Developing Safety Culture or Implementing a Safety Management System? : The Case of Organisations Operating Helicopters

By Dimitrios Vlasiou Soukeras

The University of Leicester

Intake: October 2002
Student Number: 27248KOM578
Number of words: 15.867

Date: 27 August 2009

Project submitted to Leicester University in partial fulfilment of the requirements for the degree of Master of Business Administration.

TABLE OF CONTENTS

1. Acknowledgments……...p.7

2. Executive Summary……....p.8

3. Introduction……p.9

3.1 Aim and Relation to Prior Research…….....p.9
3.2 Personal Interest……...p.10
3.3 Research Objective and Questions……...…p.10

4. Literature Review…….p.10
4.1 Safety……...p.10
4.1.1 The Genesis of Safety Management Systems…….....p.11
4.1.2 Definition of Safety Management Systems (SMS)…….....p.12
4.1.3 Safety Management Systems in Aviation…….....p.13
4.1.4 SMS is Management…….....p.14
4.1.5 The Benefits of SMS…….....p.16
4.1.6 Potential shortcomings of SMS…….....p.17
4.2 Organizational culture…….....p.18
4.3 Safety culture……..p.20
4.3.1 "Safety Culture" and "Safety Climate"…….....p.21
4.3.2 Characteristics of a positive "Safety Culture"…….....….....p.22
4.4 Safety culture as predictor of safety performance……..p.23
4.4.1 "Safety Culture" Models academic background…….....p.24
4.4.2 "Safety Culture" in use from Aviation…….....p.27
4.4.3 The SCISMS "Safety Culture" Model…….....p.28-29
4.4.4 "Safety Culture" and Leadership…….....p.29
4.4.5 "Safety Culture" and Communication…….....p.32
4.5 "Safety culture" and Change……p.32

5.Methodology…….....p.35

5.1 Introduction…….....p.35
5.2 Approach to Literature……...….....p.35-36
5.3 Research Methodology…….....….....p.36
5.3.1Justification of Choice of Qualitative-Quantitative combines Approach.....p.36-37
5.3.2The preparation of the survey…….....p.37-38
5.3.3 Demographics of Survey…….....p.39
5.3.4 The Construction of the Questionnaire…….....p.41
5.3.5 Survey Piloting…….....p.41
5.4 Ethical issues Respect for Respondents……..….....p.42-43
5.5 Data collection and analysis…….....p.43
5.6 Secondary Research…….....p.44
5.7 Limitations of the Research…….....p.44-45

6. Research Analysis and Findings…….....p.46
6.1
Introduction…….....p.46

6.2 What are the Safety Risks that an Organisation operating Helicopters face? How are these differentiated from the same that deteriorate safety in airplanes segment.....p.47-49
6.3 What is the overall assessment of the contemporary Safety Management Systems at Organisations operating helicopters?.....p.49-50
6.4 What is the ‘’safety culture’’ level of Organisations operating helicopters? What differentiates it from the same of airlines…….....p.54
6.5 Can Organisational culture be regarded as change driver towards a better safety record at organisations operating helicopters?…….....p.65

7. Overall Conclusions…….....p.68
7.1 Literature Review …….....p.68
7.2Research results and analysis …….....p.68
7.2.1 Risks faced by organisations operating helicopters and their irrelativeness similar of airplanes.…….....p.69
7.2.2 Safety Management Systems Assessment in Organisations Operating Helicopters
…….....p.70
7.2.3 Differences of “safety culture’’ segments between airlines and helicopters
…….....p.70-71
7.2.4 “Safety Culture’’ and Change……..p.71

8. RECOMMENDATIONS …….....p.72
8.1To the AviationRegulatoryAuthorities …….....p.72
8.2To the helicopter Professionals ……..…p.72
8.3 To the management Teams …….....p.73
8.4 To the public Opinion …….....p.73
8.5 Areas for further research …….....p.73

9. Reflections…….....p.74
9.1 Subject Matter…….....p.74
9.2 Research planning and Execution …….....p.74
9.3 Timetable and contribution of others…….....p.74
9.4 Development of management competencies…….....p.75

10. References…….....p.76-86

11. Bibliography……..…….....87-88

12.Appendices…….....p.89-106
Appendix A: Survey for Organizations operating helicopters…….....p.89-106
Appendix B: Does Organizational Culture enhance or hinder the implementation of Safety Management Systems in Helicopter Entities? p.107

Appendix C Demographics Data…….....p.108-111
Appendix D: SCISMS Model.....p.112-118
Appendix E: Questions scoring table…….....p.119-121
Appendic F: Statistical Portrays of Researched Samples …….....p.122-145
Appendix G: Dissertation Proposal …….....p.146-159

List of Exhibits, Figures and Tables

Exhibit 4.1 Evolvement of the Manners Applied by the Industry to decrease Accidents.....p.11
Exhibit 4.2 Accident Frequency Rate Prior and after the Implementation of SMS.....p.13
Exhibit 4.3 Accident Rates and Fatalities by Year 2007…….....p.14
Exhibit 4.4 SMS as Management Function……...15
Exhibit 4.5 SMS Illustration …….....p.18

Exhibit 4.6 Functional Approach of Organisational Culture…….....p.19
Table 4.7 Summary of the safety culture models and their associated dimensions (Chen –Shan Kao et al 2008, pp.146)…….p.24-27
Exhibit 4.8 Approach to Organizational Safety…….....p.30
Table 4.9 Summary of the Organizational Types measured using SCISMS.....p.30-31
Table 4.10 Basic Organisation Communication Styles (Adapted by Westrum 1995).....p.32
Exhibit 4.11 Types of Organisational Change…….....p.33
Table 5.1 Qualitative versus Quantitative.....p.37

Exhibit 5.2 Occupation distribution of survey participants.....p.39

Exhibit 5.3 Geographical Distribution of the sample…….....p.40

Exhibit 5.4 Pilot Test Process…….....p.42

Exhibit 6.1 U.S Registered helicopters: 10 Year accident summary Statistics 1997-2006…….....p.51
Exhibit 6.2 Canadian Registered helicopters: 10 Year accident summary Statistics 1994-2003…….....p.52
Exhibit 6.3 Canadian Registered Aircrafts: 10 Year accident summary Statistics 1994-2003(Comparison between Airlines-Helicopters)…….....p.52
Figure 6.4 Answers to the question ‘’I am convinced that risks are managed well in my company’’…….....p.53
Figure 6.5 Safety Officers ‘’Safety Culture’’ Mean Score…….....p.55
Figure 6.6 Segment E : ‘’Safety Culture’’ Mean Score…….....p.56
Figure 6.7 Comparisons between Flight Engineers and Helicopter Pilots (Segment B)……...p.57

Figure 6.8 Segment B ‘’Safety Culture’’ Mean Score…….....p.58
Figure 6.9 Comparisons between Helicopter Pilots minus Helicopter Pilots of Segment B……..p.58
Figure 6.10 Comparisons between Safety Officers and Helicopter Pilots minus Pilots of Segment B …….p.58
Figure 6.11 Helicopter pilots minus pilots of Segment B…….....p.59

Figure 6.12 Segment E……p.59
Figure 6.13 Segment C……...p.60
Figure 6.14 Segment B……...p.60
Exhibit 6.15 Airline Culture Matrix-Flight Operations…….....p.62
Exhibit 6.16 Comparison of Major Air Carriers (Passenger)-Flight Operation Only (U.S Part 121 Carriers)…….....p.62
Exhibit 6.17 Comparison of Major Air Carriers (Passenger)-Flight Operation Only (U.S Part 121 Carriers and European Carriers)…….....p.63
Exhibit 6.18 Values from Fleet Comparison among pilots at a major air carrier using SCISMS…….....p.64
Table 6.19 Comparisons between Airlines and Rotorcrafts using of SCISMS….....p.64

1. ACKNOWLEDGMENTS

I would like to express my heartfelt thanks to the following people for their contribution to this dissertation:

Dr. Warren Smith for the lessons he gave me on how to construct a research project
Dr .Triant Flouris, Dr .Nikitas Koutsioukis and Dr .Loukia Loukopoulos for their specialised support and their advice
Dr .Spyros Soukeras and Dr. Dimitris Skiadas for their friendship and their ethical support
My friends Nikos Vartelas, Kostas Filias and Konstantinos Starantzis, for their unfailing encouragement and help.
My cousin Chris Skiadopoulos that assisted me with the entire statistics and data organisation- a formidable task in itself!
Captain Tsolakis Director of the Greek AAIB, and his assistants Dr. Nikos Pouliezos and Mr. John Papadopoulos for all the inspiration and for getting me in the ‘’safety’’ concept
My ELT teacher Mrs. Dionysia Gasparinatou for never letting me down. The ISASI , ESASI members and safety professionals who embraced my job and helped me summon a respectful participation
All the anonymous participants for their contribution
My parents who offered me their continuous love and dedication and to whom I owe it all.

I feel that without the kind help, staunch support, never stopping encouragement and constructive criticism of all these people, this work would not have been the same.

Last but not least, I would like to dedicate this project to my best friend ever Major Panos Papanastasiou who was lost after a helicopter accident along with his four member crew on September 11 2004. My life ever since has not been the same. I trust this to be a tribute to his memory and my minor contribution to other ex colleagues’ safety and well being.

2. EXECUTIVE SUMMARY

This study aims at testing the hypothesis that organisational culture and its partition “safety culture’’ can substitute Safety Management Systems that are currently orchestrating all the efforts in the primary safety role. To do so the researcher has chosen a specific segment in Aviation Industry, helicopters, which suffer from a disproportional accident rate compared to the relevant one of the airlines. The author presented a comparison between accident statistics to prove that SMS are not effective enough. Then he applied a “safety culture’’ measurement tool ,the SCISMS model, arranged in an internet survey conducted in a mixture of both quantitative and qualitative method. The findings were compared with similar retrieved from relevant using the same model and other secondary data.

The conclusions concur to the original hypothesis as they offer persuasive evidence, that organisations operating helicopters are lacking structure coherence, and score significantly lower in all the tested categories. It is well perceptible that as their operating risks significantly outweigh the relative of the airplanes and their leadership and communication flow fall behind from the same in airplanes, accidents inevitably occur in gross numbers. Although the methodology used is descriptive still general assumptions can be made to be dealt from the management side. Recommendations included proposals for further consideration and repeat of such surveys as they seem to provide not only insight into the safety tendency but also to initiate a change process, necessary especially for organisations performing in the high risk category.

3. INTRODUCTION & BACKGROUND

3.1 Aim and Relation to Prior Research

Safety management exists after 1911, when the first laws pertaining to compensation of job inflicted injuries were voted. Ever since management teams had started allocating time and resources in an attempt to mitigate all risks.

The world wide helicopters aggregate counts more than 26000 civil aircrafts and a lot more flown under the flags of Military Organisations. Unwillingly though this enormous fleet suffers from an increased accident rate comparing the 0,159 for U.S Air Carriers every 100,000 flight hours, to the subsequent of 8, 09 for U.S Civil helicopters. Although theoretically both segments apply the same risk controls, there is a significant differentiation of their accident statistics.

The genesis of the notion of ’safety culture’ after the Chernobyl catastrophe had given us the chance to further elaborate safety in various industries via the application of Safety Management Systems strongly adhering to safety oriented organisational cultures.

Initially, this study reviews previous empirical studies on the “’safety culture’’ efficiency level in airlines segment with the use of SCISMS model, and then executes a similar survey via the application of the same methods in an attempt to pinpoint differences that might explain the dissimilarity in accident statistics between the two samples.

Finally this project tests the efficiency of Safety Management Systems to effectively contradict “risks’’ and draw conclusions for their use either alone, as primary measures or complementary “serving’’ the development of a “safety culture’’ which should be established first. Culture is additionally tested in its competence being a change driver. By all means the aim is obvious “Better safety adherence’’.

3.2 Personal Interest

This area is of personal interest to the author, for “safety’’ has always been a controversial issue especially in Aviation industry .It is becoming even more perplexed when integrated with Safety Management Systems and “safety culture’’ two concepts still being “under investigation’’ and relatively new in every day’s life. The researcher strongly adheres to the notion that “safety culture’’ should be further evolved as for the time being it still represents a novel idea in the field.

3.3 Research Objectives and Questions

The main objective of the current research is to test the validity of the following hypothesis:

“The development of a “safety culture’’ should rather address the safety issue in an organisation operating helicopters than just conforming with the forthcoming legislation that imposes the mandatory use of a Safety Management System’’.

To test the hypothesis the study will attempt to answer the following questions:

1) What are the Safety Risks that an Organisation operating Helicopters faces? How are these differentiated from the same that deteriorate safety in airplanes segment?

2) What is the overall assessment of the contemporary Safety Management Systems at Organisations operating helicopters?

3) What is the “safety culture’’ level of Organisations operating helicopters? What differentiates it from the same of airlines?

4) Can organisational culture be considered to be a change driver towards a better safety record at organisations operating helicopters?

4. LITERATURE REVIEW

Literature review is a critical part of business research as it reveals existing knowledge, assists the formulation of research questions, identifies potential gaps in knowledge and strengthens the research design and methodology. In reviewing the literature in cases where the topic is rather controversial or mingles ill defined terms, the researcher should be armored with patience to pinpoint the important and skip the trivial .A thorough analysis should follow on the findings of relevant papers and readings in a way proving a critical ability above the average that will culminate with the development of the hypothesis and the questions that should be answered to support it. A constructive argument made by Jankowitz (2002, p159), concludes that "knowledge doesn't exist in a vacuum", the research and findings in a project will be noteworthy to the extent that they manage to present an other perspective of the same issue.

4.1 SAFETY

" ..A Characteristic of a system with the goal of injury free operations that does not permit unacceptable risks to be undertaken.''

Flannery et al (2003).

Or as referred to the ICAO SMM (2006, P.1-1) Safety in Aviation,

"..Is the state in which the risk of harm to persons or property is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management".

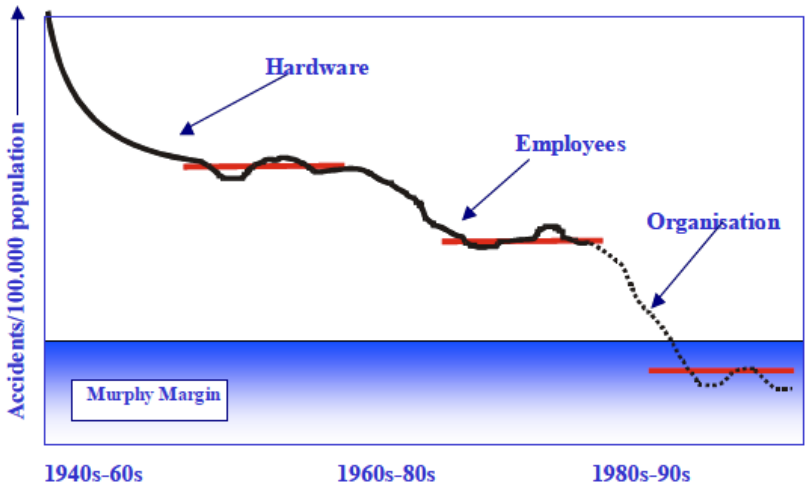
Definitely safety has been an important aspect for business entities, mainly in the latest decades, though the term is included in a catalogue of controversial notions vaguely swaying around. Reason, J. (1997) argues that "Safety is measured more by its absence than its presence''. That is why it poses an unbearable risk in case it is left unmanaged .Relevant to this belief is the fact that all three airlines that had lost aircrafts into fatal aircraft accidents in Australia since 1990 had gone out of business, Evans. A. and Parker. J. (2008, p.14).It was not like that though from the beginning. In earlier days management teams were accepting the consequences of a series of accidents as "the bearable cost of doing business''. During that period risk management was chiefly random.

4.1.1 The Genesis of Safety Management Systems

The enactment of the Workers' Compensation Legislation in USA as shown at http://www.massaflcio.org/1911-act-regulate-compensation-employees-job-related-injuries.htm [23 July 2009], decreased death losses in jobs from approximately 21000 in 1912 to about 14500 workers in 1933 Petersen. D(2001, p.3). That reduction according to his suggestions was attributed to the implementation of premature safety management.

Industries Safety administration according to http://www.hse.gov.uk/humanfactors/comah/07culture.pdf.htm [24July 2009] " is divided into three phases, schematically shown below ,which led to accident reduction , firstly with major hardware improvements, secondly with investing on selection and training workforce schemes and extensively use of reward systems and finally by changing the way risks were being managed", the prevalence of Safety Management Systems(SMS).

Exhibit 4.1 Evolvement of the Manners Applied by the Industry to decrease Accidents



Source: http://www.hse.gov.uk/humanfactors/comah/07culture.pdf.htm [24July 2009]

Safety Management Systems performed in a managerial way, were introduced after 1950s Petersen,D. (2001, p.4) but further evolved dealing with the human side of the safety problem in the early 1980s.According to Lucas, D. (1990) as cited by Reason, J (1997, P.224) three models exist for managing safety:

The person model
The engineering model
The organisation model

These models are used to address potential risks under the specific optics. The first issues the notion that humans manage the choice of performing either safe or unsafe acts . The second model accepts human fallibility or misalignment between human interface and machinery and it is strongly related to the SHEL model Edwards (1972), Hopkins(1975) as cited at CAP719 (2002, Chapter 1,P.3) when examines the Liveware-Hardware or the Liveware-Software relationship.

These first two models step mostly on the Consequence Based Safety Management principle, the 'reactive' side of dealing with 'safety' as it still accepts the possibility of accidents to occur. On the contrary the Organisation model goes in hand with the Risk Based Management principle that endorses a 'proactive' side of the issue as views human error as consequences and not a causes, Reason(1997,p.226).

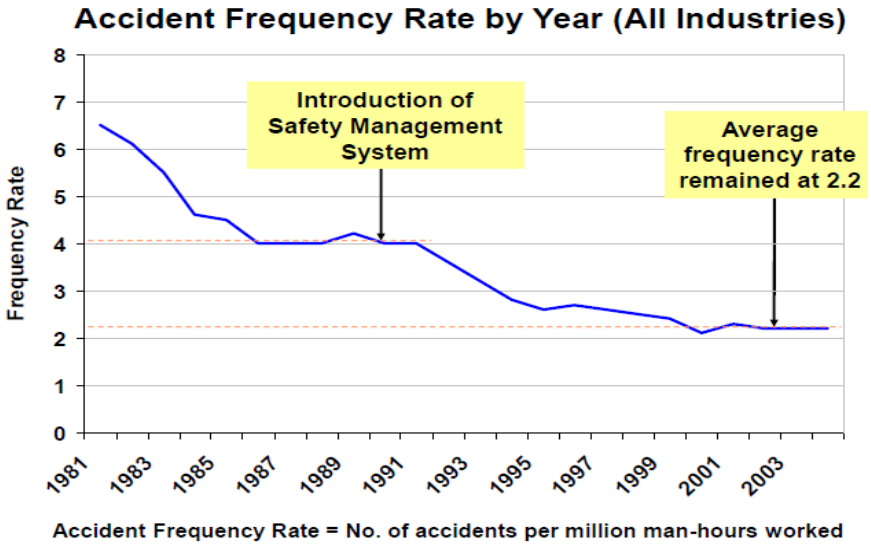
The mitigation of the organisational 'latent' conditions that might lead to an unmanageable risk has been the generic cause that paved the way for the import of Safety Management Systems in business life.

4.1.2 Definition of Safety Management Systems (SMS)

According to European Process Safety Centre (1994), "the core safety management elements include policy, organisation, management practices and procedures, monitoring and auditing, and management review". Kennedy& Kirwan (1998) as reached at HSL (2002/25, P.1) suggested that "safety management should be regarded as a documented and formalised system of controlling against risk or harm". Consequently SMS should be considered a holistic businesslike approach to mitigate safety risks that integrates operations and technical systems with human resources.

Statistics depict accidents further decreasing after the operational use of the new tool:

Exhibit 4.2 Accident Frequency Rate Prior and after the Implementation of SMS

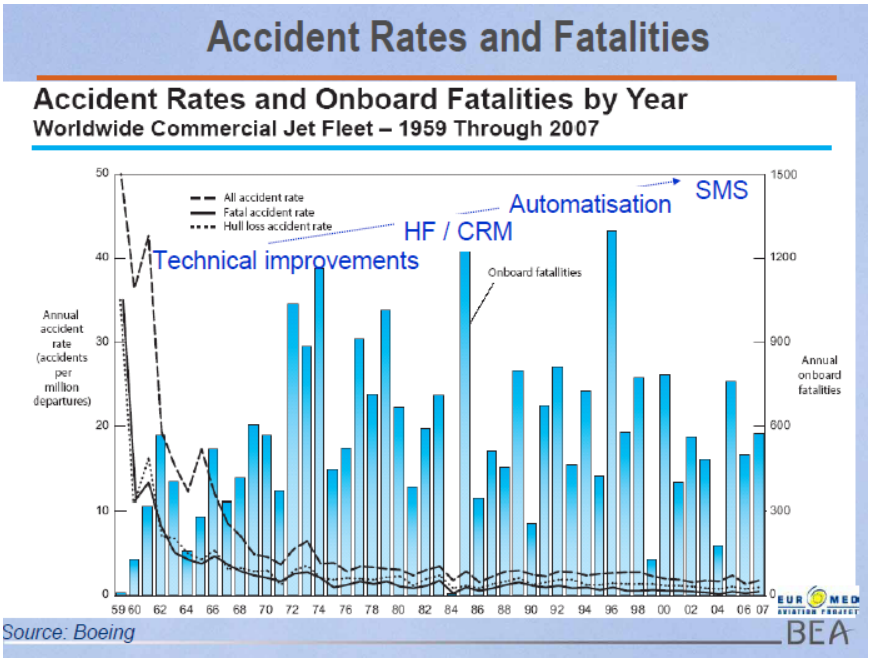


Source:www.siso.org.sg/www/attachment/20090515, RL (5)-CompetitiveAdvantageAchievedbyHarmonization.pdf.htm, accessed 30 July, 2009

4.1.3 Safety Management Systems in Aviation

Supporting the trend that was followed after the Chernobyl accident by nearly all High Reliability Organisations (HROs) in UK as in rail, petrochemical and nuclear industries, Done, J. (2002, p.1), Aviation Industry issued globally in its legislative documents, ICAO ANNEX 6 (2002) the SMS and EASA NPA 200822C reached at http://www.easa.eu , but allocated allowances period for all its participating states to comply. One by one all major airlines issued the SMS and again the findings adhered to the idea of mandatory use as illustrated in the chart:

Exhibit 4.3 Accident Rates and Fatalities by Year



Source: http://www.boeing.com/news/techissues/pdf/statsum.pdf as modified by BEA for a ppt presentation [April 2009].

Respectively the terms 'Safety management' and 'Safety Management Systems' were modified for use from Aviation; the UK CAA in CAP712 (2002, p.2) states:

'Safety Management' "is the systematic management of the risks associated with flight operations, related ground operations and aircraft engineering or maintenance activities to achieve high levels of safety performance".

And

'Safety Management System' was identified as "An explicit element of the corporate management responsibility which sets out a company's safety policy and defines how it intends to manage safety as an integral part of its overall business".

4.1.4 SMS is Management

The typical core attributes essentially needed for a competent SMS modified for an Organisation operating helicopters according to IHST(2007) reached at [http://www.alea.org.htm[12](http://www.alea.org.htm[12) June 2009] (2007) are:

(1) “SMS Management Plan

(2) Safety Promotion

(3) Document and data Information Management

(4) Hazard Identification and Risk Management

(5) Occurrence and Hazard Reporting

(6) Occurrence Investigation and Analysis

(7) Safety Assurance Oversight Programs

(8) Safety Management Training Requirements

(9) Management of Changes

(10) Emergency Preparedness and Response

(11) Performance and Continuous Improvement”

Those elements should be addressed within the known from Management sequence process of Planning, Organising, Leading and Controlling Daft (2002, p.6) as can be depicted in the modified By Bristow Group (Evans, A. & Parker (2008, P14-17) Deming’s Cycle :

Exhibit 4.4 SMS as Management Function

Source: AEROSAFETY WORLD, (2008) Flight Safety Foundation, May 2008, P14-17

According to this process, risk management is executed concurrently with the planning phase with primary goals to screen any hazards prior the issuance of a new venture or before the implementation of a new intervene .During this phase all potential risks should be identified, measured, so a decision should be made, either to undertake the burden or relieved from sustaining the consequences of human fallibility. In case we try to fit elements of the SMS here both (4) and (9) should be included.

'Monitoring' refers to the process where organisation seeks further safety enhancements with the 'hunting' of latent conditions which cannot be confronted by the established controls. In this category are included elements (3), (5), (7), (8) and (10).

Occurrence Investigation and Analysis is a reactive function dissimilar to all the others that were mentioned till now which comes in place when the 'accident' has occurred. That gives the Organisation the only chance to learn from its mistakes, to widen its 'learning organization 'aspect.

The last managerial function is performed as shown in the 'act' circle with the genesis of 'insight' the outcome of management's review. Attached to this stage are the measurement of performance and the continuous improvement of all managerial process.

The fore attempt to analyze a complete SMS circle proves that finally safety is an outcome that can be taken via management methods.

4.1.5 The Benefits of SMS

The major benefit stemming from the establishment of SMS in Aviation Industry is that they provide an easily accessible and fully understandable business plan competent to address 'safety goals'.

SMS, according to ALPA International (2006, p.1) “integrates Aviation management teams and employees experience and information”, therefore assimilates beliefs that failures can be avoided.

Finally it mobilizes Aviation Organisations, changes process, and enhances their ‘learning’ ability, Cooper (2000).

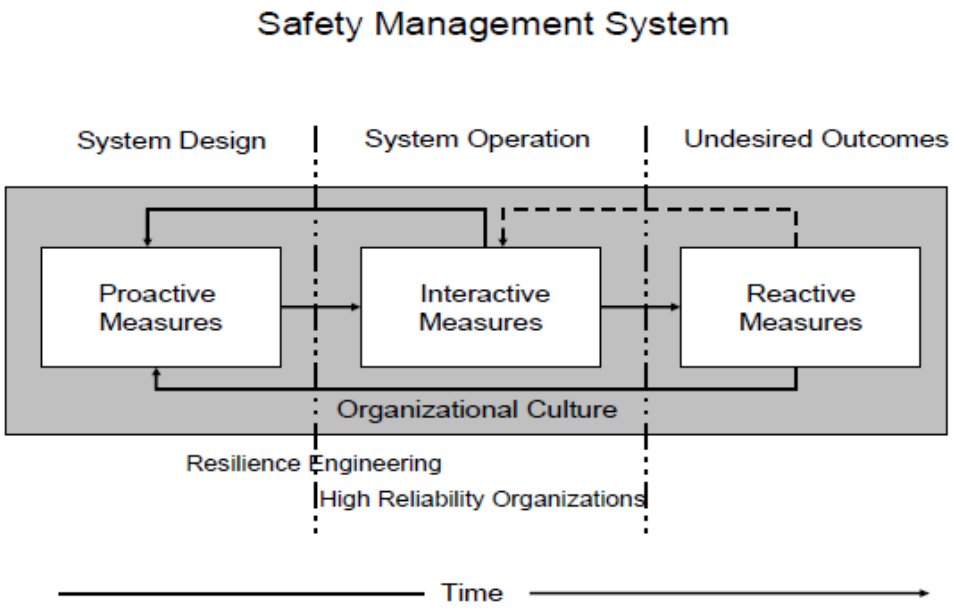
4.1.6 Potential shortcomings of SMS

Potential problems of SMS stem from inaccurate safety measurement. Lofquist, E. A. (2008) had described it as “the paradox of measuring nothing”, Weick (1987) argued the ability of conservative metrics (Incident and accident reporting) to portray the state of safety in a colourful image and Weick & Sutcliff (2001), denied the possibility of safety to be measured as being “a dynamic non-event where the absence of accident relies on a unceasing change rather than constant repetition”. That inability to efficiently estimate the progressing safety level impairs the Organisation’s competence to continuously screen and further identify minor scale changes that could enhance the safety level, and lead to an Ultra-safe performance, Amalberti (2001,p. 109).

On the other hand though, SMS issues a “safety first” approach, Petersen (2001, p.117), a priority itself that cannot win .In case there is contradiction between two, production will mostly likely outweigh safety. This attribute is further augmented in Small Organisations like those operating helicopters where it is not easy to allocate resources during SMS implementation as pointed by Wee and Quazi (2005).The latter happens as smaller entities are slower to adapt to new management practices, Chan et al (2004) as cited at Law, W. K. et al (2006, p.779).Anderson (2003) said that “off –the-shelf SMS brings too much red tape due to the existence of voluminous documentation”.

Although SMS are not mandatory yet there are signs that they lack coherence to manage “safety”. Resistance to change seems to be the greatest hindrance for successful implementation of an SMS according to Pun et al (2002) and in parallel with Schein (2001) so Lofquist (2008) proposed another model that enriches SMS elements with organisational culture as depicted below:

Exhibit 4.5 SMS Illustration



Source: Lofquist, E.A. (2008, p.13), Measuring the Effects of strategic change on Safety in a High Reliability Organization, PhD Thesis.

What is left to be examined is the role of 'Organisational Culture' in the interrelationship with SMS.

4.2 ORGANISATIONAL CULTURE

Great concern has been expressed in the last few years for "organisational culture''. Many researchers had dealt with this notion and tried to discover its dynamics. Although it was impossible for them to concur into one definition, they recognised that it plays an important role in both, long-term performance and effectiveness of business entities Cameron & Quinn (1992 p.5). Among 75 highly regarded financial analysts Kotter and Heskett (2006 p.36) summoned via interviews that only one thought culture playing no role in performance. To form the basis of our research we should adopt the definition for "organisational culture" as given by Schein (1992 p.10) that states culture to be:

“Accumulated shared learning of a given group, covering behavioural, emotional and cognitive elements of a group member’s total psychological functioning’’.

This definition is in line with the functional approach that suits the scopes of this research as it accepts that entities actually “have cultures’’ instead of “are cultures’’, emerging from collective behaviour, they can be cautiously interpreted, evolve and change after they have been measured, via tangible methods. Following is a table showing the differences of the existing two disciplinary foundations, the anthropological one that poses definitions of the term denying the potential of culture to be measured and again of Cameron& Quinn’s (2006 p.146) opposite opinion that says “Culture is treated as an attribute of the organization that can be measured separately from other organizational phenomena and, as we will show, can be very useful for predicting which organizations succeed and which do not.’’

Exhibit 4.6 Functional Approach of Organisational Culture

Functional Approach		
	Anthropological Foundation	Sociological Foundation
Focus	Collective Behaviour	Collective Behaviour
Investigator	Diagnostician, stays neutral	Diagnostician, stays neutral
Observation	Objective Factors	Objective Factors
Variable	Dependent(Understand Culture by itself)	Independent(culture predicts other outcomes)
Assumption	Organizations are cultures	Organizations have cultures

Source: Cameron & Quinn (2006 p.146)

As derived from the latter it is evident that definition of ‘’organisational culture’’ such as:
“a set of expected behaviours that are generally supported within the group’’(Silverzweig & Allen (1976)), or
“A coherent system of assumptions and basic values which distinguish one group from another and orient its choices’’ (Gagliardi (1986)), as both cited at Hall, P.D and Norburn D (1987 p.3) are not good for the purposes of this project.

Culture as suggested by Kilman et al (1986) acts as a corporate asset that inscribes on the direction, the pervasiveness and the strength of the organisation. In cases where strategy is aligned with culture, performance is expected to augment.

4.3 SAFETY CULTURE

First of all the term "safety culture'' owes its existence, on the findings of several health and safety studies after Heinrich (1931) that attributed between 85% and 98% of all workplace injuries to unsafe behaviour .This unsafe behaviour according to Dilley and Kliener (1996) is related to attitude, behaviour and culture. Dejoy (2005) attributed the 'new born' interest to 'safety culture' to three factors. He suggested that safety relies on management's decisions and behaviours; he denied the possibility of traditional personnel and policies actions and previously used engineering methods to bring about the widening safety needs of the contemporary world and concluded that the ability to assess 'safety culture' might offer us leading indicators of the safety level in an entity . Such an outcome could be used for benchmarking and further safety's performance enhancement.

Accident causation's theories progressions over the years unveiled the significance of the disputed term. Heinrich (1950), Gordon et al (1996), and Wilpert (2000) as sited by Wiegmann et al (2007) have memorized four periods in relation to the axioms that accidents were searched:
The technical period
The human error period
The socio- technical period
And finally the so called "safety culture" period

In the first era serious efforts were made to prevent technical malfunctions from happening Wiegmann & Shappel (2001).Accusation of humans was the main characteristic of the second era, as all accidents were investigated in an effort to link humans with the primary failure cause, Rochlin &Von Meier (1994), Coquelle et al (1995).In the third period accident investigation was delving into the interaction between human and machinery. Obviously efforts to confront safety in its ergonomics and engineering aspects proved fruitless. The flaws of all these theories according to Gordon et al (1996) and Wilpert (2000) could be soothed if thought that humans and machinery are not just interacting between them. It is profound that humans are forming

teams and carry common characteristics that play a substantially important role that should be identified.

The work of many authors Cox& Cox (1991), Westrum (1993), Lee (1998), Pidgeon (1998), Reason (1997) mingled all elements of culture (behaviour, attitudes and beliefs) with safety. In one word they bestowed “safety’’ into the hands of a term dwelling in the outskirts of chaos.

4.3.1 “Safety Culture” and “Safety Climate”

Officially “Safety Culture’’ was born after the occurrence of Chernobyl Accident, when investigators of IAEA, as cited by Cox and Flin (1998), had discovered “a poor safety culture’’. Guldenmud (2000) summoned 18 definitions of the term as a proof that this is a controversial issue of significant importance.

“Safety culture is the enduring value and priority placed on worker and public safety by everyone in every group at every level of organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety, act to preserve, enhance and communicate safety concerns ,strive to actively learn, adapt and modify (both individual and organisational) behaviour based on lessons learned from mistakes, and be rewarded in a manner consistent with these values”.

Wiegmann et al (2002).

Cooper (2000) as cited at HSL (2002/25, p.4) argues “Safety Culture” to be consisted of three components:
Psychological which incorporate safety climate that can be screened through a well designed questionnaire
Situational aspects that consist of policies, working procedures and management systems
Behavioural that can be found via self-report measures, statistics and observations.

The notion of “Safety Climate” entered in literature in 1980 by Zohar but still remains disputable. Unanimous concession never appealed and in literature authors mostly refer to a concept that lacks specific structure .Glendon & McKenna (1995) when compared both safety culture and climate concluded that “the implication of culture is that of existing within an organisation while climate has more passive connotations of being influenced by the external

environment". Therefore it is highly likely that its measurement will offer a small portion of significance at least in business entities.

"Safety Climate is the temporal state of safety culture, subject to commonalities among individual perceptions of the organisation. It is therefore situationally based, refers to the perceived state of safety at a particular place at a particular time, is relatively unstable, and subject to change depending on the features of the current environment or prevailing conditions". Wiegmann et al (2002) gave this definition that this project embraces.

The scope of this project deviates from just importing definitions of both terms or further discussing them. It is their impact on safety performance that interests the researcher than to interfere in a never-ending discussion without reaching a conclusion. Therefore this project accepts the pre-mentioned definitions and delves only on "safety culture".

4.3.2 Characteristics of a positive "Safety Culture"

Factors affecting a positive "Safety Culture" have been extensively investigated by many industries. Petersen (2003, p.30) identified:
"Safety expenditures
Safety measurement accuracy
Rewards of Safety
Teamwork
History
Corporate heroes
Safety systems Targets
Supervisors and Managers visibility
Employees' empowerment
Profitability of the Company"

Additionally Turner (1991) spotted the following:
Leadership commitment to Safety
Keeping Change of safety culture a company's visible strategy
Policy Statement of high expectations
Spreading the sense of safety ownership
Realistic and achievable targets

Consistency of Behaviour
Thorough accidents and Incidents investigation
Adequate reception from management of up-to date safety information

Pidgeon &O' Leary (1994) mentioned:
"senior management commitment to safety,
realistic and flexible customs and practices for handling both well and ill-defined hazards
Continuous Organisational Learning
Care and concern for hazards shared across the workforce".

The findings suggest that most characteristics are in common and what really matters is the ability to measure "safety culture" and estimate its role as a predictor of safety performance.

4.4. "SAFETY CULTURE" AS PREDICTOR OF SAFETY PERFORMANCE

"A low accident rate, even over a period of years, is no guarantee that risks are being effectively controlled...This is particularly true in organisations where there is a low probability of accidents but where major hazards are present. Here the historical record can be an unreliable or even deceptive indicator of safety performance".

Thomas (2001, p.5)

In most cases safety is dealt as a given. People tend to believe that safety exists when accidents or incidents are absent. Blanco et al (1996) argues that unfortunately concepts like "human fallibility, erroneous actions, latent errors and organisational accidents are still relatively new to be well understood".

Schein (1992, p. xi) states "The concept of organisational culture is hard to define, hard to analyze and measure and hard to manage". "Safety culture" according to Cooper (2000, p.113) is either the corporate culture itself ;in cases safety is their dominant characteristic, especially in high reliability organisations, or a sub-component of corporate culture which "alludes to individual , job, and organisational features that affect and influence health and safety". That

means that there is a strong interrelation among “safety culture” with all other elements that significantly can change the safety outcome. That is the stimulating cause leading us to attempt measuring “safety culture”.

Pidgeon (1998) argued the potential of empirical efforts, at that time to efficiently study “safety culture” and characterised the effort “unsystematic, fragmented and in particular under specified in theoretical terms”. On the other hand Braithwaite, G.(2009,p.15) believes that an accident will rapidly inhibit the perception of “safety culture” in a given organisation. What is not known yet is how long this distortion will persist.

4.4.1 “Safety Culture” Models academic background

Accident reduction and failure consequences had become a strategic target during the last years; hence the study of “safety culture” and its measurement has been a matter of grave concern for all High Reliability Organisations. A number of models that assisted “safety culture” measurement were studied and were finally aggregated by Chen –Shan Kao et al (2008) as shown in table 4.4.

The models included on the table suggest that:
The role of management commitment is of primary importance to safety Fleming (2000), Zohar (1980), INEEL (2001) ICAO (1992) which is in line with Cohen’s et al (1975), Smith et al (1978) findings that safety commitment from the upper management echelon is the main characteristic of entities having fewer accidents.
Safety Training is also considered a crucial factor in safety proliferation , Fleming (2000), Zohar (1980), INEEL (2001) ICAO (1992)
The necessity to create an learning Organisation is argued by Fleming(2000)
Communication is related with trust and is a well recognised safety driver, Fleming (2000), Zohar (1980), INEEL (2001) ICAO (1992)

Table 4.7 Summary of the safety culture models and their associated dimensions (Chen – Shan Kao et al 2008, pp.146)

Safety Culture model	**Safety Culture Dimensions or Levels**	
IAEA SafetyCulture Model	-Policy level commitment: statement of policy,	

	management structures, resources, self-regulation -Managers' commitment :definition of responsibilities, definition of control of safety practices, qualifications and training, rewards and sanctions ,audit ,review and comparison -Individuals commitment: questioning attitude ,rigorous and prudent approach, communication	
Total safety culture model Idaho National Engineering and Environmental Laboratory INEEL (2001, p.11)	-Person: knowledge ,skill, ability intelligence ,motives and personality -Behavior: complying, coaching, recognizing ,communicating ,demonstrating -Environment: equipment, tools, machines, housekeeping, heat/cold, engineering, standard operating procedure	
Reciprocal model of safety culture Cooper (1999)	-Person: personal commitment, perceived risk ,job-induced stress, role ambiguity, competencies, social status, safety knowledge ,attributions of blame ,commitment to organization and job satisfaction --Job: team-working, house-keeping, involvement in decision making, standard operating procedure, feedback, communications -Organization: allocation of resources, emergency preparedness, planning standards, monitoring, controls cooperation ,management actions, safety training job satisfaction, organization commitment	
System model of safety culture	-Leadership and support -Awareness -Responsibility and control -Competence and safe behaviours -Reinforcement and support from SM process	

Business excellence model of safety culture	-Leadership -Policy and strategy -People management -Resources -Processes -Customer satisfaction -Impact on society -Business results	
Safety culture maturity model Fleming(2000,p.3)	-Management commitment and visibility -Communication -Productivity versus safety -Learning Organization -Safety resources -Participation -Shared perceptions about safety -Trust Industrial relations and job satisfaction -Training	
Safety culture ladder model, Hudson (2001)	-Pathological: who cares as long as we are not caught -Reactive: we do a lot every time we have an accident -Calculative: we have a system in place to manage all hazards -Proactive: we try to anticipate safety problems before their arise -Generative: level of commitment and care are very high and are driven by employees who show passion about living up to their aspirations	
Safety climate Zohar (1980,p.97)	-Strong management commitment to -Safety -Emphasis on Safety training -The existence of open communication links and frequent contact between workers and management -General Environment control and good housekeeping -A stable workforce and older workers -Distinctive ways of promoting safety	
ICAO (1992)	-Senior management placing strong Emphasis on safety	

	-Staff having an understanding of hazards within workplace -Senior management's willingness to accept criticism and an openness to opposing views -Senior managements fostering a climate that encourages feedback -Emphasizing the importance of communicating relevant safety information -The promotion of realistic and workplace safety rules -Ensuring staff are well educated and trained so that they understand the consequences of unsafe acts	

The reciprocal model Cooper (1999) based on Bandura's work(1977,1986) on reciprocal determinism, is the best suitable model for application in all industries, as integrates psychological ,behavioural and situational factors, Ismail,F.& Abdullah, V.T(2006, p.376).Additionally it includes SMS as a parameter that implies the dynamics of the model when changes occur. But still is the most compound and difficult framework to be used.

