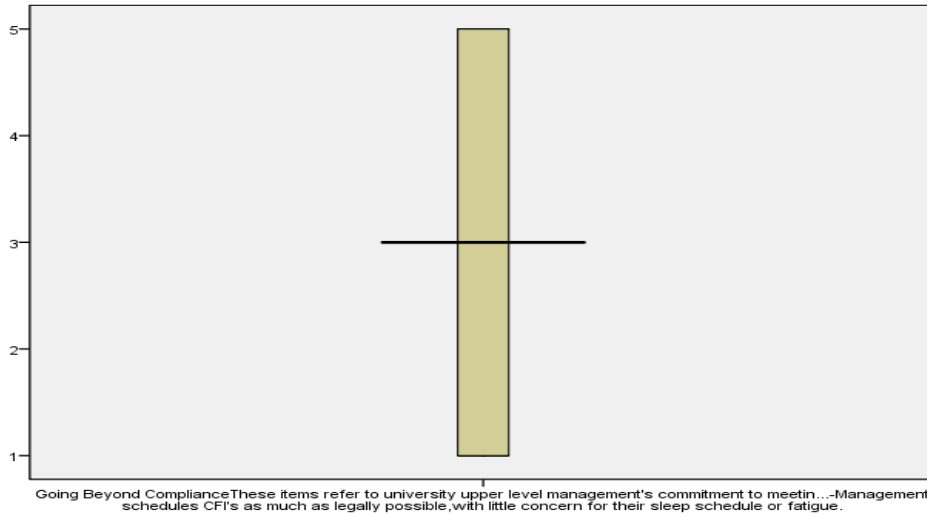


Figure 59. Box-Plot of 'Management schedule CFI's as much as legally possible'

University Safety Record

Respondents were asked about their general perception and forecast for the safety of flight operations at the university and figures 61, 62 and 63 shows their predictive perception on the safety of flight operations at the university. The results shows that generally there was a perception that within the next 12 months of flight operations at the university, there is a chance of an accident occurring and Table 9 and figures 60, 61 and 62 outlines the results of their perception. The perceptions on the likelihood of an accident (M=2.89, SD=1.23) was below the neutral point of 3 and indicates a negative perception.

The perception of respondents on the likelihood of an incident (M=2.42, SD=1.13) shows that there was a negative perception, that a major incident was likely to occur in the next twelve months. The perception that the flight program of the university would be cited for violations by the FAA (M=3.73, SD=1.20) showed that most respondents disagreed and perceived otherwise.

Table 9. University Safety Records.

Statistics

		University Safety Record ItemsThese items refer to your perception about the university's safety rec...- The university's flight department is likely to be involved in an accident over the next twelve months.	University Safety Record ItemsThese items refer to your perception about the university's safety rec...- The university's flight department is likely to be involved in an incident over the next twelve months.	University Safety Record ItemsThese items refer to your perception about the university's safety rec...- The university's flight department is likely to be cited by the FAA for a major safety violation over the next twelve months.
N	Valid	131	131	131
Mean		2.89	2.42	3.73
Std. Deviation		1.273	1.136	1.209

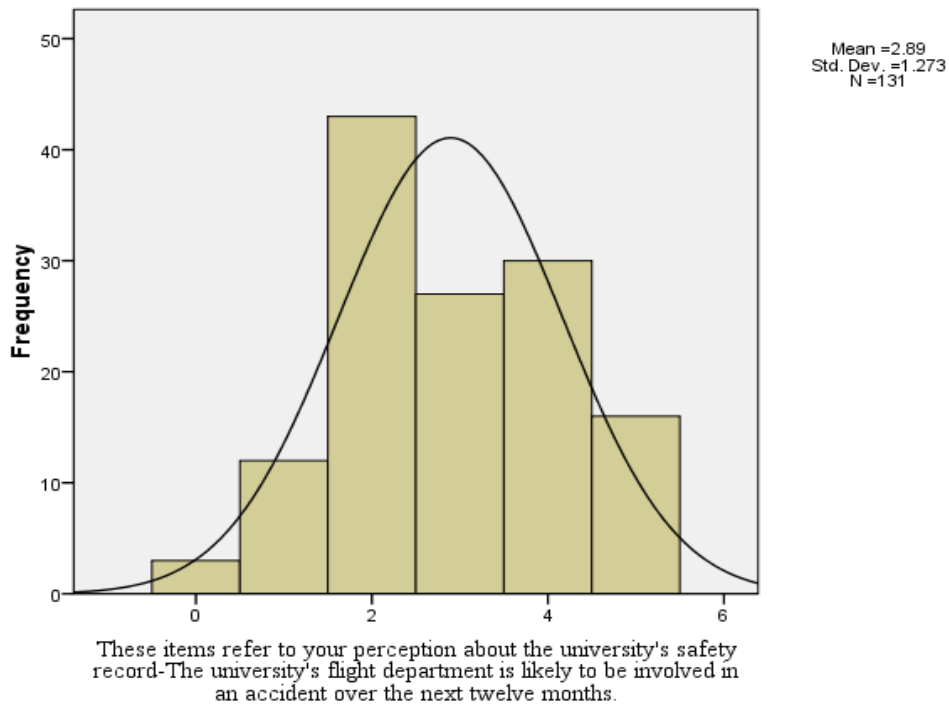


Figure 60. Histogram of 'likelihood of an accident in the flight program'.

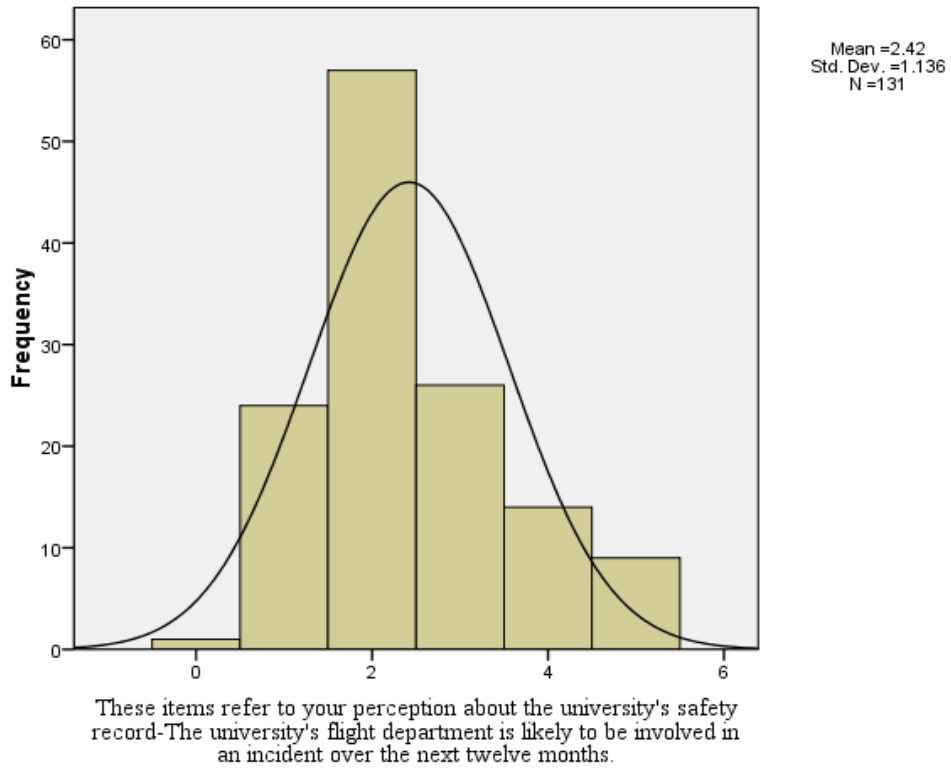


Figure 61. Histogram of 'likelihood of an incident in flight program'

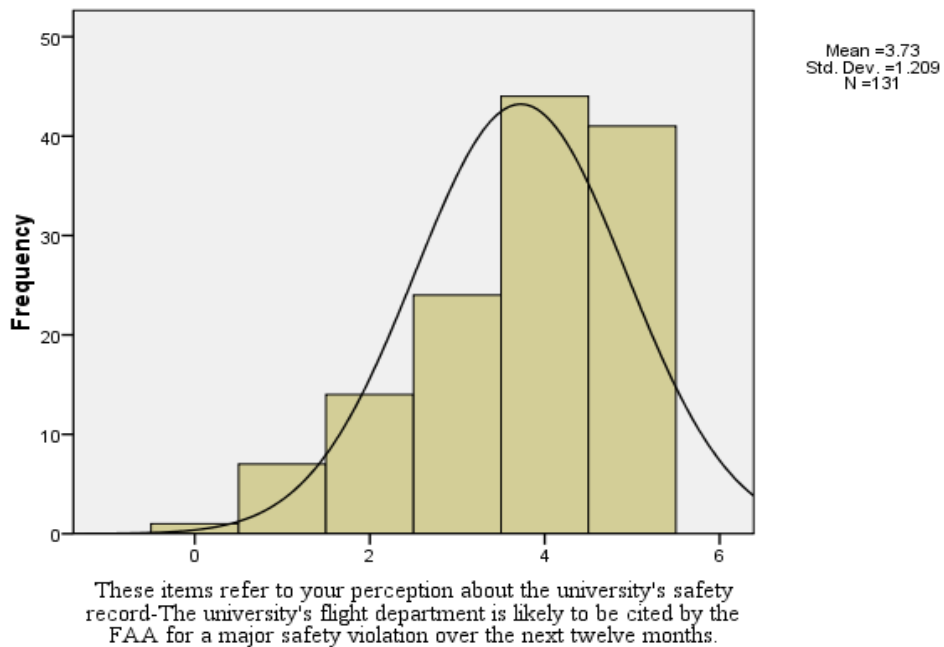


Figure 62. Histogram of 'likelihood of FAA citation'.

Research Results

Question One

What are the differences in perception among respondents [commercial flight students and certified flight instructors (CFIs)] on the status of the safety culture in an accredited four year collegiate aviation program?

An analysis of variance (ANOVA) was used to find if there were any significant differences in the mean responses of the participants on the safety culture of the flight program. A one way independent ANOVA and post –hoc (Games-Howell) analysis was used to find out which groups differ in their mean responses, since no specific hypothesis was generated before the research (Field, 2009). There was a significant difference in the mean responses of perception on the item ‘I feel like I am gambling with the safety of my aircraft every time, I go on a training activity’, $F(4,128) = 2.83$, $p < .05$ (2- tailed) which falls under the sub-scale of Ramp Operations and major scale of Operations Interaction. A post –hoc analysis (Games-Howell) revealed that there were significant differences between the mean responses of juniors and freshmen, $p < .05$ (2- tail).