On the other hand Safety Culture Maturity Model Fleming (2000) issues the idea that "safety culture" is an ongoing procedure, where we must be able to notice the changes that 'push" from one level to the next. As such this model may not be so competent in measuring absolute values but still is a valuable tool that brings the change sequence in light.

4.4.2 "Safety Culture" Models in use from Aviation

Apart from the last model that could be proved invaluable in assisting the design of a transformation process, and to draw attention towards safety the most recent period some other models were used for "safety culture" measurement:

The Reason (1997) model

The Wiegmann et al (2006) model

A tailored Dynamic Safety Culture Model based on Hatch's, M.J.(1993) dynamic culture framework used by Air Traffic Management Authorities.

The Von Thaden& Gibbons (2008) Safety Culture Indicator Scale Measurement System (SCISMS).

Reason's model (1997, p.195-196), the cornerstone of all models, differentiates as nearly all others rest on it. It suggests that a "safety informed culture" is created only if four preconditions were met. So simple but still difficult to be implemented! Although this framework names four missing parts:
A Reported Culture
A just Culture
A Flexible Culture
A learning Culture
it is not so good to be used for measurement as potential questions that could be used to quantify the safety level can be interpreted in either category causing a mixing up.

The simplified by Experimental Eurocontrol Centre Hatch's (1993) model studies four elements:
What is said
What is done
What is believed
The outcome

The first element searches the espoused values or else the organisational commitment to safety and the following two tests the employee perception or the interrelatedness of words and actions. The final factor is delegated to discover the issue's interest level of the organisation, EEC (2006, p.23).

4.4.3 The SCISMS "Safety Culture" Model

The SCISMS is the evolved form of Wiegmann's et al (2001) CASS and Wiegmann's et al (2006) model that makes their similarities nearly forgetting any differences. This model establishes an enriched image of the prevalent safety tendency in any given Aviation Organisation. It has been tested for some years and its validity so far has been found remarkably satisfactory. The model is based on the study of six basic parameters:

Organisation Commitment (OC)
Operations Interaction (OI)
Formal Safety Systems (FSS)
Informal Safety Systems (ISS)
Safety behaviour that is estimated via the estimation of Perceived Organisational Risk(POR) and Perceived Personal Risk(PR)

The SCISMS model and its factors are further explained at Appendix D.

4.4.4 ‘’Safety Culture’’ and Leadership

Leadership is found to play the most significant role in the establishment of a positive ‘’safety culture’’, Marsh et al (1998),Cox et al(1998),Cheyenne et al(1999),Gosch et al(1998),Griffin & Neal (2000) and Sawacha et al (1999).

Based on Blake’s& Mouton’s managerial Grid (1964) Von Thaden & Gibbons (2008) had used a depiction of management involvement versus employee empowerment on a grid to create a tool competent to map the current ‘’safety culture’’ condition. The grid as shown below aims at enriching managers’ armoury with a coherent method to validate the safety culture’s level .According to this framework organisation is divided:
As Collaborative (7,7)
Fixed (1,7)
Drifting (7,1)
Provisional/Avoiding (1,1)
Middle of the road (4,4)

Exhibit 4.8 Approaches to Organizational Safety

Source: Von Thaden & Gibbons (2008, p.30)

Organisations according to the applied leadership style are showing the characteristics of the following table:

Table 4.9 Summary of the Organizational Types measured using SCISMS

Organizational Type	Key Factors
Collaborative	-High assertiveness and high cooperation, -Employee/management established goals, -Recognizes and encourages personal responsibility for safety, -Esprit de corps, -Employees responsible to evaluate their own performance, -Seeks to improve, learn, -Recognises change and seeks input to ensure safety outcomes, -Looks for ways to develop win-win situation -Flexible, generative
Fixed	-Master plan for safety/high managerial assertiveness, -Means of ensuring safety performance=by-the-numbers, -Conservative decision making, slow to

	recognize change -Operates by detailed procedures/instructions /measures, -Predetermined, work carried out according to traditional procedure policy, -Safety-by-the-Rules rigid, calculative, -Immutable, inflexible ''We 've always done it this way''
Drifting	-Safety is devolved to employees/high employee assertiveness, -Employees set safety standards, -Based on personal experience, adapts to environment/population -Based on personal experience, Laissez faire management
Provisional/Avoiding	-Avoidance: low assertiveness, low cooperation -Do-it-yourself -Ad-hoc, unplanned, vague ,reactive -Workers modify, adjust, and rework safety on-the-fly, -Little to no coordination.
Middle-of-the-Road	-Compromising a moderate assertiveness and cooperation, -Accommodating: low assertiveness, high cooperation

Source: Von Thaden& Gibbons (2008, p.35)

Reason (1998) considers an ideal safety culture as the "engine'' that boosts safety statistics. Still engines need someone to drive them. That cannot be other than a Leader. Definitely Leaders are needed in Aviation where change is a constant process, Evans, A.&Parker ,J(2008,p.16-17).Respectively effective teams can be organised and better coordinated with transformational leadership styles that fit in collaborative cultures.

4.4.5 "Safety Culture'' and Communication

Hudson (2001) had evolved the Westrum's (1993, 1995) theory that separates organisations in three patterns in relation to the information flow internally. Organisations belonging to the first segment encounter high conflicts as information is kept as a secret. The second partition includes

bureaucratic schemes, reluctant on changes persistent on red tape and unable to cope with abnormal situations. The last section is appropriate for High Reliability Organisations. The table below portrays the characteristics of each style:

Table 4.10 Basic Organisation Communication Styles (Adapted by Westrum 1995)

PATHOLOGICAL	BUREAUCRATIC	GENERATIVE
Don't want to know	May not find out	Actively seek information
Messengers are shot	Listened if they arrive	Messengers are trained
Responsibility is shirked	Responsibility is compartmentalized	Responsibility is shared
Bridging is discouraged	Allowed but neglected	Bridging is rewarded
Failure is punished or covered up	Organization is just and merciful	Failure leads to Inquiry and redirection
New ideas are actively crushed	New ideas present problems	New ideas are welcome

4.5 "Safety Culture'' and Change

Cox & Cheyene (2000) had concurred to the belief that organisational culture and its part "safety culture'' cannot easily change. This happens just because as said by Hayes (2007, p7) " in equilibrium periods forces of inertia work to maintain the status quo,''. Still Flouris, (2009, p.7) argues that as change initiated in the external environment "firms should change in order to remain effective''.

All business entities are integrated into both their external and internal environment. Through the business process they collect inputs externally and via a transformation sequence they generate outputs. Effectiveness can be achieved if only organisations screen the external environments and adapt well in it. Therefore change management should be a constant effort and should be monitored. Change occurs following either incremental or discontinuous process. Incremental change is used as argued by Flouris(2009, p.7) when entities remain in equilibrium , and follow a constant process where time is not an inhibiting factor. On the contrary, the discontinuous method is the only viable method when crises occur. As referred by Flouris (2009, p.7) ''In essence this type of change requires the organisations to do things differently rather than doing things better''.

Generally Organisations according to Goodman and Pennings (1980), lie into three categories in relation to their effectiveness:

The goals perspective

The systems perspective

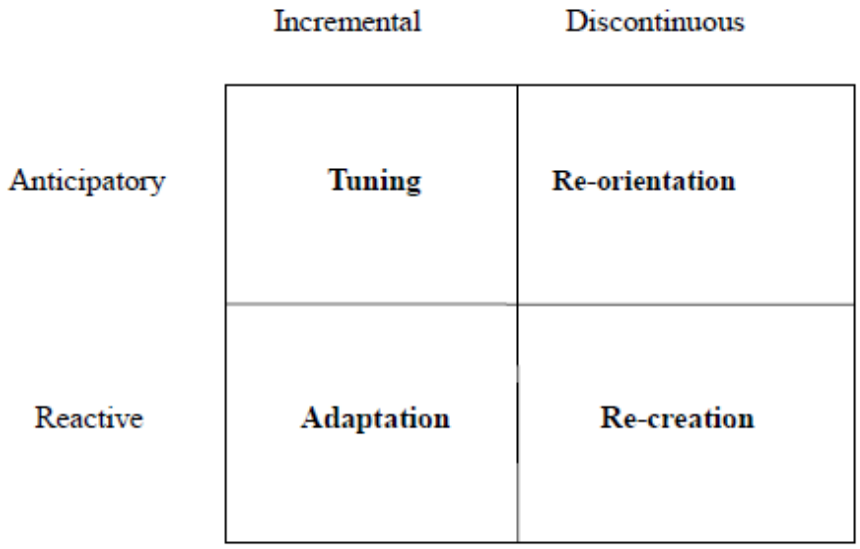
The Organisational Development perspective

Goals perspective is consistent with rational and discernible aims. Respectively systems perspective goes in hand with the regulatory phased implementation of SMS. Unfortunately organisations operating helicopters are still struggling to enter the second efficiency level in matters of safety as SMS is not mandatory yet. The organisational development perspective is according to Beer (1980) a systematic data gather following a PCDA cycle; Deming (1986), which attempts to vanish organisational conflict and establish a creative and self sustained renewal process. Organisational Development lastly is ‘’an increase in capacity and potential, not an increase in attainment’’ Ackoff(1981) as cited by Burke(1992,p.11).Or else as the previous author argues (1992, p.13) “Organisational development is a total system approach to change’’.

Furthermore correlation of time with the two change models will create interesting connotations and it will provide us with even more change options. Anticipatory change starts when an organisation establishes an intervention without having an external pressure to gain perhaps competitive advantage.

On the other hand reactive change is the response when a pressure is notable and persisting. Below are depicted the types of Organisational change:

Exhibit 4.11 Types of Organisational Change



Source: Hayes (2002, p.15)

Tuning is the applied change method in occasions when there is no external pressure for change. Respectively adaptation is used in cases an external factor exists. Consequently re-orientation is a longer scale change in anticipation of a forthcoming occurrence. Finally re-creation is applied when a crisis has already burst.

The use of “safety culture’’ measurement tools initiates by itself a change process. Unfortunately organisations with weak organisational cultures are inherently lacking the initiative to commence a radical change development. For instance SMS and its implementation as argued by Lanne (2007) in the long run affects “safety culture’’ through learning exchange of experiences. But still the use of “safety culture’’ as change driver relies on another fundamental axiom, that “safety culture’’ can change itself, Wiegmann et al (2002). However, there are authors suggesting that it cannot, Creswell (1998), Smircich (1983), Cooper & Philips (2004), or it can do it with great difficulty ,Schein (2001), or when as the previous author suggests ‘’something occurs in the external environment that threatens the organisation’’. On that occasion there is significant value on the citation by Burke (1992, p 22-23) which says ‘’Organisation change should occur like a perturbation or a leap in the life cycle of the organisation, not as an incremental process. The management of the change should be incremental, but not the initiation of the change itself’’.

What could become a threat in the external environment then? A fatal accident perhaps or a legislation imposing organisations to enter the “safety culture’’ era plays that role?

5. METHODOLOGY

5.1 Introduction

Research on vague issues as ‘’safety’’ and ‘’safety culture’’ might bring someone on the verge of total failure .Therefore the research effort should be constant , lying on a solid ground but always keeping an unceasing eye to invent a contingency plan or devise a new method to interpret data under an another perspective. In the lines to follow the author briefly describes the approach to the literature review that led to the decision to arrange a web-based questionnaire competent to provide raw data of safety perception in organisations operating helicopters that would be the basis for a comparison between other organisations operating airplanes (airlines).Furthermore the author explains the reasons that forced him to design an quantitative-qualitative tool, his actions to attract as many respondents as possible , how the questionnaire was constructed ,tested and finally the method that was chosen for the findings interpretation . Lastly certain ethical issues are addressed and how the secondary data research was executed.

5.2 Approaches to Literature Review

Rudestam & Newton (2007, pp. 61-87), and Sekaran (2003, pp. 86-103) offered valuable information and enhanced the author’s potential to research, track methods and critically explore the literature.

A significant proportion of the existing research was based on the work of ‘’holly grails’’ of Safety. To begin with Reason (1990, 1997) Gudenmud(2000) , Cooper(1998),.All that information was correlated with the work of others such as : Kotter and Heskett (1992),Cameron and Quinn(2006),Peters and Waterman(1982), Hayes(2007)mainly dealing with ‘’organisational culture’’ and its relation to performance. Whilst literature on Safety Management Systems was relying on abstracts of work by Petersen (2001), Nelson (2005), Roughton and Mercurio (2002), and Sanchez and Ballesteros(2007), nevertheless the pieces discovered from Internet sources were infinite , among them the most prominent being papers from www.Icao.int , www.Faa.gov, etc.

The researcher used a set of relevant keywords for Internet search. Firstly, the author searched among a series of books and many papers and advisory circulars, before saving material relevant

to the study in either hard or electronic form. Every relevant finding was archived according to a relative aspect and a small note prepared in front of every reference with points of significance. Later on notes were grown up from abstracts more closely to this project. Respectively there were found and studied some relevant theses with a similarity on their title.

The contribution of online journal sources, such as Emerald, Elsevier, Jstor, and others, was vital, whilst Amazon.com had been the preferable bookstore seller.

5.3 Research Methodology

5.3.1 Justification of Choice of a Quantitative-Qualitative Combined Approach

Review of literature confirmed Reason's (1997) strong belief of '' safety culture being around clouds'', therefore it became questionable the efficiency of a measurement of an intangible value such as safety perception as synthesised by delving into attitudes, beliefs and behaviours. Therefore based on the work of Von Thaden, T.R. et al (2008) the author preferred the use of a combining, both quantitative and qualitative tool that according to DeVellis(2003,p.8-9) ''intends to reveal levels of theoretical variables not readily observable by direct means'' .The latter would have worked to test the external validity and the reliability of the former while the first part of it would offer a nominal value easily comparable with other segments.

The selection of an electronic survey according to Cooper (2000) provides the ability to summon large –scale data, especially in occasions where respondents cannot be reached by other means. The technology offers a cheap mechanism for conducting surveys online instead of through the postal mail (Sheehan & Hoy 1999). While it has been noted that qualitative studies may seem more common in anthropology and quantitative in economics, it is obvious that many problematic areas of research can be investigated quantitatively as well as qualitatively (Cohen et al, 2000). Combined literature was invaluable in highlighting and comparing the features of Qualitative and Quantitative approaches in order to identify the suitable approach to this research project.

Table 5.1 Qualitative versus Quantitative Research

QUALITATIVE APPROACH	QUANTITATIVE APPROACH
Systematic	Systematic
Inductive	Deductive
Subjective	Objective
Not Generalisable	Generalisable
Words	Numbers

Source: (Sekaran, 2003).

The fact that generally quantitative approaches are perceived as more objective, comply with the need for general assumptions to be sustained, and suits the author's prerequisite to use a tool that will make comparisons easy. Furthermore enhancements are expected with a minor use of open-ended questions that adds up to the qualitative side of the tool. In fact the latter if successfully accommodated were proven; according to Schaeler & Dilman (1998), Bachmann & Elfrink, (1996) and Loke & Gilbert (1996) valuable to gather more easily self-disclosing comments without the danger of anonymity ever being at stake. Attrition is a danger that was thought of when many open-ended questions were being used Crawford et al (2001), so those were decided to be used on five occasions.

For the above reasons a questionnaire of 66 questions was prepared and launched from a professional site (www. Surveymonkey.com), see Appendix A, in an effort to eliminate many of the construction and administration challenges of web-based surveys Birnbaum (2000). Since potential respondents and were not known beforehand, were scattered all over the globe the on-line survey was the only available method to reach them. Lastly it was expected from the beginning that these professionals tended to have high connectedness with their profession, were more educated, and as being more task related Yun & Tumbo (2000), represent not just the average but the best sample assisting in that way comparisons .

5.3.2 The preparation of the Survey

The attraction of potential respondents of a questionnaire aiming at identifying the ‘’safety tendency’’ was attempted via a series of prominent ways. The author had preliminary in mind two things. Firstly to arrange at least three homogenised groups to take the survey and secondly to get as many responses as possible .To fulfil both his goals the researcher, a helicopter pilot and a qualified air accident investigator himself, used all his personal professional acquaintances after having spent 14 years in the Army Aviation. Therefore he arranged two meetings with

representatives of four arranged samples that lasted 45 minutes each, where he explained the scope of this survey and some general information on the topic of Safety and the competence of ‘’safety culture’’ surveys to portray an image of ‘’safety’’ effectiveness. Participants of these meetings were excited and declared that they were looking forward to taking part on the survey. In two of the occasions among the encounters of those meetings were not members of the management teams.

Apart from potential participants who could be reached via emails the author took part in the last Annual Seminar of the European Society of Air Safety Investigators (ESASI) of which he is a member in Hamburg. Among the participants of this event were delegates of Several Public and Private Organisations and shareholders of Aviation Industry (e.g. EASA, UK.AAIB, French BEA, EUROCOPTER, UK FLIGHT SAFETY COMMITTEE, EMBRAER, AIRBUS, German BFU, etc) .There he had the chance to announce his intentions, which were enthusiastically embraced and several participants offered to inform potential respondents via emails. Accordingly it was asked that the findings of this survey to be announced in the following next year’s Seminar.
Finally the author had sent e-mails not only as scheduled from the proposal to a famous Safety website that is reached daily by aviation safety professionals worldwide ,(www.fsinfo.org) but respectively to Helicopter Association International reached at (www.rotor.com) ,of whom he was asked and became a member, and two helicopter forums (www.justhelicopters.com and www.pprune.org) where he had found hospitable ground to upload a web link leading to the questionnaire . (See attachment B).

A fifth homogenised sample was arranged out of the blue, when the author received an email from a small helicopter operating organisation where the head-pilot happens to know an author’s close friend and colleague. In this occasion the researcher had to explain some aspects of the whole survey via the telephone.

All potential respondents were informed that after finishing with the project a copy of a general analysis was to be sent to all sites that assisted to the questionnaire dissemination along with a more detailed report for each homogenised response sample.

5.3.3 Demographics of Survey Participants

Exhibit 5.2 Occupation distribution of survey participants

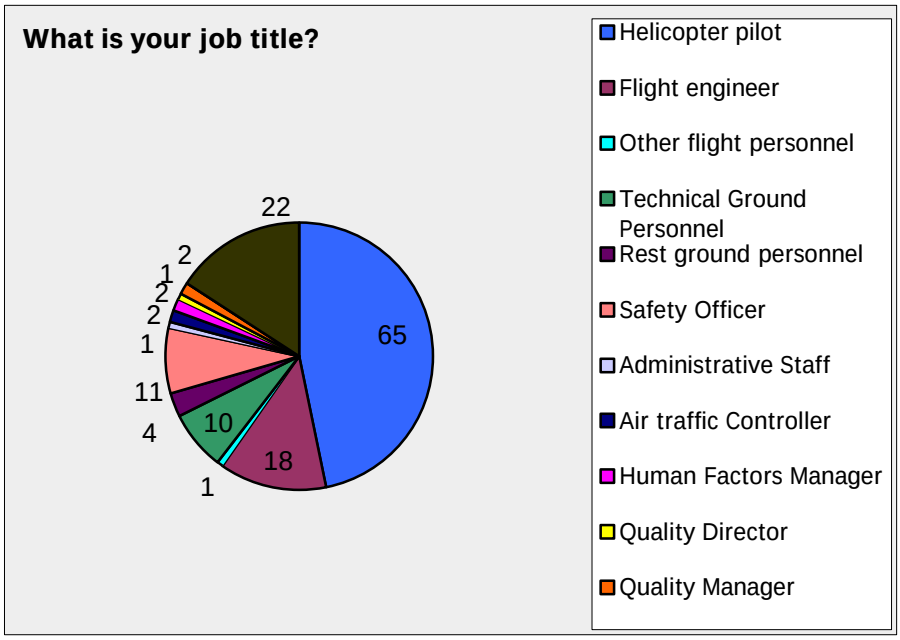
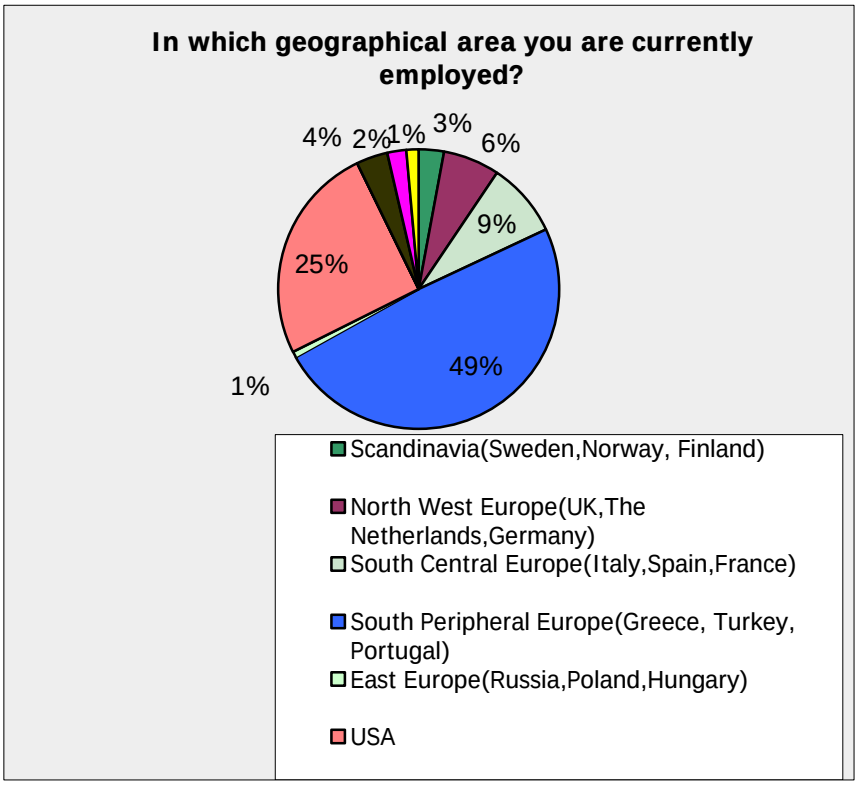


Exhibit 5.3 Geographical Distribution of the sample



As shown on Exhibit 1, finally 139 filled a valid questionnaire out of 144 that entered the designed web link and started the survey. Nearly half of the respondents were belonging to

Military Organisations which is proportional to the actual worldwide fleet allocation. The rest of the demographics of this survey can be found at Appendix C. All respondents were professionals hired from organisations that operate helicopters.

5.3.4 The Construction of the Questionnaire

Andrews, D et al (2003, p.3) identifies five characteristics of a successful Web-Based survey. Those are:
Survey design,
Subject privacy and confidentiality,
Sampling and subject selection,
Distribution and response management and
Survey piloting.

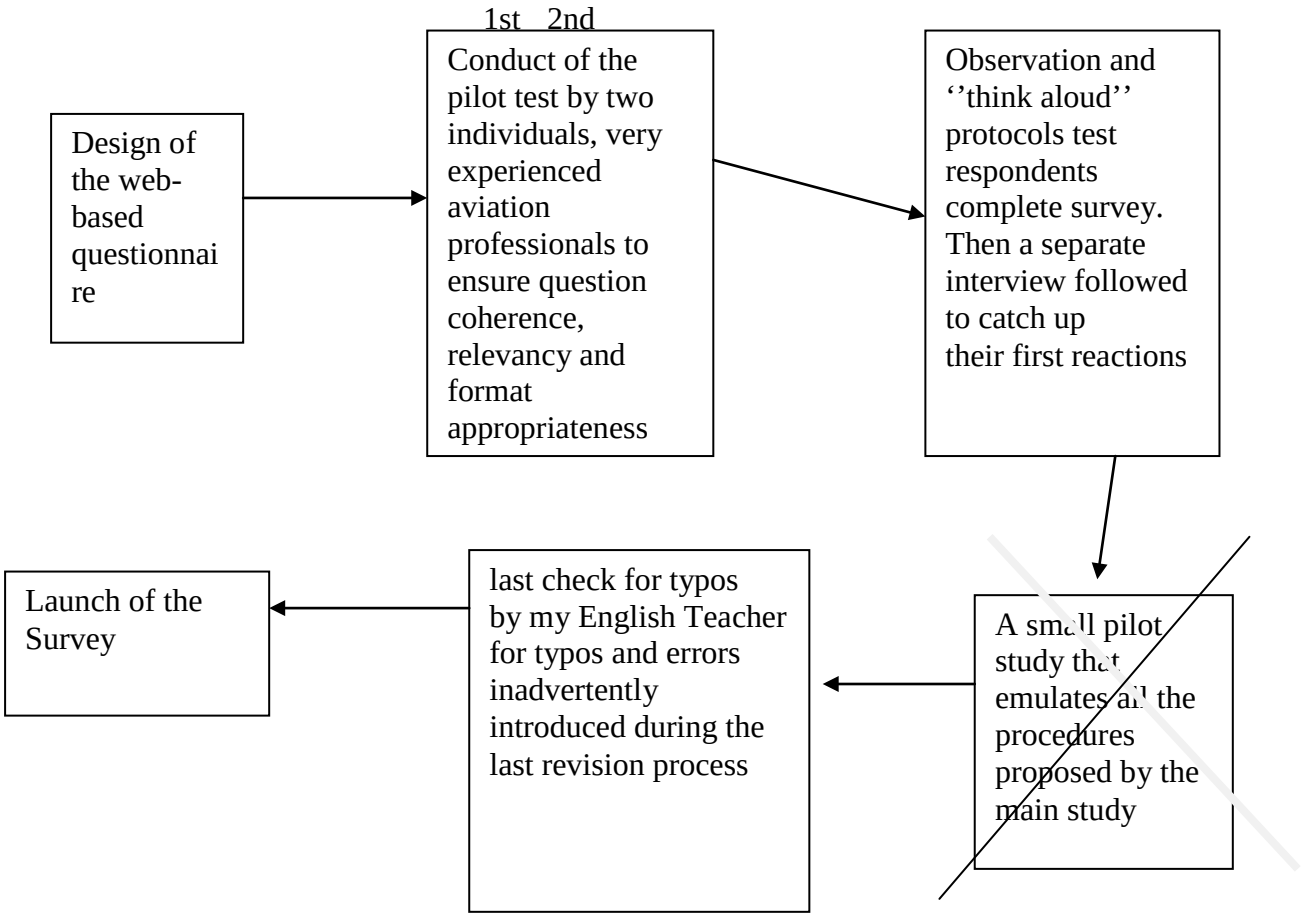
Therefore the author prepared a questionnaire of 66 questions .Those were categorised into six categories, following the Von Thaden et al SCSCM Model (2008) ,aiming at visualising the perception of parameters such as: Organisational Commitment to Safety (OC), Operation Interaction (OI), Formal Safety Systems (FSS), Informal Safety Systems (ISS), Perceived Risk (PR), Organisational Perceived Risk (POR), Demographics Or General data (DEM).Respectively five of the questions as being open-ended ,were expected to contribute additional information and explanations Andrews et al (2001).Lastly the final two questions were asked to answer straightforward a research question or to complement the data analysis. The allocation of the questions into the categories is shown at Appendix D.

Relying on the web-based designer that offered a wide range of format controls, graphics sophistication, colours and textual options Preece et al (2002), the author had accordingly used extensively a mix of Likert scales type questions ; that alone according to Taylor &Heath (1996) is one of the dominant methods of measuring social and political attitudes, Thurstone scaling ,Ordinal questions and Guttman Scales with some variations to evaluate both subjects and stimuli McIver (1981), Li et al (2001).Serious concern had been given to the questionnaire length and the time required to be filled in so the obligatory questions where minimised to 40 to lessen attrition rate as much as possible. All these precautions were taken to make the survey interesting and ‘’catchy’’ and its presentation enchanting.

5.3.5 Survey Piloting

A pilot test of the survey was conducted just prior to launching the original project. The author's attention was given to possibly restrain unintended connotations from the way questions were set and asked. Accordingly the pilot test aimed at unveiling weak points of the questionnaire that might have disturbed the mental sequence making a potential respondent loose his interest and quit the survey. The preferable final draft included all probable means of a ''catching'' design. The process of the pilot, imitated Dillman's (2000) suggestion for a four stage testing process (except that there was no time to execute the third stage).So the researcher's steps are presented below schematically:

Exhibit 5.4: Pilot Test Process



The approximate time to fill the survey was estimated to 20-30 minutes.

5.4 Ethical Issues - Respect for Respondents

The aim and purpose of the study was made clear to potential respondents. The author in the first page of the designed web-based survey reassured participants of their feedback anonymity, confidentiality that was accomplished not only from the chosen survey method that totally blocks

communication between the respondents and the researcher Andrews, D. et al (2003, p.2) but with the application of a SSL enabled connection where the IPs of online feeders were totally unreachable. After all no question was asked requiring strictly personal information to be revealed (e.g. names, exact name of the company that someone was working for etc.).

It was also explained that the respondents' participation was voluntary, so the survey was giving the potential to someone to drop at any time he/she was feeling uncomfortable with some questions. Respectively the survey was giving them the possibility to skip a number of ''sensitive'' questions minimising the successful valid questionnaire to 40 out of 66 initially issued.

5.5 Data collection and analysis

One important aspect that was taken seriously into consideration was the web-based survey ability to transfer the responses directly into a database with no transcription errors thus making the alteration of the data impossible. The fact that 139 respondents answered most of the 66 questions had made the plethora of data difficult to be managed though these were well organized.

The author would like to avoid the analysis of the data to be a complex procedure and thought that he should follow a procedure as simple as possible. Therefore he chose to analyze the findings using a descriptive statistics method .To do so he created a chart and appointed an ordinal value from one to five for each specific question and each possible answer. In occasions where in just a few questions were given six possibilities to answer then an extra value, zero was appointed and simultaneously that questions were used as validity testers. Accordingly in some questions that were just given three options to answer , the researcher decided instead of using the Guttman scaling as it is, to provide a third option that again would have offered to the validity assessment .The Appendix E shows the way that the questionnaire was validated.

Lastly the remaining questions that did not belong into the quantitative segment of the survey were analyzed and their findings were assisted qualitatively the interpretation of the quantitative assumptions and discovered rich contextual meaning.

As for data that was retrieved from the secondary research again the same philosophy .By all means, the author focused on remaining objective and achieving neutrality while quantifying and categorising the available qualitative material as sufficiently as it could be done.

5.6 Secondary Research

The author extensively used the Internet via a series of sites mainly delving into Aviation and Safety aspects such as: www.isasi.org, www.faa.gov, www.rotor.com , www.ntsb.gov, and downloaded accident data and other relevant statistics that would make him able to make a comparison in accident rates between organisational cultures of both helicopter and airplanes entities.

Denjin (1978, p.291) defined a method called triangulation, “the combination of methodologies in the study of the same phenomenon” and the author used that method as possible to be led to the same assumptions using two different paths, both quantitative and qualitative data, similarly as Bourchard (1976, P.268) believed:’’The convergence or agreement between two methods enhances our belief that the results are valid and not a methodological artefact’’.

5.7 Limitations of the research

Every research has certain limitations that can derive from the nature of the research methods employed and they way they have been applied.

When decided to deal with ‘’intangible’’ notions like ‘’safety’’, or ’’ safety culture’’ the author was running the risk to completely fail in getting data that could be proven to be of any relevance or validity. Respectively examples of previous attempts to deal with such grave issues as studying human behaviours and attitudes lie in the field of psychologists’ or human factor experts and in this effort they are usually surrounded by statistics experts .In comparison , the researcher was offering his inexperience. But still the breeze to bring something new even if it severely lacked academic coherence was strong enough and prevailed over the stagnate swallow easiness of not to try.

In general terms the author is quite happy with the way this research has been executed. If it lacks something it is the method that the findings were analysed that was decided to be as simplistic as possible. After all the researcher would not have wanted to pretend or even try to take the place of ‘a safety guru’’. No, not at all. He just wanted to just add a small brick on the ‘’safety consciousness wall’’, to stand on the side of those trying to raise their voice for the flight crews that suffer from bad accident rates.

Two more things that could be added to those that limit the findings of this project are time that is an element always invaluable in an effort like that and the survey’s inability to attract a serious representation of members of management teams that forced the author in some graphics to substitute them with Safety Officers which had been the occupation segment with the ‘’best’’ perception for safety in their organisations.

Luckily the attrition rate has been only 2, 9%, which means that 139 valid questionnaires were summoned from 144 that started them, a fact by itself proving the interest of professionals in Aviation Industry for Safety.

6. RESEARCH ANALYSIS AND FINDINGS

6.1 Introduction

This chapter presents and analyses the findings of the research the way they came up primarily from the web-based survey with the necessary comparison with relevant data that was retrieved from a series of Internet sites and other related secondary research.

The data is discussed following a sequence to test the validity of the researched hypothesis and answering the sub-questions. The researcher wishes now to reiterate the hypothesis and the questions that hopefully will be answered:

“The development of a “safety culture’’ should rather address the safety issue in an organisation operating helicopters than just conforming with the forthcoming legislation that imposes the mandatory use of a Safety Management System’’.

1) What are the Safety Risks that an Organisation operating Helicopters faces? How are these differentiated from the same that deteriorate safety in airplanes segment?

2) What is the overall assessment of the contemporary Safety Management Systems at Organisations operating helicopters?

3) What is the “safety culture’’ level of Organisations operating helicopters? What differentiates it from the same of airlines?

4) Can organisational culture be considered to be a change driver towards a better safety record at organisations operating helicopters?

Appendix F provides a series of findings as illustrated in several figures, charts and grids to back up the findings as they were analysed in the main body of this part. The author was reluctant to add so much material on this appendix but still there was no alternative.

6.2 What are the Safety Risks that an Organisation operating Helicopters faces? How are these differentiated from the same that deteriorate safety in airplanes segment?

‘’The thing is, helicopters are different from planes. An airplane by its very nature wants to fly, and if not interfered with too strongly by unusual events or by deliberately incompetent pilot, it will fly. A helicopter does not want to fly. It is maintained in the air by a variety of forces and controls working in opposition to each other, and if there is any disturbance to this delicate balance the helicopter stops flying immediately and disastrously. There is no such thing as a gliding helicopter.’’

Harry Reasoner’s comments, ABC News, 16 Feb 1971

Source: http://www.search9.net/helitac/harryreasoner.htm[25 July 2009]

What is really described by the words of Harry Reasoner and additionally the thoughts of McAdams, T. (2009), NASA (2009), Committee on Aircraft Certification Safety Management (1998, p.50), Johnson, K. (unknown), Overturf, H. (2007) and Chung,C.K.(2003), is that helicopters in comparison to airplanes generally are:

Aerodynamically less ‘’failsafe’’ structures
With more complicated flight controls
Less automated than airplanes
More complex technologically because of the number of the moving parts existing and therefore more maintenance prone
More susceptible to adverse weather conditions not only because they fly closer to obstacles but additionally due to the lower flying speed that prevents them from avoiding bad weather frontiers
A ‘’product’’ in the growth lifecycle stage as its first built up took place approximately forty years after airplanes
Much smaller than airplanes which makes distance with other seat occupants a factor that increases tension in cabin?

These aircraft's characteristics cause to helicopter pilots and technical personnel a series of risks different from the same faced by their colleagues in airplanes which could be analysed as follows:

Time factor deteriorates pilots' ability to efficiently validate and implement decisions due to the small operational height they fly and the high rate of descend obtained by the aircraft in cases of malfunctions

Pilots are facing prefight planning difficulties since they fly in most occasions in uncontrolled airspace and they additionally lack real time weather information for the designated flight legs

Since they fly an aircraft with more sensitive flight controls the required experience and training level to maintain safe piloting is generally higher

Helicopter pilots are more susceptible to spatial disorientation, loss of situational awareness due to the aircraft's flight envelope limitations

While dealing with all these they should be happy when landing on unprepared confined sites, refuel their aircraft, and simultaneously maintain full control of their PR ability with customers

According to Iseler, L. & De Maio, J. (2001):

Helicopter accident rates are at least ten times more that the same of airlines. Taken account of that Organisations operating helicopters till now suffer from extremely higher accident rates as the previous authors continue ,due to the fragmentation of the rotorcraft Industry ,the variability of the flown missions, and the inexistence of a ‘’central safety clearinghouse’’.

The fact that 75% of the operators who belong to the Helicopter Association International operate less than five rotorcrafts and 39% just one, while the 13 largest U.S carriers with turbojet fleets have an average of 300 aircrafts ,Committee on Aircraft Certification Safety Management (1998) ,shows that these entities are smaller communities (less human resources), different in nature that strive to overcome complex safety risks based on both the limitations of the aircraft, the dissimilarities of the flight missions and the variability of the operational environment, Iseler, L. & De Maio, J. (2001),thriving for society's acceptance of a noisy transportation machine.

A failure in an organisation that operates helicopters mostly stems from four human related causal factors which according to Wyght, G. (2007) are:

Controlled flight Into Terrain in higher percentages than airplanes and with additional categories like Loss of visual reference, or struck object, Morley, J.& MacDonald, B. (2004),

Pilot procedural error, in more than expected occasions for airplanes due to machinery limitations mostly,
Release of an Un-airworthy aircraft into service (Human Error in Maintenance and,
Mid Air Collision

All the above in case they occur will inflict direct and indirect costs and according to Transport Canada Agency (2004, p.84) those are:
Damage to the aircraft which ranges from minor, substantial or total loss
Compensation for Injuries
Damage to property

While indirect costs are said to be:
Lost of business and reputation
Legal fees and damage claims
Medical costs not covered by workplace compensation
Cost of lost use of equipment (loss of income)
Time lost by injured persons and cost of replacement workers
Increased insurance premiums
Aircraft recovery and clean-up
Fines

The previous show that entities choice to operate helicopters is under constant risk raking so different from the same of airplanes and definitely must apply more safety controls to manage all risks that makes their business being at stake.

6.3 What is the overall assessment of the contemporary Safety Management Systems at Organisations operating helicopters?

International Civil Aviation Authority (ICAO) according to Smith, S.D. (2005), mandated the use of Safety Management Systems in 2001 to address risks related with flights. Since then, one by one all its participating states started incorporating the new requirement in their legislation. Fortunately though while most airlines globally already applied SMS and the rate of compliance in the airplanes segment is growing fast the first country that is expected to include in its legislation a mandatory requirement for Organisations operating helicopters is Canada in September 2009 and then Australia on January first 2010.

It seems that while most ICAO States have already implemented SMS legislation as a regulatory prerequisite for Airplanes the same is not happening for helicopters.

If it is so its implementation should have brought better safety performance outcomes which can be depicted in accident rates charts.

Unfortunately the following exhibits pertain to the opposite. Randomly choosing accident rates charts will always show different optics of the same problem.
'' Helicopters are suffering from extensively higher accident rates''. Exhibits 6.1, 6.2, and 6.3 which follow are undisputable witnesses of the situation.

Exhibit 6.1 U.S Registered helicopters: 10 Year accident summary Statistics 1997-2006

Helicopter Association International

U.S. HELICOPTER 10-YEAR ACCIDENT SUMMARY STATISTICS - 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
TOTAL FLIGHT HOURS (100K)	2.084	2.342	2.629	2.191	1.953	1.875*	2.135*	2.260*	2.440*	2.565
*FAA Flight Hour Estimates Revised February 2006										
ACCIDENT DATA:										
TOTAL ACCIDENTS	163	191	197	206	182	205	214	180	193	162
ANNUAL HELICOPTER ACCIDENT RATE	7.82	8.15	8.23	8.33	9.32	10.93	10.02	7.96	7.91	6.32
FATAL ACCIDENTS	27	34	31	35	29	26	37	33	25	25
FATAL HELICOPTER ACCIDENT RATE	1.30	1.45	1.29	1.42	1.48	1.39	1.73	1.46	1.02	0.97
FATAL INJURIES	43	66	57	63	51	41	67	68	40	43
SERIOUS INJURIES	62	26	44	42	34	51	51	38	47	34
MINOR INJURIES	79	55	81	81	71	58	83	68	78	64
NO INJURIES	157	197	205	202	223	267	239	219	265	219
MINOR OR NO DAMAGE	0	1	6	0	6	2	2	1	2	2
SUBSTANTIAL DAMAGE	111	139	153	154	145	174	169	141	160	130
AIRCRAFT DESTROYED	50	51	38	52	31	29	43	38	29	30
UNKNOWN	2	0	0	0	0	0	0	0	0	0
PHASE OF OPERATION:										
STANDING	3	2	6	6	9	6	6	8	3	6
TAXI	0	1	2	0	1	2	3	1	1	1
TAKEOFF	16	16	22	16	21	33	18	17	27	22
CLIMB	7	7	6	7	3	2	5	3	5	3
CRUISE	26	38	33	32	25	43	29	35	24	24
APPROACH	13	19	8	16	13	17	5	3	15	8
LANDING	16	17	25	25	22	22	32	17	25	17
MANEUVERING	34	40	40	49	25	36	51	37	31	32
HOVER	19	15	20	21	21	7	28	28	26	26
AUTOROTATION	18	22	22	26	19	22	19	21	28	18
OTHER/UNKNOWN	11	14	13	8	23	15	18	10	8	5
TYPE OF OPERATION:										
FAR 91 AERIAL OBSERVATION	6	6	13	7	5	8	8	9	4	6
FAR 91 AIR MEDICAL	2	4	8	9	6	8	10	5	9	8
FAR 91 BUSINESS	6	3	10	14	12	11	10	8	12	13
FAR 91 CORPORATE/EXECUTIVE	2	0	1	0	1	0	0	0	1	0
FAR 91 ELECTRONIC NEWS GATHERING	1	1	2	3	1	1	1	1	0	1
FAR 91 INSTRUCTION/TRAINING	30	32	22	31	32	37	43	42	46	32
FAR 91 MAINTENANCE/TEST	2	4	3	4	5	4	0	5	0	1
FAR 91 OTHER AERIAL WORK	2	6	9	2	3	8	6	1	10	3
FAR 91 PERSONAL	36	45	34	41	39	50	41	44	46	31
FAR91 POSITIONING/FERRY	11	13	11	13	10	10	13	5	12	11
FAR 91 PUBLIC USE	17	24	27	26	19	21	20	14	16	15
FAR 91 SIGHTSEEING	6	6	4	4	2	2	3	2	4	4
FAR 91 UTILITIES	0	1	2	2	0	3	1	1	0	1
FAR 133 EXTERNAL LOAD -LOGGING	3	7	3	5	3	4	5	3	0	3
FAR 133 EXTERNAL LOAD -UTILITIES	3	2	3	1	4	0	0	1	1	0
FAR 133 EXTERNAL LOAD - OTHER	9	4	5	4	5	4	8	4	4	7
FAR 135 AIR TAXI- AIR MEDICAL	1	2	2	3	4	3	5	6	3	2
FAR 135 AIR TAXI- AIR TOUR	2	2	3	5	5	2	5	3	4	6
FAR 135 AIR TAXI- PASSENGER/CARGO	9	5	12	8	11	14	17	14	7	11
FAR 137 AERIAL APPLICATION	15	24	24	25	15	15	18	11	14	6
PRELIMINARY CAUSAL FACTORS (Multiple Factors Possible):										
ENGINE FAILURE/MALFUNCTION	37	38	27	25	37	40	45	41	27	26
SYSTEMS FAILURE	10	16	8	19	18	16	26	19	21	23
STRUCTURAL FAILURE	12	17	10	11	1	5	9	5	4	7
WEATHER	7	6	9	8	4	12	12	9	10	15
HUMAN FACTORS	95	111	134	119	113	135	107	92	119	94
WIRESTRIKES	9	13	11	13	10	16	10	7	10	10
FLIGHT CONDITIONS:										
DAY	149	173	178	187	168	192	190	160	181	146
NIGHT	14	18	19	19	14	13	24	20	12	15
UNKNOWN	0	0	1	0	0	0	0	0	0	1
VMC	157	187	188	193	175	201	205	173	185	153
IMC	6	4	9	13	7	3	9	7	6	9
UNKNOWN	0	0	1	0	0	1	0	0	2	0

Source: HAI Accidents Database

Exhibit 6.2 Canadian Registered helicopters: 10 Year accident summary Statistics 1994-2003

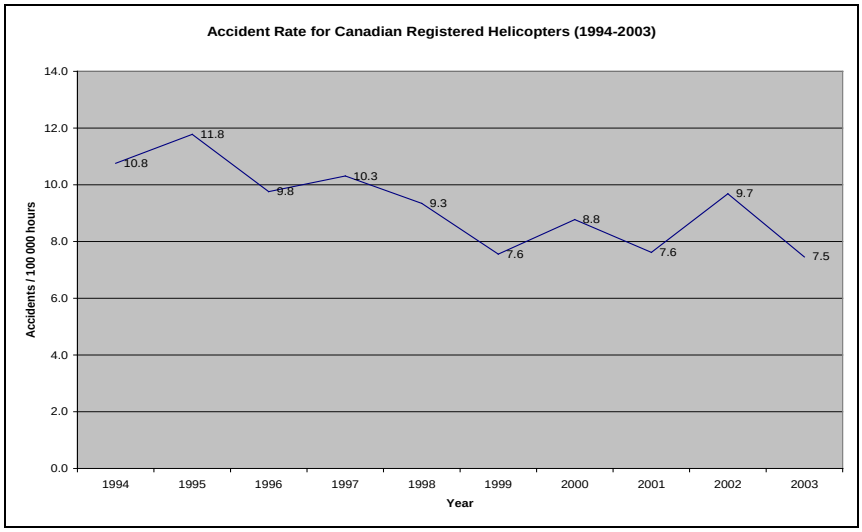
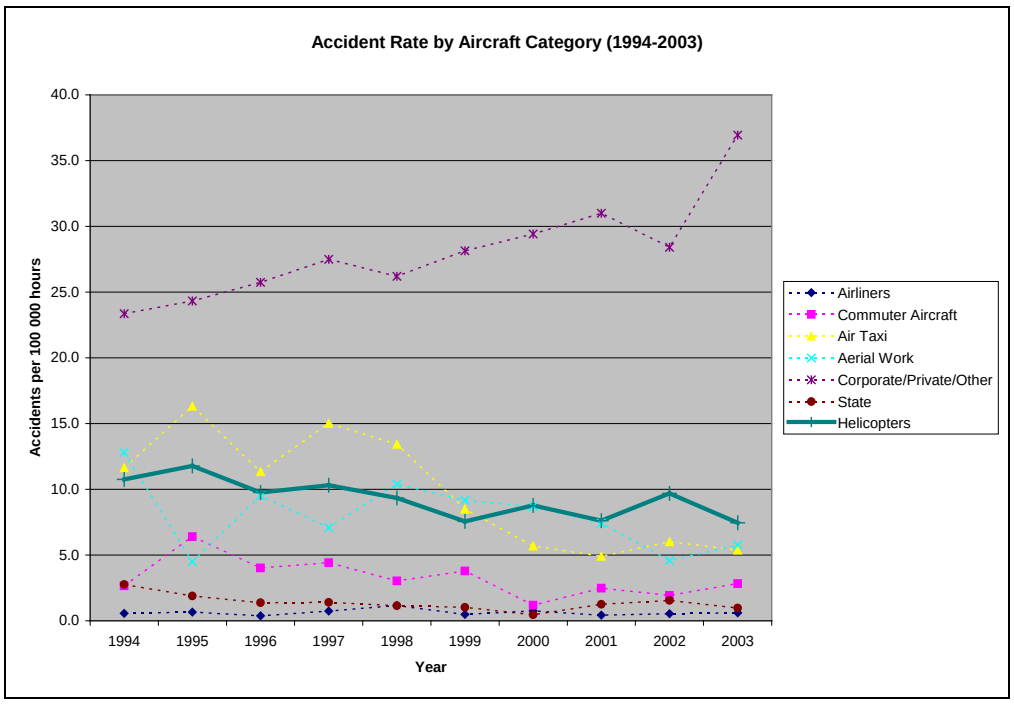


Exhibit 6.3 Canadian Registered Aircrafts: 10 Year accident summary Statistics 1994-2003(Comparison between Airlines-Helicopters)

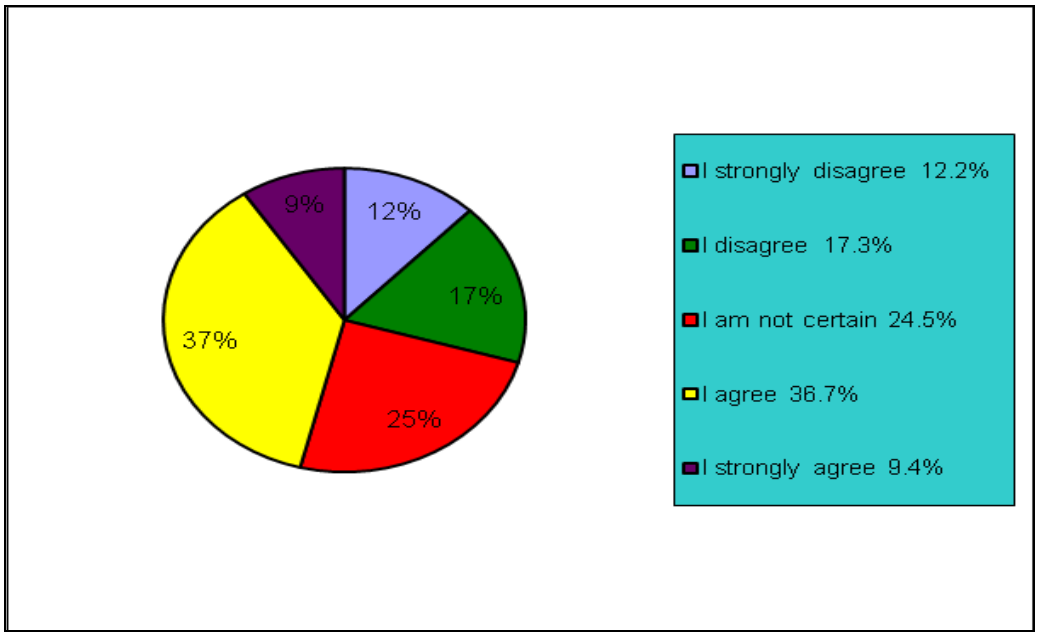


Source: Morley, J& MacDonald, B. (2004), *Lessons learned from Transportation Safety Board Investigations of Helicopter Accidents (1994-2003),* Paper Presented at the International Helicopter Safety Symposium 2004.

No matter if the implementation of an SMS is compulsory or not, 87% of the survey's participants declared that in their organisation they implement an SMS.

Supplementary findings in the survey to the question ‘’I am convinced that risks are managed well in my company’’ as schematically shown in the following figure goes in parallel with the accident rates statistics. Shortly 54% of the respondents answered that either they are not happy with the way risks are managed in their company or they are not certain. That proves that members of the entities are not confident on the ability of their organisation to abstain accidents from happening.

Figure 6.4 Answers to the question ‘’I am convinced that risks are managed well in my company’’.



The Survey findings for the competence of SMS to impose safety in organisations operating helicopters unveiled contradicting suggestions. Among 71 participants that answered that open-ended question nearly 58% suggested that SMS is a competent tool to address safety issues. Only a minor percentage 2% referred to the forces of ‘’a super hero’’. Respondent A, for instance suggested, ‘’I think it is a great idea the SMS.I think it all depends on the size of a company on complex the SMS has to be’’. Respondent B on the other hand said ‘’SMS ties it all together’’.

Accordingly the remaining 40% issued the notion that SMS should be linked with efforts in other fields, for instance Respondent C suggested ‘’Great idea when well implemented, supported by culture and management’’. On the other hand Respondent D discussed about mixing it with culture, ‘’A properly designed SMS when combined with safety culture can shift the culture of an organisation to where everyone ‘’owns’’ safety. Without this approach, most SMS programs become a manual on someone’s desk and a check in the compliance box with no business or

cultural changes''. Consequently what is meant is that the implementation of SMS is so important, Respondent E, admitted ''Yes. Often depends on the skill of the person in charge''.

Respectively nearly 20% of the total respondents either expressed negatively or declared that they are not familiar with SMS. Multiple responses were sound like complaints:' It's all about planes not for helis'', ''Yes but after some time the system will not be followed due to operational and cost issues''. Or ignorance:''I am not familiar'', ''Do not really know''.

Global Statistics portray a picture that is not so rich in colours. Signs leave space to suggest that either the applied SMS are not efficiently designed for their purpose or they are not effectively implemented. Nevertheless they are by far left behind from being successful .The survey findings suggest that since they are not mandatory yet, has left the members of the helicopter community to share opaque opinions for their use. In business terms, 'the decided strategy did not reach the designated performers as the communication flow is interrupted'. It seems that management teams lack coherent knowledge of their credibility; not to mention that they are not assisted by the regulatory agencies. The market remains unregulated and precautions are taken in occasion leadership fails to address risks efficiently. Hopefully there is a growing awareness and safety consciousness but still SMS are in their ''infancy''.

6.4 What is the "safety culture'' level of Organisations operating helicopters? What differentiates it from the same of airlines?

Measuring organisational culture and specifically its ''safety culture'' segment is not expected to be an easy task. But still as Rod Eddington (unknown), as cited by Professor Braithwaite (2009, p.15), reminded to the British Airways staff ''If you cannot measure something, you cannot manage it''.

The Safety Culture Indicator Scale Measurement System (SCISMS), Von Thaden, L.T& Gibbons, A. (2008) studies six factors that constitute the ''measurement'' of an organisation's ''safety culture''. Those are: Organisational commitment (OC), Operations Interaction (OI), Formal Safety Systems (FSS), Informal Safety Systems (ISS), Perceived Risk (PR) and Perceived Organisational Risk (POR).

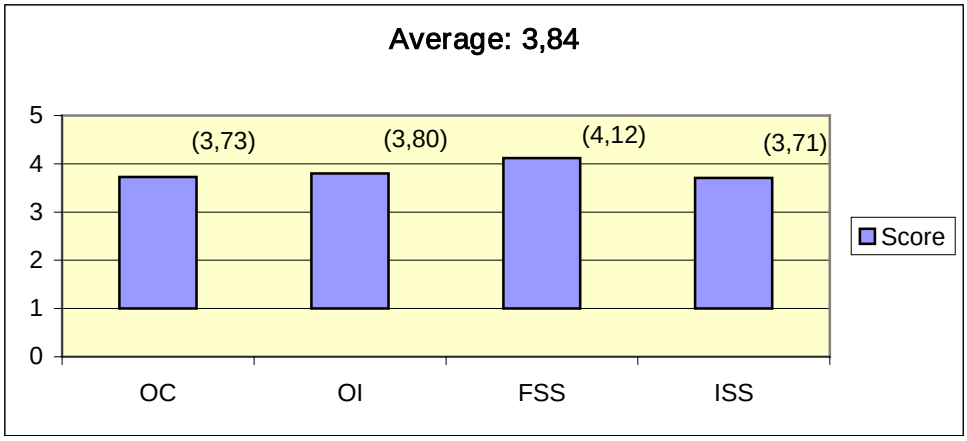
The Analysis of the survey's findings had been done following the methodology as described in the previous part of this project and divulged interesting findings. A series of figures and charts were prepared to ''visualise'' the safety inclination of the selected segments:

Aggregate
Safety Officers
Helicopter Pilots minus pilots of segment B
Pilots of segment B
Flight Engineers
Segment B
Segment C
Segment E

For practical reasons most of the figures were attached to the Appendix F, only a few will be used in the body of this project as necessary as required to make the comparison with the airlines segment and test the hypothesis.

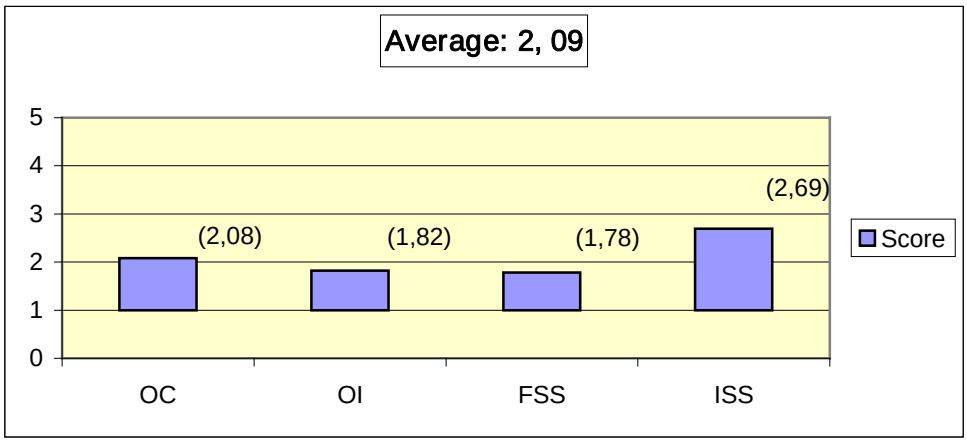
The mean score of "safety culture'' inclination was substantially distinguished among the examined samples. "Safety officers" partition was found to score an average of 3, 84 in a 5-likert scale measure as shown in the following figure:

Figure 6.5 Safety Officers "Safety culture '' Mean Score



While the worst score was presented by Segment E participants that were counted at a 2, 09 value as shown in the following Figure:

Figure 6.6 Segment E "Safety Culture'' Mean Score



Findings suggest that there is reverse escalating trend from more safety prone working groups to less safety addicted cultures. Obviously values below 3 should be considered a matter for serious concern. Nevertheless the oncoming of an accident occurrence should not be taken for granted but still there are signs of a possible safety breach.

The findings indicate that "safety cultures'' that reside in a positive level score well in their Organisation Commitment section when the senior commitment to safety is visible, in line with the beliefs of Droste (1997), Marsh et al (1998), Cheyenne et al (1998), when exactly the opposite is happening in contrast examples (Segment E).In the occasion of Segment E it is well perceptible that safety relies in hands of professionalism and accountability of its employees as the ISS is the best contributing section.

Delving into data originating from Segment B we can assume that both constituting parts: Helicopter pilots belonging to sample B and Flight engineers are sharing nearly common beliefs for the prevailing culture as illustrated in the following figures:

Figure 6.7 Comparisons between Flight Engineers and Helicopter Pilots (Segment B)

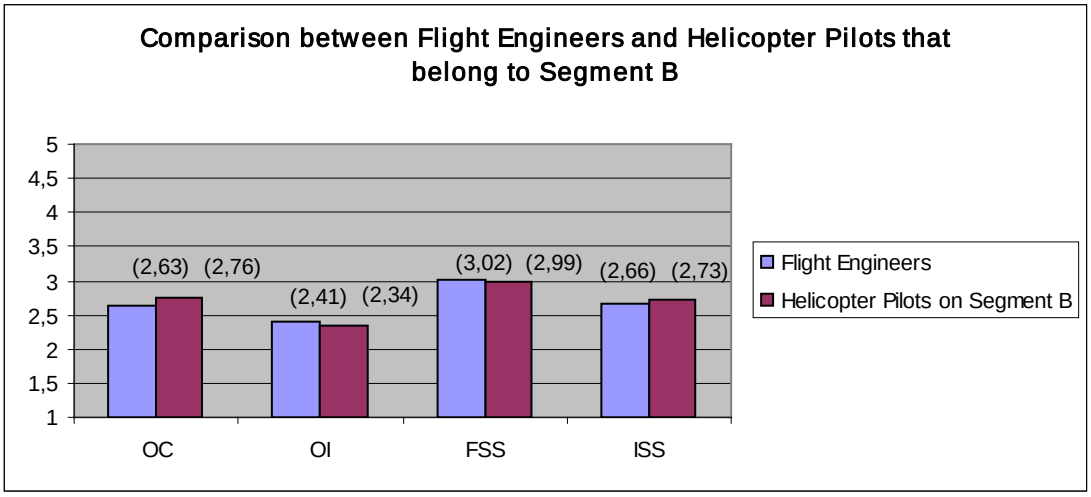
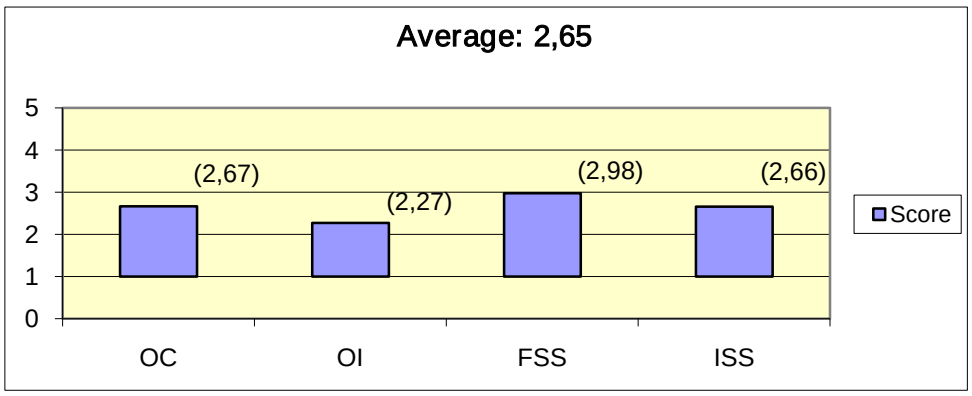


Figure 6.8 Segment B ''Safety Culture'' Mean Score



The findings in this occasion are opposing Harvey's et al (1999) assumptions that normally it is expected that an Organisation might have more than one sub-culture. The signs here suggest that there is no communication gap between the two groups but still the fact that both scored not so well means that safety is not addressed efficiently in a strategic level.

The opposite can be seen if we compare helicopter pilots belonging to segment B and those who do not, or safety officers against pilots minus segment's B pilots. The inconsistency in this occasion is obvious proving the reliability of the measurement and its validity and the fact that many dissimilar organisations exist in the Industry. (See the following figures)

Figure 6.9 Comparisons between Helicopter Pilots minus Helicopter Pilots of Segment B

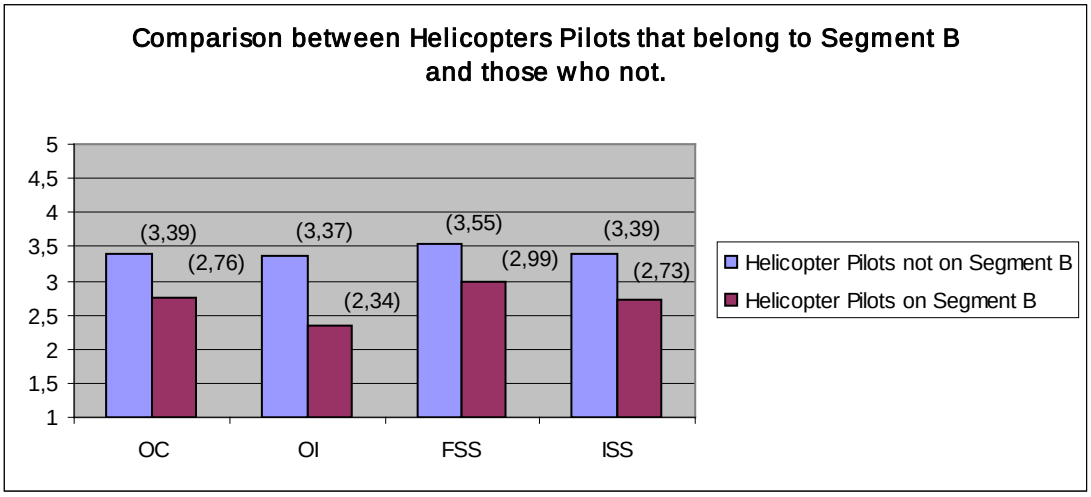
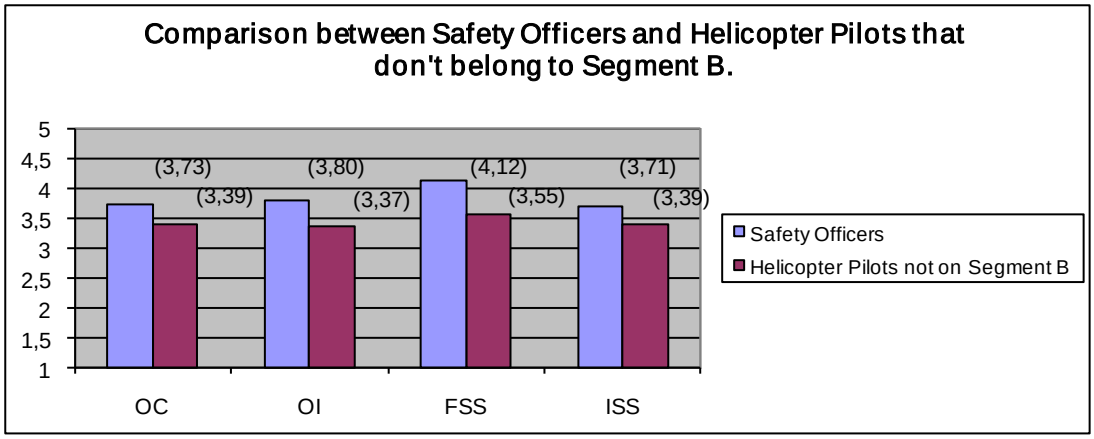


Figure 6.10 Comparisons between Safety Officers and Helicopter Pilots minus Pilots of Segment B



It is logical to conclude that safety officers and helicopter pilots excluding those of segment B are presented as the “best cases’’ in this research and concur to Helmreich’s (1997) and Merrit’s (2000) suggestions that typically pilots are proud of their accomplishments and themselves.

To be credible in the comparison between entities operating helicopters and others dedicated to transport passengers with airplanes, we should not only compare the mean scores, that might resemble with the scores of the “best cases’’ helicopter sample, but we must employ the expertise offered by a multidimensional continuum or grid that will assist us engrave a solid footprint of “safety culture’’ in terms of the equation relating Management Involvement and Employee Empowerment. This application is additionally consistent with the Fiedler (1964) Contingency (LPC) Leadership theory .In our situation we are going to plot the perceptions of safety officers representing the management team against the perceptions of all the other

employees segments. The best opportunity would have been offered, if only we had collected a representative sample of Organisations operating helicopters original management teams but unfortunately that is among the limitations of this project. Still we can use safety officers as they are second in the chain of command towards safety accountability. The grids that follow will provide us with an approximate view readily to be used for more general comparisons, but still efficient in arming managers into getting a realistic idea of the situation.

Figure 6.11 Helicopter pilots minus pilots of Segment B

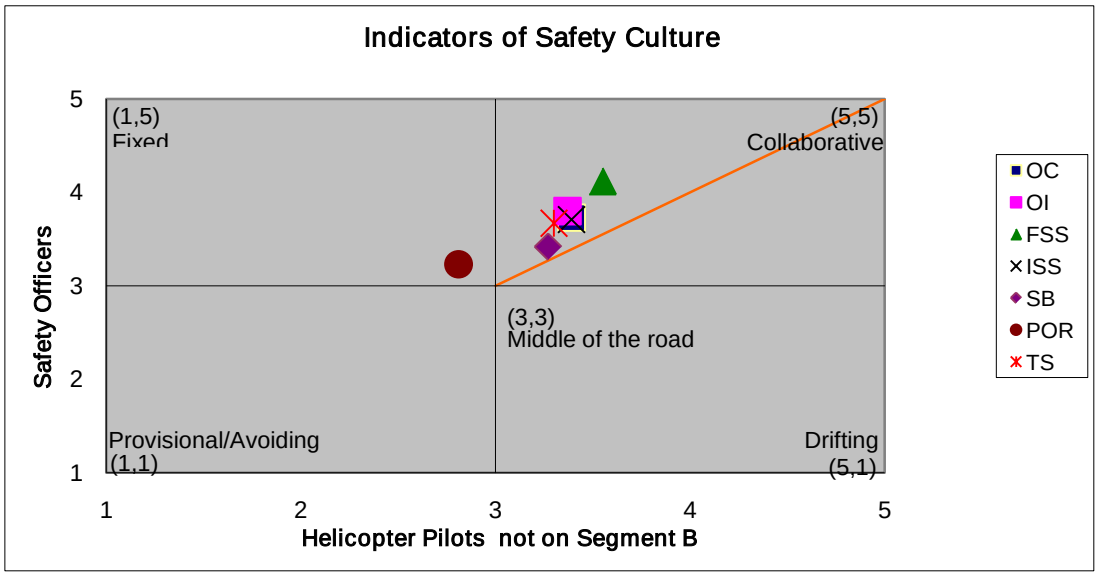


Figure 6.12 Segment E

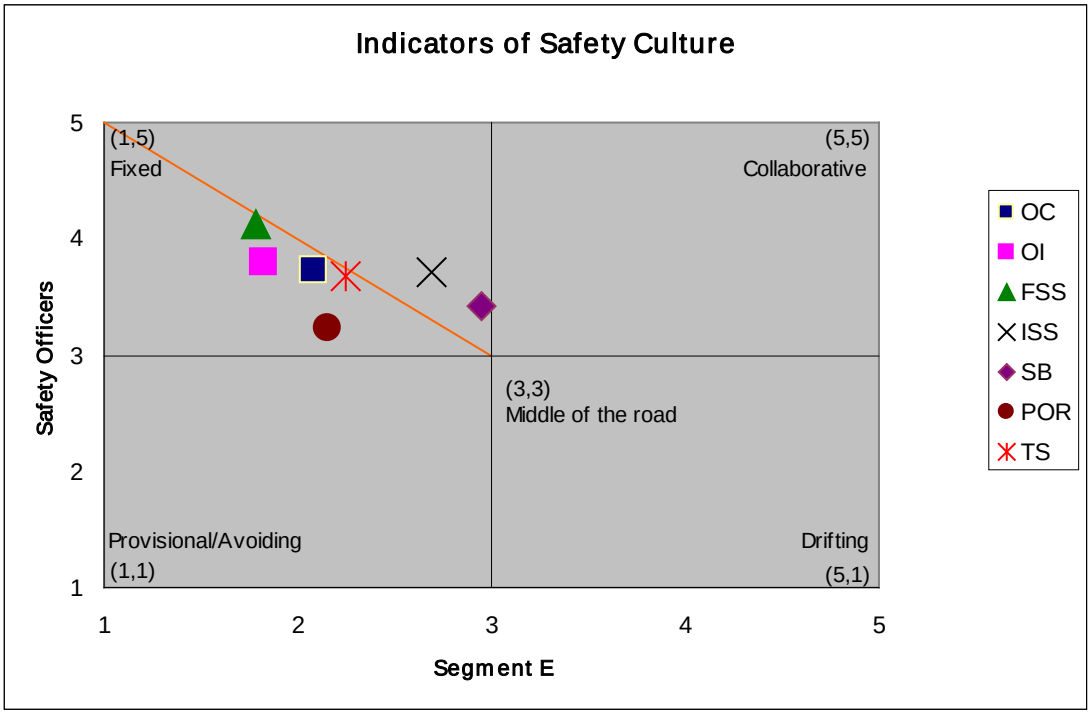


Figure 6.13 Segment C

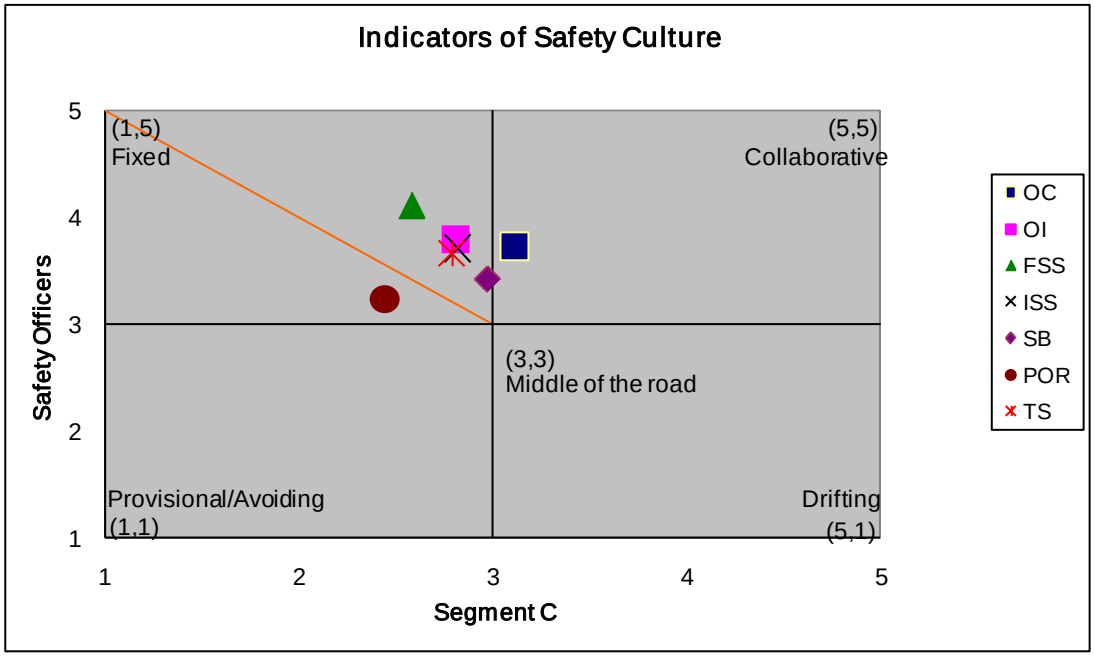
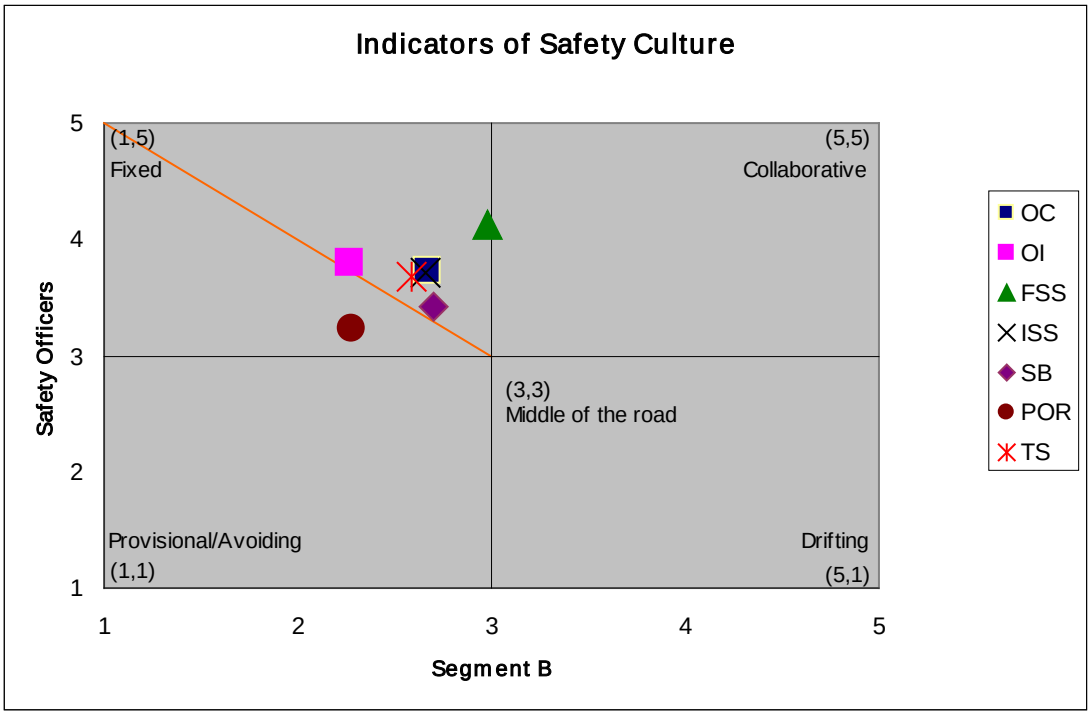


Figure 6.14 Segment B



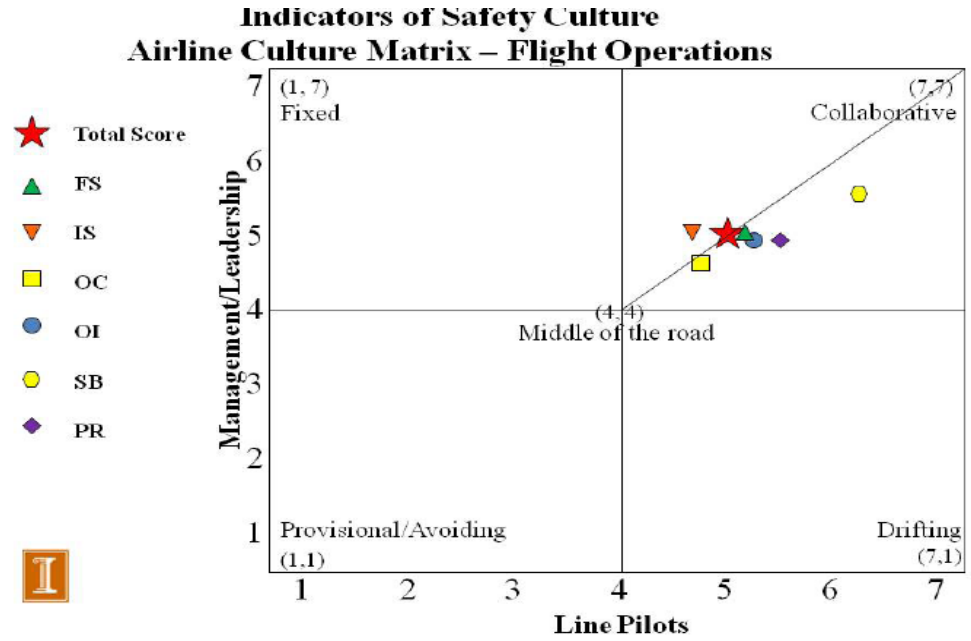
Interpretation of the grids in terms of consistency, direction and concurrence was attempted following the steps of Von Thaden, L.T& Gibbons ,A(2008, P.30) to gain a platform for the final comparisons with representatives of the Airplanes Industry.

Although the first segment (Pilots) is an ‘’artificial structure’’ it maintains better consistency (Safety indicators are clustered firmly) than the following three entities. That is a mark that “safety culture” it is not dealt methodically as a step by step procedure in the latter examples. While the first feature of the grid was resolved the second one, direction, presents a serious variation among the samples. Segments B, C, and E having most of their safety indicators on the upper left quadrant portray schematically that the safety perception between management team and employees differs substantially. This is an indicator that leadership and strategy lacks efficiency and it is related to the last feature ‘concurrence’’. On occasions that indicators lie mostly above the diagonal implications it is suggested that either management derives a vague safety image or employees are holding great expectations. On the contrary when stains stay below the diagonal workforce efforts were underestimated as management keeps high standards. In both situations the problem will be resolved if only communication channels get fully open again.

Segments B, C ,E that lie in the territory of the ‘’fixed’’ culture according to Von Thaden, L.T. & Gibbons, A. (2008, P. 35) are organisations were control over safety is grasped and maintained in full detail by management, procedures govern all safety aspects, little initiative is permitted to employees and organisation’s instinct for change is weak.

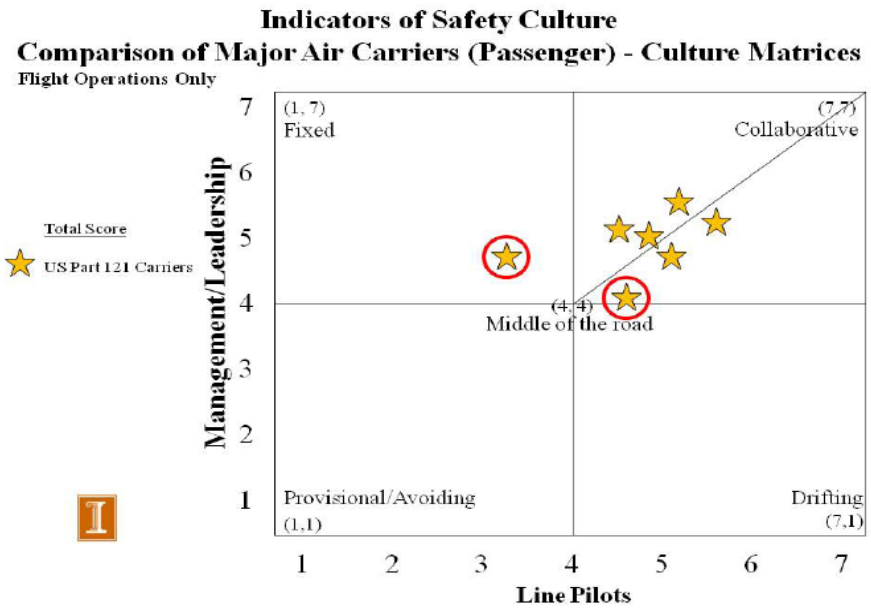
Correlation of the previous grids with some stemming from similar researches from the airlines aviation segment renders a totally different image. The following exhibits show that airliners construct a grid with the safety indicators lying on the upper right quadrant, mostly clustered closely to the diagonal, scenery that goes proportionally with the safety outcomes that were accomplished by airlines. ‘Just being on the right path’’.