The item ‘My university is committed to equipping aircraft with up to date technology’ under the sub-scale of Safety Fundamentals and scale of Organizational Commitment showed a significant differences in the mean responses of respondents, $F(4,126) = 3.02$, $p < .05$. A post –hoc analysis revealed significant differences in the mean responses between the juniors and freshmen, $p < .05$. The other item that showed significant differences in mean responses was ‘Management tries to get around safety requirements, whenever they get the chance’. The results was $F(4,125) = 3.22$, $p < .05$. Further post hoc analysis revealed that there was a significant differences in the

mean responses of juniors and freshmen, $p < .05$. Figure 61 shows simple bar graph with error bars highlighting the significant mean differences in mean of responses to their perception of the safety culture.

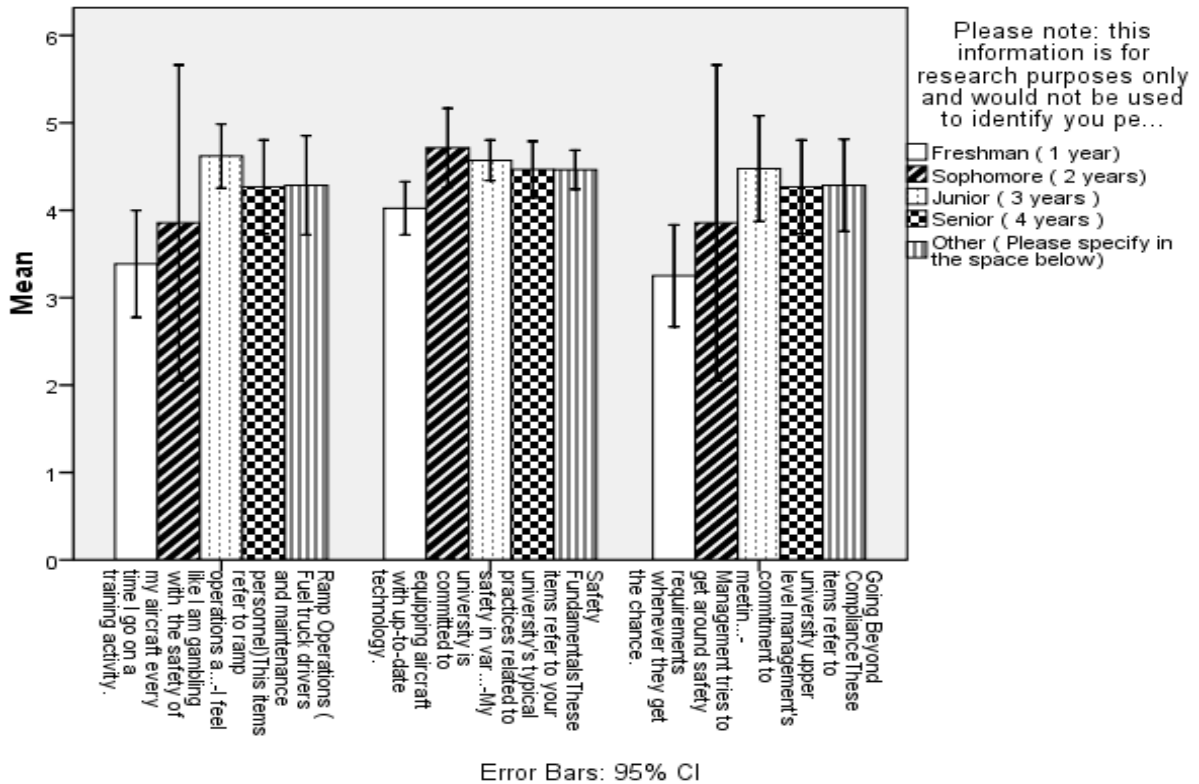


Figure 63. Simple bar graph of 'Mean perception of safety culture'.

Question Two

What are the differences between the perception of international contract students and indigenous US students on the status of the safety culture at an accredited four year collegiate aviation program?

An independent t-test was used to determine if there existed any significant differences in the mean perception of the two groups on the safety culture of the university's flight program. The variances in the samples were assumed roughly equal

and scores were independent. The mean perception on the status of the safety reporting system of the collegiate aviation program of resident US students ($M=4.27$, $SE = 0.23$) was better than the international contract students ($M= 3.77$, $SE =0.23$), when asked 'The safety reporting system is convenient and easy to use'. The responses were all above the neutral point of 3. The differences in the mean response was also significant $t(132) = -2.59$, $p < .05$.

Pilots do not bother reporting near misses or close calls, since this event does not cause any real damage'. The resident US students had a mean response of ($M=3.40$, $SE=0.18$) as compared to the international students who had ($M=2.49$, $SE= 0.27$). The difference was significant, $t(132) = 2.68$, $p < .05$. This shows that the contract students in their perception agreed with the item. The responses for the item 'Pilots are satisfied with the way, the university deals with safety reports' showed that the contract students ($M= 3.92$, $SE= 0.23$) had a more positive perception than the US students ($M= 3.37$, $SE= 0.11$), even though all of the mean responses were above the neutral point of 3.

The differences in their responses was significant, $t(132) = 2.35$, $p < .05$. However when the mean responses of their perception on the item 'University only keeps track of major safety problems and overlook routine ones' were compared, the resident US students ($M=3.92$, $SE=0.16$) disagreed with the item as against the international students ($M= 2.44$, $SE= 0.27$) who agreed with the item. The differences in their responses was significant, $t(132) = -4.78$, $p < .05$.

Generally there was a good perception on the item 'Personnel responsible for safety hold high status in the university'. The mean responses for the US students ($M=4.13$, $SE= 0.07$) was higher than the international students ($M=3.72$, $SE= 0.21$). The

difference in response was significant, $t(130) = -2.03, p < .05$. Both groups were in strong agreement with the item 'personnel responsible for safety have power to make changes'. The mean of responses for the US students ($M = 4.34, SE = 0.07$) was higher than the international students ($M = 3.71, SE = 0.21$). The difference in responses was significant, $t(130) = -3.45, p < .05$.

The two groups also agreed with the item 'Personnel responsible for safety have a clear understanding of the risk involved in flight'. The mean responses of the US students ($M = 4.31, SE = 0.09$) was higher than the international students ($M = 3.87, SE = 0.21$) and the differences in the mean responses was significant, $t(130) = -2.11, p < .05$. The item 'safety personnel have little or no authority compared to operational personnel' showed that while the US students ($M = 4.29, SE = 0.14$) disagreed with the item, the international students ($M = 2.03, SE = 0.27$) agreed with it. There was a significant difference in the mean of their responses, $t(128) = -6.63, p < .05$.

The item 'University management shows favoritism to certain pilots' showed that the perception of the US students ($M = 3.15, SE = 0.18$) were partially neutral, while the international students ($M = 2.03, SE = 0.27$) agreed with the item. The differences in response was significant, $t(128) = -3.28, p < .05$. The international students ($M = 2.35, SE = 0.28$) had a strong perception that 'When accidents and incidents happen, management always blame the pilot' as compared to the US students ($M = 3.39, SE = 0.17$) who partially disagreed with the item. The differences in their responses was significant, $t(128) = -3.12, p < .05$.

The two groups had a neutral perception that 'Pilots are actively involved in identifying and resolving safety concerns'. The responses of the US students ($M = 3.23,$

SE= 0.11) had a lower mean as compared to the international students (M=3.82, SE= 0.19). The differences in the mean responses for both groups was significant, $t(130) = 2.67, p < .05$. The international students (M= 2.26, SE = 0.28) had a strong perception that 'Pilots who call in sick or fatigue are scrutinized by the Supervisor of Flight or other flight management personnel', while the US students (M= 3.69, SE=0.18) disagreed with the item. The differences in their responses was significant, $t(130) = -4.25, p < .05$. The international students (M=2.53, SE=0.29) also had a strong perception that 'Pilots have little or no authority to make decisions, that affect the safety of normal flight operations'. The US students (M=3.45, SE=0.13) however disagreed with the item. The differences in their responses was significant $t(130) = -3.86, p < .05$.

The US students (M=2.88,SE= 0.12) disagreed with the item 'Pilots who are new and less senior are willing to speak up regarding flight safety issues', while the international students (M= 3.55,SE= 0.21) agreed. There was a significant difference in their responses $t(130) = 2.80, p < .05$. The US students (M=2.47,SE=0.09) however disagreed that 'Pilots, never cut corners or compromise safety, regardless of the operational pressures to do so' while the international students (M=3.55,SE= 0.21) agreed. There was a significant differences in their responses, $t(130) = 4.79, p < .05$.

The international students (M=2.59, SE=0.33) agreed with the item 'Chief/Lead CFI's and SoF are unavailable when pilots need help' while the US students (M=4.19, SE= 0.16) disagreed. The differences between their response was significant, $t(127) = -4.19, p < .05$. The international students (M=2.88,SE=0.32) had a perception that 'As long as there are no accidents or incidents, Chief/Lead CFI's and SoF don't care how flight

operations are performed' while the US students ($M=4.91, SE=0.16$) disagreed. The differences in their responses was significant, $t(127) = -3.92, p < .05$.

The international students ($M=2.79, SE =0.34$) agreed with the item 'Dispatch inappropriately uses MEL, when it is better to fix equipment. The US students ($M=4.48, SE=0.12$) strongly disagreed. The differences in response was significant, $t(126) = -5.80, p < .05$. The US students ($M=4.27, SE=0.14$) disagreed with the item ' Dispatch would rather take a chance with safety, than cancel a flight'. The international students ($M= 2.06, SE= 0.29$) strongly agreed. The differences in their responses was significant, $t (127) = - 7.35, p < .05$.

Both US student ($M= 4.28, SE=0.05$) and international students ($M=3.91, SE= 0.18$) agreed with the item 'Instructors/trainers have a clear understanding of the risk associated with operations' .The differences in their responses was significant, $t(126) = - 2.49, p < .05$. The two groups US students ($M= 4.31, SE=0.13$) and international students ($M=3.91, SE=0.18$) all agreed to the item 'Safety is consistently emphasized during training at my university'. There was a significant difference in their responses, $t (126) = - 2.33, p < .05$. The international students ($M= 2.21, SE= 0.31$) had a perception that 'Instructors/trainers teach shortcuts and ways to get around safety requirements' while the US students ($M= 4.24, SE=0.13$) disagreed. The differences in their responses was significant, $t(126) = -6.89, p < .05$.

US students ($M= 4.17, SE= 0.07$) and International students ($M=3.76, SE= 0.18$) agreed to the item 'Ramp personnel are careful about position of equipment (fuel trucks, power carts, etc)'. There was significance in the differences in their response, $t(131) = - 2.41, p < .05$. The international students ($M=2.63, SE=0.31$) had a perception that 'Ramp

personnel are careless about removing debris (e.g. cups,rags,tools,clothing etc) near the aircraft, which may pose FOD hazards'. The US students (M=4.28, SE=0.14) did not agree with the item. The differences in their responses was significant, $t(130) = -5.49, p < .05$. International students (M=2.47, SE=0.31) agreed with the item 'I feel like I am gambling with the safety of my aircraft every time, I go on a training activity' while the US students (M=4.65, SE = 0.10) disagreed. The differences in their response was significant, $t(131) = -8.54, p < .05$.