Exhibit 6.15 Airline Culture Matrix-Flight Operations



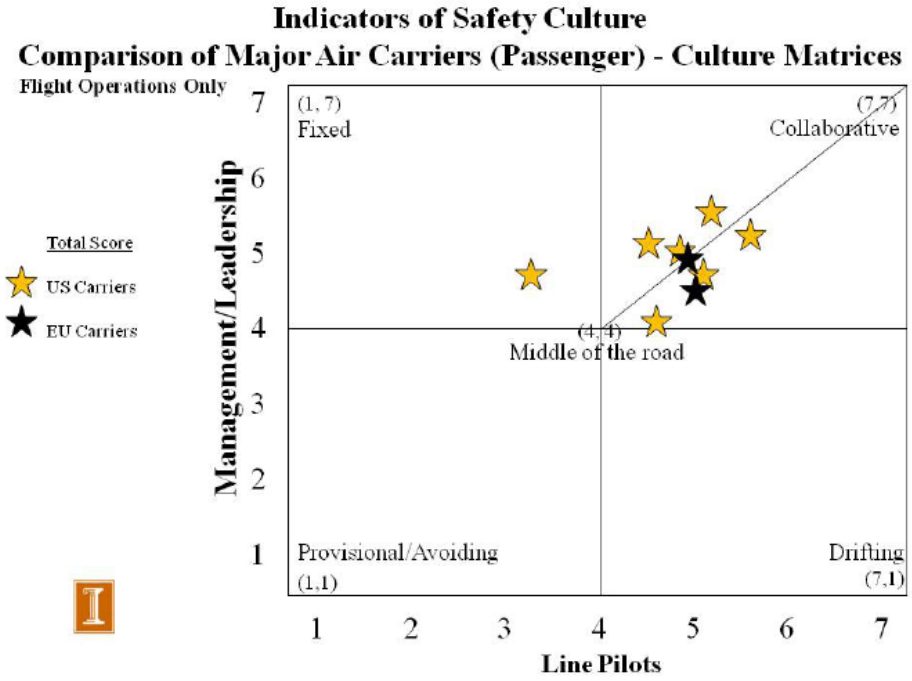
Source: Von Thaden, L.T & Gibbons, A. (2008, p.36)

Exhibit 6.16 Comparison of Major Air Carriers (Passenger)-Flight Operation Only (U.S Part 121 Carriers)



Source: Von Thaden, L.T & Gibbons, A. (2008, p.37)

Exhibit 6.17 Comparison of Major Air Carriers (Passenger)-Flight Operation Only (U.S Part 121 Carriers and European Carriers)



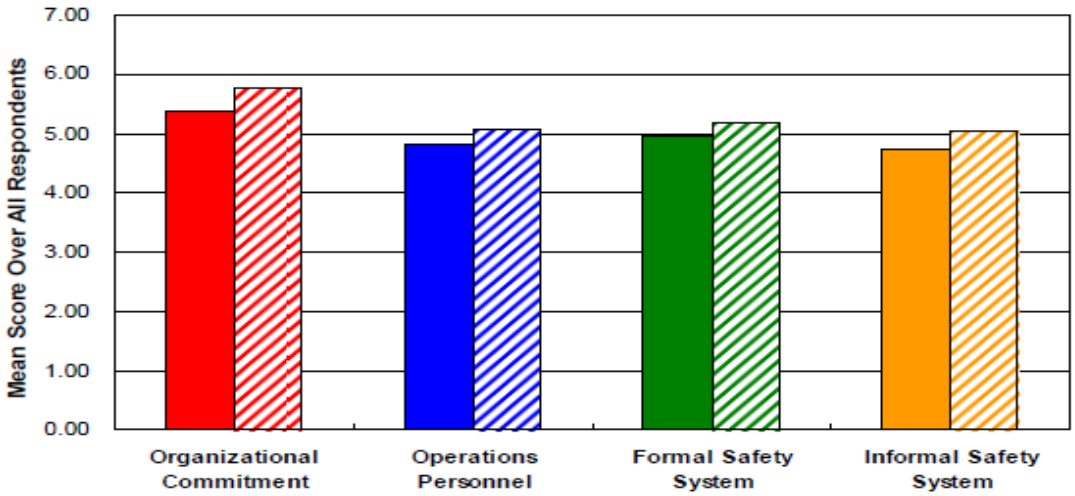
Source: Von Thaden, L.T & Gibbons, A. (2008, p.38)

Comparison now between Organisations operating helicopters and airplane segment (airlines) "safety cultures'' has started being much easier. Quantitative data reveal that only the best rotorcraft sample "safety officers '' managed to reach values similar to the relevance of airlines. Unfortunately the results stemming from helicopters are dramatically scattered, proving that it is very difficult to get a mean score close to the real. The table that follows shows the comparable values of the two samples. The airliners numbers are computed after the following exhibit was transformed from a 7-likert scale into a 5-likert scale modification.

Table 6.18 Comparisons between Airlines and Rotorcrafts using of SCISMS

	SAMPLE	OC	OI	FSS	ISS	MEAN
1	Airline A	3,78	3,5	3,57	3,42	3,56
2	Airline B	4,14	3,64	3,71	3,57	3,76
3	Aggregate	3,22	2,96	3,36	3,21	3,18
4	Safety Officers	3,73	3,8	4,12	3,71	3,84
5	Helicopter Pilots Minus Pilots of Segment B	3,39	3,37	3,55	3,39	3,42
6	Pilots of Segment B	2,76	2,34	2,99	2,73	2,70
7	Flight Engineers	2,63	2,41	3,02	2,66	2,68
8	Segment B	2,67	2,27	2,98	2,66	2,64
9	Segment C	3,11	2,81	2.58	2,82	2,83
10	Segment E	2,08	1,82	1,78	2,69	2,09

Exhibit 6.19 Values from Fleet Comparison among pilots at a major air carrier using SCISM



Source: Von Thaden,L.T& Gibbons,A.(2008, p.28)

Respectively qualitative data support the hypothesis so far. Respondents to the question on the status of their organisation's "safety culture'' admit in a percentage no higher than 30% that they are confident with 'the way things were done'. Among 69 answerers to this dilemma, Respondent A declared that "ours is a sound system. We are empowered, relative to safety input and implementation''.

On the other side 23% replied in a negative way, for instance, Respondent B said ''I think that employees working for my organization have no interest to safety'' or Respondent C admitted that "more worried about keeping their jobs''. Some others revealed problematic areas in their workplaces ''All workers are not motivated, they do not trust managers'' or as Respondent D argued ''Safety is 60% slogan and 40% action. It is a form of political correctness. We are still

mission orientated and as we convince leaders that safety helps accomplish missions, we get more acceptance''.

The remaining 47% of the responses expresses great concern and scepticism on the efforts that are a prerequisite to establish a well structured ''safety culture'', admit that time is ruthless and always in sort, they have identified areas that should be improved, for example Respondent E suggests ''There is no ''push'' from upper management and ''bending the rules of safety '' is strongly opposed in our culture''. Another colleague had said ''Safety culture is not a given, needs to grow into it. Yes the global idea is good, and sought after, but can fall behind, due to lack of trained personnel''. Finally Respondent F issued the notion that inside the organisational culture he works there are anti-safety sub-cultures, ''Pro-Safety culture, but many Anti-Safety sub-cultures''.

Overall it is blatant that generally speaking organisations operating helicopters have failed to recognise the multiple sources of cultural interaction that according to Woolfson et al (1996) is a critical factor for success in the contemporary business world, as that reflected to safety. Findings underscored the notion that rotorcraft entities are competent to build so far positive ''safety cultures'' as they lack most of the solid constructing characteristics as mentioned by Gill, G.K.(2001) such as : consideration of safety to be a strategic goal, communication of safety concerns to all and availability of feedback on reported incidents/accidents to all staff. It is evident that the existences of sound structured cultures represent the minority and in most cases their wellbeing is relying on the professionalism , the day long good job of their employees and the success of the small ''change traps'' that were laid in a infertile soil by their safety professionals. Therefore airlines ''safety cultures'' outweigh those of the rotorcraft community and that can be easily seen on the accident charts. Statistically helicopters occupants suffer a fifty times higher risk having an accident and so far we have not concluded into an answer. But it seems that building a ''safety culture '' is more prominent than relying on the implementation of a Safety Management System!

6.5 Can organisational culture be considered to be a change driver towards a better safety record at organisations operating helicopters?

The aspect of organisational culture had been searched in a number of different perspectives and its strength is a well recognised value Deal & Kennedy (1982). The need culture to be seen as a change driver is not new. The Piper Alpha accident in 1988 had been in UK the enabler of a change in the way that high reliable Organisations were exerted training and managed acculturation of their employees, Back & Woolfson (1999) to enhance safety.

The survey uncovered findings showing that the role of culture has been respectful in the helicopter community. Among 139 respondents 87% agree or strongly agree that culture holds the primary role in ascertaining that safety can be maintained. Accordingly the "safety culture'' is bonded with any effort of implementing any Safety Management System as 72% of the participants argue its role is either positive or negative. Respectively 88% assign to "safety culture'' the role of positive driver of change while voices of opposition are heard only by 6, 4% of the answerers.

The loyalty of the respondents to organisational culture was further tested and the discoveries concurred to the latter. Again 85% of the respondents declared that SMS alone cannot do it all and finally nearly the same percentage, approximately 85% believe that "safety culture'' is the generator of new ideas and constant innovations of SMS. The findings are in accord with the beliefs of Gordon, R. Et al (2006, p.2) that "SMS may be seen as the 'Competence' to manage safety in an explicit way, whereas Safety Culture refers more to the 'Commitment' at all levels of the Organisation to safety''.

Furthermore the role of culture as change driver was tested qualitatively in an open ended question and it was found that it can be enhanced according to Respondent A if only ''Management embraces and the rest should easy''. Another colleague answered as follows:'' We just implemented the JAA/EASA based Aviation Regulations. We should have invested more in the cultural aspect of our organisation before we did that. In the beginning there was a lot of resistance from the older people (''we have always been operating this way, I see no reason for change'')''.The last thoughts underline the encountered findings of researched rotorcraft groups, sharing the characteristics of a fixed culture, Von Thaden, L.T & Gibbons, A

(2008, p.33) ‘’where resistance to change should be expected as professionals prefer to exploit their stronghold on the procedures’’, instead of support the issuance of fresh ideas.

Another array of answers exposed the role of training mostly and leadership on the driver’s seat so culture can be managed. Respondent B voted for ‘’Training and education together with sharing responsibility’’, on the other hand Respondent C suggested ‘’Start at the top, better buy in from the CEO’’.

Overall it was summoned that culture and its perspectives are not well explored yet. Most of the answers in the qualitative part of the survey show that there is no solid view, which might mean that stakeholders are not certain of how to efficiently apply culture into the change process.

7. OVERALL CONCLUSIONS

7.1 Literature Review

The current study's literature review initially referred to safety and the evolution of safety management systems. It reviewed the findings of conventional wisdom, such as Reason (1997) that referred to Lucas (1990) to summarize the three existing models for managing safety .Furthermore, SMS was tested as being a businesslike procedure and found pertinent, Evans &Parker (2008) , while benefits and accordingly shortcomings stemming from the use of SMS were underlined ,ALPA (2006), Weick (1987), Weick & Sutcliff (2001),Petersen (2001), Wee & Quazi (2005).Then evidence was presented to shed light to the interrelation between SMS and "safety culture''. Findings suggested that SMS is not a coherent tool by itself to contradict all potential risks, Lofquist (2008). After organizational culture was defined the review proceeded to adopt definitions originating from the functionalist side that believes culture to be manipulated and therefore change, Dejoy (2005).Respectively there was examined the ability of "safety culture'' to be measured, opinions pro and against Cooper (2000), Pidgeon(1998) .Accordingly representative "safety culture'' models where mentioned , along with their positive characteristics and further analyzed models convenient for use in Aviation. Fleming (2000), Cooper (1999), Hudson (2001), Von Thaden (2008), Reason (1997).This author's review took the functional approach and prior to examining how "safety culture'' functions as a clock bomb and is able to initiate change, he underpinned the role of leadership and communication flow in creating "safety cultures''.

7.2 Research results and analysis

The findings of this study attempted to enrich the academic background on the potential value of "safety culture'' concept to address safety concerns more effectively than the nowadays established Safety Management Systems in a typical segment of high risk organisations .This hypothesis was tested in entities that operate helicopters, as they represent a unique kind presenting at present both grave variation in their characteristics and in accident statistics when compared with airlines. Accordingly, the competence of "safety culture'' to perform as change driver is evaluated. The above themes are the three broad themes that the conclusions of this study will discuss.

7.2.1 Risks faced by organisations operating helicopters and their irrelativeness similar of airplanes.

In addressing the current research question of this study, the research retrieved secondary data from the internet.

The findings indicate that, helicopters are less ‘'failsafe’’ structures than airplanes McAdams (2009), Overturf (2007), more complex technologically and represent a “product’’ in the growth life cycle still evolving.

Iseler & Maio (2001) admit that helicopters present accident rates at least ten times higher than airplanes, while accident rates as presented by HAI (2007) upgrade the accident potential multiplied by fifty.

According to Committee on Aircraft Certification Safety Management (1998) organisations that choose to operate helicopters are employing fewer human resources and their fleet is significantly smaller than the one of airlines.

Respectively helicopter pilots due to the nation of the flying missions, the characteristics of the operational environment and the limitations of their “machine’’ are facing a greater risk themselves and their organisations to engage in an accident and face the consequences, Wyght (2007).

Overall the findings suggest that organisations operating helicopters are under the constant danger of facing a higher percentage of accidents not only for reasons stemming from the characteristics of aircrafts and their pilots but additionally because these entities are less structured.

7.2.2 Safety Management Systems Assessment in Organisations Operating Helicopters

The accidents statistics accessed via the internet depict a sad fact. Helicopters are suffering from a disproportional accident rate that multiplies nearly fifty times the relative of airplanes.

According to the survey although the implementation of the SMS is not mandatory yet 87% of the respondents admitted that in the organisation they work for they already implement an SMS. Respectively the participants of the survey answered that in a percentage of 54% they are not satisfied with the way risks are managed in their organisation .In comparing the previous findings with the answers that 40% are reporting that something else is also missing and 20% admit that they are not familiar with SMS comes in parallel with Wee &Quazi(2005) that suggest that small entities are reacting slowly to new interventions.

It is evident that SMS at least the way they are implemented in organisations operating helicopters present serious implications of problematic use.

7.2.3 Differences of "safety culture'' segments between airlines and helicopters

When addressing this question, the research compared relevant findings from airlines that took the same survey under the same theoretical model with the responses of 139 people representing rotorcrafts segment that were divided for the purpose of this project into 8 samples, some of them being already homogenised as belonging to the same organisation.

Unfortunately only one of the helicopter teams managed to score higher than the mean score of airlines .The quantitative data revealed that organisations operating helicopters present huge variations in findings with the worst indicators showing problematic Organisational commitment to safety, (not that visible Droste(1997)) and respectively with Operations Interactions.

A finding worthy to be mentioned is that on one occasion, one sample both pilots and engineers scored closely which opposes the Harvey's (1999) assumptions that something like that should be expected. Perhaps it is the specialized training that led to those findings but still they are not conducive to helping us make general assumptions.

The depiction of grids of two kinds was dissimilar .Organisations with helicopters are diverted not only on direction, but in consistency and concurrency as well.

The findings suggest that most helicopter segments belong into “fixed’’ cultures contrary to the airlines that normally belong to collaborative ones proving that helicopters entities are facing difficulties with leadership and communication. These findings depict ,if compared with the Fleming’s (2000) model, that rotorcraft organisations under the best situation lie in the “calculative’’ side or under Westrum’s (1995) terms they represent a typical bureaucratic organisation.

Qualitative results empower the previous assumption and prove the validity of the hypothesis.

7.2.4 “Safety Culture’’ and Change

The last section of the findings reveals that in the helicopter community the role of organisational culture is respectful as 87% of the respondents agree that it plays the primary role in ascertaining safety.

Additionally 88% assign to “safety culture’’ the role of positive driver of change but still the qualitative findings reveal that there is no unanimous opinion on what exactly “safety culture’’ or organisational culture are able to do.

Concurrently it seems that Helicopter community’s stakeholders have not made up their mind yet on how culture can be used to assist in change process. They only referred to training and leadership as most prominent factors relating with culture.

8. RECOMMENDATIONS

8.1 To the Aviation Regulatory Authorities

The current study's findings have indicated that although the implementation of Safety Management Systems is not mandatory yet the majority of the organisations operating helicopters are already complying with standards that will be the pillars of the forthcoming legislation.

These findings do not adhere to the notion that those organisations are acting proactively as the findings generally suggested the opposite. A number of military personnel, approximately half of the respondents took part in this survey and for Military Organisations SMS is an old establishment.

The fact that there is general concession for the positive role that "safety culture'' can play towards safety in relation to the suggestions that there is a great variation in the "safety culture'' level of the existing helicopter entities advocates the following considerations:

Regulatory Authorities should adopt the suggestions of Schein (1992) who considers "culture to be the product of adaptive (or external) and integrative (or internal) processes of a group, steered by its leader''.

Proceed with their actions to offer discernible change in Organisations external environment to "make'' Rotorcrafts entities start considering the role that culture plays in safety.

Arrange training sessions on a voluntary basis in the beginning to inform members of the helicopter community under a constant scheme.

Finally reconsider the necessity to obligate Organisations operating helicopters to perform safety culture measurements regularly.

8.2 To the helicopter Professionals

The findings suggest that working in this Aviation segment is by far more difficult, estimating the magnitude of risks and the working conditions. Additionally this study has shown that the shared level of professionalism is extremely high as nearly all respondents of the survey scored high on the Informal Safety Systems factor .But still they should be acquainted with the knowledge that "latent conditions'' are waiting a chance to cause the accident to happen.

So the only thing they should do is to drive the change in their organisation and save themselves from the accidents.

8.3 To the management Teams

As nobody gets happy with an accident no matter how small or nasty it might be they should only lead instead of manage and for those that seem to forget safety is an outcome that should not be left unattended.

8.4 To the public Opinion

All public that might use helicopters as a means of transportation should be assured that professionalism and safety tendency goes beyond all the other transportation methods.

8.5 Areas for further research

Since Respondents belonging to a homogenised segment were from three different organisations this study cannot make general assumptions .Still a repeat of this study in organisations that operate both airplanes and helicopters could give more accurate results.

Additionally it would be a matter of great interest if the same organisations could repeat the same survey to test the change process and the validity of this study.

9. REFLECTIONS

9.1 Subject matter

When choosing this dissertation topic the author hoped that his survey would be able to shed light on the reasons that give to the Rotorcrafts Industry the notorious privilege to substantially differ in safety outcomes from their counterpart, airlines. He suspected from own experience that entities operating helicopters generally lack culture strength but he could not have been certain that findings would back up his hypothesis. Only after the collected data was analysed was he able to sustain his hypothesis and sustain it. The feedback from the proposal never left the author's mind and on his effort to give focus to his work he mildly reshaped the questions that could support his hypothesis. Eventually not only did he summon complementary data, but by attracting homogenised samples to answer his questionnaire he was given a valid and valuable for his research comparisons baseline.

9.2 Research planning and Execution

The researcher planned his survey according to the time available; a stressful fact, as it is. If time had not been so limited efforts to attract members of management teams as potential respondents would have added to the accuracy of this project on "safety culture" depictions especially on the designed grids. If this work be dealt as a general tool to assist management decision making should be considered more than efficient. Still even more beneficial assumptions could have been made in case whole organisations that operated both helicopters and aircrafts could have participated. Then the role of sub-cultures within could be further explored.

9.3 Timetable and contribution of others

The analysis of nearly 12000 entries in the survey inadvertently consumed much time. Similar projects were attempted by more than one field researchers simultaneously in the past and time was not so limited. An additionally inhibiting factor was the author's intermediate research capability in front of data magnitude.

Albeit the tenure that was laid on the researcher's shoulders during the last period many emails were received expressing concern and interest in the content of the researcher's results. The author was invited by Academics (Embry Riddle University, Dr. Von Thaden), Safety Committees (e.g EHEST, IHST), professional Associations (e.g HAI) and safety professionals to share the findings. Definitely it is an issue of grave concern for the Aviation Industry and luckily the author has been the recipient of a series of relevant material that was sent to him and assisted this study.

In coping with these and other issues, the help of iCon staff was invaluable, and the Blackboard was a really helpful tool to keep this project closer to academic paths.

9.4 Development of management competencies

Through all this process the author earned valuable experience to analyse, deal with massive data and synthesize from the findings a clear image of the prevalent situation. He thoroughly exercised his investigation skills and mixed them with a set of conceptual skills that assisted him to finish this project. All these including self -discipline and study focus finally led to this accomplishment. The lessons learned from this study on the role of organisational culture and more specifically "safety culture" will hopefully be used to enhance safety in the Aviation Industry. The latter, being a pioneer in the High Reliability Organisations sample, will in turn suggest principles and guidelines that could be applied into the whole business world.

10. REFERENCES

ADAMS, C. (23.7.2009) Organizational Culture and Safety, http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20030064927_2003074804.pdf

ALTMAN, Y. (1989), 'The organisational culture of the armed forces: the case of the Israeli army', http://hdl.handle.net/1826/586

ANDREWS D. et al (2003), 'Electronic survey methodology: A case study in reaching hard to involve Internet Users', International Journal of Human-Computer Interaction. Vol. 16, No 2, pp. 185-210

AREZES, P.M. and MIGUEL, A.S. (2003), *The role of Safety Culture in Safety performance measurement, Measuring Business Excellence* , Vol.7, No 4,pp 20-28.,MCB UP Limited.

AXELSSON L. et al (2007). 'Safety Culture Enhancement and Safety Leadership', Safety Culture Enhancement and Safety Leadership, pp. 70-74

BARBARA B. et al (2005), 'Helicopter Offshore safety in the Brazilian oil and gas industry', Systems and Information Engineering Design Symposium, 2005 IEEE, pp. 235-241

BLANCO, J. (2000), 'Return on Investment of Safety Management', Prepared for Human Factors in Aviation MAINTENANCE Symposium, March 2000, http://hfskyway.faa.gov/%28A%28oL6ChMAcygEkAAAAMDA5MmFkMWEtZDRmNi00OTVmLThlMDAtMDljNmE4NjYyNjRkqu0og6wevRjQsBuEpsnKYgwC0-w1%29%29/HFTest/Bibliography%20of%20Publications%5CHuman%20Factor%20Maintenance%5CReturn%20on%20Investment.pdf

BORGSDORF D. and PLISZKA D. (1999), 'Manage Your Risk Or Risk Your Management, Public Management', Vol 81,No 11

BORK E. C. and FRANCIS B. J. (1985) Developing Effective Questionnaires, Vol. 65, No. 6, pp. 907-911

BRADLEY L. and PARKER R. (1991), 'Organisational Culture in the Public Sector, Report for the Institute of Public Administration Australia', http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN006307.pdf.htm

BREWSTER, C. (1991), 'Culture: The International Dimension', http://hdl.handle.net/1826/373

BROWN W. (11 Aug 2009) 'Organizational culture safety culture and safety performance at research facilities, Brookhaven National Laboratory', http://www.bnl.gov/isd/documents/20797.pdf.htm

BRYANT J. et al (2005), 'Cultural differences in situational awareness, shared mental model and workload perceptions : an analysis of American and Chinese simulated flightcrews', Presented at the Student Research Conference, Omni Hotel, Newport News, Virginia, pp. 1-10

CAP 681 Global Fatal Accident Review 1980-1996, Civil Aviation Authority, Safety Regulation Group www.caa.co.uk

CAP 735 Aviation Safety Review 1992-2001, Civil Aviation Authority, Safety Regulation Group www.caa.co.uk

CASTELLANO J.et al, (2004), 'How corporate culture impacts unethical distortion of financial numbers', Management Accounting Quarterly, Vol 5, No 4, pp 37-41

CENTRE FOR CHEMICAL PROCESS SAFETY (2005), 'Building process safety culture: Tools to enhance process safety performance', http://www.aiche.org/uploadedFiles/CCPS/Resources/KnowledgeBase/Flixborough.pdf

CHEYENE A. Et al (2002), 'The Architecture of employee attitudes to safety in the manufacturing sector', Personnel Review, Vol 31,No 6, pp 649-670.

CHINNECK P. and PUMFREY G. (23.7.2009) 'Turning up the HEAT on Safety Case Construction', http://www-users.cs.york.ac.uk/~djp/publications/HEAT-ACT.pdf

CLARK, S. et al, (17 March 2009) 'Safety Management system and safety culture working group (sms wg)': Guidance on organizational structures, ECAST http://www.easa.europa.eu/essi/documents/ECASTSMAWG/Guidanceonorganizationalstructures-000.pdf

CLARKE S.(2003), 'The Contemporary workforce Implications for Organisational safety culture' ,Personnel Review ,Vol 32,N o1,pp.40-57.

CLARKE S.(2006), 'Safety Climate in an automobile manufacturing plant ,The effects of work environment ,job communication and safety attitudes on accidents and unsafe behaviour', Personnel Review, Vol 35 ,No 4,pp413-430.

COOPER D. (2008), 'Risk-Weighted Safety Culture Profiling', http://bsms-inc.com/Documents/riskwscp.pdf

COOPER M.D. (1997), 'Evidence from safety culture that risk perception is culturally determined', The International Journal of Project & Risk Management, Vol. 1, No. 2, pp. 185-202

COOPER M.D. (23.7.2009), 'Towards a model of safety culture', http://www.behavioural-safety.com/articles/towards_a_model_of_safety_culture

COY J. J. (2000), 'Rotorcraft Vision', International Power Lift Conference, p. 12, Arlington Virginia, assessed at http://rotorcraft.arc.nasa.gov/vision/Coy_RCVision.pdf.htm

CROSS R. M. (2005)Exploring attitudes: the case for Q methodology, Oxford University Press, Volume 20, Number 2, pp. 206-213

CULLINAN A. (2006), 'The Influence of the CEO on the Corporate Culture of an Airline', MSc Thesis, School of Engineering, Cranfield University, http://hdl.handle.net/1826/2604

CURT LEWIS CHRISTOPHER Ed (23.7.2009), 'SMS and the development of effective safety culture', Flight Safety Information Journal, October 2008, http://www.airforce.forces.gc.ca/DFS/publications/fc/08-3/d/d3-eng.asp

DAVISON S. (1989), 'Cultural mapping :What is it, and how does it relate to previous Research?', http://hdl.handle.net/1826/371

DAY M. (1998), 'Transformational discourse: ideologies of organizational change in the academic library and information science literature' Middle Eastern Studies, Indiana University Libraries, Library Trends, vol 46, No 4 Spring 1998, pp. 635-667.

DELLANA, S. (2000), 'Corporate Culture's Impact on a Strategic Approach to Quality', American Journal of Business, Vol 15, No 1.

DENISON D. and FISHER C. (June 2005) 'The Role of the Board of Directors in shaping corporate culture: Reactive compliance or visionary leadership?', Paper presented at the "Changing the Game Forum: Reforming American Business", June 2-4, 2005, Beaver Creek, Colorado

DIEHL A. (22.7.2009), 'Does cockpit management reduce aircrew error?' Paper presented at the 22nd International Seminar International Society of Air Safety Investigators Canberra Australia, November 1991, http://www.crm-devel.org/resources/paper/diehl.htm

DIERMEIER, D et al (April 6, 2006), 'Innovating under pressure – towards a science of crisis management',
http://www.kellogg.northwestern.edu/faculty/diermeier/papers/CrisisPaper051106%20_2_.pdf
Directors general of civil aviation conference on a global strategy for aviation safety (Montreal 20 to 22 March 2006), 'Culture – the unseen factor in aviation safety', Presentation by Pakistan, http://www.icao.int/icao/en/dgca/ip/dgca_06_ip_04_e.pdf

DONE J. (2002) Safety Management Systems: Why the need. 19th ANNUAL FAA/JAA INTERNATIONAL CONFERENCE pp 1-6

ETI M.C. et al, (2006), 'Reducing the cost of preventive maintenance (PM) through adopting a proactive reliability-focused culture', Applied Energy, Volume 83, issue 11, November 2006, pp. 1235-1248

ETI, M.C. et all, (April 2006) 'Impact of corporate culture on plant maintenance in the Nigerian electric-power industry', Applied Energy, Volume 83, Issue 4, April 2006, Pages 299-310

EUROCONTROL (September 2006), 'Understanding safety culture in air traffic management', http://www.eurocontrol.int/safesky/gallery/content/public/SafetyDomainSept06.pdf

EUROCONTROL Experimental Centre (2004), 'Developing a safety culture in a research and development environment: Air Traffic Management domain', http://www.hfes-europe.org/books/firstpage2004/51.pdf

EVANS A. and PARKER J. (2008), 'Beyond Safety Management Systems', Aerosafety World, Flight Safety Foundation, http://www.flightsafety.org/asw/may08/asw_may08_p12-17.pdf

FARIDAH I. et al, (22.7.2009), 'The operational research framework for safety culture of the Malaysian construction organization', ICBE 2006, 13-15 June, http://www.ccsenet.org/journal/index.php/ijbm/article/viewFile/3803/3413
Federal Aviation Administration (February 6, 2009), 'Safety Management systems framework for: aviation service providers', http://cryptome.org/0001/faa072309.htm

FLANNERY J. (22.7.2009), ‘Safety culture and its measurement in aviation’, http://asasi.org/papers/other/safety_culture_measurement_aviation.pdf

FLANNERY J. et al (19.5.2003) ‘Safety climate : a dimension of safety culture in aviation’, http://asasi.org/papers/2003/Safety%20Climate_Flannery_Carrick_Nendick.pdf

FLEMING M. and RONNY L. (11 March 1999) ‘Safety culture-the way forward’, The Chemical Engineer, pp.16-18.

FLEMING MARK and RONNY LARDNER (23.7.2009), ‘Safety culture- the way forward’, The chemical engineer, 11 March 1999, http://asasi.org/papers/other/safety_culture_measurement_aviation.pdf

FLOURIS T. and YILMAZ K. (2009) Change Management as A Road Map for Safety Management System Implementation in Aviation Operations: Focusing on Risk Management and Operational Effectiveness, International Journal of Civil Aviation, Vol. 1,No 1,Assesed at http//www.Makrothink.org/ijca[14 Jul 2009]
Foundation for Traffic Safety (April 2007), Improving Traffic Safety Culture in the United States: The Journey Forward

FOX ROY G.(2002)Civil Rotorcraft Risks, China International Helicopter Forum ,pp. 1-13

GADD S (Project leader) et al (2002), ‘Safety Culture: A review of the literature’, http://www.hse.gov.uk/research/hsl_pdf/2002/hsl02-25.pdf

GARMENDIA J. (2004), ‘Impact of Corporate Culture on Company Performance’, Current Sociology, Vol 52, No 6,pp. 1021-1038

GILL G. and SHERGILL G. (2004), ‘ Perceptions of safety management and safety culture in the aviation industry in New Zealand’, Journal of Air Transport Management, Vol. 10, pp. 233-239

GLAZER S. et al (27.7.2009), ‘A conceptual framework for studying safety climate and culture of commercial airlines’, http://hfskyway.faa.gov/HFTest/Bibliography%20of%20Publications%5CHuman%20Factor%20Maintenance%5CA%20Conceptual%20Framework%20for%20Studying%20Safety%20Climate%20and%20Culture%20of%20Commercial%20Airlines.pdf

GORDON R. and KIRWAN B. (2007), A safety culture questionnaire for European air traffic management, http://www.eurocontrol.int/eec/public/standard_page/DOC_Conf_2007_008.html

GORDON R. et al, (24.7.2009), ‘A safety culture questionnaire for European air traffic management’, http://www.eurocontrol.int/eec/public/standard_page/DOC_Conf_2007_008.html

GORDON RACHAEL et al (24.7.2009), ‘ Measuring safety culture in a research and development centre: a comparison of two methods in the Air Traffic Management domain’, *http://www.eurocontrol.int/eec/gallery/content/public/documents/EEC_safety_documents/Developing_Safety_Culture.pdf*

GRIFFIN M. and NEAL A.(2000) Perceptions of Safety at Work: A Framework for Linking Safety Climate to Safety Performance, Knowledge ,and Motivation ,Journal of Occupational Health Psychology Vol . 5,No 3,pp 347-358

GRIFFIN Mark A. and Andrew Neal (2000), 'Perceptions of safety at work: a framework for linking safety climate to safety performance, Knowledge and motivation', Journal of occupational health psychology, 2000, vol 5, No 3, 347 – 358

GUI, F. et al (24.7.2009), 'Design for Safety Climate Questionnaire Framework', http://lib.hpu.edu.cn/comp_meeting/PROGRESS%20IN%20SAFETY%20SCIENCE%20AND%20TECHNOLOGY%20VOL.V1/0215.doc

GULDENMUND F.W., (2000) The nature of safety culture: a review of theory and research. Safety Science, vol 34, pp 215-257

HACKWORTH CARLA et al (2007), 'An international survey of maintenance human factors programs', http://www.stormingmedia.us/67/6755/A675574.html

HAI (22.7.2009), 'Improving Safety in HEMS Operations', http://www.rotor.com/membership/rotor/rotorpdf/fall2005/30.pdf

HALL P. and NORBURN D. (1987), 'The management factor in acquisition performance', Leadership & Organization Development Journal. Vol.: 8, Issue 3, pp 23 – 30

HALL P. and NORBURN D. (1989), 'Corporate Culture: A Framework for its Measurement and Comparison', http://hdl.handle.net/1826/364

HAYWARD B. (25.7.2009), 'Culture, CRM and aviation safety, Paper presented at the ANZANASI 1997 Asia Pacific Regional Air Safety Seminar, p. 21, http://asasi.org/papers/hayward.pdf
Helicopter association international (August 2005), 'White Paper: Improving safety in helicopter emergency medical service (HEMS) operations', http://www.rotor.com/membership/rotor/rotorpdf/fall2005/30.pdf

HELMREICH ROBERT L., (23.7.2009), 'Culture, Threat and Error: assessing system safety', http://homepage.psy.utexas.edu/homepage/group/helmreichlab/Publications/pubfiles/Pub257.pdf

HENRY, C. (March 13, 2009), 'The Normal Operations Safety Survey (NOSS): Measuring system performance in air traffic control', System Safety, 2007 2nd Institution of Engineering and Technology International Conference, pp. 78-83

HERRERA I. and RANVEIG K (25.7.2009), 'Key elements to avoid drifting out of the safety space', http://www.resilience-engineering.org/REPapers/Herrera_Tinmannsvik.pdf

HOPFL H.(1994), 'Safety Culture ,Corporate Culture Organizational Transformation and the Commitment to Safety', Disaster Prevention and Management, Vol 3, No 3, PP.49-58.

HOPKINS A. (24.7.2009), ,Safety culture, mindfulness and safe behaviour: converging ideas?', National research centre for OHS regulation, http://ohs.anu.edu.au/publications/pdf/wp%207%20-%20Hopkins.pdf

HORMANN, H. (2001), 'Cultural variation of perceptions of crew behaviour in multi-pilot aircraft' Presses Universitaires de France, Le travail humain, Vol. 64, No. 3, pp. 247-268

HOWARD E. and SWEATMAN P. (2007), 'Road safety culture development for substantial road trauma reduction, Foundation for traffic safety', http://www.aaafoundation.org/pdf/HowardSweatman.pdf JAHARUDDIN N. (2006), 'Corporate culture, leadership style and performance of foreign and local organizations in Malaysia', Academy of Taiwan Information Systems Research, Volume 3, Issue 1, http://bai2006.atisr.org/BAI2006Proceedings.pdf.htm
ICAO (22.7.2000) Safety Management Manual, bDOC 9859, http://www.icao.int/anb/safetymanagement/Documents.html
International Helicopter safety Symposium, (2005 September 26-29) 'Final Report', 2005 Montreal, Quebec, Canada, http://www.vtol.org/pdf/IHSSSummary.pdf

ISELER L. and DE MAIO J. (21.7.2009), 'Analysis of US Rotorcraft Accidents from 1990 to 1996 and Implications for a Safety Program', http://www.ihst.org/portals/54/industry_reports/NASA90-96.pdf.htm

ISMAIL F. and ABDULLAH ,J.V.T.(2006), 'The Operational Research Framework for Safety Culture of the Malaysian Construction Organization', Proceedings of the International Conference in the built Environment in the 21st Century,13-15 June, Shah Abam, Malaysia, pp. 373-386

JICK D. (1979) Mixing Qualitative and Quantitative Methods: Triangulation in Action, Administrative Science Quarterly ,Vol. 24, No. 4, Qualitative Methodology, pp. 602-611.

JOHNSON, K. (23.7.2009), 'Avoid Unnecessary risks', http://www.alea.org/public/safety/articles/AvoidUnnecessaryRisks.pdf.htm

JOINT HELICOPTER SAFETY ANALYSIS TEAM (25.7.2009), 'Interim Safety Recommendations to the International Helicopter safety team', http://www.google.gr/search?q=Interim+Safety+Recommendations+to+the+International+Helicopter+safety+team&ie=utf-8&oe=utf 8&aq=t&rls=org.mozilla:el:official&client=firefox-a

JOINT HELICOPTER SAFETY IMPLEMENTATION TEAM (21.7.2009), 'Safety MANAGEMENT System Toolkit', Presented at the International Helicopter Safety Symposium 2007, Quebec, Montreal Canada, http://www.ihst.org/Portals/54/SMS-Toolkit.pdf

JOINT PLANNING AND DEVELOPMENT OFFICE (JPDO), (24.7.2009), 'Safety culture Improvement Resource Guide' http://www.jpdo.gov/newsArticle.asp?id=101

KAI – HUI, L. et al (26.7.2009), 'Development of utilities to assess airline cabin safety culture', http://asasi.org/papers/2006/Cabin_safety_culture_Lee_Stewart_Kao.pdf.htm[17 Aug 2009]

KAO, C. et al (2001), *Safety culture factors, group differences and risk perception in five petrochemical plants*, Wiley Interscience, Vol. 27 Issue 2**,** Pages 145 - 152

KIRWAN, B. Et al (23.7.2009), 'Enhancing safety culture in Air Navigation Service Providers', FSF, ERA and EUROCONTROL, 21st European Aviation Safety Seminar, Nicosia Cyprus (March 2009)

LAPPALAINEN, J. (2008) 'Transforming Maritime Safety Culture: Evaluation of the impacts of the ISM Code on maritime safety culture in Finland', Publications from the centre for maritime studies University of Turku, http://mkk.utu.fi/dok/pub/A46-transforming%20maritime%20safety.pdf

LARDNER R. et al (2000), 'Safety culture maturity', The Keil Centre, http://www.prismnetwork.org/files/seminars/FG1%20Internet%20Seminar/safety%20culture%20maturity/presentation/Lardner_Presentation1.PDF

LARDNER, R. (22.7.2009), 'Towards a mature safety culture', http://www.keilcentre.co.uk/html/downloads_hfact.htm

LAW, W.K. et al (2006), '*Prioritizing the safety management elements A hierarchical analysis for manufacturing enterprises'*, Industrial Management & Data Systems , Vol 106, No 6, pp 778-792.

LE MITCHELL, S.J., (23.7.2009), 'The economics of safety. A case study of the UK offshore Helicopter industry', Ph.D. Thesis, School Of engineering Granfield University, , http://dspace.lib.cranfield.ac.uk:8080/bitstream/1826/1824/1/Mitchell%202006.pdf

LEVESON N. et al (2004), 'Effectively addressing NASA'S Organizational and Safety Culture :Insights from Systems Safety and Engineering Systems', Presented at Engineering Systems Division Symposium, MIT, http://esd.mit.edu/symposium/pdfs/papers/leveson-c.pdf

LEVESON N. et al (2009) 'Moving beyond normal accidents and high reliability organizations: a systems approach to safety in complex systems', Organization Studies, Vol. 30, No. 2-3, pp 227-249

LIVIU I. and GAVREA C. (25.7.2009) 'The link between organizational culture and corporate performance – an overview', http://steconomice.uoradea.ro/anale/volume/2008/v4-management-marketing/057.pdf

LOFQUIST E., (23.7.2009), 'Measuring the Effects of Strategic Change on Safety in a High Reliability Organization' http://bora.nhh.no/bitstream/2330/1916/1/lofquist%20avh2008.pdf

LRN, (25.7.2009)The impact of codes of conduct on corporate culture: Measuring the immeasurable, http://ethics.org/files/u5/LRNImpactofCodesofConduct.pdf

MARAGAKIS I. et al (March 2009) 'Safety Management System and Safety Culture Working Group (SMS WG): Guidance on Hazards Identification'. http://www.easa.europa.eu/essi/ECAST_SMS.htm

MEARNS K. et al (2003), Safety climate, safety management practice and safety performance in offshore environments', Safety Science Vol 41, pp 641-680

MEARNS, K. et al (24.7.2009), 'Developing a safety culture measurement toolkit (SMCT) for European ANSPS', Eighth USA/Europe Air Traffic Management Research and Development Seminar (ATM 2009), http://www.google.gr/url?q=http://www.atmseminar.org/8th-seminar-united-states-june-2009/Book%2520of%2520Abstracts%2520ATM2009.pdf&ei=Sp2aSty4DMrZ-Qa3kq2PBA&sa=X&oi=spellmeleon_result&resnum=1&ct=result&usg=AFQjCNGY9a0xu8a0-IVhArItA68U5mMVFQ

MILLER, HERMAN (2004), 'Demystifying Corporate Culture', http://www.prestigebusinessinteriors.com/Research/Demystifying%20Corporate%20Culture.pdf
MITCELL GIBBONS, A., et al, (24.7.2009), 'Development and validation of a survey to assess safety culture in airline maintenance operations', http://hfskyway.faa.gov/HFTest/Bibliography%20of%20Publications%5CHuman%20Factor%20Maintenance%5CDevelopment%20and%20validation%20of%20a%20survey%20to%20assess%20safety%20culture%20in%20airline%20maintenance%20operations.pdf

MITCELL, G. et al (26.7.2009) , 'Development of a commercial aviation safety culture survey for maintenance operations', http://www.humanfactors.uiuc.edu/Reports&PapersPDFs/TechReport/05-06.pdf

MITCHELL, S. J. Le M. (2006) PhD THESIS ,The Economics of Safety: A case study of the UK offshore helicopter industry, CRANFIELD UNIVERSITY

MORLEY J. et al (22.7.2009), ' Lessons learned from transportation safety board investigations of helicopter accidents (1994-2003)', http://www.ihst.org/portals/54/industry_reports/TSB.doc
National Aviation Safety Center (June 2005) 'National Aviation safety and mishap prevention plan', United states department of agriculture, forest service, http://www.fs.fed.us/fire/aviation/av_library/2005_nasmpp.pdf

NELLEN, T. (October 1997) 'notes on Organizational Culture & leadership by SCHEIN E.', http://www.tnellen.com/ted/tc/schein.html

PAGE-BUCCI , H. (2003) The value of Likert scales in measuring attitudes of online learners ,http://www.hkadesigns.co.uk/websites/msc/reme/likert.htm[23 june 2009]

PATANKAR, M. (October 2008), 'Safety Culture Transformation', presentation to the EUROCONTROL R&D Symposium, http://www.eurocontrol.int/eec/gallery/content/public/document/other/conference/2008/safety_r_and_d_Southampton/day_3/Manoj_Patankar_Safety_culture_transformation.pdf

PETRY, E. (March/April 2005), 'Assessing Corporate Culture', ETHICOS, Vol. 18, No. 5

PHILLIPS, P. (2006) 'Women in Nuclear Global 2006 Meeting' presentation, Human & Organizational Performance Division Canadian Nuclear Safety Commission, http://www.win-2006.org/Win/files/win_program.pdf

PIDGEON, N. (23.7.2009), 'The limits to safety? Culture, politics, learning and man-made disasters', http://www.ingentaconnect.com/content/bpl/jccm/1997/00000005/00000001/art00001

PIERS, et al (March 2009), 'Safety Management System and Safety Culture Working Group (SMS WG): Safety culture framework for the ecast sms-wg', ECAST. http://www.easa.europa.eu/essi/ECAST_SMS.htm

PIZZI LAURA T., et al (23.7.2009), 'Promoting a culture Safety' ,http://www.ahrq.gov/Clinic/ptsafety/pdf/chap40.pdf.htm

RAISANEN P. (26.7.2009), 'Influence of corporate top management to safety culture. A literature survey',

http://www.merikotka.fi/metku/Raisanen%202008%20Influence%20of%20corporate%20top%20management%20to%20safety%20culture%20final%20v3.pdf
ROBERTS, K. and Bea, R. (2001), 'Must Accidents happen? Lessons from high-reliability organizations', Academy of Management Executive, Vol, 15, No3.