US students (M=3.76, SE=0.16) disagreed with the item 'Management is more concerned with making money than being safe' while the international students (M=2.58, SE=0.31) agreed. The differences in their responses was significant, $t(128) = -3.57, p < .05$. International students (M=2.84, SE = 0.31) agreed to the item 'Management does not show much concern for safety, until there is an accident or incident' while the US students (M=4.14, SE= 0.15) disagreed. Both US Students (M=4.34, SE=0.06) and international students (M=3.97, SE=0.18) agreed to the item 'My university flight manual is carefully kept up to date'. The differences in their responses was significant, $t(129) = -2.18, p < .05$.

US students (M=4.16, SE=0.08) and international students (M=3.79, SE=0.18) both agreed to the item 'My University is willing to invest money, resources, and effort to improve safety'. The differences between the responses was significant, $t(129) = -2.18, p < .05$. The international students (M=3.87, SE=0.18) and US Students (M=4.55, SE=0.05) both agreed to the item 'My university is committed to equip aircraft with up to date technology'. The differences is responses was significant, $t(129) = -4.62, p < .05$. The item 'My University ensures that maintenance on aircraft is adequately

performed and aircraft safe to operate' was agreed to by the US students ($M=4.58$, $SE=0.06$) and international students ($M=3.92$, $SE=0.19$). The differences in their response was significant, $t(129) = -4.07, p < .05$.

The US students ($M=4.11$, $SE=0.09$) and international students ($M=3.55$, $SE=0.20$) agreed to the item 'Management goes above and beyond regulatory minimums, when it comes to issues of flight safety'. The differences in their response was significant, $t(128) = -2.79, p < .05$. The international students ($M=2.21$, $SE=0.28$) agreed that 'Management schedules CFI's as much as legally possible, with little concern for their sleep schedule or fatigue'. The US students ($M=3.67$, $SE=0.17$) however disagreed. The differences in the response was significant, $t(128) = -4.48, p < .05$.

The US students ($M=4.61$, $SE=0.11$) disagreed that 'Management tries to get around safety requirements, whenever they get the chance'. The international students ($M=2.32$, $SE= 0.28$) agreed to the item and the differences in the responses was significant, $t (128) = -9.10, p < .05$. Finally both US students ($M=4.09$, $SE=0.10$) and international students ($M=3.68$, $SE=0.20$) agreed that 'Management views violation very seriously, when they don't result in any serious damage or injury'. The differences of their responses was significant, $t(128) = -2.00, p < .05$.

Question Three

What is relationship between the perception of respondents (flight students and certified flight instructors) regarding the informal safety and operation interaction at an accredited four year collegiate aviation program?

In order to establish any relationship between the major scales, Pearson's correlation coefficient was determined for some items in both scales to find the extent of

significant correlations among items. In general there were numerous significant correlations of items in Informal Safety and Operations Interaction. The responses to the item 'Dispatch consistently emphasize information or details' significantly correlated with the item 'pilots are actively involved in identifying and resolving safety concerns', $r = .28, p < .01$.

The responses to the item 'dispatch inappropriately uses the Minimum Equipment List (MEL), when it would be better to fix equipment significantly correlated with the item 'Pilots are seldom asked for input when university aviation procedures are developed or changes', $r = .31, p < .01$ and significantly (negative) correlated to 'Pilots are actively involved in identifying and resolving safety concerns', $r = -.27, p < .01$. The item 'pilots who call in sick or fatigued are scrutinized by the supervisor of flying or other flight management personnel' significantly correlated responses to the items 'Dispatch would rather take a chance with safety than cancel a flight', $r = .47, p < .01$ and 'Dispatch inappropriately uses the Minimum Equipment List (MEL) when it would be better to fix the equipment', $r = .48, p < .01$.

The responses to items 'Pilots have little or real authority to make decisions that affect safety of normal flight operations' strongly correlated with the item 'Dispatch inappropriately uses MEL, when it is better to fix equipment' and was significant, $r = .54, p < .01$. The item 'management rarely questions a pilot's decision to delay or request for cancellation of a flight for a safety issue' negatively correlated with the item 'Dispatch inappropriately uses MEL when it would be better to fix equipment' $r = -.20, p < .01$, but positively correlated to the item 'Dispatch is responsive to pilots concerns about safety of flight operations' $r = .39, p < .01$ and they were all significant. Tables 10 and

10cont, show the correlation tables for items in Informal Safety Scale correlated with Operations Interaction Scale.

Question Four

What is the relationship between the perception of respondents (students and certified flight instructors) on the formal safety program and their safety behavior at an accredited four year collegiate aviation's program?

The question sought to find out if there was any form of relationship between perception and safety behavior. Multiple Regressions was used to establish a relationship between the perception of respondents on the FS program and their safety behavior. An exploratory analysis was developed to use the relationship to establish a predictive model for safety behavior, from perception of respondents on the Formal Safety program. Perception and attitude have been known to have an influence on behavior (American Psychological Association, 2012) and they can be used as leading indicators in SMS to predict safety behavior and personal risk. The aim of SMS is to use this safety leading indicators to pro actively predict lagging indicators (outcomes) like incidents and accidents (ICAO, 2009)

A forced method was used and the model summary with the values of R (Coefficient of Determination), R^2 and the adjusted R^2 were determined. R^2 gives an idea of the proportion of variance, explained by model. The adjusted R^2 gives an idea how the model generalize and ideally when the value is close to R, it indicates that the cross-validity of the model is good (Field, 2009). The beta-values (B) were also recorded and

Table 10. Pearson's Correlation between Items of Informal Safety and Operation Interaction

Correlations

		Accountability/Just Culture These items refer to the ways in which pilots are treated on their safe o...-When pilots make a mistake or do something wrong,they are dealt with fairly by the university.	Pilots' Authority This items refer to the extent to which pilots have the authority to provide input...-Pilots are actively involved in identifying and resolving safety concerns.	Professionalism This issue refers to the attitudes you perceive among your fellow pilots in regards t...-Pilots view the university's safety record as their own and take pride in it.	Professionalism This issue refers to the attitudes you perceive among your fellow pilots in regards t...-Pilots never cut corners or compromise safety regardless of the operational pressures to do so.	Chief/Lead Certified Flight Instructors (CFI's) and Supervisor of Flight (SoF) These items refer to...- Chief/Lead CFI's have a clear understanding of the risk associated with flight operations.	Chief/Lead Certified Flight Instructors (CFI's) and Supervisor of Flight (SoF) These items refer to...- Chief/Lead CFI's and SoF do not hesitate to contact pilots to proactively discuss safety.	Dispatch These items refer to your university's dispatch procedures.-Dispatch consistently emphasizes information or details (e.g ,weather requirements ,NOTAMs) that affect Flight safety.	Instructors/Trainers This items refer to your university's flight instructors or trainers. - Safety is consistently emphasized during training at my university.	Ramp Operations (Fuel truck drivers and maintenance personnel) This items refer to ramp operations a...-I am confident ramp personnel would notify me of any minor vehicle/aircraft collision that involves my aircraft, even if damage is not readily apparent.
Accountability/Just Culture	Pearson Correlation	1	.345**	.584**	.401**	.438**	.460**	.166	.338**	.239**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.056	.000	.005
	N	142	142	142	142	134	134	134	134	138
Pilots' Authority	Pearson Correlation	.345**	1	.450**	.451**	.327**	.374**	.288**	.444**	.302**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.001	.000	.000
	N	142	146	145	145	137	137	137	136	141
Professionalism	Pearson Correlation	.584**	.450**	1	.452**	.394**	.382**	.258**	.406**	.306**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.002	.000	.000
	N	142	145	145	145	137	137	137	136	141
Professionalism	Pearson Correlation	.401**	.451**	.452**	1	.320**	.317**	.329**	.330**	.407**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000
	N	142	145	145	145	137	137	137	136	141
Chief/Lead Certified Flight Instructors (CFI's) and Supervisor of Flight (SoF)	Pearson Correlation	.438**	.327**	.394**	.320**	1	.474**	.344**	.459**	.516**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000
	N	134	137	137	137	138	138	138	137	138
Chief/Lead Certified Flight Instructors (CFI's) and Supervisor of Flight (SoF)	Pearson Correlation	.460**	.374**	.382**	.317**	.474**	1	.245**	.431**	.372**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.004	.000	.000
	N	134	137	137	137	138	138	138	137	138
Dispatch	Pearson Correlation	.166	.288**	.258**	.329**	.344**	.245**	1	.379**	.233**
	Sig. (2-tailed)	.056	.001	.002	.000	.000	.004		.000	.006
	N	134	137	137	137	138	138	138	137	138
Instructors/Trainers	Pearson Correlation	.338**	.444**	.406**	.330**	.459**	.431**	.379**	1	.296**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000
	N	134	136	136	136	137	137	137	137	137
Ramp Operations (Fuel truck drivers and maintenance personnel)	Pearson Correlation	.239**	.302**	.306**	.407**	.516**	.372**	.233**	.296**	1
	Sig. (2-tailed)	.005	.000	.000	.000	.000	.000	.006	.000	
	N	138	141	141	141	138	138	138	137	142

** Correlation is significant at the 0.01 level (2-tailed).

Table 10 cont. Pearson's Correlation between Items of Informal Safety and Operation Interaction