ROLLENHAGEN C. and WAHLSTROM B. (2007), 'Management systems and safety culture; reflections and suggestions for research' Joint 8th IEEE H FPP/ 13th HPRCT, http://www.elisanet.fi/bewas.ab.oy/Monterey_safety_management.pdf

SANSNESS T. et al (2007) Integrating Qualitative and Quantitative Information in an Evaluation, Submitted to the International Conference of the Australasian Evaluation Society, pp. 1-10

SAULL J. et al (2009) How are you solving the puzzle of Implementing SMS around your existing systems? ,International Federation of Airworthiness

SHACKLADY T. (22.7.2009), 'Analysis of helicopter safety and the potential benefits of flight data monitoring, Granfield University, MSc Thesis, September 2003, https://dspace.lib.cranfield.ac.uk/bitstream/1826/1964/1/T%20G%20Shacklady%20MSc%20Thesis.pdf

SHAPPELL S and WIEGMANN D. (2004), 'HFACS Analysis of Military and Civilian Aviation Accidents: A North American Comparison' http://asasi.org/papers/2004/Shappell%20et%20al_HFACS_ISASI04.pdf

SHAPPELL S. et al.(24.7.2009), 'Human Error and commercial aviation accidents: a comprehensive fine-grained analysis using HFACS', http://www.stormingmedia.us/56/5683/A568364.html

SIJBESMA C. and POSTMA L. (2008) Quantification of qualitative data in the water sector: the challenges, Water International, Volume 33, Issue 2, pp. 150-161

SMITH A. L.(2004)What Do We Know About Developing and Sustaining a Culture of Innovation, Organizational Culture Assessment Instrument, pp 1-5

SORENSEN J. B. (2002), 'The strength of corporate culture and the reliability of firm performance, Business Publications', http://findarticles.com/p/articles/mi_m4035/is_1_47/ai_87918557/
TANEJA, N (2002), 'Human Factors in Aircraft Accidents: A holistic Approach to intervention Strategies' ,Proceedings of the 46th Annual meeting of the Human FACTORS AND Ergonomics Society, Aerospace Systems , pp. 160-164(5)

THE AIR LINE PILOTS ASSOCIATION, INTERNATIONAL (February 2006), 'Background and fundamentals of the safety management systems (SMS) of aviation operations', http://ihst.rotor.com/Portals/54/Aviation%20SMS%20Background-Fundamentals.pdf
The Keil centre for the health and safety executive (23.7.2009), 'Safety culture maturity model', http://www.hse.gov.uk/research/otopdf/2000/oto00049.pdf

THOMAS, M. (2003), 'Uncovering the Origins of Latent failures: The Evaluation of an Organisation's Training Systems Design in Relation to operational Performance', In proceedings of the sixth International Aviation Psychology Symposium, Sydney Australia.

Transport Canada (September 2004), 'Safety Management Systems for small aviation operations: A practical guide to implementation', http://www.tc.gc.ca/civilaviation/general/flttrain/sms/tp14135-1/menu.htm

UK CAA (2002), 'Fundamental Human Factors Concepts', CAP 719, http://www.caa.co.uk.htm

UK CAA (2008), 'Safety Management Systems for Commercial Air Transport Operations', CAP 712, http://www.caa.co.uk.htm

VECCHIO – SADUS ANGELICA M. (2007), 'Enhancing Safety Culture through effective communication', Safety Science Monitor, Vol 11, issue 3, article 2

VIKTORSSON, C. (25.7.2.009), Understanding and Assessing Safety Culture. Presentation, International Atomic Energy Agency, http://www.nsc.go.jp/abunka/kouen3.pdf

VON THADEN, T. et al (2003), 'Safety Culture in a regional airline: results from a commercial aviation safety survey', http://www.humanfactors.uiuc.edu/Reports&PapersPDFs/isap03/vonwiemitshazha.pdf

VON THADEN, T. and GIBBONS , A. (2008), 'The Safety Culture Indicator Scale Measurement System (SCISMS)',Technical Report HFD-08-03/FAA-08-02, http://www.humanfactors.illinois.edu/Reports&PapersPDFs/TechReport/08-03.pdf

VON THADEN, T. and WIEGMANN D. (23.7.2009), 'Measuring Organizational Factors in Airline Safety', http://www.humanfactors.illinois.edu/Reports&PapersPDFs/TechReport/08-03.pdf

VON THADEN, T. et al (22.7.2009), 'Validating the commercial aviation safety survey in the Chinese Context', http://www.humanfactors.uiuc.edu/Reports&PapersPDFs/TechReport/06-09.pdf

VON THADEN, T. et al (23.7.2009), ' Safety culture in a regional airline: results from a commercial aviation safety survey', http://www.humanfactors.uiuc.edu/Reports&PapersPDFs/isap03/vonwiemitshazha.pdf

VON THADEN, T. et al (23.7.2009), 'Measuring indicators of safety culture in a major European Airline's flight operations department', http://www.humanfactors.illinois.edu/Reports&PapersPDFs/TechReport/08-03.pdf

VON THADEN, T.. and HOPPES MICHELLE (23.7.2009), ,Measuring a just culture in healthcare professionals: initial survey results', http://www.humanfactors.uiuc.edu/Reports&PapersPDFs/miscconf/vonhop05.pdf

WAHLSTROM, B. (23.7.2009), 'Some cultural flavours of safety culture', http://www.bewas.fi/safe_cult_95.pdf

WALDERA, L and MANCHESTER R. (October 2002), 'Culture Matters: how an intangible asset impacts growth', http://www.inmomentum.com/resources/pdfs/cult_matters.pdf

WIEGMANN D. (22.7.2009), *'Safety Culture: a review'* Technical Report ARL-02-03?FAA-02-2 http://www.theiplgroup.com/safety%20culture-review.pdf

WIEGMANN, D. and SHAPELL, S. (2000), 'Human Error Perspectives in Aviation, The International Journal of Aviation Psychology', Vol. 11, No. 4, pp. 341-357.

WIEGMANN, D. And VON THADEN, T. (23.7.2009), 'A review of safety culture theory and its potential application to traffic safety', A review of safety culture theory and its potential application to traffic safety'

WIEGMANN, D. et al, (23.7.2009), 'Synthesis of safety culture and safety climate research'. http://www.humanfactors.uiuc.edu/Reports&PapersPDFs/TechReport/02-03.pdf

WIEGMANN, D. et al. (2007) A review of safety culture theory and its potential application to traffic safety. Institute of Aviation, Human Factors Division, http://www.aaafoundation.org/pdf/WiegmannvonThadenGibbons.pdf

WILSON, J. F. (2002), 'Business cultures and business performance: A British perspective, Nottingham University Business School', http://www.nottingham.ac.uk/businesshistory/2002Three.PDF

WYMAN, O. (24.7.2009) 'The congruence model. A roadmap for understanding organizational performance', Delta organization & Leadership, http://www.oliverwyman.com/ow/pdf_files/Congruence_Model_INS.pdf

ZHANG, H. et al (2002), 'Safety Culture: A concept in chaos?' http://www.humanfactors.uiuc.edu/Reports&PapersPDFs/humfac02/zhawiegvonshamithf02.pdf

11. BIBLIOGRAPHY

ADLER NANCY J. (2002), International Dimensions of Organizational Behavior, 4ed. South Western, Thomson Learning.

BIBEL GEORGE (2008), Beyond the Black Box: The Forensics of Airplane Crashes, 1ed. Maryland: The John Hopkins University Press.

BURKE WARNER W. (1935), Organization Development: a Process of Learning and Changing, 2ed. United States of America: Addison-Wesley Publishing Company. Inc.

BURKE WARNER W. and TRAHANT WILLIAM (2000), Business climate shifts: profiles of change makers, 1ed. Butterworth Heinemann.

CAMERON KIM S. and QUINN ROBERT E. (2006), Diagnosing and Changing Organizational Culture: based on the Competing Values Framework, Revised ed. San Francisco: Jossey-Bass.

DAFT RICHARD L. (2003), Management, 6ed. South Western, Thomson Learning.

DE WIT BOB and MEYER RON (1998), Strategy: Process, Content, Context, 2ed. International Thomson Business Press.

DEKKER SIDNEY (2007), Just Culture: Balancing Safety and Accountability, 1ed. Hampshire: Ashgate Publishing Limited.

DIEHL ALAN E. (2002), Silent Knights: Blowing the Whistle on Military Accidents and their Cover-ups, 1 ed. Virginia. Brassey's, Inc.

DISMUKES R. KEY (Ed.) ET AL (2007), The limits of expertise: rethinking pilot error and the causes of airline accidents – (Ashgate studies in human factors for flight operations), 1ed. Hampshire: Ashgate Publishing Limited.

DORNER DIETRICH (1996), The Logic of Failure: Recognizing and Avoiding Error in Complex Situations, 1ed. New York: Metropolitan Books.

FAHLGREN GUNNAR (2004), Life Resource Management CRM & Human Factors, 1ed. United States of America: Creative books Publishers.

HALL RICHARD H. and TOLBERT PAMELA S. (2005), Organizations: Structures, Processes, and Outcomes, 9ed. New Jersey, Pearson Education, Inc.

HAYES JOHN (2007), The Theory and Practice of Change Management, 2ed. Hampshire: Palgrave Macmillan.

JANICAK CRISTOPHER A. (2003), Safety Metrics: Tools and techniques for Measuring Safety Performance. United States of America: Government Institutes, an imprint of The Scarecrow Press, Inc.

KOTTER JOHN P. and HESKETT J AMES L. (1992), Corporate Culture and Performance, 1ed. New York: The Free Press, a Division of Simon & Schuster, Inc.

LOUKOPOULOS LOUKIA D. (Ed.) ET ALL (2009), The Multitasking Myth: Handling Complexity in Real Word Operations– (Ashgate studies in human factors for flight operations), 1 ed. Surrey: Ashgate Publishing Limited.

NELSON EMMITT J. (2005), The Pathway to a Zero Injury Safety Culture, 1ed. Houston, Texas: Nelson Consulting, Inc.

ORLADY HARRY W. and ORLADY LINDA M. (1999), Human Factors in Multi-Crew Flight Operations, 1ed. Hants: Ashgate Publishing Limited.

PETERS THOMAS J. and WATERMAN ROBERT H. JR (2004), In Search of Excellence, 1ed. United States of America: First Collins Business Essential Edition.

PETERSEN DAN (2001), Safety Management: a Human Approach, 3ed. Illinois: American Society of Safety Engineers.

REASON JAMES (1990), Human Error, 1ed. New York: Cambridge University Press.

REASON JAMES (1997), Managing the Risks of Organizational Accidents, 1ed. Hants: Ashgate Publishing Limited.

ROUGHTON JAMES E. and MERCURIO JAMES J. (2002), Developing an Effective Safety Culture: a Leadership Approach, 1ed. Butterworth-Heinemann.

SANCHEZ JOSE and BALLESTEROS ALARCOS (2007), Improving Air Safety through Organizational Learning: Consequences of a Technology-led Model, 1ed. Hampshire: Ashgate Publishing Limited.

STARBUCK WILLIAM H. and FARJOUN MOSHE (2005), Organization at the Limit: Lessons from the Columbia Disaster, 1ed. Blackwell Publishing Ltd.

SWARTZ GEORGE (Ed) (2000), Safety Culture and Effective Safety Management, 1ed. United States of America: National Safety Council.

WEICK KARL E. and SUTCLIFFE KATHLEEN M. (2001), Managing the Unexpected: Assuring High Performance in an Age of Complexity, 1ed. San Francisco: Jossey-Bass.

WEICK KARL E. and SUTCLIFFE KATHLEEN M. (2007), Managing the unexpected: resilient performance in an age of uncertainty, 2ed. San Francisco: Jossey-Bass.

WIEGMANN DOUGLAS A. and SHAPPELL SCOTT A. (2003), A Human Error Approach to Aviation Accident Analysis: The Human Factors Analysis and Classification System, 1ed. Hants: Ashgate Publishing Limited.

12. APPENDICES

APPENDIX A

International Survey of the role of safety culture Status

Welcome to the International Survey of Organizations operating helicopters. This survey is designed to assess the role of "safety culture" segment of organizational culture in enhancing or hindering implementation, further elaboration, of Safety Management Systems in all relevant entities. The questionnaire additionally aims at pinpointing flaws of the already used SMS in managing all potential risks. By delving into areas such as safety training, company safety policies, organizational commitment it is expected that finally the relation between the two will be unveiled. This is what really interests me to discover ways to make more efficient the way risks were dealt.

The findings of this survey will be used for the fulfillment of an MBA/ER thesis. The information that will be gathered via this survey will be protected to the extent available under applicable laws and no individually identifiable information will be included in the published report. Participation in the survey is completely voluntary. That is why there is no requirement to disclose personal information. Following the survey a follow on report will send to you. Thank you in advance for your participation.

N.B because the questionnaire is mostly addressed to professionals whose English is not the mother tongue. an effort has been made to keep the language simple and 'chatty'. Therefore, some syntax errors, e.g. the sequence of words in the interrogative formation, are made deliberately to allow for easier understanding of the language

*When met refers to compulsory Question

1. Do you work for a… (Please select one response)*

Public Civil Organization
Military Organization
FTO/TRTO Organization
Air Taxi/Charter Operator
Privately owned helicopters Organization
Other Training Organization
Manufacturer

Helicopter Organization Offering specialized flight operations(external loads, SAR, Fire fighting, commute flights ,etc)
HEMS Organization
Maintenance Facility
Other

(Display when response for item1 is ‘’other’’.)

Please specify what is that the Organization you work for does. (Text box provided)

2. In which geographical area you are currently employed?*

Scandinavia(Sweden, Norway, Finland)

North West Europe (UK, The Netherlands, Germany)

South Central Europe (Italy, Spain, France)

South Peripheral Europe (Greece, Turkey, Portugal)

East Europe (Russia, Poland ,Hungary)

USA

Canada

Rest America

Asia

Australia and New Zealand

Africa

In case you have decided to answer this questionnaire not individually but as a different Organization please specify on which segment you belong (The answer should be provided to you by your management team)*

Segment A

Segment B

Segment C

Segment D

Segment E

Segment F

Individual membership

4. Which is the primary regulatory authority your helicopter operations Organization are designed to be in Compliance with?*

Civil Aviation Safety Authority(CASA)

European Aviation Safety Agency (EASA)

Federal Aviation Administration (FAA)

Transport Canada

Other National Aviation Authority

Military Designed System

5. How many helicopters were used by your Organization for its operations?*

Maximum 2

3 but less than 8

more than 8 less than 20

more than 20

6. How many employees work for your Organization?

Maximum 5

6 but no more than 20

21 but less than 50

more than 50

7. What is your Job title?*

Helicopter pilot

Flight engineer

Other flight personnel

Technical Ground personnel

Rest Ground personnel

Safety Officer

Ground Instructor

Administrative Staff

Air Traffic Controller

Human factors Manager

Quality Director

Quality Manager

CRM Instructor

Other

(Display when response for item 7 is ‘’other’’.)

Please specify your job title (Text box provided)

Do you really think that people working for helicopter organizations are lacking recognition and privileges comparing to those working in the airplanes counterpart?*

I strongly disagree

I disagree

I feel we share same opportunities

I agree

I strongly agree

9. How many years of Aviation Experience you have?*

Less than a year

1-5 years

6-10 years

11-15 years

16-20 years

More than 20 years

10. As dealing with an aircraft that is not as aerodynamic shape as airplanes I have accepted that accidents unavoidably will occur often*

I strongly disagree

I disagree

I feel that both Aircrafts suffer from the same accident rate

I agree

I strongly agree

11. Sometimes you have the feeling that Organizations that operate helicopters cannot be so effective in managing safety risks because the human losses are far less than those from airplanes, therefore there is less public interest *.

I strongly disagree

I disagree

The interest in mitigating safety risks is equal to the like in airplanes segment.

I agree

I strongly agree

12. What is your attitude if you knew that people working as flight personnel mostly pilots in helicopters are being characterized by public opinion as impulsive, careless and immature?

This is something that never occurred to me

I heard it but I can hardly believe that it can be true

I believe that there are a lot of bad rumours in Market

Perhaps there are colleagues that behave in a way that leaves space for public opinion to believe so

Helicopter pilots are behaving sometimes awkwardly because it is the nature of the risky situations they are involved into

13. Does your Organization implement any kind of Safety Management System?*

Yes although it is not necessitated by a Regulatory Authority

Yes it is implemented because is mandatory by a Regulatory Authority

I am not sure what that it is

No because it is not thought to offer any better results towards safety

No because no one from the Management Team could ever thought to spend funds without discernible results

14. The most common slogan in your Organization is: *

Mission comes first

Minimisation of cost is important

Safety should be maintained at all costs

Time accuracy distinct us from competition

We are interested in quality and long term prosperity

Can you scale in rate of importance the appearance of a safety slogan?

It is the most common phrase but actually it is a slogan value only

Safety is heard from time to time but remains vague ,minimisation of costs really comes first

What really comes first is our mission, safety is at stake sometimes but we are taking as many countermeasures as possible

We are obsessed with quality after a period that we were running after time accuracy which came as subsequent step of minimising our costs.

It is perceptible that time and resources are spent in training, up to a level that makes it logical that safety comes first

Can you tick on the closest 5 core values that characterize the Organization you work for among the ones that were provided to you?*

Seeking high Quality, Customer satisfaction,

Caring about Our communities and Environment,

Supporting team member happiness and Excellence,

Creating Wealth, Pursue Learning, Innovation emphasis,

Build a positive team and family relations, Safety, Honour outstanding performance, Integrity, Do more with less, Be passionate and determined, Be humble, Embrace and drive change, Build open and honest relationships with communication, Responsibility, Equality, Admitting own mistakes ,Respect for the Individual

16. Safety information in your Organization is handled generally as*

Feedback in an issue that will never occur and we would not want to know about

Safety information is something difficult to find among piles of other more useful documents

When it comes it sparks important conversations and gives us space for fruitful changes that we love to make

Really do not know

We do not receive any safety information

17. When someone makes a mistake and brings the reputation of the Organization at stake

He normally draws negative comments and he might be punished

Well we would not like to be related with him for a short period till some time lapses

Well more of us will offer themselves to share responsibility, after all the same might happen to us no matter if we take the risk to loose some benefits

18. If you were making a mistake what you would like to do?

Hoping that no one noticed it I would like to forget it as soon as possible and move on
If I will be '' Caught'' or being ''accused'' on that my first reaction would be to deny that it was my mistake
I would be worrying for other colleagues because there is a tendency ''bad news'' to be disseminated easily
My experience has proven me that no matter what happens my general performance will be taken into account as well
I will head to the management team and share with them my mistake. It is a general policy to be praised for such a behaviour

19. Who monitors safety issues in your company?*

A special department or the Safety Officer
The middle Manager
No oneDo not know
The accountable Manager

20. Sometimes you think that in your working environment everybody have different values and goals.

I strongly disagree
I disagree
I am not certain
I agree
I favourably agree

21. When you discover a situation that might cause any future threat to your company*

• You without hesitation disclose it to the safety officer
• You would like to do something but you feel that if you take an action that might be misunderstood
• You do not feel that you have the proper training to stand for your opinion and perhaps your stance would bring yourself into trouble
• In the past you did it but no one take any action
• You are bored of trying. It is useless anyway

22. Does your Company estimate Failure (accident, incidents, and near misses) in financial costs?

Do not know
No
Yes

23. Does your Company have established an action plan to identify incidents?*

Yes
No
Do not know

24. Identified hazards after incident investigation are being eliminated after:

Mostly after 24 hours
Do not know
They are not addressed at all
There is no incident investigation only grave accidents investigation
I could not say we are never being informed, probably they are doing something about them

25. Does your Company set every year any specific safety goals?*

Yes and those are announced every year by the accountable Manager
I think yes they announce some goals that they do not seem to be clarified and realistic

We are informed about some goals I do not recall someone clarifying that they have to do something with safety
We are kept informed about goals every now and then but we know that safety is monitored by a specialist
No nothing relevant is being announced to us

26 Does your Company have a designed for the kind of operations you execute Safety Manual?*

Yes
No
Do not know
Yes and probably it is modified by other similar Organizations
Yes I think it is translated from a similar Organization without modification

27. How could you consider your knowledge on quality and safety issues?
I have minor knowledge I do not feel comfortable
Quality and safety are the same thing If you know one you know it all after all there is no time to look for myself
Quality and Safety should be together I cannot distinguish them
I was taught some things in a course that was arranged in the company but I would like to learn more
I find issues both being interesting, I delve into sources to learn as much as possible

28. Have you received initial safety training before you have started the job you are doing today? (Perhaps getting you familiarized with the Company's SOPs?)

No not really
I was given a manual explaining SOPs
No but my company has an extensive hiring system
Yes I was given some not so well organised
Yes and I was amazed from its content

29. How much you trust that the Management team really cares about safety in your Company?

Not at all
I feel that they say they care but do not really care
They have a good potential but they take only ''first layer'' measures
I believe that they are trying to do their best
You can never be sure, I see things change but there are many to be done

30. You said this phrase so many times to yourself , ''I feel that I was left alone to face so many risks in my working environment without having someone close to understand me and be willing to help'' *

I strongly disagree

I disagree
It happened a few times but I managed to get someone to help
I agree
I strongly agree

31. Do you know if there is a database of accidents, near misses, incidents which are combined to provide your Company with useful proactive measures?*

Do not know
No there is not
Yes there is something but I do not think that functions well
I think that the Safety Officer administers that and is giving us feedback very often
Yes there is such a database and we get feedback but still I cannot see anything good out of it

32. How much you respect the work of Safety Officer?

Not much, he does not do something ,actually he lacks the ability
He is trying to do something but I do not think that there is someone really listening
He is in the position but he has little authority to change things
He proposes interesting changes but he lacks the needed funds to proceed faster
Very much he has good reputation, although sometimes I cannot understand what he means

33. Do you know if your company does safety audits, or climate surveys?*

Do not know
No never
Yes I think there is someone trained from our company who does those things
Yes I think we have the first from time to time never the second
Even though we have them I could not have known

34. How many safety audits and climate surveys were held in your company in the last 3 years ?*

None
Do not know
1
2-3
More than 3
Who organized and executed them?
Text Box provided

35. Is there an anonymously safety suggestions system to provide your Organization with data?*

Yes
No
Do not know

36. How many times in your career you anonymously offered a suggestion towards safety? *

Never
1-3 times
4-6 times
7-12
more than 12

37. How often your colleagues are offering safety suggestions by using an anonymously system?*

Never
1-4 per year
Do not really know
5-12 per year
More than 12 per year

38. How often you participate in a safety meeting in your company?

Once a year
Never
It is not my job to attend those meetings
Every month
3-4 times a year

39. Do you have arranged in your company a constant training scheme for safety issues?*

Yes there is one session every year for everybody
Yes there is a session organized when the management team feels that we need some updating on safety
No apart from the newcomers in the company the rest get some info via emails
We have nothing already arranged , but I think the company will comply with new legislation if it occurs
No there is nothing arranged

40. What percentage of your colleagues in the company you work for you really trust?

Nearly all of them are good professionals and I trust them
I trust some of my colleagues and I am trying to work only with them
I trust only myself
It takes me some time to get to know people but the company has a policy to assist its employees get well because what we do is risky and they need us all
I trust everybody in my company, they are carefully selected and extensively trained prior to taking specific tasks

41. What do you think when hearing about Crew Resource Management Training and other safety stuff?*

It is an other feeble attempt to polish safety record
It is a trend that will fade after a while
I do not really know
I had the chance to be trained and I find it promising
It is the essence of perfection, it will solve all the problems

42. How you interpret your stance towards safety in the Organization you work for?

You are assimilated in the already designed team, everybody cares a lot and tries hard to enhance it
You are again assimilated; everybody is holding a middle way.
You are always managing to assimilate easily, the same happens now, you can afford that safety is not a priority
You suffer to see that others pay little attention to safety ,you will try as hard as possible even though you were left alone
You cannot quit from trying to enhance safety ,you will try to gain more supporters from your colleagues and explain them some of your thoughts

43. How often your company does held safety meetings?*

Once a month
Once a week
Once every 3 months
Once every year
Do not Know

44. Are your safety competences and safety training level are valued and they are a prerequisite to get promoted?*

No
Yes
Do not know

45. Do you get any kind of reward if you discover a threat or offer a recommendation to further enhance the safety level of your company?*

No
I am not sure
Yes sometimes it is just a piece of paper offered to me without any other ritual
Yes and when that happens my self esteem rises, I am getting higher marks on my evaluation
Well yes I feel important ,everybody envies me , it counts and also getting some extra money depending on my contribution

46. Your safety performance is being evaluated at regular intervals and the same happens with middle managers and the CEO?*

No safety is not a crucial factor in evaluation
Do not know
Yes it is for me ,I am not certain if it is the same for middle managers and the CEO

Yes I am accountable for safety, even the middle manager, but the CEO is excluded
Yes everybody is accountable, even the CEO

47. Does the Management team have participated in initial safety training?

Yes
No
Do not know

48. Does the Management team follow up safety training courses?*

Yes
No
Do not know
Typically they do But I am afraid they are not so cheerful and they are left behind in contemporary safety knowledge
Yes and they are among the first who ask questions and make noticeable comments

49. Please answer the first thing that comes into your mind: If failure occurs,

Some will get punished
Some will be laid off
A local repair will happen
It is the time for a great reform
Probably the first two are correct

50. Please answer the first thing that comes into your mind. New ideas are :

Actively discouraged
Often present problems
Are welcomed
Are expected and rewarded
Are forbidden to newcomers, nobody says that but you feel it

51. What is your opinion about air safety investigations?*

They offer less than we expect
They cover up findings and blame mostly the pilots
They are underdeveloped and they have failed in giving the good example
They are written in a way that can be understood only by specialists
They are a source that it is not taken seriously by helicopter Organisations stakeholders

52. Please rate the relative importance of each factor in the decision of your Organization to implement a Safety Management System(Start from the highest to the lowest importance)*
Regulatory compliance
Flight SAFETY
Employee Safety

Cost Minimisation
Social Responsibility
Following the antagonism
Business Ethics

53. Please mark all that apply in your Organization*

Managers regularly visit the workplace and discuss safety matters with the workforce
Strongly Disagree - Strongly Agree
1 2 3 4 5

The company gives regular, clear information on safety matters
Strongly Disagree - Strongly Agree
1 2 3 4 5

We can raise a safety concern, knowing the company take it seriously and they will tell us What they are doing about it
Strongly Disagree - Strongly Agree
1 2 3 4 5

Safety is always the company's top priority; we can stop a job if we don't feel safe
Strongly Disagree - Strongly Agree
1 2 3 4 5

The company investigates all accidents and near misses, does something about it and gives Feedback
Strongly Disagree - Strongly Agree
1 2 3 4 5

The company keeps up to date with new ideas on safety
Strongly Disagree - Strongly Agree
1 2 3 4 5

We can get safety equipment and training if needed – the budget for this seems about right
Strongly Disagree - Strongly Agree
1 2 3 4 5

Everyone is included in decisions affecting safety and are regularly asked for input
Strongly Disagree - Strongly Agree
1 2 3 4 5

It's rare for anyone here to take shortcuts or unnecessary risks
Strongly Disagree - Strongly Agree
1 2 3 4 5

We can be open and honest about safety: the company doesn't simply find someone to Blame
Strongly Disagree - Strongly Agree

1 2 3 4 5

Morale is generally high
Strongly Disagree - Strongly Agree
1 2 3 4 5

Safety is the number one priority in my mind when completing a job:
Strongly Disagree - Strongly Agree
1 2 3 4 5

Co-workers often give tips to each other on how to work safely:
Strongly Disagree - Strongly Agree
1 2 3 4 5

Safety rules and procedures are carefully followed:
Strongly Disagree - Strongly Agree
1 2 3 4 5

54. Does your Company track corrective actions as a part of your formal process to manage the recommendations of safety investigations?*

Yes
No
Do not Know

55. How are your Safety investigations Database being used? (Please select all that apply)

We do not have a Safety Investigations Database
We are informed periodically whenever a new failure occurs by the safety officer and he reveals his first thoughts
Every failure brings a change in the procedures we do our mission
Within the past year , processes and procedures were changed as a result of the Analysis of the Database
We review the Database to assess the effectiveness of the interventions
Senior Management uses the information as part of a formal safety management system procedure
We do not use our Safety Investigations Database

56. Please express your opinion in the following:
• The role of the Organizational Culture especially the "safety" segment is crucial in ascertaining that safety can be maintained
Strongly Disagree - Strongly Agree
1 2 3 4 5
• Safety culture either enhances or hinders the implementation of the SMS
Strongly Disagree - Strongly Agree
1 2 3 4 5
• I think that culture is the positive driver of change that can assist operational safety
Strongly Disagree - Strongly Agree
1 2 3 4 5

• Even the best designed SMS cannot be implemented if it is not aligned with the subsequent "safety culture"
Strongly Disagree - + Strongly Agree
1 2 3 4 5
• "Safety Culture" functions as the generator of fresh ideas and constant innovations for a better suitable for the situation SMS
Strongly Disagree - + Strongly Agree
1 2 3 4 5

57. What you really think of the existing corporate culture level? Are really employees working for your Organization empowered by what is said, what is believed and what is done, to seek safety? *
(Text box provided)

58. Your initial training in the Organization you work for included (Please select all that apply)

Human Factors
Crew Resource Management
Safety Training
Safety Investigation
Safety Management Systems
Quality Management Systems
Several Drills
Communications
Fatigue on Performance
Human Error
Other

If you selected ''other'' please specify the areas that additionally covered:
(Text Box Provided)

59. Your recurrent training in the Organization you work for consists of lessons such as: (Please select all that apply)

Crew Resource Management
Human FACTORS
Safety Training
Safety Investigation
Safety Management Systems
Quality Management Systems
Several Drills
Communications
Fatigue on Performance
Human Error
Shift Turnover
Other
If you selected ''other'' please specify the areas that additionally covered:
(Text Box Provided)

60. How in your opinion safety training could it be more beneficial /What could be changed?
(Text Box Provided)

61. We perform a cost benefit or return on investment calculation to justify our safety recommendations success
Yes
No
Do not know

62. Our management demands return on investment calculations in our proposed Safety Management System

Yes
No
Do not know

63. What is your opinion about Safety Management Systems? Are they competent tools to enhance safety in Organizations operating helicopters?
(Text Box provided)

64. Please express your opinion:
I am convinced that risks are managed well in my company
Strongly Disagree - Strongly Agree
1 2 3 4 5
We are doing nothing if we do not first accomplish a hazard analysis
Strongly Disagree - Strongly Agree
1 2 3 4 5
You are confident that the procedures you follow are the best we can think off
Strongly Disagree - Strongly Agree
1 2 3 4 5
A constant refreshing of risk analysis should always be made
Strongly Disagree - Strongly Agree
1 2 3 4 5
I am happy that my middle Manager (Chief fleet pilot or the head of the Maintenance Facility, etc) are held accountable for safety
Strongly Disagree - Strongly Agree
1 2 3 4 5
Everybody should be held accountable for safety as well
Strongly Disagree - Strongly Agree
1 2 3 4 5

65. What should be done so your organizational culture can become a change driver to assist your entity maintain a continuum safety tendency?
(Text Box provided)

66. What is your comment for this survey?
(Text Box provided)

APPENDIX B

Does Organizational Culture enhance or hinder the implementation of Safety Management Systems in Helicopter Entities?

Mr. Dimitrios Soukeras
Ds116@leicester.ac.uk

Mr. Dimitrios Soukeras, an ex-military helicopter pilot and active air safety investigator enrolled in a Master's Degree, is conducting an anonymous survey to gather data relative to the disproportional helicopter accident rate as compared to their fixed-wing counterparts. The author of the survey believes that it might uncover information that could aid in improving helicopter safety.

The survey launched on June 1st attempts to delve into the ''safety'' culture segment of organizations that operate helicopters. Potential respondents are invited to click on the following web link and fill in the questionnaire. You can reach the researcher via his email address at: ds116@leicester.ac.uk (Mr. Dimitrios Soukeras). The web link will remain active until June 23rd. Those interested in participating are encouraged to act quickly. The survey is completely voluntary and anonymous. There is no requirement to disclose personal information. Following the completion of the survey, a follow-up report will be sent to you.

https://www.surveymonkey.com/s.aspx?sm=DZR7KnHIt_2b_2fPjZtS3HcR_2fg_3d_3d

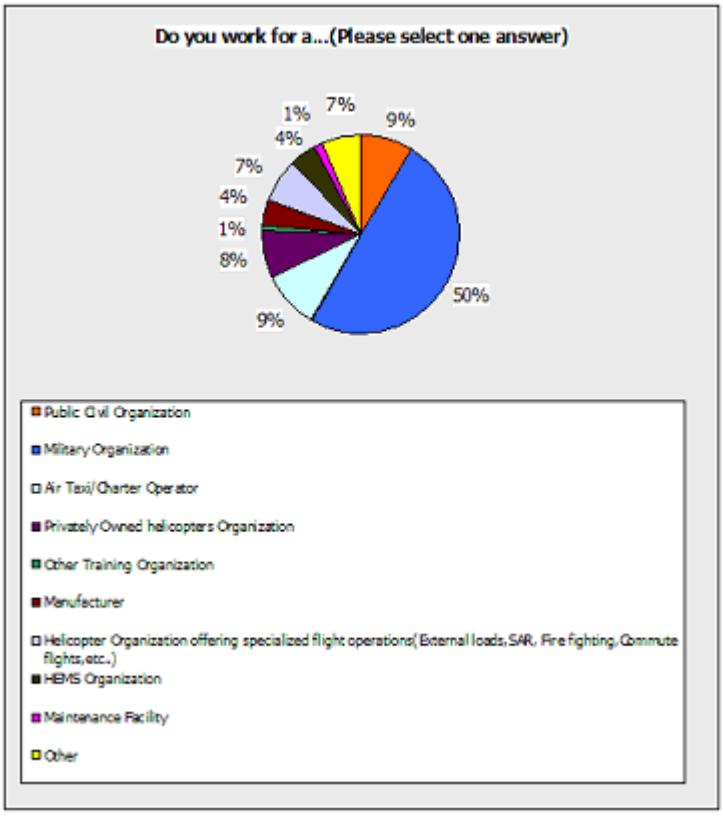
Posted on Thursday, June 04, 2009 (Archive on Monday, January 01, 0001)

As posted at www.rotor.com

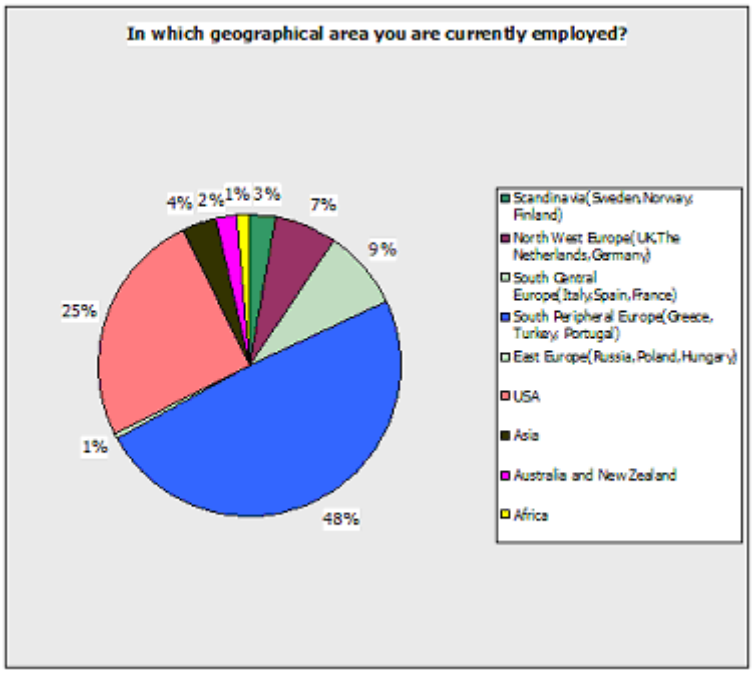
APPENDIX C

Demographics Data

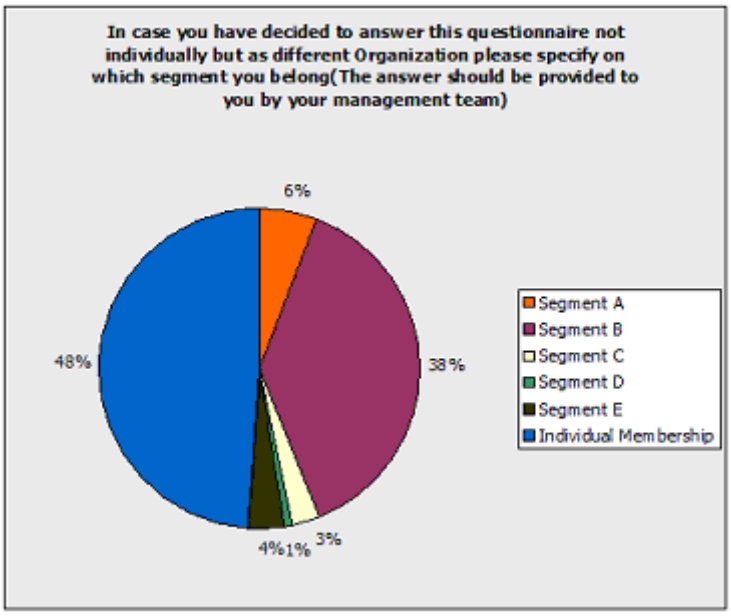
C.1



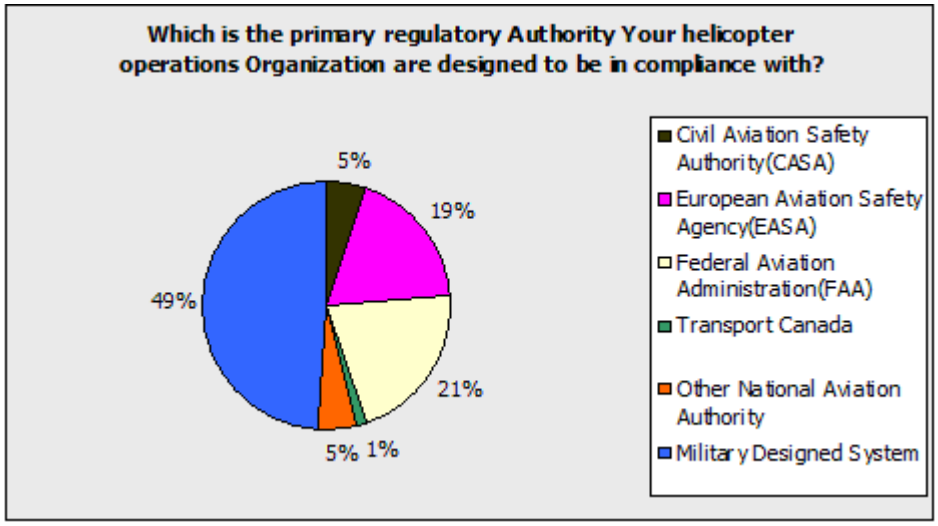
C.2


In which geographical area you are currently employed?
4%
2%
1%
3%
7%
9%
25%
1%
48%
Scandinavia(Sweden,Norway, Finland)
North West Europe(UK,The Netherlands,Germany)
South Central Europe(Italy,Spain,France)
South Peripheral Europe(Greece, Turkey, Portugal)
East Europe(Russia,Poland,Hungary)
USA
Asia
Australia and New Zealand
Africa

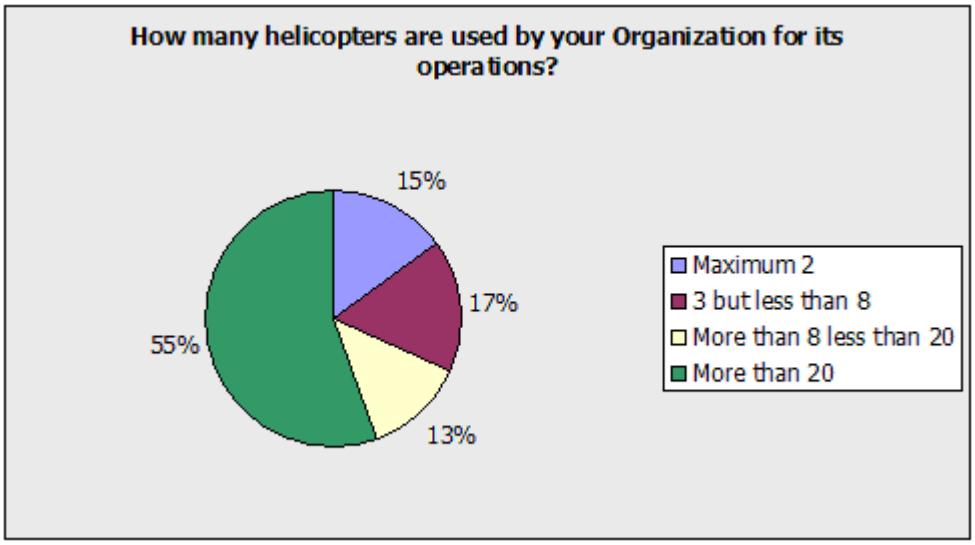
C.3


In case you have decided to answer this questionnaire not individually but as different Organization please specify on which segment you belong(The answer should be provided to you by your management team)
6%
38%
48%
4%
1%
3%
Segment A
Segment B
Segment C
Segment D
Segment E
Individual Membership