Correlations

		Accountability/Culture	Accountability/Culture	Pilots' Authority	Pilots' Authority	Professionalism	Professionalism	Chief/Lead Certified Flight Instructors (CFI) and Supervisor of Flight (SOF)	Chief/Lead Certified Flight Instructors (CFI) and Supervisor of Flight (SOF)	Dispatch	Dispatch	Instructors/Trainers	Instructors/Trainers	Ramp Operations (Fuel truck drivers and maintenance personnel)	Ramp Operations (Fuel truck drivers and maintenance personnel)
Accountability/Culture	Pearson Correlation	1	.032	.160	-.165*	-.212*	-.216**	-.052	.362**	-.127	.506**	-.116	.451**	-.068	.411**
	Sig. (2-tailed)		.704	.057	.049	.011	.010	.547	.000	.144	.000	.182	.000	.428	.000
	N	143	142	142	143	142	142	134	134	134	134	134	134	138	138
Accountability/Culture	Pearson Correlation	.032	1	-.139	.345**	.407**	.401**	.460**	-.012	.166	.066	.338**	-.056	.369**	-.100
	Sig. (2-tailed)		.704	.098	.000	.000	.000	.000	.889	.056	.449	.000	.519	.000	.243
	N	142	142	142	142	142	142	134	134	134	134	134	134	138	138
Pilots' Authority	Pearson Correlation	-.160	-.139	1	.044	-.137	-.217**	-.117	.347**	-.099	.146	-.085	.177*	-.268**	.350**
	Sig. (2-tailed)		.057	.098	.599	.099	.009	.173	.000	.248	.088	.327	.039	.001	.000
	N	142	142	142	145	145	145	137	137	137	137	136	136	141	140
Pilots' Authority	Pearson Correlation	-.165*	.345**	.044	1	.290**	.451**	.374**	-.101	.288**	-.211*	.444**	-.201*	.280**	-.238**
	Sig. (2-tailed)		.049	.000	.599	.000	.000	.000	.240	.001	.013	.000	.019	.001	.005
	N	143	142	145	146	145	145	137	137	137	137	136	136	141	140
Professionalism	Pearson Correlation	-.212*	.407**	-.137	.290**	1	.333**	.499**	-.235**	.247**	.132	.327**	.028	.362**	-.068
	Sig. (2-tailed)		.011	.000	.099	.000	.000	.000	.006	.004	.125	.000	.743	.000	.422
	N	142	142	145	145	145	145	137	137	137	137	136	136	141	140
Professionalism	Pearson Correlation	-.216**	.401**	-.217**	.451**	.333**	1	.317**	-.385**	.329**	-.283**	.330**	-.245**	.328**	-.400**
	Sig. (2-tailed)		.010	.000	.009	.000	.000	.000	.000	.001	.000	.000	.004	.000	.000
	N	142	142	145	145	145	145	137	137	137	137	136	136	141	140
Chief/Lead Certified Flight Instructors (CFI) and Supervisor of Flight (SOF)	Pearson Correlation	-.052	.460**	-.117	.374**	.499**	.317**	1	-.116	.245**	.129	.431**	-.082	.331**	-.097
	Sig. (2-tailed)		.547	.000	.000	.000	.000	.000	.175	.004	.132	.000	.340	.000	.259
	N	134	134	137	137	137	137	138	138	138	138	137	137	138	137
Chief/Lead Certified Flight Instructors (CFI) and Supervisor of Flight (SOF)	Pearson Correlation	.362**	-.012	.347**	-.101	-.235**	-.385**	-.116	1	-.073	.448**	.123	.462**	.014	.433**
	Sig. (2-tailed)		.000	.889	.000	.240	.006	.000	.175	.397	.000	.151	.000	.874	.000
	N	134	134	137	137	137	137	138	138	138	138	137	137	138	137
Dispatch	Pearson Correlation	-.127	.166	-.099	.288**	.247**	.329**	.245**	-.073	1	-.019	.379**	-.062	.235**	.002
	Sig. (2-tailed)		.144	.056	.001	.004	.000	.004	.397	.000	.822	.000	.469	.006	.985
	N	134	134	137	137	137	137	138	138	138	138	137	137	138	137
Dispatch	Pearson Correlation	.506**	.066	.146	-.211*	.132	-.285**	.129	.448**	1	.043	.607**	.083	.623**	.000
	Sig. (2-tailed)		.000	.449	.088	.013	.125	.001	.000	.822	.000	.617	.000	.333	.000
	N	134	134	137	137	137	137	138	138	138	138	137	137	138	137
Instructors/Trainers	Pearson Correlation	-.116	.338**	-.085	.444**	.327**	.330**	.431**	.123	.379**	1	.098	.491**	-.023	.000
	Sig. (2-tailed)		.182	.000	.327	.000	.000	.000	.151	.000	.617	.000	.252	.000	.793
	N	134	134	136	136	136	136	137	137	137	137	137	137	137	137
Instructors/Trainers	Pearson Correlation	.451**	-.056	.177*	-.201*	.028	-.245**	-.082	.462**	-.062	.607**	1	.072	.539**	.000
	Sig. (2-tailed)		.000	.519	.039	.743	.004	.340	.000	.469	.000	.252	.000	.404	.000
	N	134	134	136	136	136	136	137	137	137	137	137	137	137	137
Ramp Operations (Fuel truck drivers and maintenance personnel)	Pearson Correlation	-.068	.369**	-.268**	.280**	.362**	.328**	.331**	.014	.235**	.083	.491**	.072	1	.027
	Sig. (2-tailed)		.428	.000	.001	.000	.000	.000	.874	.006	.333	.000	.404	.000	.748
	N	138	138	141	141	141	141	138	138	138	138	137	137	142	141
Ramp Operations (Fuel truck drivers and maintenance personnel)	Pearson Correlation	.411**	-.100	.350**	-.238**	-.068	-.400**	-.097	.433**	.002	.623**	-.023	.539**	.027	1
	Sig. (2-tailed)		.000	.243	.000	.005	.422	.000	.259	.000	.985	.000	.793	.000	.748
	N	138	138	140	140	140	140	140	137	137	137	137	137	141	141

*. Correlation is significant at the 0.05 level (2-tailed).
 **. Correlation is significant at the 0.01 level (2-tailed).

shows the how much of the variance in safety behavior can be explained by each of the significant predictors (perceptions).

The first item ‘Self-Reported for duty when fatigued, ill, or under unusual stress because you had no other choice’ was the outcome variable and Items in FS were used as independent variables. The Tables 9 and 10 shows the model summary and coefficients of ‘Self-Reported for duty when fatigued, ill or under unusual stress because you had no other choice’

Table 11. Model Summary of ‘Reported for duty when ill, fatigued, or under unusual stress’.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.376 ^a	.142	.105	.690	.142	3.894	5	118	.003
2	.411	.169	.096	.694	.027	.748	5	113	.589
3	.435	.189	.077	.701	.020	.536	5	108	.749

a. Predictors: (Constant), Reporting SystemPlease rate the university aviation official system for reporting safety issues and...-Pilots are willing to file reports about unsafe situations,even if the situation was caused by their own actions., Reporting SystemPlease rate the university aviation official system for reporting safety issues and...-Pilots do not bother reporting near misses or close calls,since this events don't cause any real damage., Reporting SystemPlease rate the university aviation official system for reporting safety issues and...-The safety reporting system is convenient and easy to use., Reporting SystemPlease rate the university aviation official system for reporting safety issues and...-Pilots can report safety discrepancies without fear of negative repercussions., Reporting SystemPlease rate the university aviation official system for reporting safety issues and...-Pilots are willing to report information regarding marginal performance or unsafe actions of other pilots.

Note $p < .01$

Table 12. Coefficients of ‘Reported for duty when fatigued, ill or under unusual stress’.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.113	.305		6.940	.000
	Reporting System>Please rate the university aviation official system for reporting safety issues and...-Pilots are willing to report information regarding marginal performance or unsafe actions of other pilots.	-.213	.083	-.320	-2.558	.012
	Reporting System>Please rate the university aviation official system for reporting safety issues and...-Pilots do not bother reporting near misses or close calls, since this events don't cause any real damage.	.126	.035	.313	3.558	.001

a. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR)The following items describe behaviors that aviation... : Self-Reported for duty when fatigued,ill,or under unusual stress because you had no other choice.

Note *p< .01,**p<.05

Table 13. Model Summary of ‘been pressured to fly a university aircraft you believe was not in safe condition’.

Model Summary^d

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.264	.070	.031	.705	.070	1.774	5	118	.123
2	.331	.110	.031	.705	.040	1.013	5	113	.414
3	.460	.211	.102	.679	.102	2.784	5	108	.021

d. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR)The following items describe behaviors that aviation... : Self-Been pressured to fly a university aircraft you did not believe was in safe condition.

Note:* p< .05

Table 14. Coefficients of ‘Been pressured to fly a university aircraft you believe was not in safe condition’.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	1.924	.379		5.073	.000
	Safety Personnel. This item refers to the person or people in your university who are formally design... - Safety personnel have little or no authority compared to operational personnel.	.163	.050	.391	3.249	.002

a. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR)The following items describe behaviors that aviation... : Self-Been pressured to fly a university aircraft you did not believe was in safe condition.

Note:* p< .01

Table 15. Model Summary of ‘Failed to challenge a superior on a safety issue for fear of ruining a cordial relationship’.

Model Summary^d

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.350	.123	.086	.716	.123	3.301	5	118	.008
2	.398	.159	.084	.717	.036	.969	5	113	.440
3	.500	.250	.145	.692	.091	2.614	5	108	.028

d. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR)The following items describe behaviors that aviation... : Self-Failed to challenge a superior on a safety issue for fear of ruining a cordial relationship with the superior.

Table 16. Coefficients of ‘Failed to challenge a superior on a safety issue for fear of ruining a cordial relationship with the superior’

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.051	.316		6.488	.000
	Reporting System>Please rate the university aviation official system for reporting safety issues and...-Pilots do not bother reporting near misses or close calls, since this events don't cause any real damage.	.123	.037	.298	3.354	.001

a. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR)The following items describe behaviors that aviation... : Self-Failed to challenge a superior on a safety issue for fear of ruining a cordial relationship with the superior.

Note *p< .05(model summary), **p<.01(coefficients)

Table 17. Model Summary of ‘Allowed an instructor or senior pilot’s mistake to go unchallenged’

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.223	.050	.010	.784	.050	1.236	5	118	.296
2	.291	.085	.004	.786	.035	.861	5	113	.510
3	.420	.176	.062	.763	.092	2.409	5	108	.041

Table 18. Coefficients of ‘Allowed an instructor or senior pilot’s mistake to go unchallenged’

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	2.208	.426		5.178	.000
	Response and Feedback. This item refers to the response pilots receive from your university official... -My university only keeps track of major safety problems and overlooks routine ones.	-.143	.058	-.312	-2.467	.015
	Safety Personnel. This item refers to the person or people in your university who are formally designated... - Safety personnel have little or no authority compared to operational personnel.	.150	.056	.329	2.669	.009

a. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR)The following items describe behaviors that aviation... : Self-Allowed an instructor or a senior pilot's error to go unchallenged.

Note* p< .05(model),** p<.01(Coefficients)

Table 19. Model Summary of ‘Ever been put on flight hold for alcohol or drug violations’

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.268	.072	.033	.662	.072	1.831	5	118	.112
2	.346	.120	.042	.659	.048	1.227	5	113	.301
3	.472	.222	.114	.633	.103	2.852	5	108	.019

Table 20. Coefficients of ‘Ever been put on flight hold for alcohol or drug violations’

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	1.899	.354		5.364	.000
	Safety Personnel. This item refers to the person or people in your university who are formally design... - Safety personnel have little or no authority compared to147	.047	.376	3.147	.002

a. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR)The following items describe behaviors that aviation... : Self-Ever been put on flight hold for alcohol or drug violation.

Note* p<.05(Model),** p<.01(Coefficients)

Question Five

What is the relationship between the perception of respondents (students and certified flight instructors) on organizational commitment to safety and perceived attitudes that affects safety behavior at an accredited four year collegiate aviation program?

The question sought to find out if there was any form of relationship between the perception of respondents about organizational commitment in the flight program of the university and their safety behavior. Multiple Regressions was used to establish a relationship between the perception of respondents on the organizational commitment and their safety behavior. An exploratory analysis was developed to use the relationship to establish a predictive model for safety behavior, from perception of respondents on the organizational commitment and their safety behavior. The models that has been proposed are for exploratory purposes and can be used as a pro active leading indicator as part of trend monitoring in the implementation and management of the SMS. The significant results from the research are outlined.

Table 21. Model Summary of 'been pressured to fly a university aircraft you believe was not in safe condition'.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.396	.157	.121	.672	.157	4.383	5	118	.001
2	.478	.228	.160	.656	.072	2.103	5	113	.070
3	.574	.330	.244	.623	.102	4.131	4	109	.004

Table 22. Coefficients of 'been pressured to fly a university aircraft you believe was not in safe condition'

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
1	(Constant)	1.818	.302		6.018	.000
	Safety ValuesThis items refer to the value that your university's upper level management places on s...-Management doesn't show much concern for safety until there is an accident or incident.	.162	.059	.384	2.725	.007
3	(Constant)	1.425	.364		3.920	.000
	Safety FundamentalsThese items refer to your university's typical practices related to safety in var...-My university is willing to invest money,resources and effort to improve safety.	-.268	.121	-.340	-2.220	.029
	Going Beyond ComplianceThese items refer to university upper level management's commitment to meetin...-Management tries to get around safety requirements whenever they get the chance.	.127	.050	.290	2.534	.013

a. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR)The following items describe behaviors that aviation... : Self-Been pressured to fly a university aircraft you did not believe was in safe condition.

Note** p<.01 (Model),*p<.05 (Coefficients)

Table 23. Model Summary of 'Failed to challenge a superior for fear of ruining a cordial relationship'.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.362	.131	.094	.743	.131	3.555	5	118	.005
2	.394	.155	.080	.749	.024	.644	5	113	.667
3	.525	.275	.182	.706	.120	4.523	4	109	.002

Table 24. Coefficients of 'Failed to challenge a superior for fear of ruining a cordial relationship'

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	1.586	.412		3.848	.000
	Going Beyond Compliance These items refer to university upper level management's commitment to meeting...-Management tries to get around safety requirements whenever they get the chance.	.144	.057	.301	2.531	.013

a. Dependent Variable: Personal Risk (PR) and Organizational Risk (OR) The following items describe behaviors that aviation... : Self-Failed to challenge a superior on a safety issue for fear of ruining a cordial relationship with the superior.

Note: **p<.01 (Model Summary), * p<.05 (Coefficients)

CHAPTER IV

DISCUSSION

Perception of Safety Culture among Respondents

The results showed that respondents had a good perception and favorable outlook of the safety culture at the university's flight program. There were however some areas that need improvement and the discussion will focus more on the areas for improvement of the safety program and how the Safety Management System, can consolidate a more proactive and positive safety culture. Generally all the four major CAPCUS factor scales had mean values (M) above the midpoint of 3. This means that cumulatively, the perception of the respondents on the flight operations of the university was good. The Formal Safety Program (M= 3.65), Informal Safety Program (M= 3.34), Operational Interaction (M = 3.32) and Organizational Commitment (M = 3.32) was compared to previous study by vonThaden (2008) on a flight operations department of a major European carrier and the results were similar and consistent.

The results show that the university formal safety program was perceived as the best and the duo of operational interaction and organizational commitment had the least score and may indicate that some adverse perception by respondents about these major scales. The first research question was to find out the level of variability in the perception of flight students and flight instructors on the safety culture in the university's flight program. A good measure of consistency in the safety culture of an organization is

to focus on the variance in survey responses (von Thaden , 2008). When a population demonstrates considerable variance, the coherent structure for an underlying culture of safety is for all intents and purposes, nonexistent and shows that there are gaps in the purpose, alignment and control of the safety management (Patankar, 2003).

There was a significant difference in the mean responses of perception on the item ‘I feel like I am gambling with the safety of my aircraft every time, I go on a training activity’, under the major scale of Operations Interaction. The significant differences were between the responses of juniors and freshmen. The results showed that while the juniors had a more favorable perception on most items under operations interaction, the freshmen had poor perception on these items. Since the university has a standard operational procedure and curricula for all flight operations, it was expected that there would be very minimal variability of responses among the year groups. However variability in perception can be a function of training environment, operational interaction, experience level, prior training, fleet assignment, and operational safety records (von Thaden, 2008).

A significant variation in responses can also be as a result of the risk perception among the year groups (Block, 2007). A more risk loving attitude and behavior can result in significant safety breaches in the wall of the most formidable safety management system (Reason, 2003;Patankar, 2003). Some relevant additional comments provided by respondents can be found in the quote below:

“Once after getting an aircraft refueled by a fuel truck, the fuel truck driver forgot to unclip the ground wire from the exhaust pipe of the aircraft. He drove away and the ground wire snapped back towards the truck when he drove far enough

away. There was no apparent damage to the aircraft but the fuel truck driver said, "Please don't file a safety report on me." I feel like this was the wrong attitude by the fuel truck driver towards safety. He should be more willing to own up to his mistakes”.

“I had a fuel personnel knock a static wick off my horizontal stabilizer and not tell me (the PIC) about it”.

“There is not much standard procedure of the travel of line vehicles on the ramp. Sometimes they make erratic movements and I don't believe they monitor ground frequency, so they are unaware of where aircraft are travelling to. Also the pilots are unaware of where line vehicles are travelling”.

“The training for student line personnel seems weak in the finer details of fuelling aircraft. For example some student and fuel truck operators display ignorance in the perils of hitting the bottom of a fuel tank, or side loading the filler neck with a fuel nozzle. I must applaud ramp personnel for having good situational awareness in moving aircraft with tugs. Though they move quickly are very much aware of their surroundings”.

Concurrence is a critical feature of a healthy safety culture (von Thaden ,2008; IATA, 2011), as it reflects the degree to which both juniors and freshmen share a common perception of the safety culture. It is therefore important for more attention to be focused on freshmen by reinforcing safety education especially on operations interaction.

The item ‘My University is committed to equipping aircraft with up to date technology’ under the sub-scale of Safety Fundamentals and scale of Organizational

Commitment showed a significant differences in the mean responses of juniors and freshmen. There were some relevant comments from respondents in the quote below:

“As per technology in the aircraft, just look at our fleet. Most of the fixed-wing astounding. Most of the helicopters are laughable. I feel that there is not equal representation among fixed-wing and rotorcraft in terms of technology. This obviously plays a role in safety”

The quote underscores the perception that updating aircraft with new technology is skewed towards fixed wing operation and that management should make a conscious effort to create equity in allocation of resources. It can create a perception of management not committed to enhancing safety in some fleet of the program.

The other item that showed significant differences in mean responses was ‘Management tries to get around safety requirements, whenever they get the chance’. The significant differences in responses were between the juniors and the freshmen. From the results, the freshmen seem to have a rather poor perception about the commitment of management to safety, while the juniors had a rather good perception. Some notable quotes from respondents are highlighted below:

“The university has a very strong commitment to safety from all departments. There are bi-annual safety seminars held for students, staff, and community members, the university has a maintenance program that is impeccable, and positions such as the Supervisor of Flight and Manager on Duty that help the flight operations operate safely and even having a separate safety department shows that it is committed to upholding safety”

“Especially when dealing with contract students there is a major push to get it done regardless of the weather and to push the safety envelope, And when someone gets praised for going out and getting time in even though they got ice and got stuck in Fargo is extremely unsafe in my eyes.”

“Management has done absolutely nothing when it has come to the recent icing incidents. They are essentially covered up and almost nothing is ever said”

The diametrical responses and measure of the perception of the commitment of management to safety potentially indicates a gap in the safety management of the flight program.

Perception of International students and US students on the Safety Culture in the Program

The perceptions of the two groups were analyzed on the basis of the impact of national culture on their perception on the safety culture (Hofstede , 2005). Fanjoy (2011) in his study on the learning style of chinese collegiate aviation students, observed that chinese culture is significantly different from that of the US in terms of power distance,individualism and long term orientation. (Joy, 2009) stated that national culture has an impact on individual learning and cognitive style preferences. Hofstede (2005) suggested that when students from a different cultural background are educated in a different cultural context, the impact of the cultural differences should be considered to identify any potential negative influence.

‘Pilots do not bother reporting near misses or close calls, since this event does not cause any real damage’.

This item on the reporting system of the flight program showed that, the resident US students disagreed with the item, while the contract students in their perception

agreed with the item. The significant differences in the responses could be as a result of the level of risk perception as compared to a similar study on general aviation pilots by Hunter(2006). The differences in national culture and language could also affect the perception and behavior of these two groups as outlined in the research of Helmreich(1999) on crew management resources among multi-cultural crew.

However when the mean responses of their perception on the item ‘University only keeps track of major safety problems and overlook routine ones’ were compared, the resident US students disagreed with the item as against the international students who agreed with the item. The differences in their responses were significant. The results shows similarities with the study of Dillman(2009),which showed that flight students sometimes simply don’t report safety occurrences because the time,energy and effort required to complete documents is not significantly related to the event. There is also the issue of effective feedback from mangement for the effort at reporting safety occurrences. Some relevant responses are outlined below:

“Our safety program does not incorporate a way of tracking safe actions. Safety reports are typically generated when someone exhibits a violation of Safety Policy and Procedure or any unsafe action. There is no real system of maintaining actions of safety which I believe they should be able to give recognition to those who uphold a safety culture. We implemented a safety recognition program that awards those which certain hour milestones flown without accidents, but does not specifically note the events”.

Some further quotes are outlined below to show a more comprehensive outlook at the perceptions of the respondents.

"I have used the program and found it to be slow to act and the safety personnel have to defer things to the operation side. They do not seem to have the authority to change things. There is no feedback when you turn in a safety form. I had a problem with something in an aircraft and had to go through two other departments and prove to them that it was a problem with the aircraft and not with me as they were suggesting".

"Pilots can report safety discrepancies without fear of negative repercussions"
Unfortunately this is not the case, as I have knowledge of cases of CFI's being issued performance cards after self-reporting a safety incident to their lead.

"Pilots do not bother reporting near misses or close calls, since these events don't cause any real damage." The safety reporting system is turning into a punitive system, and pilots are becoming afraid to 'throw their peers under the bus' so to speak.

"When a pilot reports a safety problem, it is corrected in a timely manner - I have reported an issue with institutional aircraft placards non-compliance a year ago, the problem has not been corrected".

"Pilots are satisfied with the way the university deals with safety reports - Safety reporting has turned into a tattle tale system".

"Personnel responsible for safety have a clear understanding of the risk involved in flight training - It seems like personnel responsible for safety feel like flight training should have no risk, which is not possible".