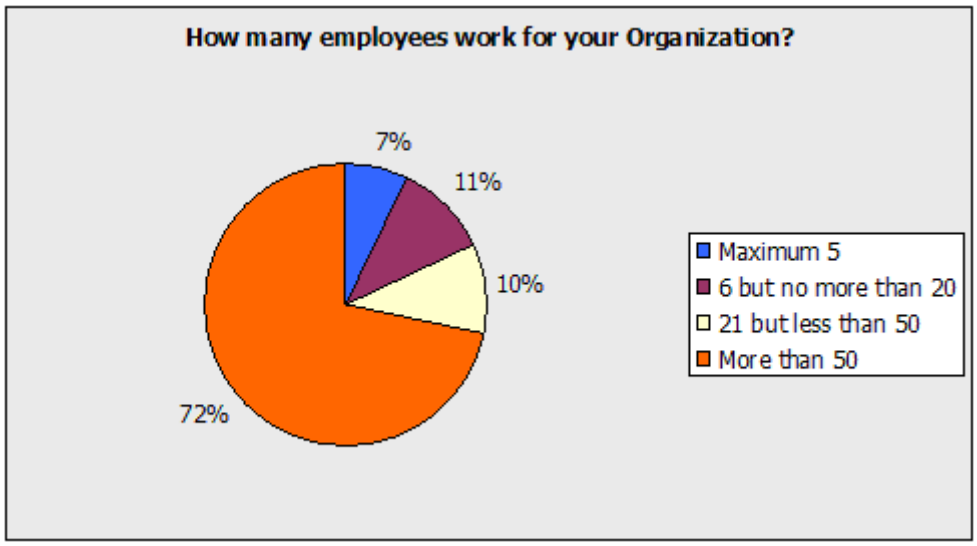
C.4


Which is the primary regulatory Authority Your helicopter operations Organization are designed to be in compliance with?
5%
19%
49%
21%
5%
1%
Civil Aviation Safety Authority(CASA)
European Aviation Safety Agency(EASA)
Federal Aviation Administration(FAA)
Transport Canada
Other National Aviation Authority
Military Designed System

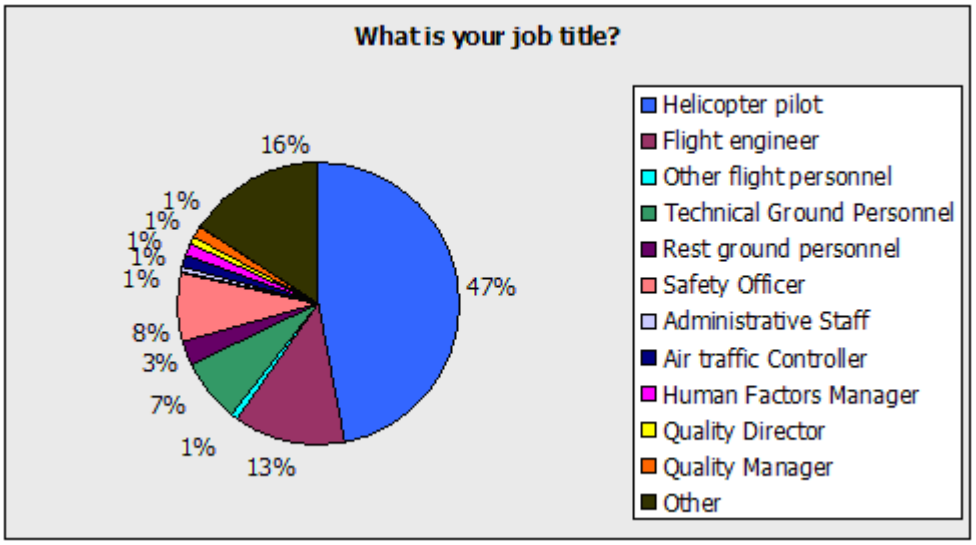
C.5


How many helicopters are used by your Organization for its operations?
15%
17%
55%
13%
Maximum 2
3 but less than 8
More than 8 less than 20
More than 20

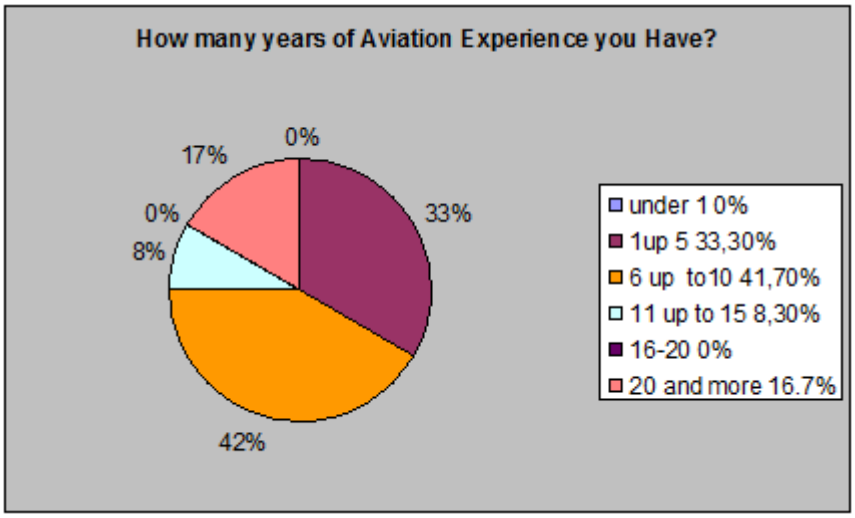
C.6


How many employees work for your Organization?
7%
11%
10%
72%
Maximum 5
6 but no more than 20
21 but less than 50
More than 50

C.7


What is your job title?
16%
1%
1%
1%
1%
1%
47%
8%
3%
7%
1%
13%
Helicopter pilot
Flight engineer
Other flight personnel
Technical Ground Personnel
Rest ground personnel
Safety Officer
Administrative Staff
Air traffic Controller
Human Factors Manager
Quality Director
Quality Manager
Other

C.8

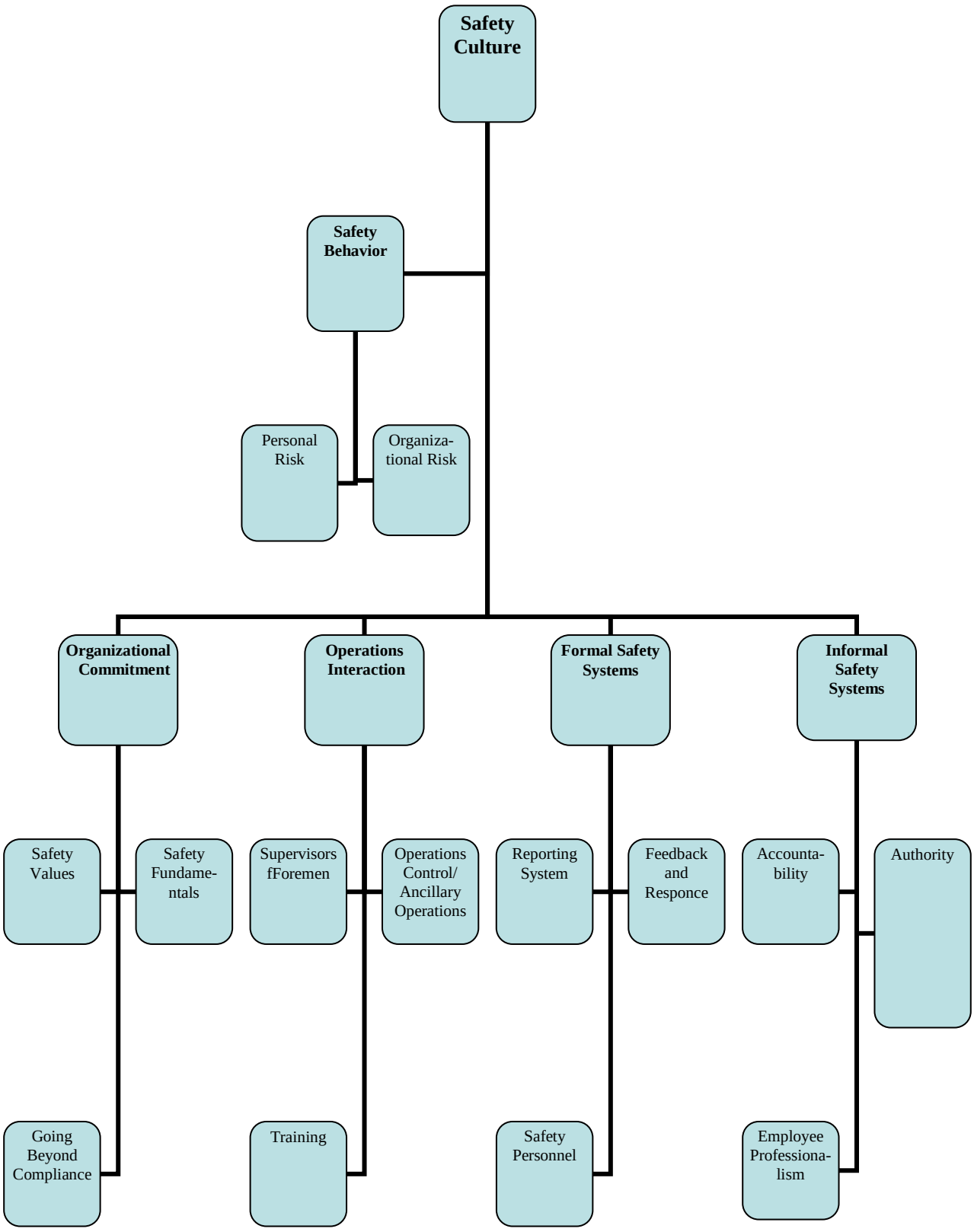

How many years of Aviation Experience you Have?
0%
17%
33%
0%
8%
42%
under 1 0%
1up 5 33,30%
6 up to10 41,70%
11 up to 15 8,30%
16-20 0%
20 and more 16.7%

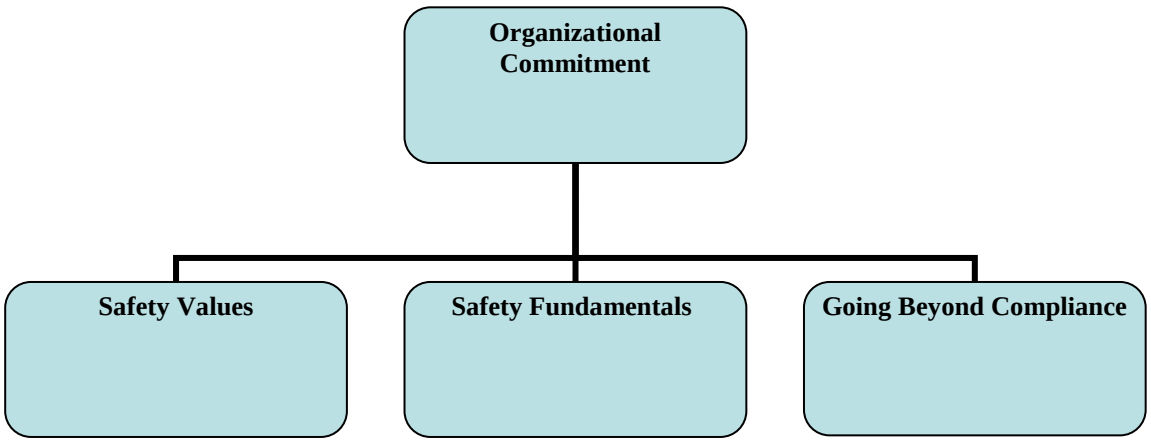
APPENDIX D

SCISMS MODEL Source:Von Thaden & Gibbons(2008)

	DEM	**OC**	**OI**	**FSS**	**ISS**	**PR**	**POR**	**OQ**	**GQ**	
	1	53A	23	13	17	10	8	57	52	
	2	53B	30	16	18	53L	11	60	56	
	3	14	44	19	20	53I	12	63		
	4	15	45	22	21	53L	53K	65		
	5	25	46	24	27	64A				
	6	26	51	31	30	64B				
	7	28	53F	32	35	64C				
	9	29	53G	34	36	64D				
		33	53H	53 E	37					
		34	53M	54	38					
		39	53O	55	40					
		41	53P		42					
		43	53Q		49					
		47			50					
		48			53C					
		58			53D					
		59			53K					
		61			64E					
		62			64F					
Total	8	19	13	11	19	8	4	4	2	88

DEM	DEMOGRAPHICS
OC	ORGANIZATIONAL COMMIMENT
OI	OPERATIONAL INTERACTION
FSS	FORMAL SAFETY SYSTEM
ISS	INFORMAL SAFETY SYSTEM
PR	PERSONAL RISK
POR	PERCEIVED ORGANIZATIONAL RISK
OQ	OPEN-ENDED QUESTIONS
GQ	GENERAL QUESTIONS


Safety Culture
Safety Behavior
Personal Risk
Organiza-tional Risk
Organizational Commitment
Operations Interaction
Formal Safety Systems
Informal Safety Systems
Safety Values
Safety Fundame-ntals
Supervisors fForemen
Operations Control/ Ancillary Operations
Reporting System
Feedback and Responce
Accounta-bility
Authority
Going Beyond Compliance
Training
Safety Personnel
Employee Professiona-lism

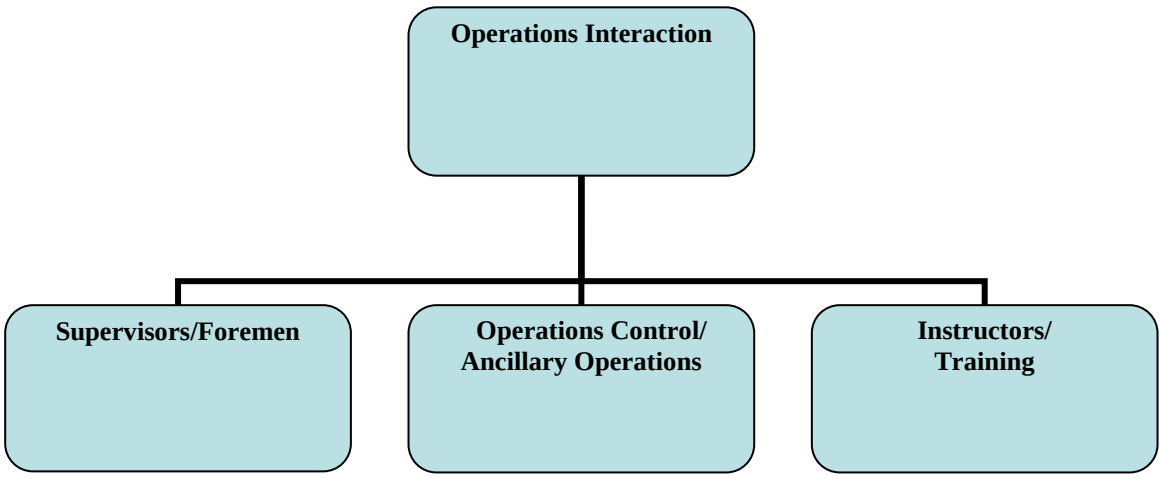


The degree to which an organization's leadership prioritizes safety in decision-making, and allocates adequate resources to safety.

Safety Values – Attitudes and values expressed (in words and actions) by upper management regarding safety.

Safety Fundamentals – Compliance with regulated aspects of safety (e.g., training requirements, manuals and procedures, and equipment maintenance), and the coordination of activity within and between teams/units.

Going Beyond Compliance – Priority given to safety in allocation of company resources (e.g., equipment, personnel time) even though not required by regulations.



Operations Interaction

The degree to which those directly involved in the supervision of employees' safety behavior are actually committed to safety and reinforce the safety values espoused by upper management (when these values are positive).

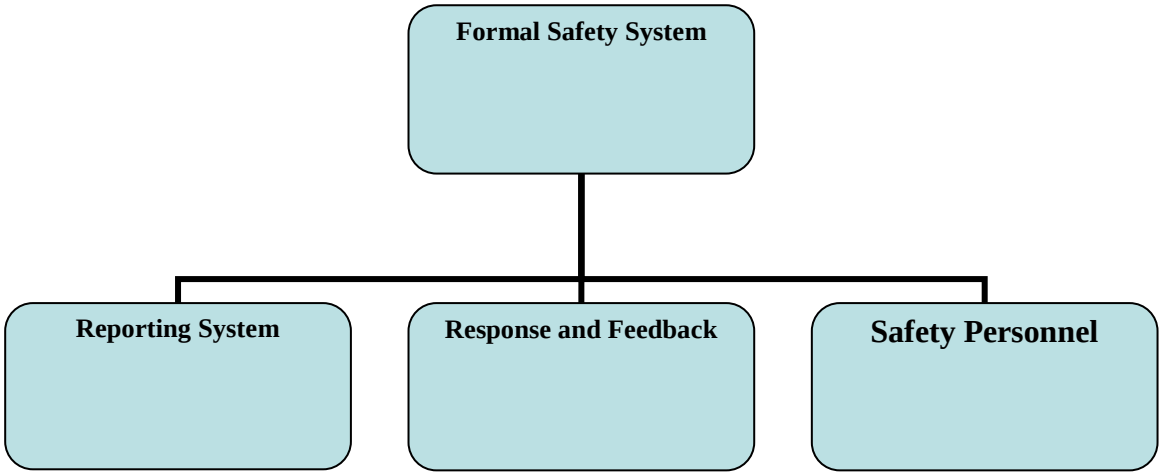
Supervisors/Foremen- Their involvement in and concern for safety on the part of supervisory and "middle" management at an organization (e.g. Chief Fleet Pilot).

Operations Control - Effectively managing, maintaining, and inspecting the safety integrity of the equipment, tools, procedures, etc. (e.g. Dispatch, Maintenance Control, Ground Operations, etc.).

Instructors/Training-Extent to which those who provide safety training are in touch with actual risks and issues

Formal Safety System

Processes for reporting and addressing both occupational and process safety hazards.

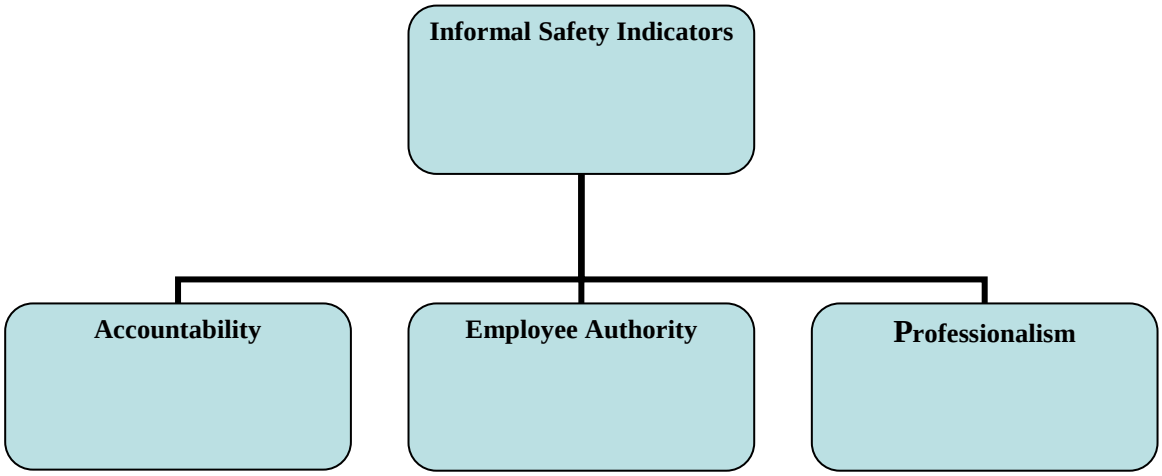


Reporting System- Accessibility, familiarity, and actual use of the organization's formal safety reporting program.

Response and Feedback- Timeliness and appropriateness of management responses to reported safety information and dissemination of safety information.

Safety Personnel- Perceived effectiveness of and respect for persons in formal safety roles (e.g., Safety Officer, Vice President of Safety).

Informal Safety System



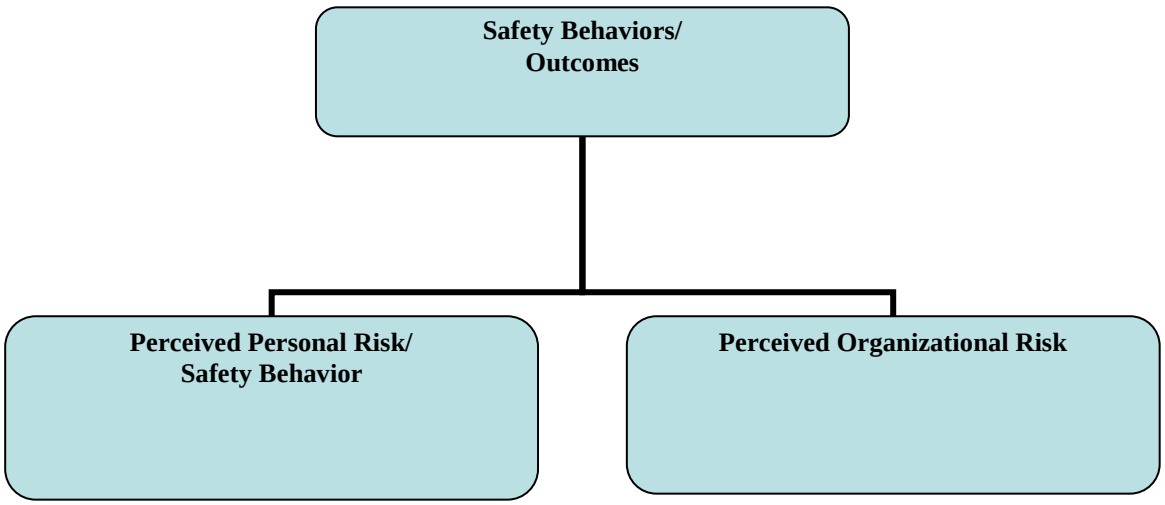
Includes unwritten rules pertaining to safety, such as rewards and punishments for safe and unsafe actions. Also includes how rewards and punishments are instituted in a just and fair manner.

Specifically, the informal safety systems include such factors as:

Accountability- The consistency and appropriateness with which employees are held accountable for unsafe behavior.

Employee Authority- Authorization and employee involvement in safety decision making.

Employee Professionalism- Peer culture employee group norms pertaining to safe and unsafe behaviour



Safety Behaviors/ Outcomes

Source: Von Thaden and Gibbons (2008, pp 11-16)

These measures reflect employees; perceptions of the state of the safety within the airline. The SCISMS contains two outcome scales: Perceived Personal Risk/ Safety Behavior and Perceived Organizational Risk

The Perceived Personal Risk scale seeks to address an employee's perceptions of the prevalence of safety –relevant behaviors

These items address the attitude for the priority of safety displayed in circumstances where speed and proficiency are necessary components of the work.

Some more minor behaviors included in the Safety Behavior scale reflect more common, and perhaps more accepted, risks, which nonetheless breach system safety, and have resulted in undesiredoutcomes.

APPENDIX E

QUESTIONS SCORING TABLE

Question 10		Question 11		Question 12		Question 13	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	5	A	5	A	4	A	5
B	4	B	4	B	3	B	4
C	3	C	3	C	2	C	3
D	2	D	2	D	1	D	2
E	1	E	1	E	5	E	1

Question 14		Question 15		Question 16		Question 17	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	1	1 Safety answered first	5	A	1	A	1
B	2	2 Safety	4	B	3	B	2
C	3	3 Safety	3	C	5	C	5
D	4	4 Safety	2	D	2		
E	5	5 Safety	1	E	4		
				F	0		

Question 18		Question 19		Question 20		Question 21	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	2	A	5	A	5	A	5
B	1	B	4	B	4	B	4
C	3	C	1	C	3	C	3
D	4	D	2	D	2	D	2
E	5	E	3	E	1	E	1

Question 22		Question 23		Question 24		Question 25	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	2	A	5	A	5	A	5
B	1	B	1	B	2	B	4
C	5	C	2	C	1	C	3
				D	3	D	2
				E	4	E	1

Question 26		Question 27		Question 28		Question 29	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	5	A	1	A	1	A	1
B	1	B	2	B	2	B	2
C	2	C	3	C	3	C	3
D	4	D	4	D	4	D	4
E	3	E	5	E	5	E	5

Question 30		Question 31		Question 32		Question 33	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	5	A	2	A	1	A	2
B	4	B	1	B	2	B	1
C	3	C	3	C	3	C	4
D	2	D	4	D	4	D	5
E	1	E	5	E	5	E	3

Question 34		Question 35		Question 36		Question 37	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	1	A	5	A	1	A	1
B	2	B	1	B	2	B	2
C	3	C	2	C	3	C	3
D	4			D	4	D	4
E	5			E	5	E	5

Question 38		Question 39		Question 40		Question 41	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	3	A	5	A	4	A	0
B	1	B	4	B	2	B	1
C	2	C	3	C	1	C	2
D	5	D	2	D	3	D	4
E	4	E	1	E	5	E	5
						F	3

Question 42		Question 43		Question 44		Question 45	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	4	A	4	A	1	A	1
B	2	B	5	B	5	B	2
C	1	C	3	C	2	C	3
D	3	D	2			D	4
E	5	E	1			E	5

Question 46		Question 47		Question 48		Question 49	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	1	A	5	A	4	A	2
B	2	B	1	B	1	B	1
C	3	C	2	C	2	C	4
D	4			D	3	D	5
E	5			E	5	E	0
						F	3

Question 50		Question 51		Question 53		Question 54	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	1	A	1	A	5	A	5
B	3	B	0	B	4	B	1
C	4	C	3	C	3	C	2
D	5	D	4	D	2		
E	2	E	5	E	1		
		F	2				

Question 55		Question 58		Question 59		Question 61	
Answer	Score	Answer	Score	Answer	Score	Answer	Score
A	1	Either of A, B	5	Either of A, B, C	5	A	5
B	4	C	4	D	4	B	1
Either of C, D, E, F	5	Either of D, E, F	5	Either of E, F, G	5	C	2
G	2	G	4	H	4		
		Either of H, I, J	5	Either of I, J, K, L	5		
		K	1				

Question 62		Question 64	
Answer	Score	Answer	Score
A	5	A	1
B	1	B	2
C	2	C	3
		D	4
		E	5

APPENDIX F

ABBREVIATIONS

OC	**Organizational Commitment**
OI	**Operational Interaction**
FSS	**Formal Safety System**
ISS	**Informal Safety System**
PR	**Personal Risk**
POR	**Perceived Organizational Risk**
TS	**Total Score**
SB	**SB=PR/Safety Behaviour+POR**

Statistical Portrays of Researched Samples

F.1 Statistical Portray of Aggregate

Figure 1.1: Aggregate "Safety Culture Mean Score"

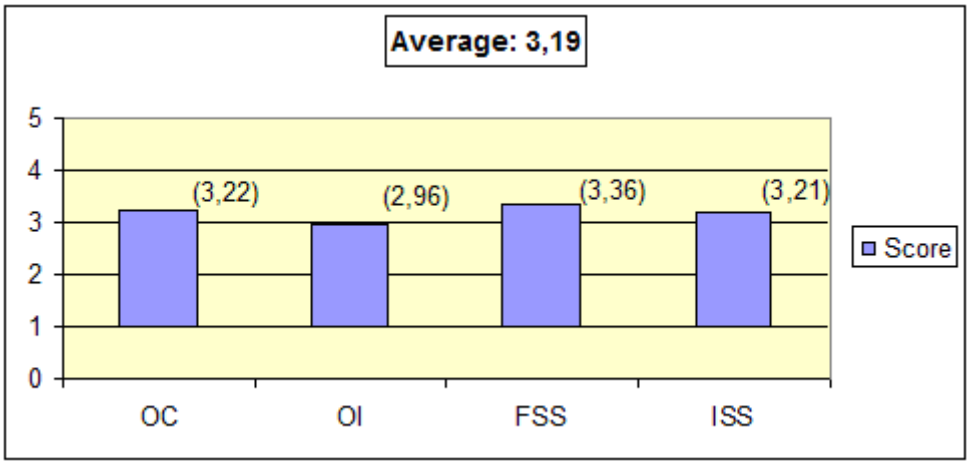


Figure 1.2: Aggregate "OC Distribution"

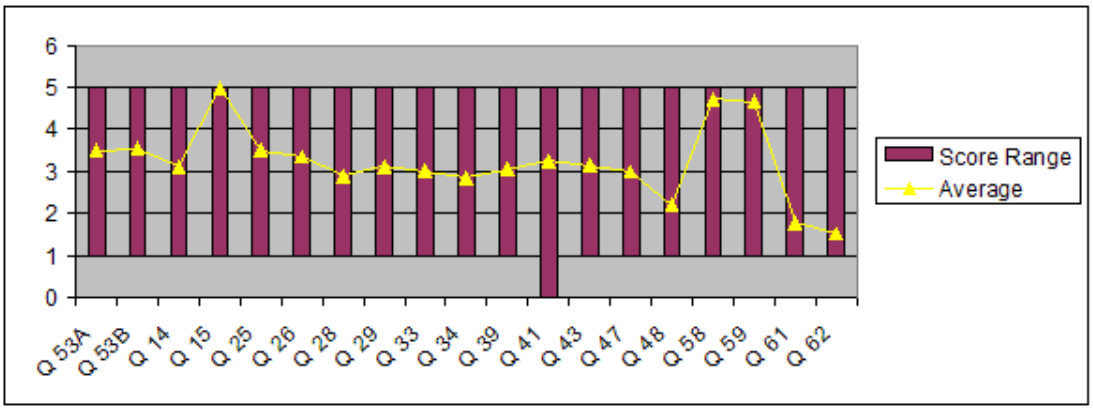


Figure 1.3: Aggregate "OI Distribution"

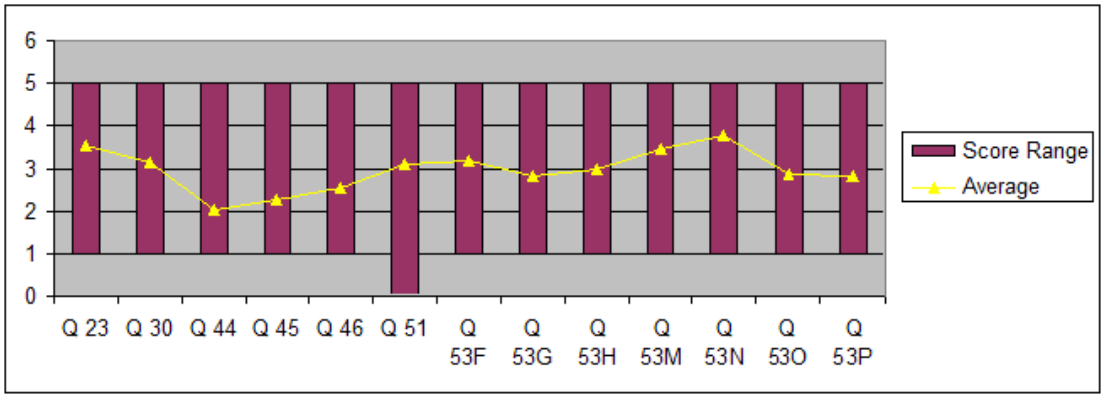


Figure 1.4: Aggregate "FSS Distribution"

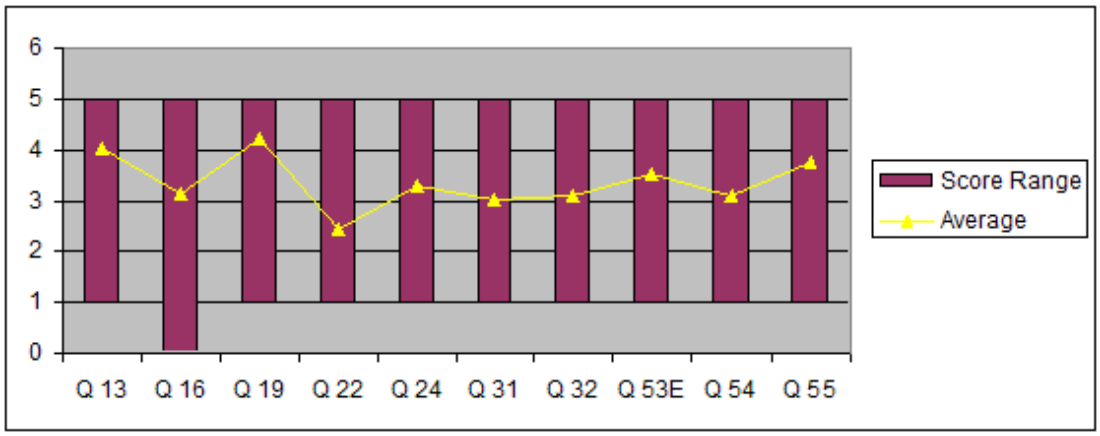


Figure 1.5: Aggregate "ISS Distribution"

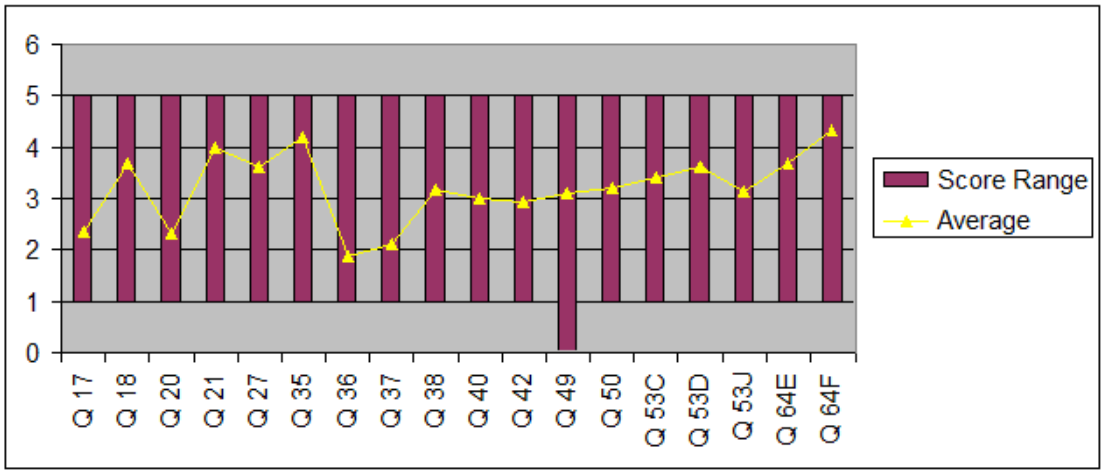


Figure 1.6: Aggregate "PR Distribution"

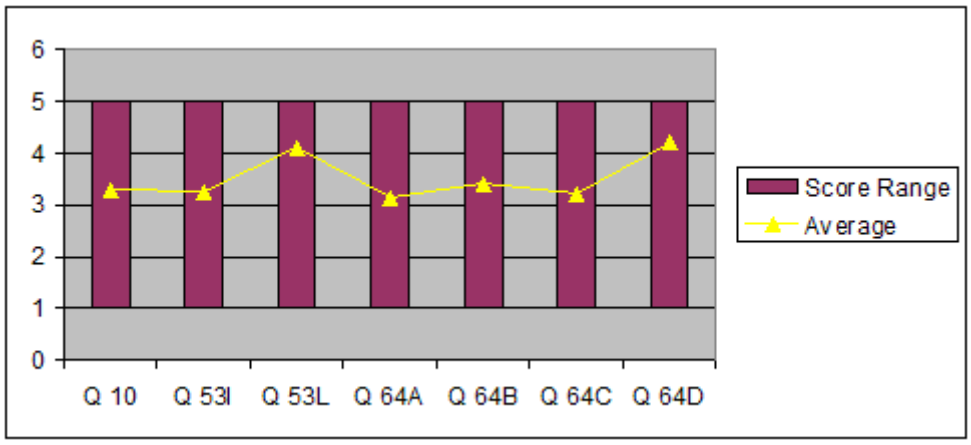


Figure 1.7: Aggregate "POR Distribution"

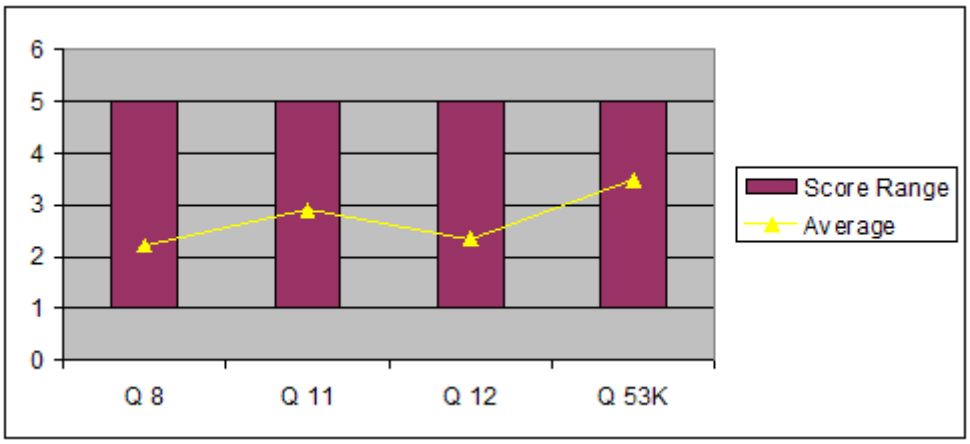
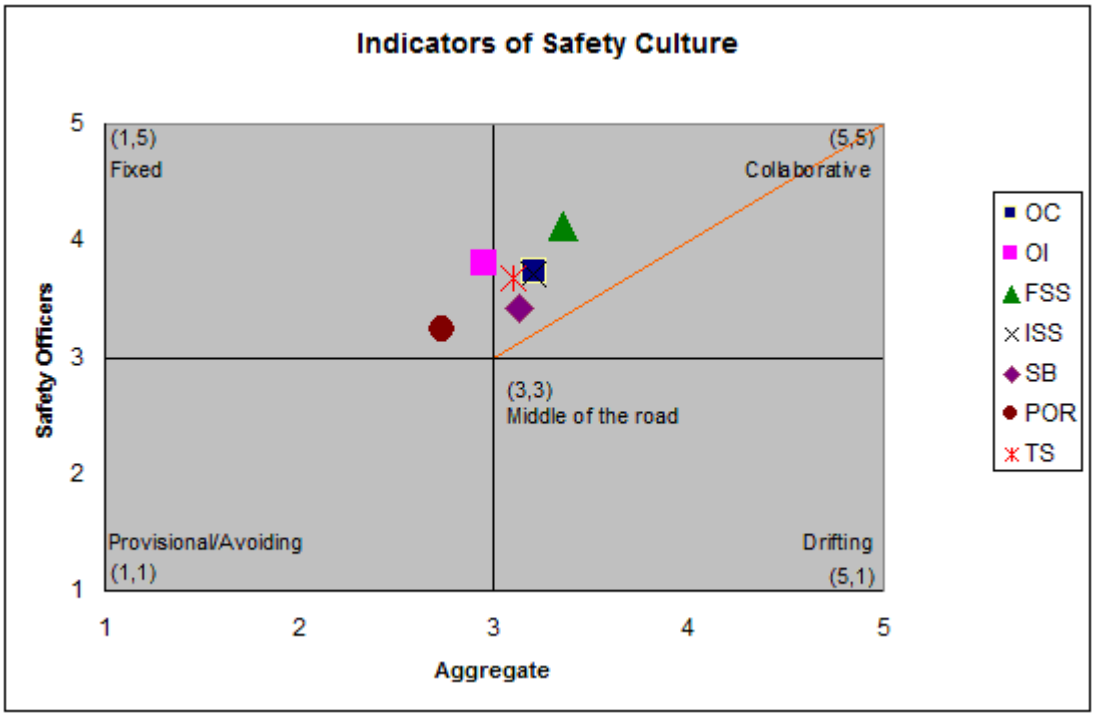


Figure 1.8: Grid



F.2 Statistical Portray of Safety Officers

Figure 2.1: Safety Officers "Safety Culture Mean Score"

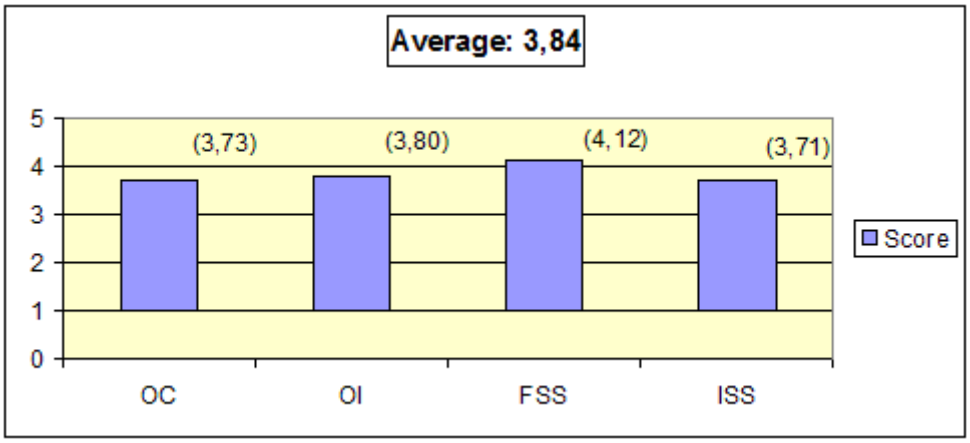


Figure 2.2: Safety Officers "OC Distribution"