The US students disagreed with the item 'safety personnel have little or no authority compared to operational personnel' but the international students strongly

agreed with it. There was a significant difference in the mean of their responses. This can be an indication of the perceived marginal input of safety personnel in the administration and operation of contract flight programs. The international students' perception is probably influenced by their interaction, more with the operational personnel than the safety personnel.

The item 'University management shows favoritism to certain pilots' showed that the perception of the US students were almost neutral, while the international students agreed with the item. The differences in response was significant and this was correlated to the response to the item 'When accidents and incidents happen, management always blame the pilot' where the international students strongly agreed, while the US students partially disagreed. This result is similar to research findings of von Thaden (2008) which suggested that a primary challenge regarding accountability concerns perceptions of favoritism. It appears that pilots are not blamed unfairly for their errors, but favored pilots may receive more beneficial outcomes than non-favored pilots (Dekker, 2007).

"I feel that SOF's know the leads well and a lot of them are shown favoritism.

There has been times when I have seen SOF's breaking SOP's and then when asked just giving an excuse. I have witnessed an off-duty SOF try to fly when it was clearly no fly and just told the SOF to just sign it and pretend he didn't see the conditions change. I believe that the SOF's at the university need to be held to a higher standard as they are in an authority role. I also am concerned about how management tries to push us to fly when it's marginal weather in the winter with icing around. I understand summer because you can pick up IFR no problem but

with icing it scares me. With that said I do feel that upper management really will support the pilot decision and is protective of who may be involved”

The international students had a strong perception that ‘Pilots who call in sick or fatigue are scrutinized by the Supervisor of Flight or other flight management personnel’, while the US students disagreed with the item. The international students also had a strong perception that ‘Pilots have little or no authority to make decisions, that affect the safety of normal flight operations’. The US students however disagreed with the item. The two items rather send a worrying signal about the perception of the international students on their input, when it comes to making decisions that can affect the safety of flight. Studies by Gordon(2004) and Dillman (2006) highlights the importance of personnel input in order to achieve an effective SMS.

“I put that pilots have very little authority to make safety decisions, because all the decisions are already made for us”

“Pilot reputation is definitely at stake if you don't follow proper procedures. There are a lot of peer and staff pressures to do the job as safely as possible. I think it would be a great idea for CFIs to reiterate that a new pilot can question them at anytime without penalty about operational conduct”

“Lead flight instructors push too hard to increase productivity. They challenge a line instructor’s ability to say no because of weather. The same ones allow SOf's to do things they will not allow line instructors to do. I fear a serious incident will occur before the top level realizes the pressure and questions lead instructors are placing on fatigues line instructors. It needs to stop”

“Pilots are almost always scrutinized when cancelling flights. Superiors tend to ignore suggestions of new pilots and encourage students to cut corners and go outside their safety window to make them fly”

The US students disagreed with the item ‘Pilots who are new and less senior are willing to speak up regarding flight safety issues’, while the international students agreed. This was quite unusual since Hofstede (1980), Helmreich (1999) and Hofstede (2005) suggested that national cultures with Low Power Distance like the US, has a tendency to be more assertive and bold, when in a group as compared to the international students, who mostly have a culture that is more of a High Power Distance, which makes them less willing to challenge authority. The US students however disagreed that ‘Pilots, never cut corners or compromise safety, regardless of the operational pressures to do so’ while the international students agreed. National cultural values like Uncertainty Avoidance (rules and order) (Hofstede, 1980) (Hofstede, 2005) could largely influence this perception. Respondents provided comments to reinforce their perceptions and are quoted below:

“I think in general most pilots treat safety with respect and are professional about safety, but there are some who are much more willing to cut corners or ignore safety policies and procedures than others”.

“Students are negatively impacted by not meeting flight templates which promotes them to cut corners and fly when they should not”

“Many of the safety violation I have read about that could have easily been prevented seem to stem from the feeling pressure to finish on time. The university could not do a worse job in planning courses so the weather or other

variables are accounted for. This makes it very difficult for a pilot under heavy financial and other external pressures to make a good unbiased decision. Getting done at the cost of a few minor safety infractions can seem more than fair when facing astronomical flight costs. Especially when the policies seem to be written by higher ups who are far removed from the flight line”.

The international students agreed with the item ‘Dispatch inappropriately uses MEL, when it is better to fix equipment. The US students) strongly disagreed. The US students disagreed with the item ‘Dispatch would rather take a chance with safety, than cancel a flight’. The international students strongly agreed. This was another worrying trend in flight operations interaction of the university. It could be as a result of the operational tempo of the contract training, which sometimes require that, international student fly under some pressure to meet company deadlines.

US students disagreed with the item ‘Management is more concerned with making money than being safe’ while the international students agreed. The International students agreed to the item ‘Management does not show much concern for safety, until there is an accident or incident’ while the US student’s .The international students agreed that ‘Management schedules CFI’s as much as legally possible, with little concern for their sleep schedule or fatigue’ the US students however disagreed. The US students disagreed that ‘Management tries to get around safety requirements, whenever they get the chance’. The international students agreed to the item. The perception of the international students was consistent in their mean responses and reflected a rather poor outlook and raises a gap in alignment of safety education coverage in their contact training.

“The organization as a whole is more concerned with making money than the safety or concern of the students. Everyone from CFI's to lead flight instructors are more concerned about draining the student's money than helping the student succeed”

“With the amount of contract training we are doing and the pressure we are under to get them done on time I would say that is a recipe for an accident/incident”.

“Student's are always pressured to fly even if they themselves don't feel like they could safely due to illness or other reasons”.

Perception on Relationship between the Informal Safety and Operational Interaction

Pearson's correlation was determined for some items in both scales to find the extent of significant correlations among items. The results show significant correlations of items in Informal Safety and Operations Interaction. This was compared to similar study by vonThaden (2008) and showed that, a high correlation of items in the two major scales could indicate, more lateral safety management approach that is peer-driven. A look at the results showed that there was a level of consistency in the perception of respondents on the items under both major scales. The consistency also helped to cross-validate the responses and give a better understanding of the safety culture in the university.

The responses to items ‘Pilots have little or real authority to make decisions that affect safety of normal flight operations’ strongly correlated with the item ‘Dispatch inappropriately uses MEL, when it is better to fix equipment’ and was significant. The results show that as perception of respondents on an item could influence their perception

on another item in another scale of the survey and show that perception is susceptible to changes in event and information flow.

The item ‘management rarely questions a pilot’s decision to delay or request for cancellation of a flight for a safety issue’ negatively correlated with the item ‘Dispatch inappropriately uses MEL when it would be better to fix equipment’ but positively correlated to the item ‘ Dispatch is responsive to pilots concerns about safety of flight operations’ and they were all significant. The better the perception of respondents on the positive role of dispatch seems to have a positive effect on the perception of respondent on the authority of pilots to make informed and safe decisions on flight issues.

Perception on Relationship between Formal Safety and Safety Behavior (Personal Risk)

The effect and relationship of the scale on the risk perception and behavior of respondents was determined using Multiple Regression. The question also attempted to develop a model that can be used as a predictor of safety behavior from perceived attitudes of respondents. The success of any proactive SMS depends on the ability to identify leading indicators of safety to be able to determine the outcome of any safety action of intervention (IATA, 2011). The predictive safety model could help in proactively outlining significant predictors and their contribution in causing the safety occurrence (outcome).

The item “Reported for duty, when fatigued, ill and under unusual stress because you had no choice” was significant and had positive predictor ‘Pilots do not bother reporting near misses or close calls, since this events do not cause real damage’, but a negative predictor ‘pilots are willing to report information regarding marginal

performance or unsafe actions of pilots'. This shows that a pro active peer to peer safety advocacy and non-punitive reporting system can reduce potential at risk flight related behavior.

The item 'been required to fly a university aircraft, you did not believe was in a safe condition'' had a positive predictor 'Safety personnel have little or no authority as compared to operational personnel'. The more respondents had a perception that safety personnel lacked the authority to ensure safety oversight, the greater their perceived risk of flying a university aircraft believed to be unsafe. This can indicate that there is an expectation on safety personnel, to have more leverage in mitigating flight operational risk. The item 'Failed to challenge a superior on a safety issue for fear of ruining a cordial relationship' had a positive predictor 'pilots do not bother reporting near misses or close calls, since this events don't cause any real damage'. The relationship between flight crew is very important. The result is similar with the study done by Kanki (2010),which showed that due to the effect of Trans-Cockpit Authority Gradient (TAG) ,subordinate flight crew members assertiveness can be diminished and they may not voice out safety concerns to their superiors on the flight deck.Helmreich (1999) also explained that Low Uncertainty Avoidance effect, can affect some students not to be bold to voice out safety concerns when flying with instructors or flight management personnel.

The item 'allowed an instructor pilot's or senior pilot's error to go unchallenged' had a predictor ' My university only keeps track of major safety problems and overlook routine ones'.This results show a preception that the university is more concerned with major safety problems and as such reporting errors or challenging senior pilots and instructor pilots ,who are normally percieved to be more proficient and less prone to

error, will not be important. This could indicate a serious misalignment of the perception of respondents and flight management and has the potential to create safety occurrences.

Perception on Relationship between Organizational Commitment and Safety Behaviour (Personal Risk)

The role of management to ensure that purposeful organization of human, material and financial resources are available and judiciously distributed at all levels down the organization is very crucial in setting and attaining goals (Dresner, 2002; CASA, 2009).

The item 'Been pressured to fly a university aircraft that you did not believe was in a safe condition' had three significant predictors. It had two positive predictors 'management does not show concerns for safety, until there is an accident' and 'Upper Level management tries to get around safety, whenever they get the chance'.

The negative predictor 'My university is willing to invest money and resources to improve safety' shows that respondents do not feel pressured and are less concerned about the safety of the aircraft, when they perceive that the university is willing to invest money and resources to improve safety. This finding is similar to research by Damon (2011) which showed that when management proactively invests in safety, there are substantial returns on investment. Some of these returns are crew confidence, minimal incidents, employee productivity and enhanced business outlook.

Limitations

There were some limitations present within the study. Since the survey is anonymous there was no way for the researcher to follow up in case of questions requiring further feedback and responses. In addition, due to this anonymity there was no way to ensure that individuals only took the survey once. The sample was also limited to

commercial aviation students, international contract students and flight instructors who are active in the flight program of the university. Perceptions are dynamic and can be influenced by information, mood, attitude, sensory experience, cognitive structure and changes in event (American Psychological Association, 2012). In all the data analysis, the exclusion of certain data, based on non-responses by participants, was done solely by the SPSS software, which coded any non-response as zero.

It was assumed that during the period of the data collection, the safety culture at the university was unchanged. The study also assumed that leading metrics of safety such as perception and attitudes could have an effect on behavior and can be used as a predictor of respondent behavior. The results of the study were also limited to the study population, since safety culture is dynamic and could vary due to different procedures, type of operations, environment and population. It was assumed that all international contract students had a proficient reading and written comprehension level of the English language, since the survey was in English. Finally the study could not actually authenticate the truthfulness of self-reported responses on personal risk or safety behavior, since respondents were anonymous. The study assumed self-reported responses from participants were factual.

Future Studies

Safety Culture assessment is a dynamic process and requires establishing a baseline for comparison. There has to be a continuous assessment over a given time period to be able to build a confident data base for comprehensive analysis. Due to changes in procedures, operations and even the human components, the safety culture of an organization will always evolve and safety staff and management would have to

continuously review the effectiveness of the safety management system (ICAO, 2009).

Safety assurance is a cyclic process even when the SMS is fully matured, since there will always be the need for periodic review and continuous improvement (Stolzer, 2011). Safety culture studies should be continued on other populations in the university's flight program like ATC, Maintenance and UAS personnel. There should also be an assessment of the perceptions of university aviation management on the safety culture and the results correlated with the perception of students to be able to gauge the vertical extent of SMS saturation.

Another area that requires study is building good fit model of leading indicators like perception, attitude and behavior and using it as a predictor of lagging indicators (safety outcome) like incidents, accidents and violations (IATA, 2012). It is also recommended that further studies be conducted in other collegiate aviation programs and the results cross validated to build a useable database for predictive safety studies. It is recommended that the FAA, university aviation programs in the US and industry players provide funds for an intercollegiate safety culture assessment research program, to provide baseline for the implementation and continuous improvement of SMS in universities.

The proposed research on safety culture assessment and SMS, will establish the necessary structures before the FAA adopts a final rule on SMS for Part 141 training organizations in the near future. It is also more important to invest in SMS, because of global awareness on the return on investment on safety and as more international flight training contracts are undertaken by US universities (Lercel, 2011). Finally, more studies should also be conducted on the effect of national culture on the perceptions and

behavior of foreign students in flight training programs of US universities, which are implementing SMS.

Conclusion

As part of the implementation of a Safety Management System in a four year Part 141 collegiate aviation program, a safety culture assessment was conducted to find out the perception of flight students and flight instructors on the safety culture in the flight program. A safety culture perception survey of a sample of flight students and instructors was conducted using a modified survey called CAPSCUS. The flight program had perception mean values (M) of, Formal Safety Program (M= 3.65), Informal Safety Program (M= 3.34), Operational Interaction (M = 3.32) and Organizational Commitment (M = 3.32). The values were above the neutral point of 3 on a 5 point Likert Scale. This means that cumulatively, the perception of the respondents on the safety culture in the flight program of the university was good.

There was a good perception of respondents on the professional role of dispatch, which seem to have an effect on their authority to make informed and safe decisions on flight issues. There was a perception of respondents that the safety reporting system in the program was convenient to use and personnel responsible for safety had a clear understanding of the risk involved in flight training. The respondents also had a perception that the university ensures that maintenance on aircraft, were adequately performed and generally aircraft were safe to fly.

The respondents also had a very good perception that safety was a core value in the university. The respondents also had a good perception that management viewed regulations violations seriously, even when they don't result in any serious injury to

personnel or damage to aircraft. There was also another good perception, that safety is consistently emphasized during training at the university, however some respondents perceived that there was over emphasis, which was leading to a state of 'safety fatigue'.

There were however some negative perception of respondents. Respondents had a perception that, the university flight management showed favoritism to certain pilots. There was also a perception that equipping and up-dating aircraft was skewed to favor fixed wing aircraft, to the disadvantage of helicopters. There was a perception that respondents were seldom asked for input when, when university aviation procedures were developed or changed. There was also a perception that respondents would cut corners or compromise safety, when under operational pressure to do so. There was a perception among respondents that sleep schedule and fatigue among CFI's were compromised and was a potential safety issue.

The study revealed that there were significant variance in the perception of respondents on the safety culture by year groups and that could potentially arise due to different flight operational experience level and years spent in the flight program. There was an observed trend that the more years and time spent in the aviation program, the better the perception of the safety culture. This was reflected in the responses between the year groups. Significantly the responses between the juniors and freshmen showed that while the juniors had a very favorable perception of the safety culture, the freshmen had less favorable perception of the safety culture. There should be a proactive review of the safety education program to better suit the characteristics of these aviation student population, as part of the SMS implementation. There should be more attention and emphasis of the safety program for freshmen and new personnel in the flight program.

There were also significant differences in the perceptions of US students and international contract students on the program's safety culture. The differences could be as a result of prior or dissimilar operational experience, language and cultural environment. Generally the US students had a more favorable perception of the safety culture than the international contract students. The international students had a perception that pilots who called in sick or fatigued, were scrutinized by flight management personnel. The international students also perceived that pilots had little or no authority to make decisions that affect flight safety. The international students also had a perception that pilots who are new or less senior were unwilling to speak up regarding flight safety issues.

The international students also had a perception that management did not show much concern for safety, until there was an accident or incident and that management tries to get around safety requirements, whenever they get the chance. The international students also had a perception that flight management personnel were unavailable when pilots need help. Finally the international students had a perception that they were gambling with the safety of the aircraft any time they went on a training activity.

The study shows that there was a need to modify and restructure the safety education program for international contract students, which will take their specific national culture and differences into consideration. There should be a proactive effort, to bridge the national culture and safety expectations of the international contract students with the university safety culture, so that there will be less safety misalignment. The safety alignment could be achieved through detailed and modified safety education

curriculum, during the initial phase of training at the university and through periodic recurrent safety education.

The respondents also had a perception that due to the intensity and operational tempo of flight training at the university, especially contract training, there was a high likelihood of an incident and accident in the next twelve months of the flight year. The respondents however had a perception that the university would not be cited by the FAA, within the twelve month flight period. There was also significant correlation in some of the items of Informal Safety scale and Operations Interaction. Relationships in the form of regression models were derived to predict Safety Behavior and personal risk from the perceptions of respondents on the Operation Interaction and Formal Safety. Some predictors were statistically significant. This was a quote from a respondent on the general perception of the safety culture.

“The program in place is great! I feel that with some culture changes to the mind set, this program will show much improvement”.

An innovative, peer involved and dynamic approach should be adapted in the promotion of safety and risk management. This approach would help to reduce indifference and apathy towards the safety program. An exploratory model was recommended to predict risky behavior and safety outcomes using self reported perceived attitudes of front line personnel like flight students and flight instructors. This would augment predictive safety risk management processes already in place like Flight Data Monitoring and Data Mining.

APPENDICES

Appendix A

Commercial Aviation Program Safety Culture Survey (CAPSCUS)

Q3 Reporting System Please rate the university aviation official system for reporting safety issues and concerns

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
The safety reporting system is convenient and easy to use. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots can report safety discrepancies without fear of negative repercussions. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots are willing to report information regarding marginal performance or unsafe actions of other pilots. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots do not bother reporting near misses or close calls, since this events don't	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>cause any real damage. (4)</p> <p>Pilots are willing to file reports about unsafe situations, even if the situation was caused by their own actions. (5)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q4 Response and Feed back. This item refers to the response pilots receive from your university official safety system.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
Safety issues raised by pilots are communicated regularly to all other pilots in this university. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When a pilot reports a safety problem, it is corrected in a timely manner. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots are satisfied with the way the university deals with safety reports. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My university only keeps track of major safety problems and overlooks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

routine ones. (4)						
my university keeps confidential database of responses and feedback. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5 Safety Personnel. This item refers to the person or people in your university who are formally designated as responsible for safety.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
Personnel responsible for safety hold high status in the university. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personnel responsible for safety have the power to make changes. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personnel responsible for safety have a clear understanding of the risk involved in flight training. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety personnel have little or no authority compared to operational personnel. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety personnel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

demonstrate a consistent commitment to safety. (5)						
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Q6 Please use the space below for any extra comment on Formal Safety Program.

Q7 Accountability/Just Culture These items refer to the ways in which pilots are treated on their safe or unsafe behavior at your university.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
University management shows favoritism to certain pilots (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Standards of accountability are consistently applied to all pilots in this university. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When pilots make a mistake or do something wrong, they are dealt with fairly by the university. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When an accident or incident happens, management always blames the pilot. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8 Pilots' Authority This items refer to the extent to which pilots have the authority to provide input and make decisions regarding safety.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not applicable (6)
Pilots are seldom asked for input when university aviation operations procedures are developed or changed. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots are actively involved in identifying and resolving safety concerns. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots who call in sick or fatigued are scrutinized by the Supervisor of Flying or other flight management personnel. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots have little real authority to make decisions that affect the safety of normal flight operations. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management rarely questions a pilot's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

decision to delay or request for cancellation of a flight for a safety issue. (5)						
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Q9 Professionalism This issue refers to the attitudes you perceive among your fellow pilots in regards to safety

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not applicable (6)
Pilots view the university's safety record as their own and take pride in it. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots who don't fly safely quickly develop a negative reputation among other pilots. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots who are new and less senior are willing to speak up regarding flight safety issues. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decisions made by senior pilots and instructors are difficult to challenge. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pilots never cut corners or compromise safety regardless of the operational pressures to do so. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q10 Please use space below for any extra comments on Informal Safety Program

Q11 Chief/Lead Certified Flight Instructors (CFI's) and Supervisor of Flight (SoF) These items refer to Chief/Lead Certified Flight Instructors (CFI's) and Supervisor of Flight (SoF), with whom you interact regularly.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
Chief/Lead CFI's and SoF do not hesitate to contact pilots to proactively discuss safety. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chief/Lead CFI's and SoF are unavailable when pilots need help. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As long as there are no accidents or incidents, Chief/Lead CFI's and SoF don't care how flight operations are performed. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chief/Lead CFI's have a clear understanding of the risk associated with flight operations. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pilots often report safety concerns to their Chief/Lead CFI's and SoF rather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

than the safety department. (5)						
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Q12 Dispatch. These items refer to your university's dispatch procedures.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
Dispatch consistently emphasizes information or details (e.g., weather requirements, NOTAMs) that affect Flight safety. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dispatch inappropriately uses the Minimum Equipment List (MEL) when it would be better to fix equipment. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dispatch is responsive to pilots' concerns about safety of operations. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dispatch would rather take a chance with safety than cancel a flight. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13 Instructors/Trainers This items refer to your university's flight instructors or trainers.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not applicable (6)
Instructors/trainers have a clear understanding of risk associated with flight operations. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety is consistently emphasized during training at my university. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instructors/trainers teach shortcuts and ways to get around safety requirements. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instructors/trainers prepare pilots for the various safety situations, even uncommon or unlikely ones. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14 Ramp Operations (Fuel truck drivers and maintenance personnel) these items refer to ramp operations at the university.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
Ramp personnel are careful about positioning of equipment (e.g. fuel trucks, power carts) that poses potential safety hazards. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The lack of communication between ramp personnel and pilots frequently lead to an incident at the flight line. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am confident ramp personnel would notify me of any minor vehicle/aircraft collision that involves my aircraft, even if damage is not readily apparent. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ramp personnel are careless about removing debris (e.g. cups, rags,	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

tools, clothing etc) near the aircraft, which may pose FOD hazards. (4)						
Ramp activities are well coordinated between pilots and ramp employees at the flight line. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel like I am gambling with the safety of my aircraft every time I go on a training activity. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15 Please use the space below for any extra comments on Operational Interaction.