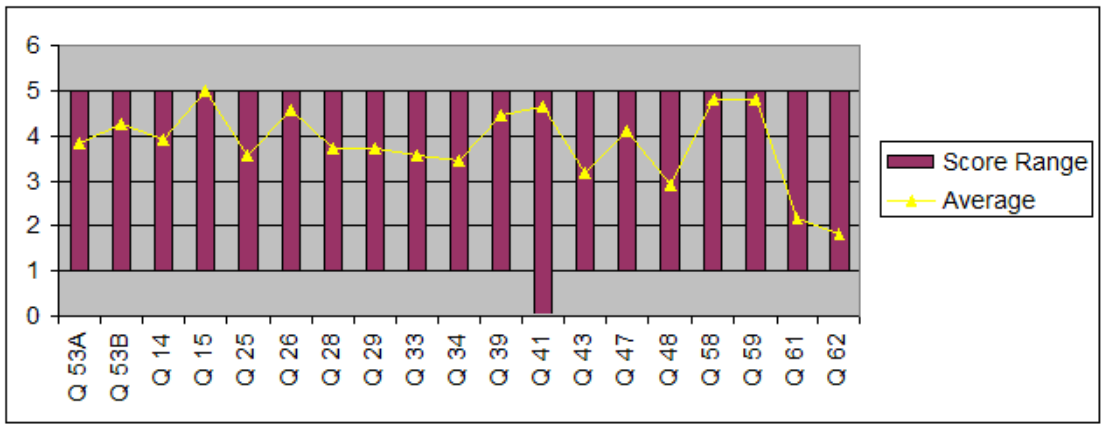


Figure 2.3: Safety Officers "OI Distribution"

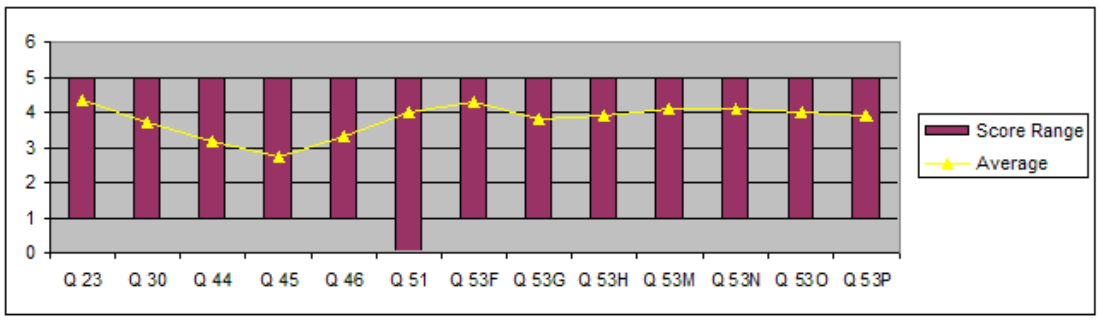


Figure 2.4: Safety Officers "FSS Distribution"

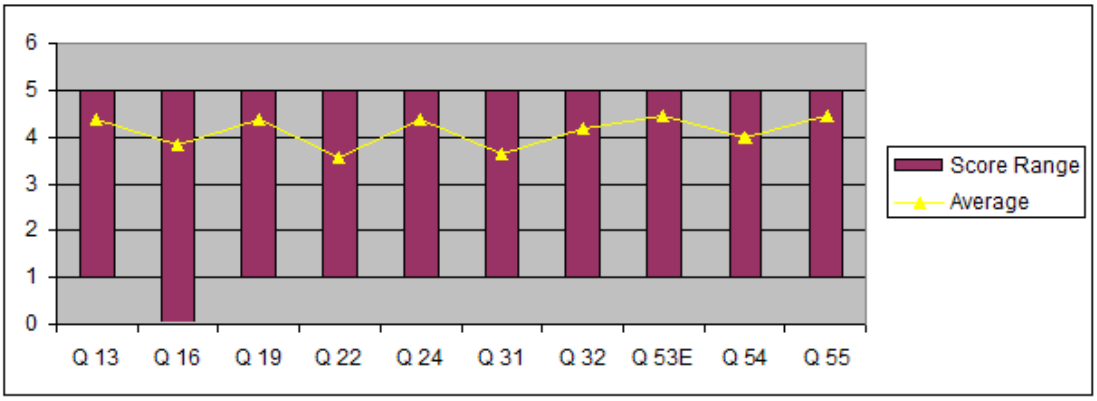


Figure 2.5: Safety Officers "ISS Distribution"

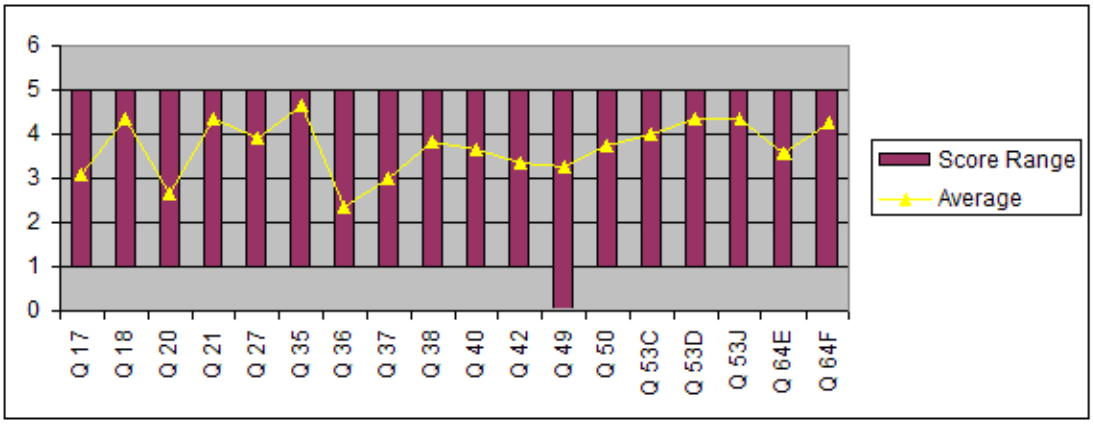


Figure 2.6: Safety Officers "PR Distribution"

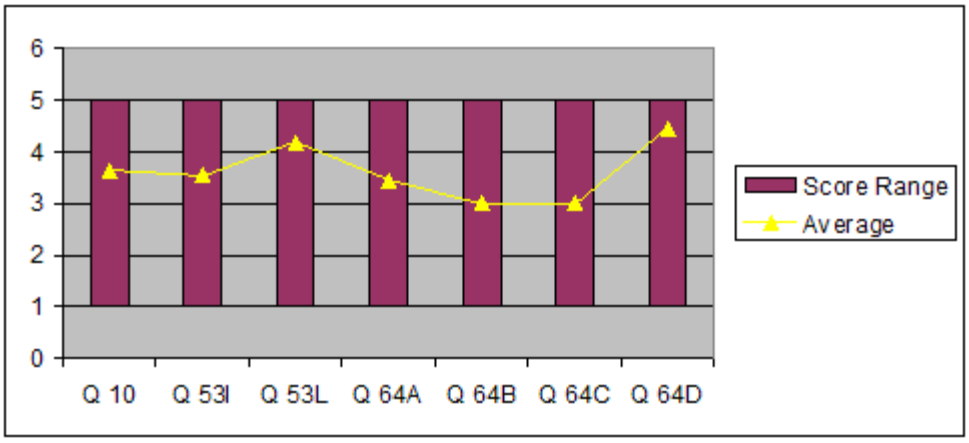
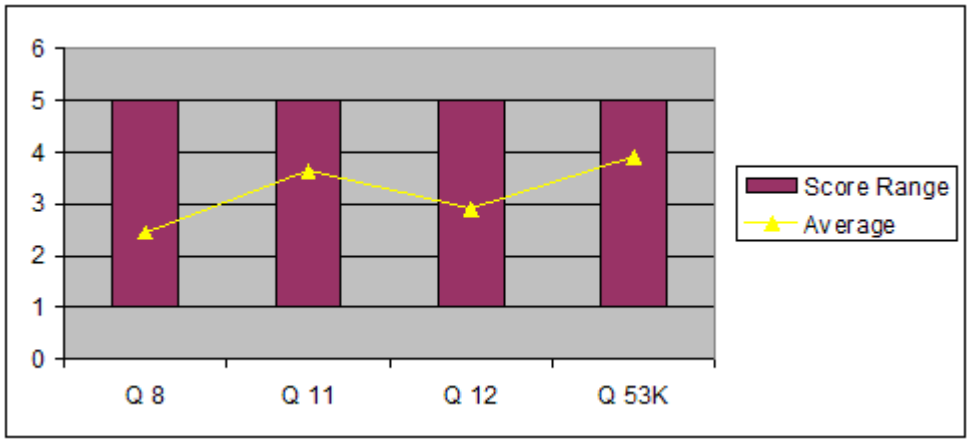


Figure 2.7: Safety Officers "POR Distribution"



F.3 Statistical Portray of Helicopter Pilots minus Pilots of Segment B

Figure 3.1: Helicopter Pilots minus Pilots of Segment B "Safety Culture Mean Score"

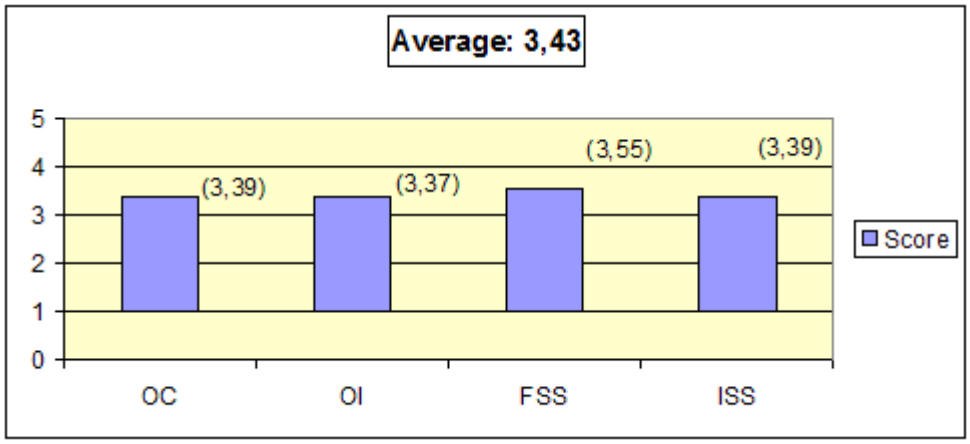


Figure 3.2: Helicopter Pilots minus Pilots of Segment B "OC Distribution"

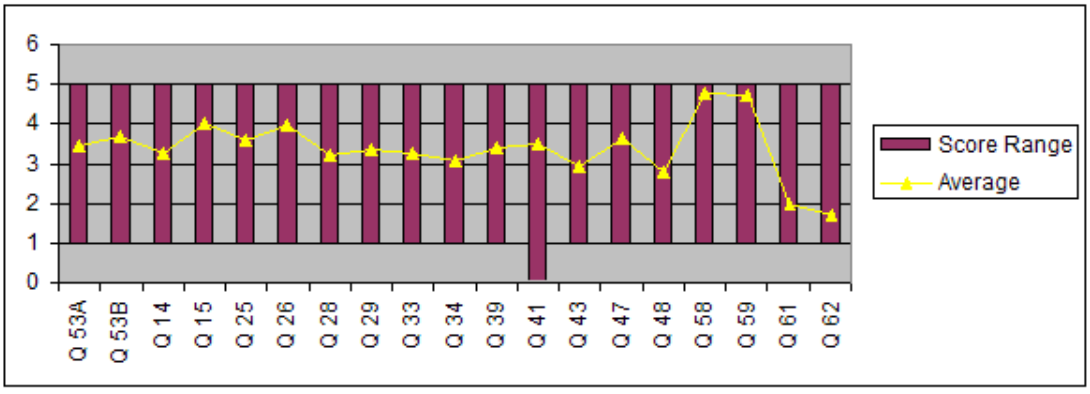


Figure 3.3: Helicopter Pilots minus Pilots of Segment B "OI Distribution"

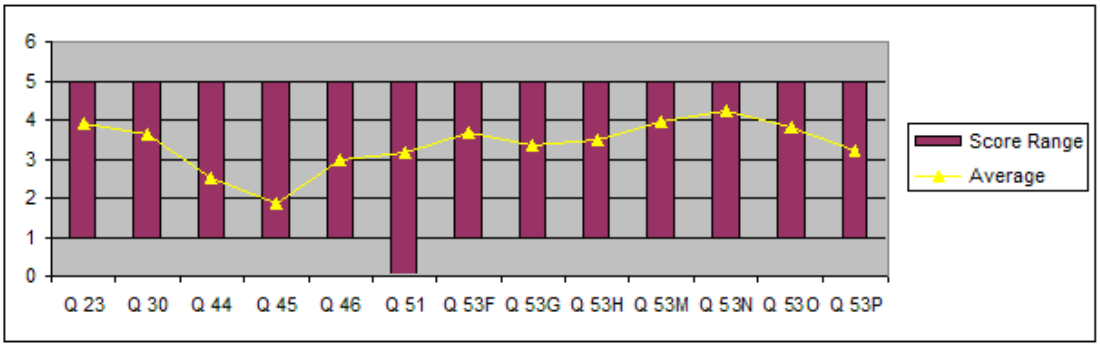


Figure 3.4: Helicopter Pilots minus Pilots of Segment B "FSS Distribution"

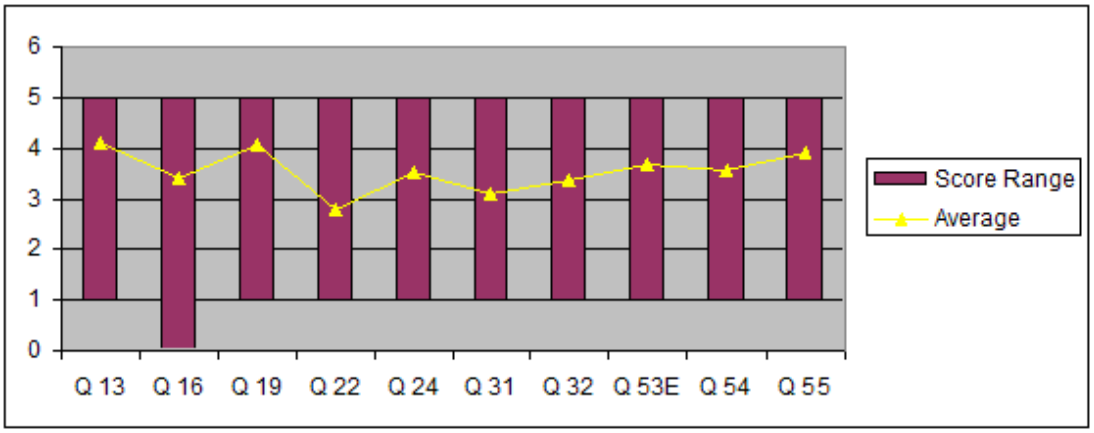


Figure 3.5: Helicopter Pilots minus Pilots of Segment B "ISS Distribution"

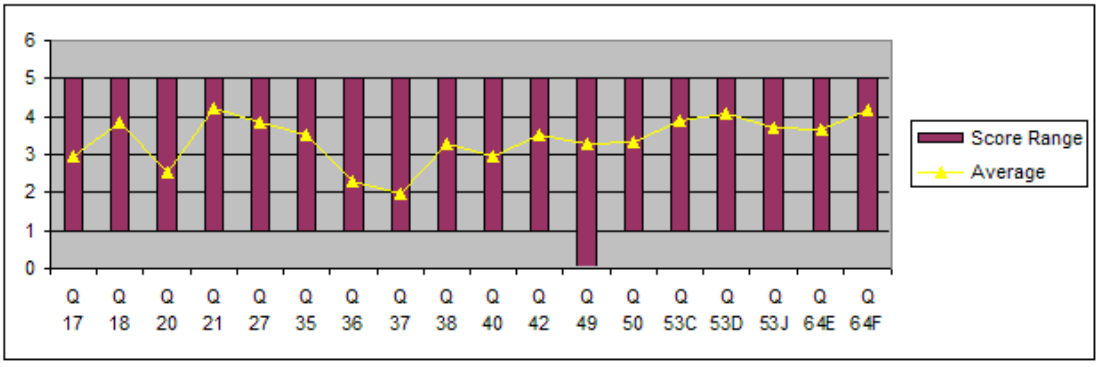


Figure 3.6: Helicopter Pilots minus Pilots of Segment B "PR Distribution"

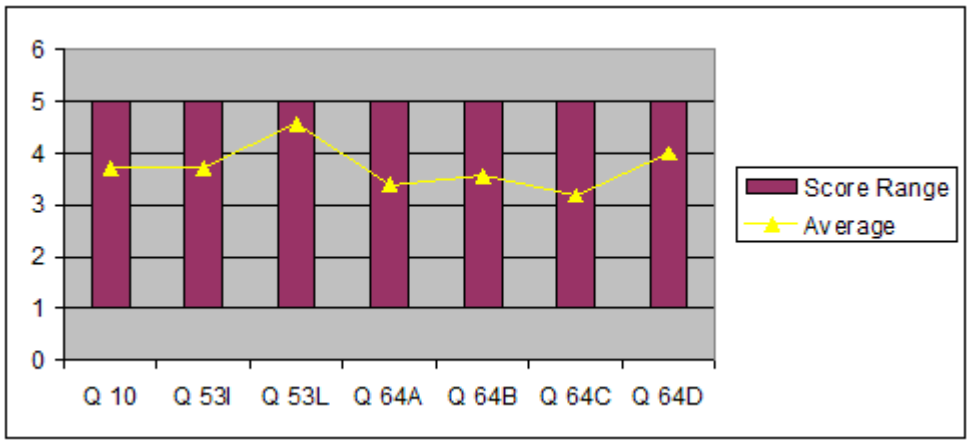


Figure 3.7: Helicopter Pilots minus Pilots of Segment B "POR Distribution"

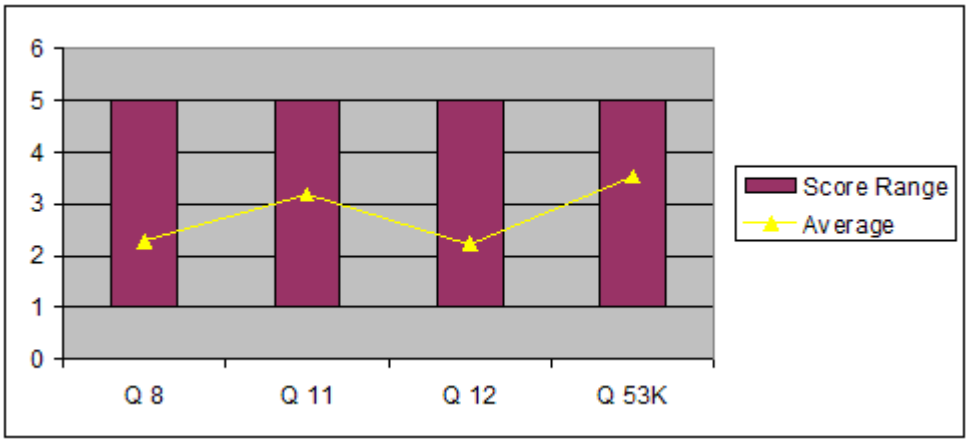
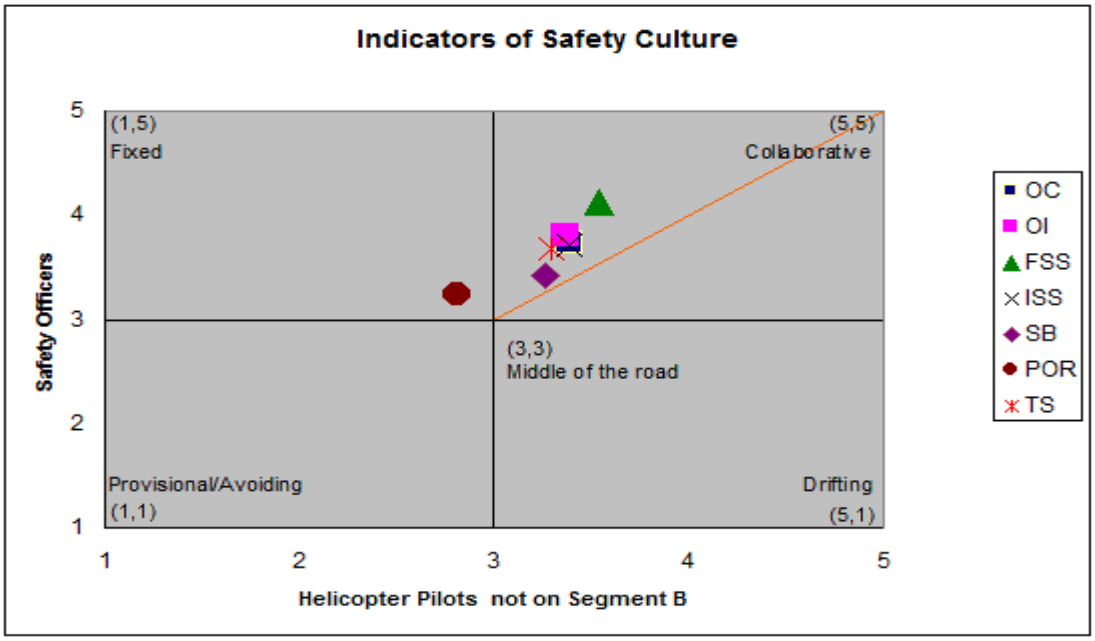


Figure 3.8: Grid



F.4 Statistical Portray of Helicopter Pilots of Segment B

Figure 4.1: Helicopter Pilots of Segment B "Safety Culture Mean Score"

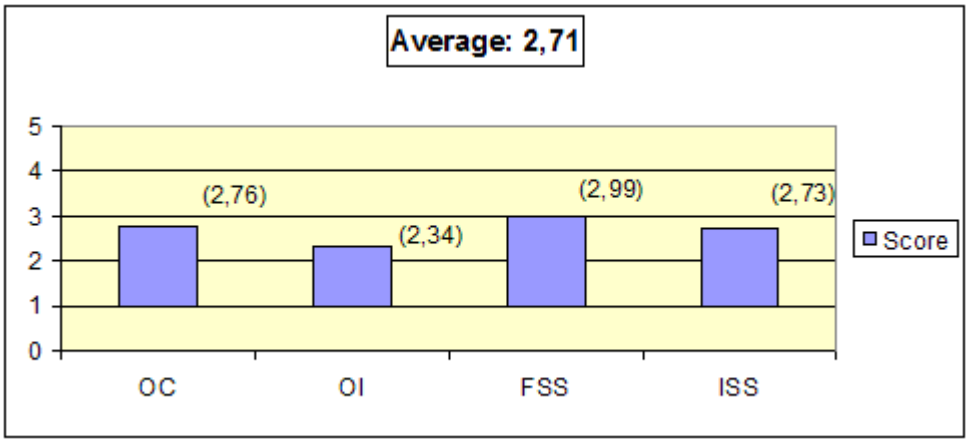


Figure 4.2: Helicopter Pilots of Segment B "OC Distribution"

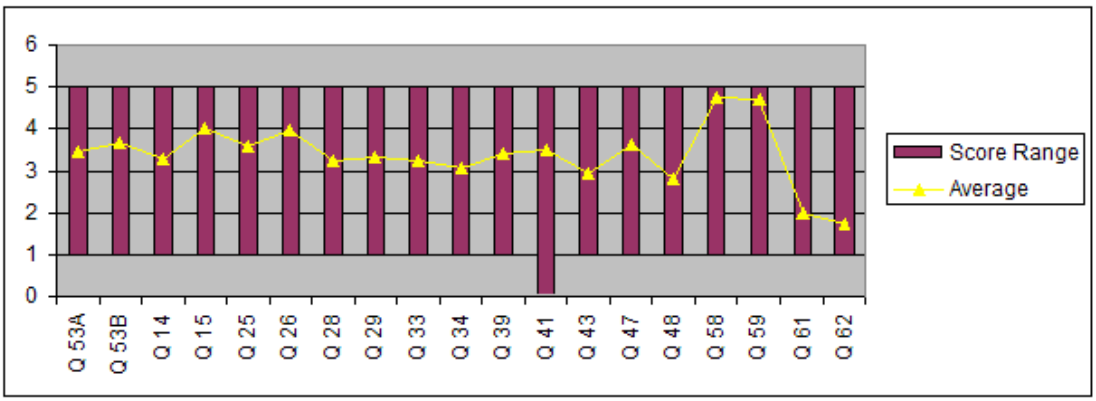


Figure 4.3: Helicopter Pilots of Segment B "OI Distribution"

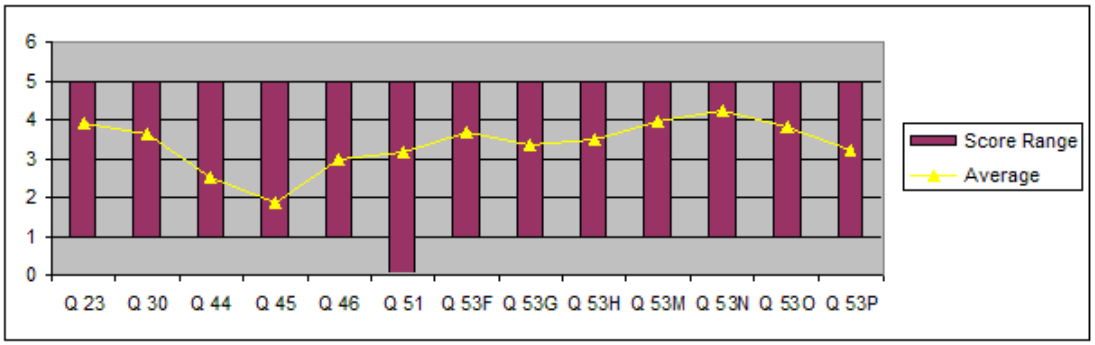


Figure 4.4: Helicopter Pilots of Segment B "FSS Distribution"

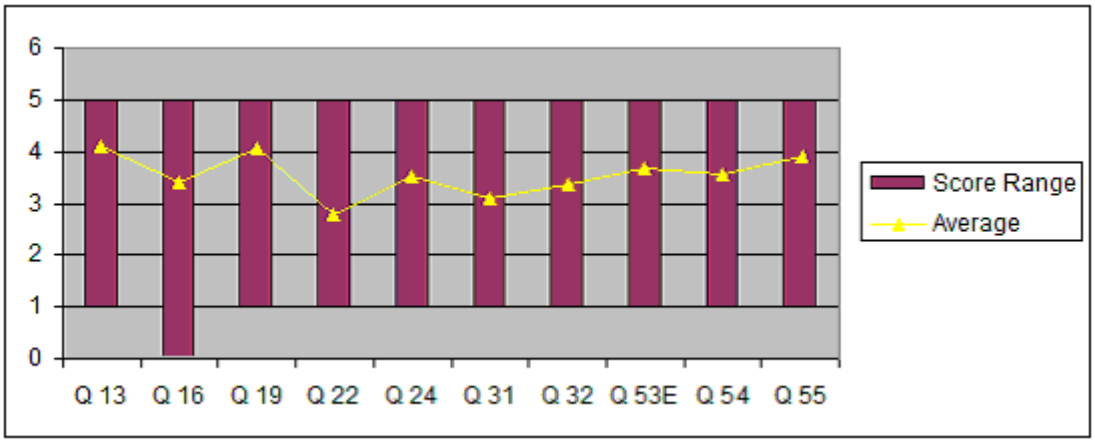


Figure 4.5: Helicopter Pilots of Segment B "ISS Distribution"

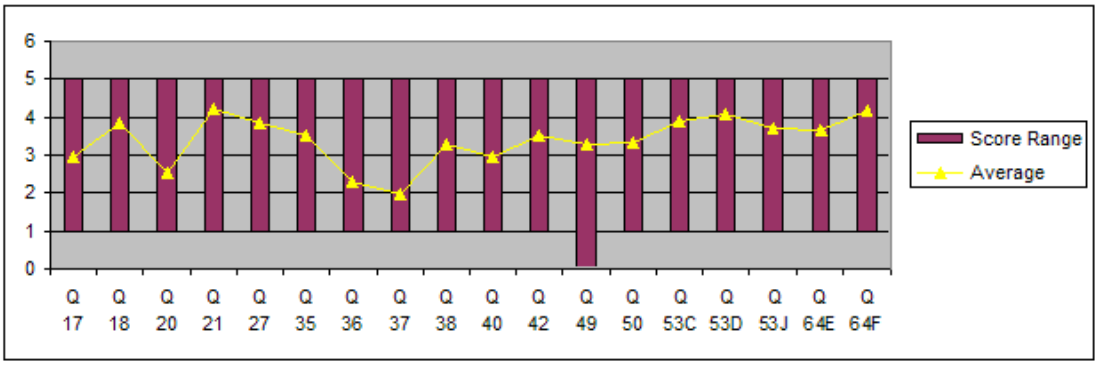


Figure 4.6: Helicopter Pilots of Segment B "PR Distribution"

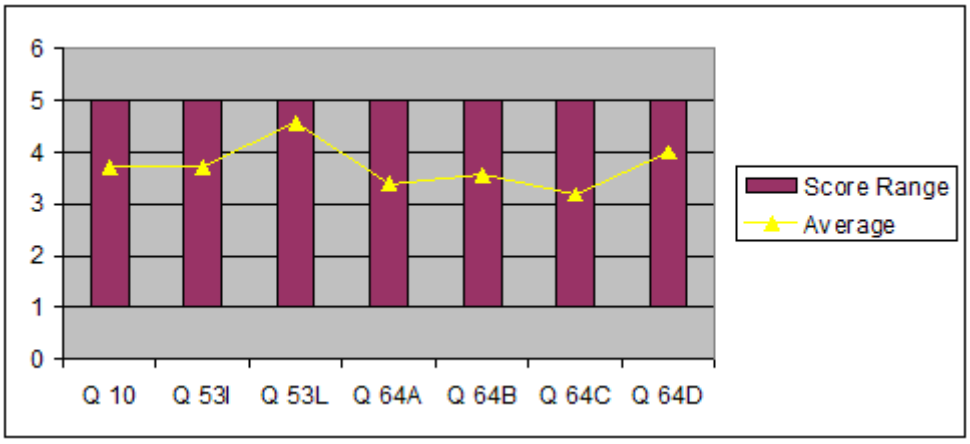


Figure 4.7: Helicopter Pilots of Segment B "POR Distribution"

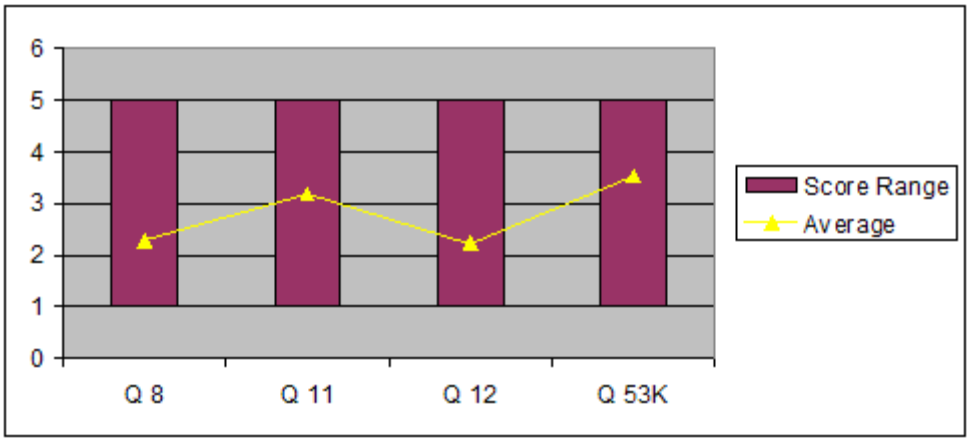
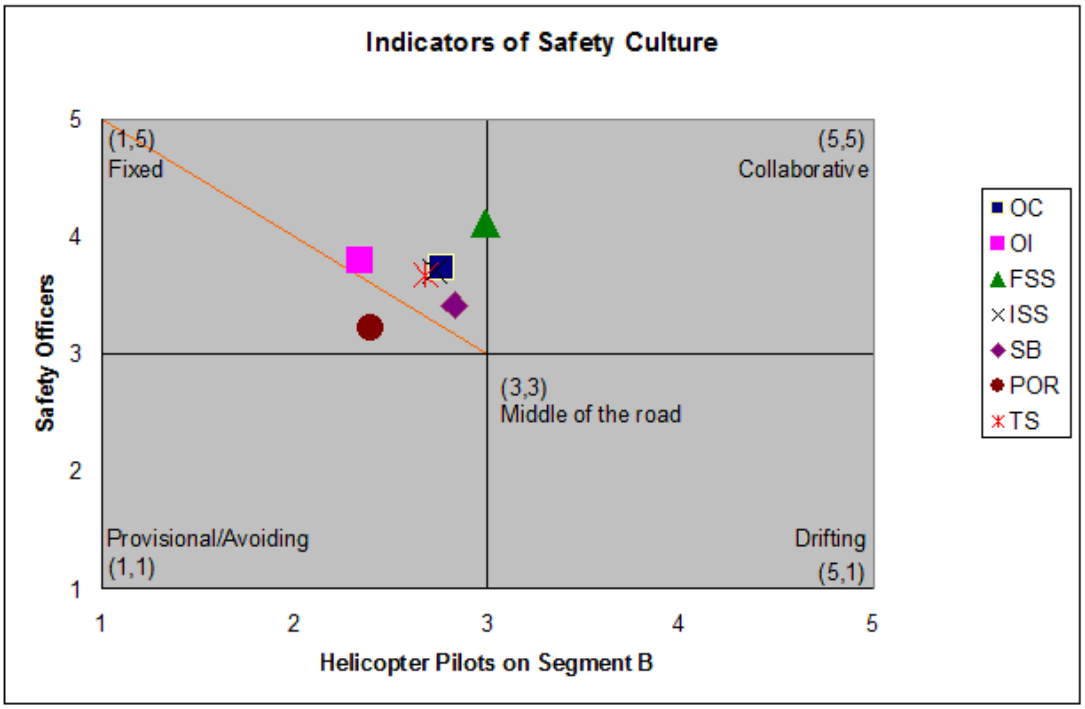


Figure 4.8: Grid



F.5 Statistical Portray of Flight Engineers

Figure 5.1: Flight Engineers "Safety Culture Mean Score"

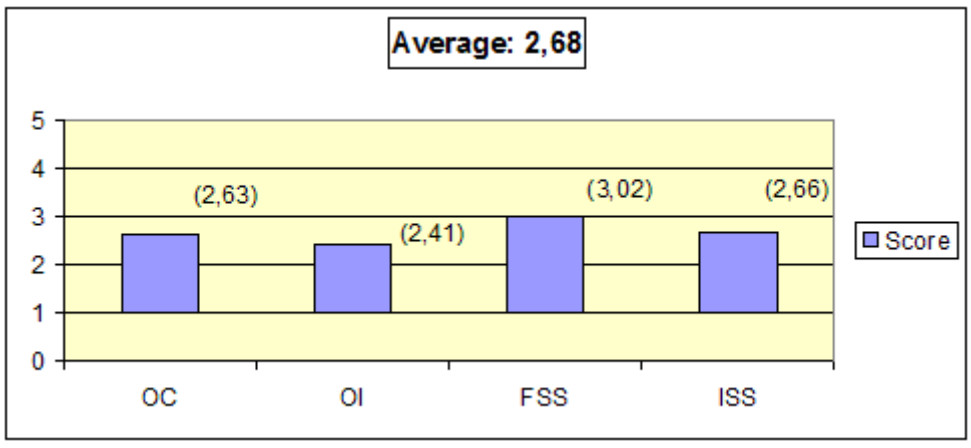


Figure 5.2: Flight Engineers "OC Distribution"

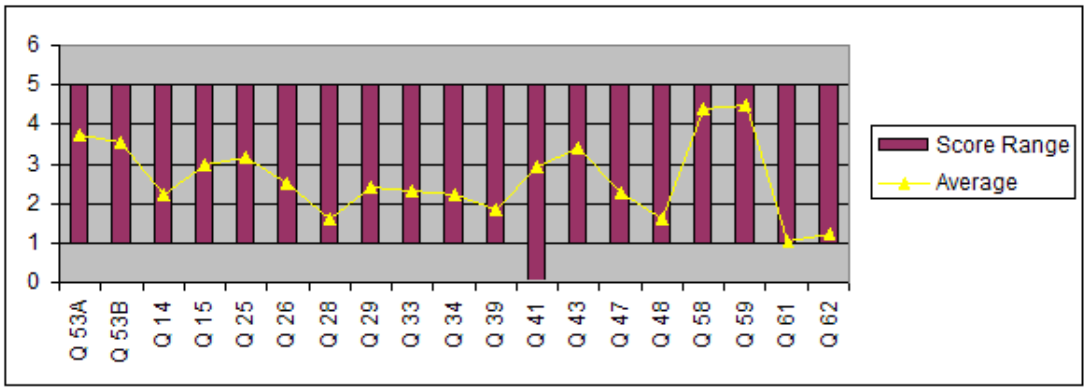


Figure 5.3: Flight Engineers "OI Distribution"

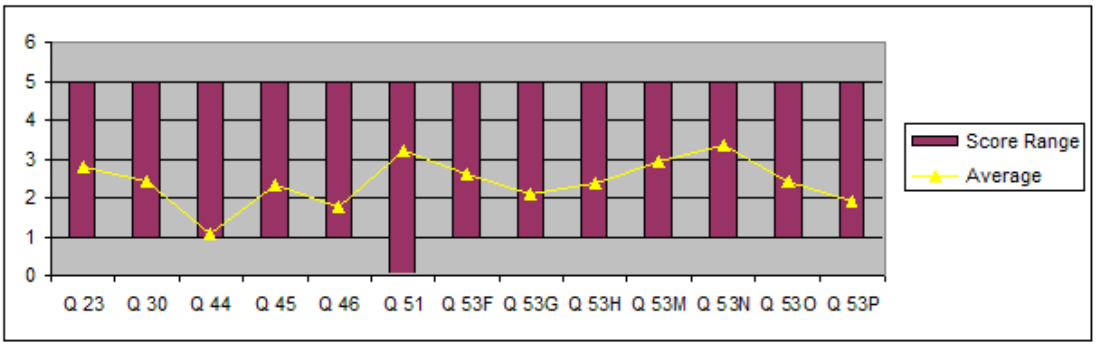


Figure 5.4: Flight Engineers "FSS Distribution"

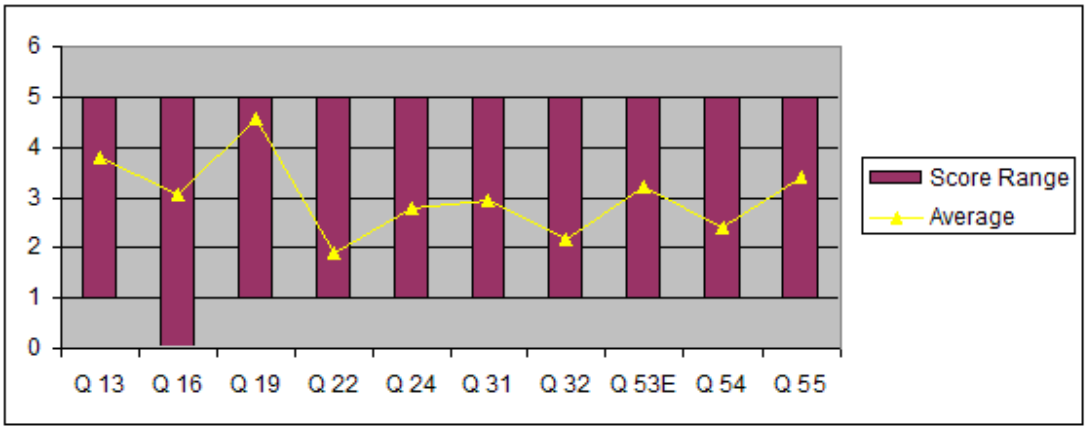


Figure 5.5: Flight Engineers "ISS Distribution"

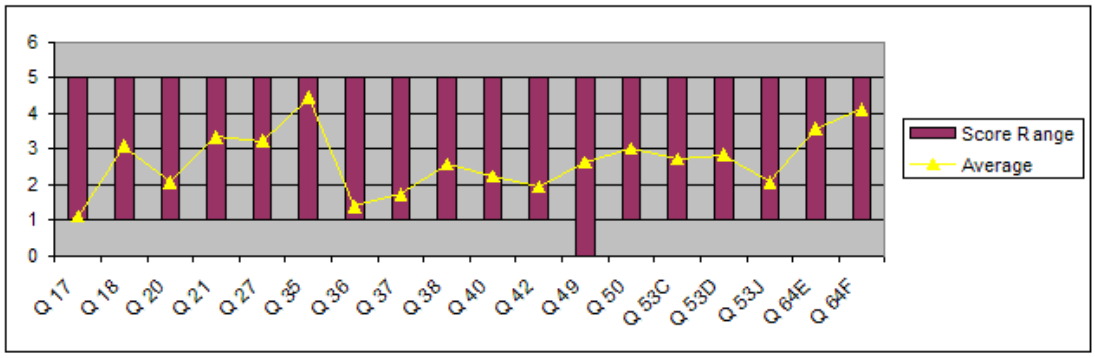


Figure 5.6: Flight Engineers "PR Distribution"