Q16 Safety Values This items refer to the value that your university's upper level management places on safety.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not applicable (6)
Safety is a core value in my university (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management is more concerned with making more money than being safe. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management expects pilots to push for on time performance, even if it means compromising safety. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management doesn't show much concern for safety until there is an accident or incident. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management does not cut corners where safety is concerned. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q17 Safety Fundamentals These items refer to your university's typical practices related to safety in various areas.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not applicable (6)
Checklist and procedures are easy to understand (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My university's flight operations manual are carefully kept up to date. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My university is willing to invest money, resources and effort to improve safety. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My university is committed to equipping aircraft with up-to-date technology. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

My university ensures that maintenance on aircraft is adequately performed and that aircraft are safe to operate. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q18 Going Beyond Compliance These items refer to university upper level management's commitment to meeting or exceeding safety requirements.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
Management goes above and beyond regulatory minimums when it comes to issues of flight safety. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management schedules pilots as much as legally possible; with little concern for pilots' sleep schedule or fatigue. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management tries to get around safety requirements whenever they get the	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

chance. (3) Management views regulation violations very seriously, even when they don't result in any serious damage or injury. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q19 Please use the space below for any extra comments on Organizational Commitment.

Q20 Personal Risk (PR) and Organizational Risk (OR) The following items describe behaviors that aviation professionals sometimes engage in or feel pressured to engage in. Please answer each item twice. In the first case refer to your own behavior and the next to the behavior of other pilots that you know. Please remember that your answers to this questionnaire are COMPLETELY ANONYMOUS and no attempt will be made to personally identify you. Your honest answer will help me to make effective recommendations regarding aviation safety at your university.

	Self				Others			
	Never (1)	Sometimes (2)	Always (3)	Not Applicable (4)	Never (1)	Sometimes (2)	Always (3)	Not Applicable (4)
Reported for duty when fatigued, ill, or under unusual stress because you had no other choice. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
been pressured to take-off or land in bad weather with minimal briefing, to maintain schedule. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Been pressured to fly a university aircraft you did not believe was in safe condition. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Failed to challenge a superior on a safety issue for fear of losing you job. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Made a hard landing that you did not report. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Been aware that another pilot was not flying safely but said nothing. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Allowed an instructor or a senior pilot's error to go unchallenge d. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q21 Please use the space below for any extra comments on Safety Behavior.

Q22 University Safety Record Items These items refer to your perception about the university's safety record.

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Not Applicable (6)
The university's	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>flight department is likely to be involved in an accident over the next twelve months. (1)</p>						
<p>The university's flight department is likely to be involved in an incident over the next twelve months. (2)</p>	○	○	○	○	○	○
<p>The university's flight department is likely to be cited by the FAA for a major safety violation over the next twelve months. (3)</p>	○	○	○	○	○	○

Q23 Please use the space below for any extra comments on your University's Safety Record.

Q24 Please note: this information is for research purposes only and would not be used to identify you personally. Academic Year Group

- Freshman (1)
- Sophomore (2)
- Junior (3)
- Senior (4)
- Other (Please specify in the space below) (5) _____

Q25 Gender

- Male (1)
- Female (2)

Q26 Are you an International Contract Student.

- Yes (1)
- No (2)

Q27 Age

- Below 20 (1)
- 20-30 (2)
- 31-40 (3)
- 41-50 (4)
- 51-60 (5)
- 60+ (6)

Q28 Certificates/Ratings (Please check all that apply)

- Student (1)
- Private (2)
- Commercial - Single Engine (3)
- Commercial-Multi Engine (4)
- CFI (5)
- CFII (6)
- MEI (7)
- ATP (8)
- Other certificates and type ratings (9) _____

Q29 Have you ever reported a safety problem at your university?

- Yes (1)
- No (2)

Q30 Please use the space below for any additional comments you have. Thank you very much for your time and participation in this survey.

Appendix B

Informed Consent Form

Introduction

This study attempts to collect information about the perception of front line operational personnel like commercial flight students and certified flight instructors (CFI's) referred to as PILOTS in this study, on the status of the safety culture in the collegiate aviation program. The study will also find out if there are differences in these perceptions and try to establish a relationship between these perceptions on the safety culture and safety behavior.

Procedures

You are invited to participate in this study and it is important, you understand the procedures and your rights. You are asked to answer a short questionnaire about your perception about the aviation safety culture in the university. The questionnaire consists of thirty (30) questions with 5 likert -scale and a Not Applicable options. The questionnaire includes open ended essay style questions with spaces for extra comments and will take approximately 30 minutes or less. Questions are designed to determine how you perceive the safety culture in the collegiate aviation program, after the implementation of a Safety Management System (SMS) phase 1 and 2. The questions also assess the strength of relationship between your perceived safety culture and safety behavior. This questionnaire will be conducted with an on-line created survey called the Collegiate Aviation Program Safety Culture Survey (CAPSCUS).

Risks/Discomforts

Risks are minimal for involvement in this study. However, you may feel emotionally uneasy when asked to make judgments based on your perception of some safety issues affecting aviation safety at the university. You are allowed to omit questions that you feel uncomfortable answering. Although we do not expect any harm to come upon any participants due to electronic malfunction of the computer, it is possible though extremely rare and uncommon.

Benefits

There are no direct financial benefits for participants. However, it is hoped that through your participation, the researcher will come up with recommendations on how to enhance a positive organizational safety culture and continuously improve aviation safety at the university.

Confidentiality

Identifying information will not be collected in this study. Data will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). All questionnaires will be secured by electronic password, and no one other than the primary investigator and individuals with legal authority will have access to them. The data collected will be stored in the UND-secure database until it is deleted by the primary investigator in accordance with UND policy on data disposal.

Compensation

There is no direct compensation; however, participants are strongly encouraged to partake in this survey to help in the continuous improvement of aviation safety at the university.

Participation

Participation in this research study is completely voluntary. You have the right to withdraw at anytime or refuse to participate entirely without jeopardy to your relationship with the aviation department or the university. If you desire to withdraw, please close your Internet browser and notify the principal investigator at this email: daniel.adjekum@my.und.edu

Questions about the Research

If you have questions regarding this study, you may contact Daniel Kwasi Adjekum , at 701-630-9743, kadjekum@yahoo.com or daniel.adjekum@my.und.edu.

Questions about your Rights as Research Participants If you have questions you do not feel comfortable asking the researcher, you may contact (Bill Watson, J.D.), 701-740-3277, 211 Odegard Hall, watson@aero.und.edu. Or contact the director of UND's Institutional Review Board at 701-777-4279.

Appendix C

INVITATION TO PARTICIPATE IN AN AVIATION SAFETY CULTURE PERCEPTION SURVEY

My name is Daniel Kwasi Adjekum and I am a graduate student at the UND Odegard School of Aerospace Sciences. I am presently completing a Master of Science (MS) program in Aviation and in my third semester.

I am currently working on my thesis, which is in the area of assessing the perceptions of commercial flight students and certificated flight instructors (CFI) on the safety culture of the UND flight program. The survey is an on line questionnaire, which is strictly voluntary and confidential and no identifying information will be collected. All information and data would be secured in line with UND IRB policy on handling of data.

You are invited to kindly visit the link, which is pasted here. **Your Anonymous Survey Link:**
https://und.qualtrics.com/SE/?SID=SV_6MzrGsl9Ma6egLP

It will also be securely sent to your UND mail inbox and by using a password, which is your UND mail password, answer the questions. Your candid opinion will help me to establish relationships and differences in the perceived status of aviation safety at UND Aerospace and how it affects safety behavior.

This study is in line with establishing a baseline study for our safety culture and to continuously improve safety as part of our Safety Management System (SMS) implementation plan.

For any further clarification and information please feel free to send me an email at kadjekum@yahoo.com or Daniel.adjekum@my.und.edu.

Thanks for your participation.

Appendix D

RE: Gentle Reminder about request for assistance

1 recipient

CC: recipients You More

BCC: recipients You

[Show Details](#)

FROM:

- [Von Thaden, Terry L](#)

TO:

- [kwasi adjekum](#)

[Message starred](#)

Tuesday, October 16, 2012 3:11 AM

Capt Adjekum,

The CASS items are available in the open literature. You certainly may use them; just need to cite the source, that's all.

Regards,

Terry

Terry L. von Thaden, Ph.D.
Illinois Fire Service Institute
University of Illinois at Urbana-Champaign

217/244.8667

vonthade@illinois.edu

Address:

11 Gerty Drive
Champaign, IL 61820 USA

<http://www.fsi.illinois.edu/>

"In theory, there is no difference between theory and practice, but in practice, there is."

-- Jan L. A. van de Snepscheut

From: kwasi adjekum [kadjekum@yahoo.com]

Sent: Monday, October 15, 2012 11:00 AM

To: Von Thaden, Terry L

Subject: Gentle Reminder about request for assistance

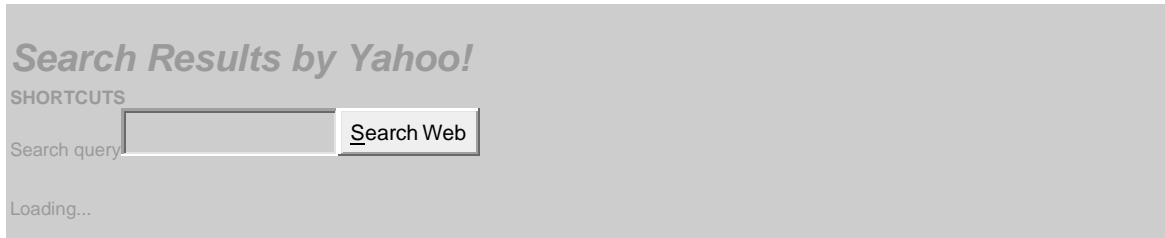
Hi Terry

I hope you had a good week end. I am writing to remind you about my request to use and modify if possible, the questions in the Commercial Aviation Safety Survey (CASS) for my intended safety culture survey at an accredited collegiate aviation flight department. This is part

of my research thesis for a Master of Science degree in aviation. I intend to use an array of questions from the CASS and other sources to assess the safety climate/culture and also draw inference on strength of relationship about perceptions and safety behavior. I would be most grateful if you could get me a feedback on the possibility of using the CASS and what the modalities will be in using it.

Thanks and as always have a great day.

Daniel Kwasi Adjekum
Graduate Service Assistant
UND Aerospace
701-630-9743



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