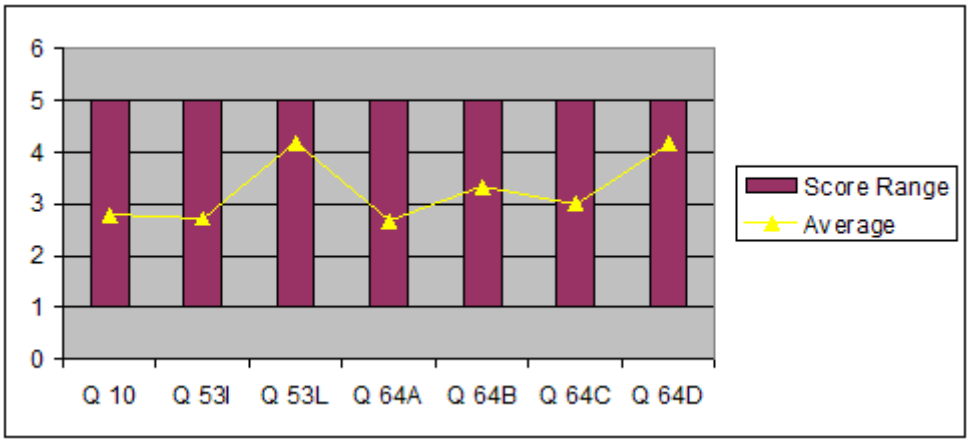


Figure 5.7: Flight Engineers "POR Distribution"

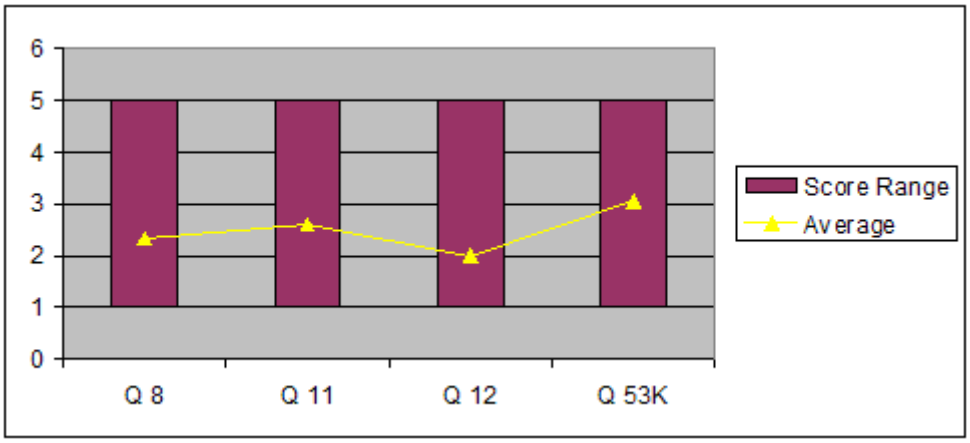
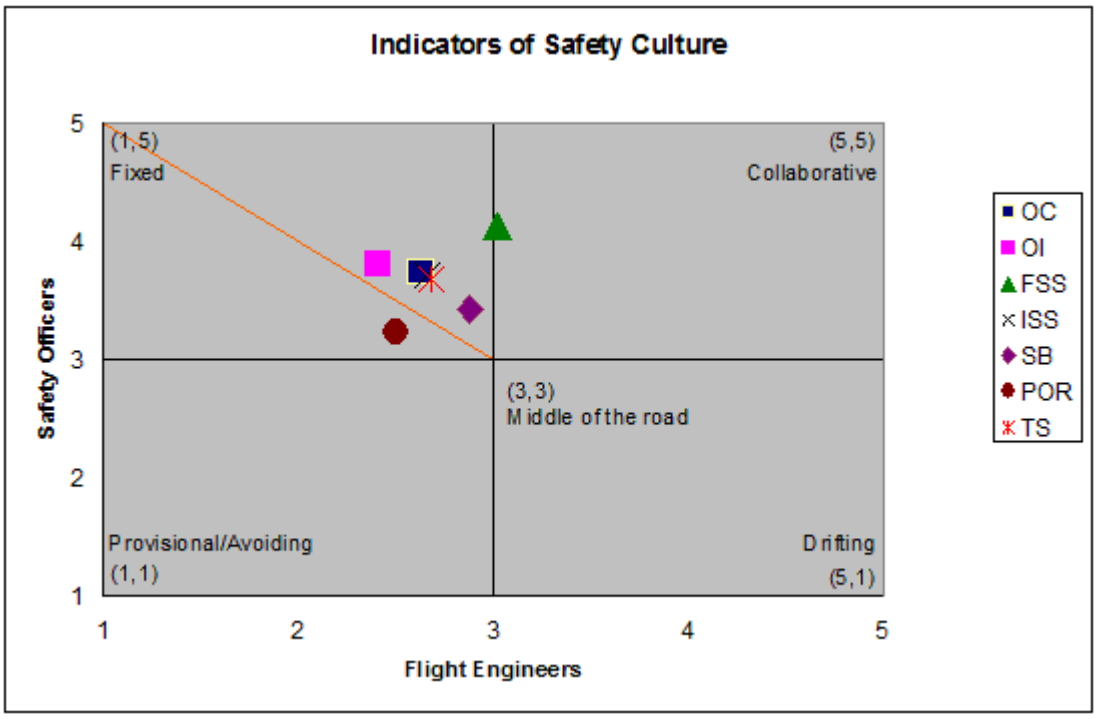


Figure 5.8: Grid



F.6 Statistical Portray of Segment B

Figure 6.1: Segment B "Safety Culture Mean Score"

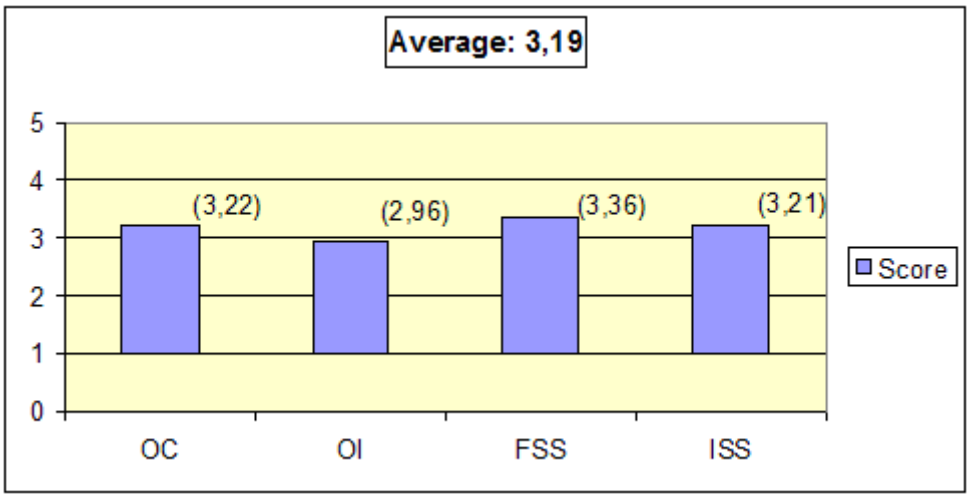


Figure 6.2: Segment B "OC Distribution"

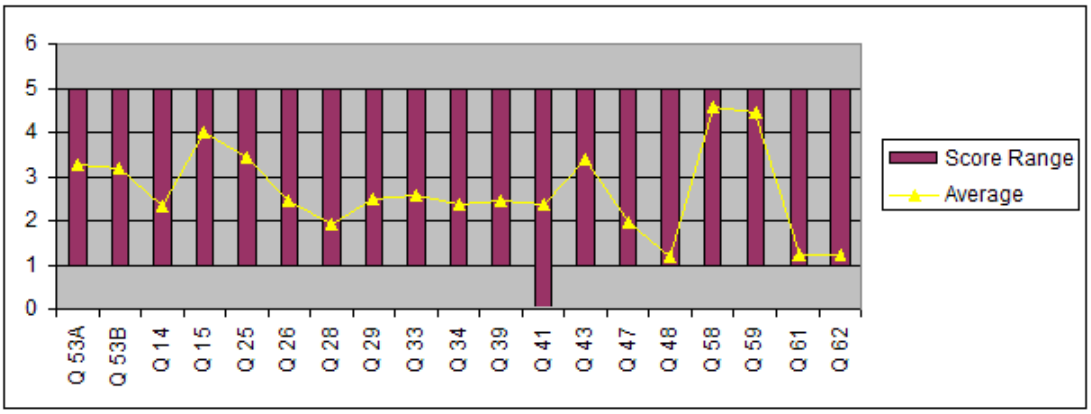


Figure 6.3: Segment B "OI Distribution"

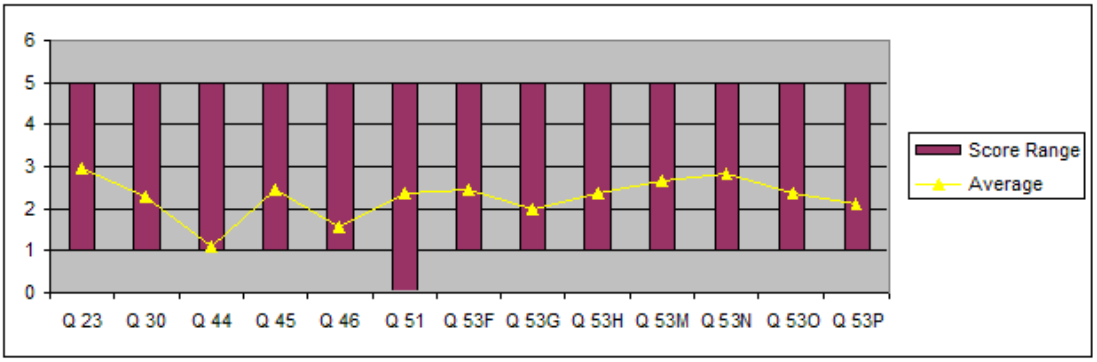


Figure 6.4: Segment B "FSS Distribution"

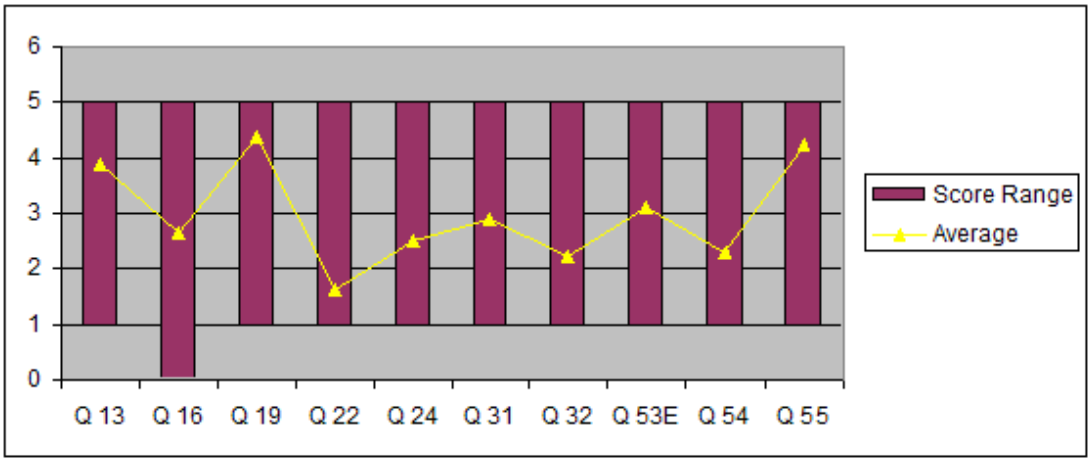


Figure 6.5: Segment B "ISS Distribution"

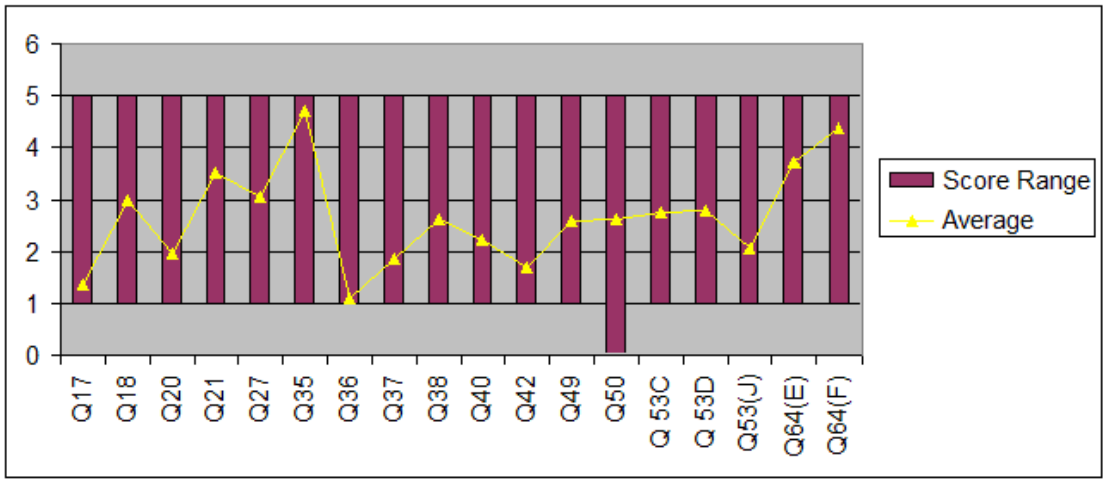


Figure 6.6: Segment B "PR Distribution"

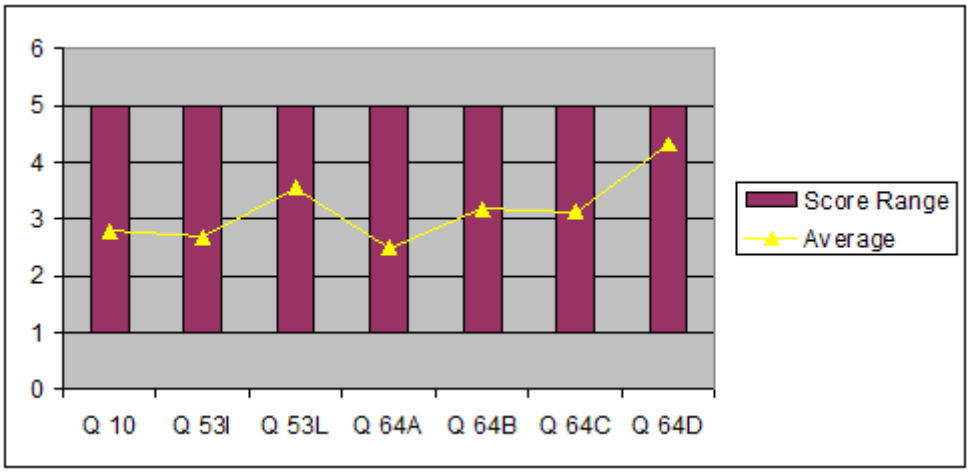


Figure 6.7: Segment B "POR Distribution"

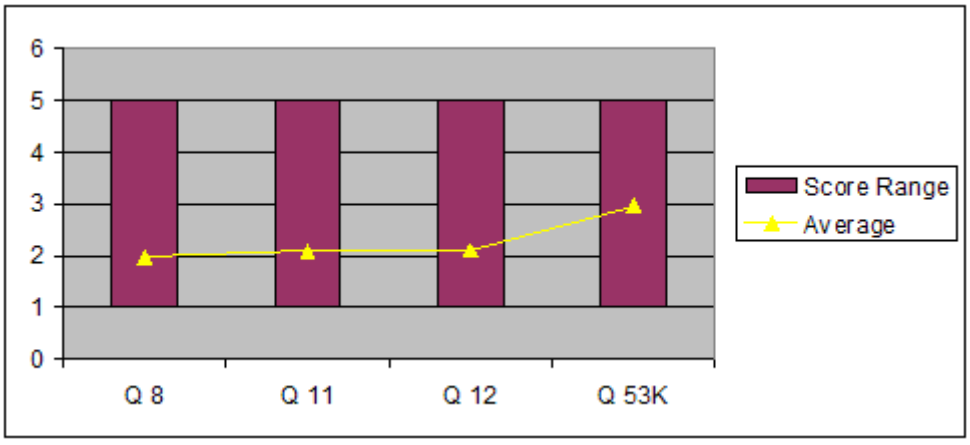
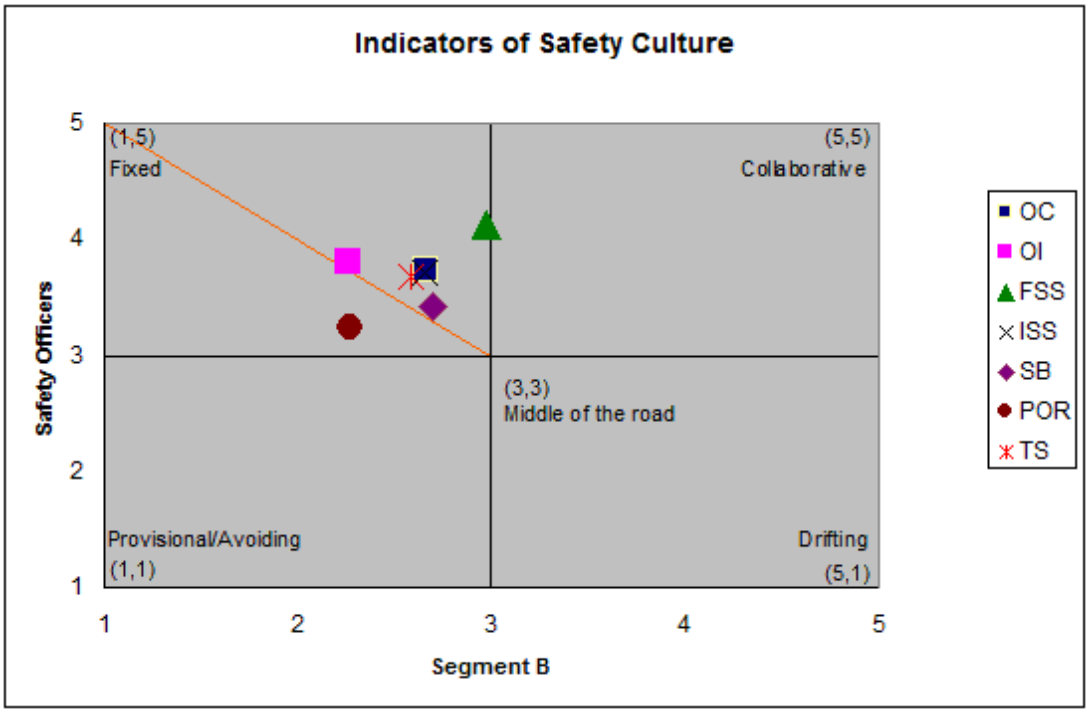


Figure 6.8: Grid



F.7 Statistical Portray of Segment C

Figure 7.1: Segment C "Safety Culture Mean Score"

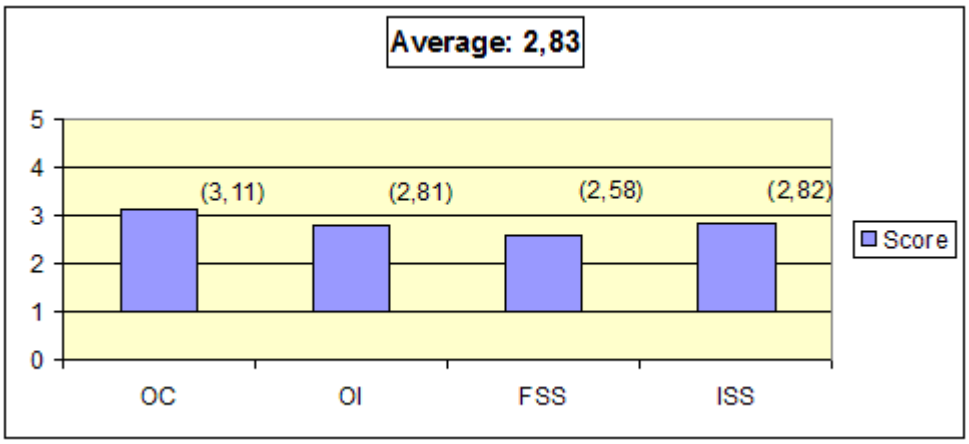


Figure 7.2: Segment C "OC Distribution"

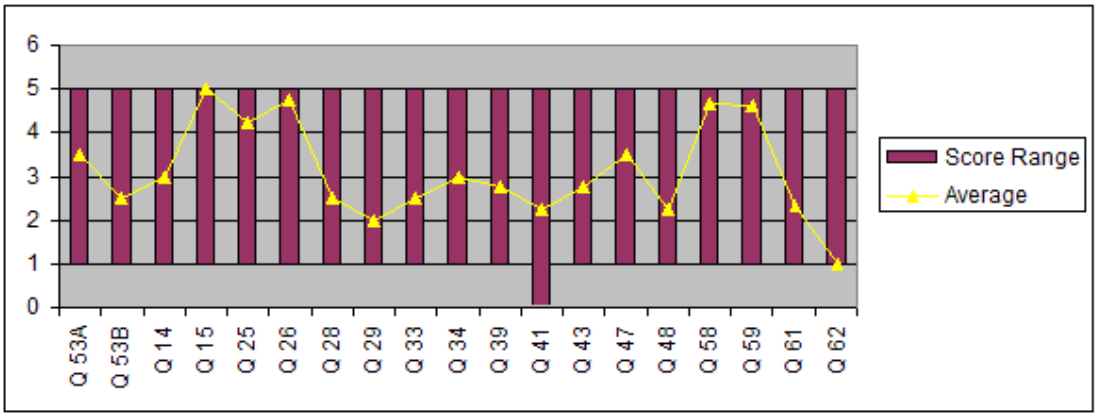


Figure 7.3: Segment C "OI Distribution"

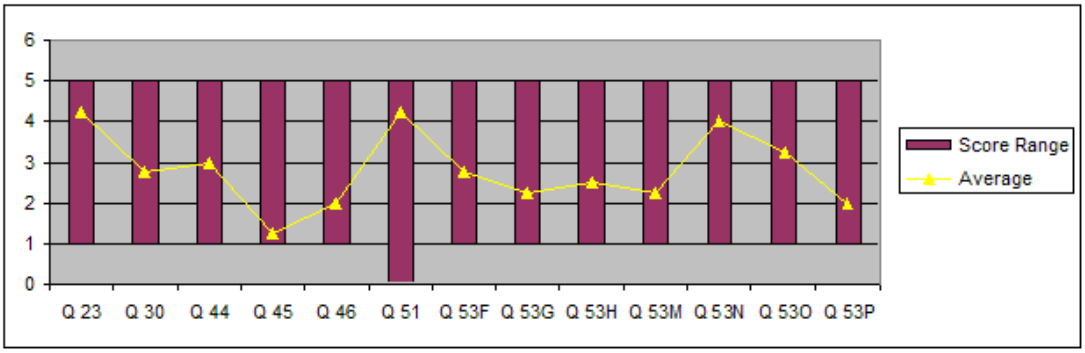


Figure 7.4: Segment C "FSS Distribution"

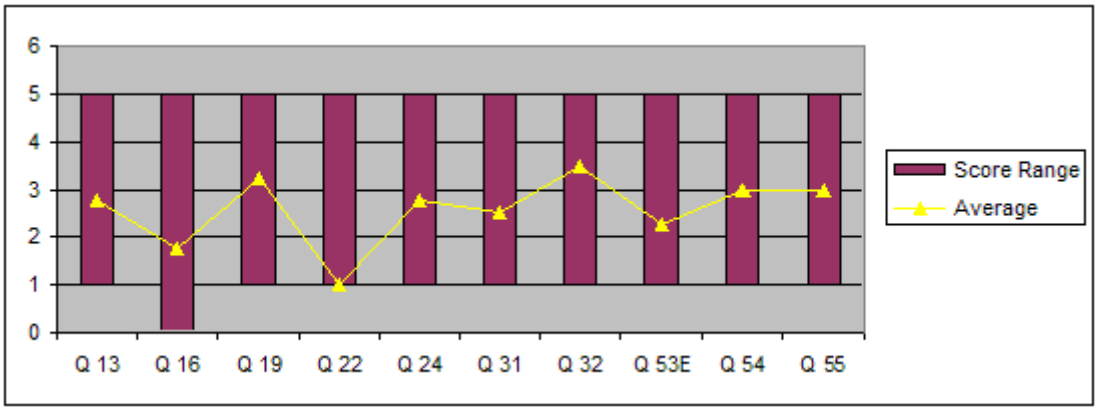


Figure 7.5: Segment C "ISS Distribution"

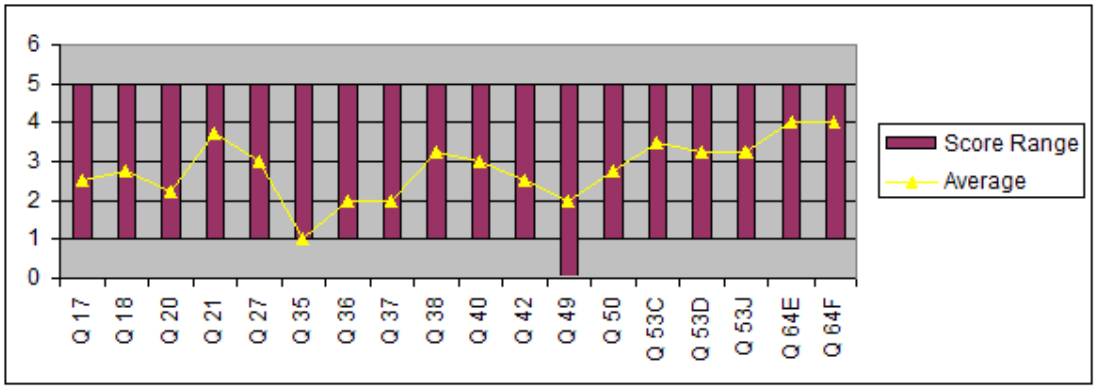


Figure7.6: Segment C "PR Distribution"

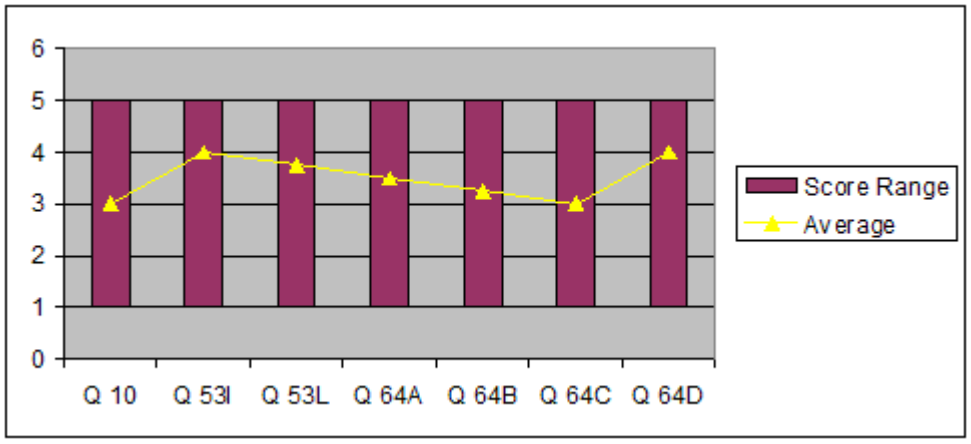


Figure 7.7: Segment C "POR Distribution"

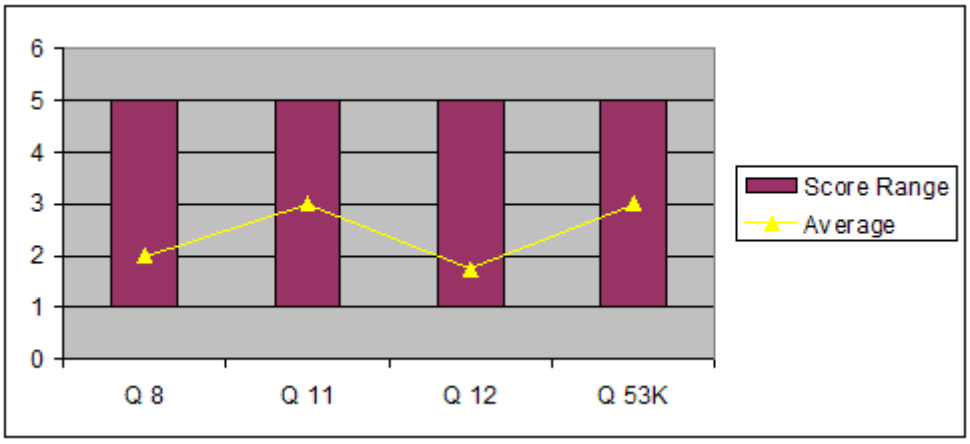
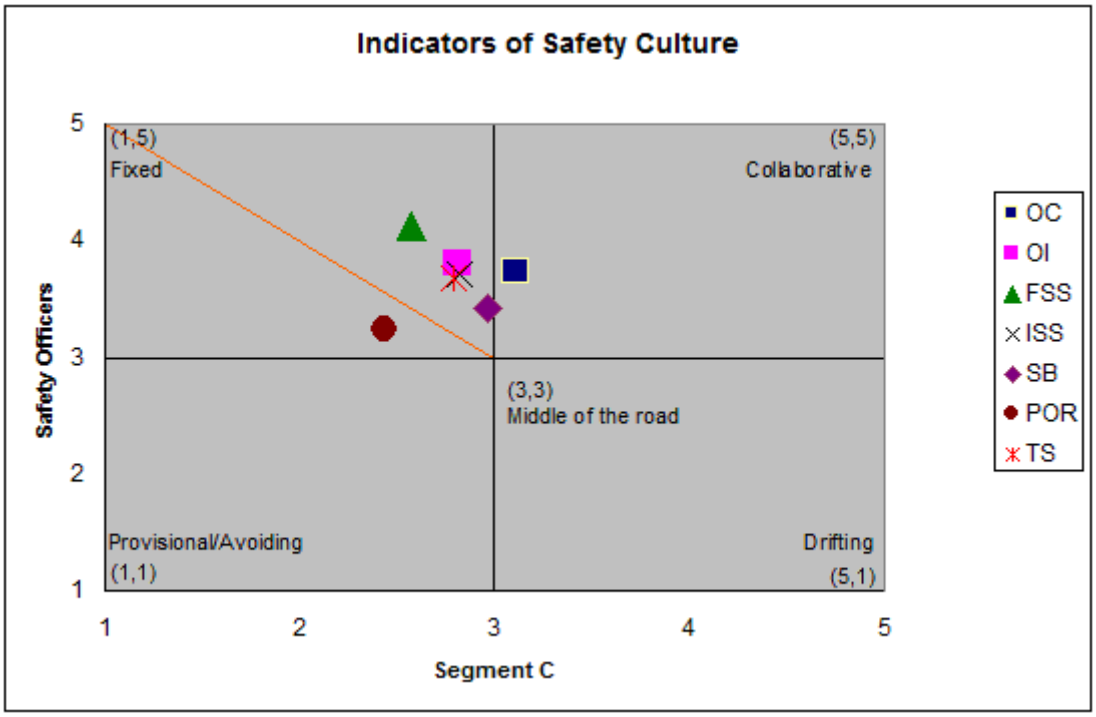


Figure 7.8: Grid



F.8 Statistical Portray of Segment E

Figure 8.1: Segment E "Safety Culture Mean Score"

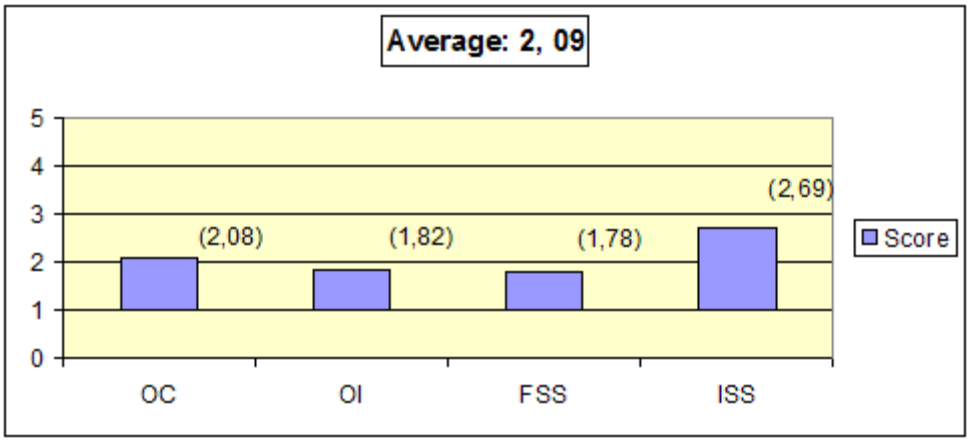


Figure 8.2: Segment E "OC Distribution"

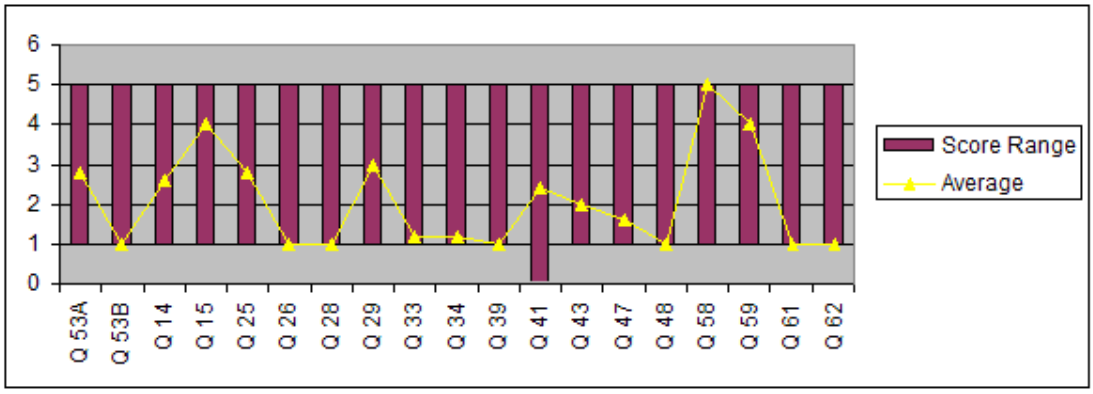


Figure 8.3: Segment E "OI Distribution"

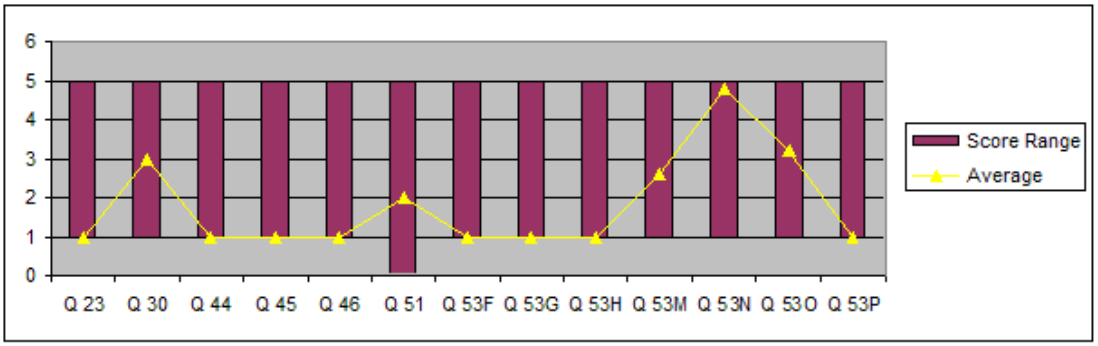


Figure 8.4: Segment E "FSS Distribution"

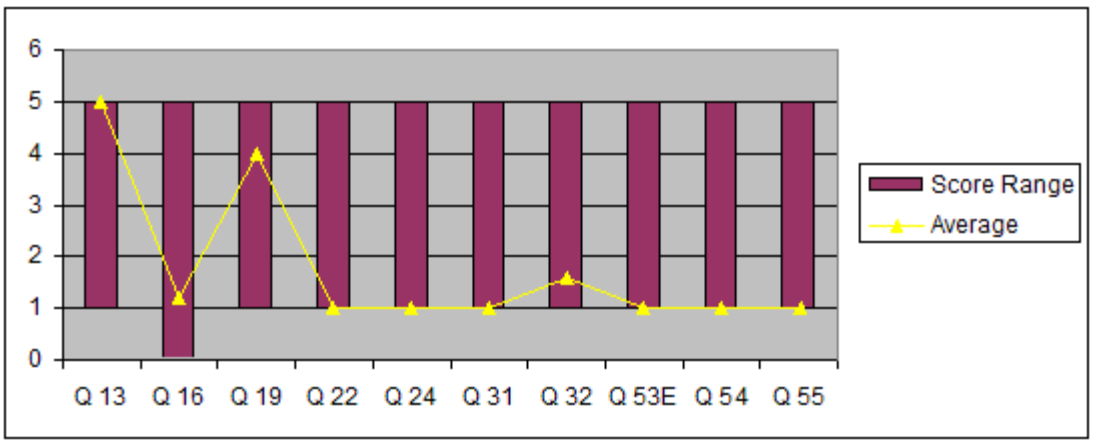


Figure 8.5: Segment E "ISS Distribution"

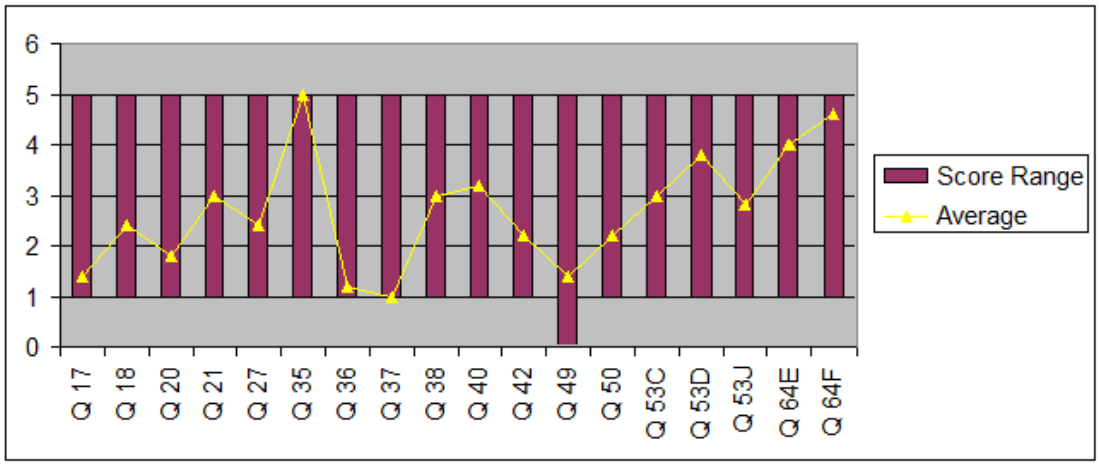


Figure 8.6: Segment E "PR Distribution"

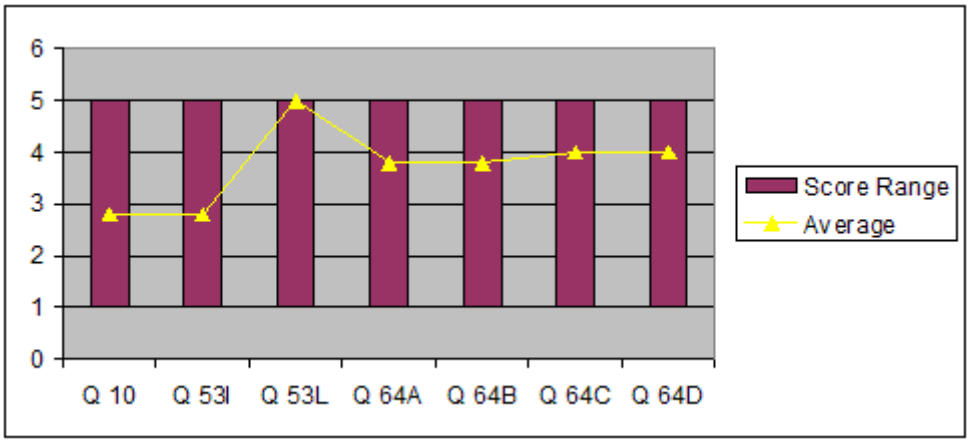


Figure 8.7: Segment E "POR Distribution"

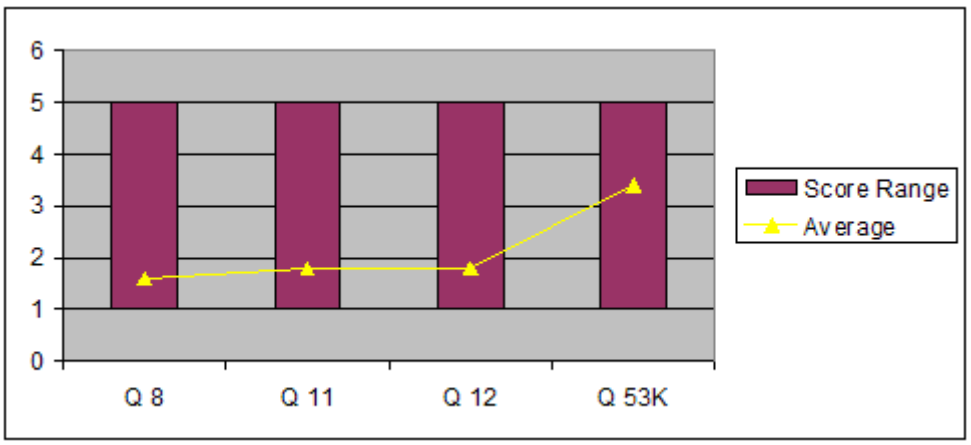
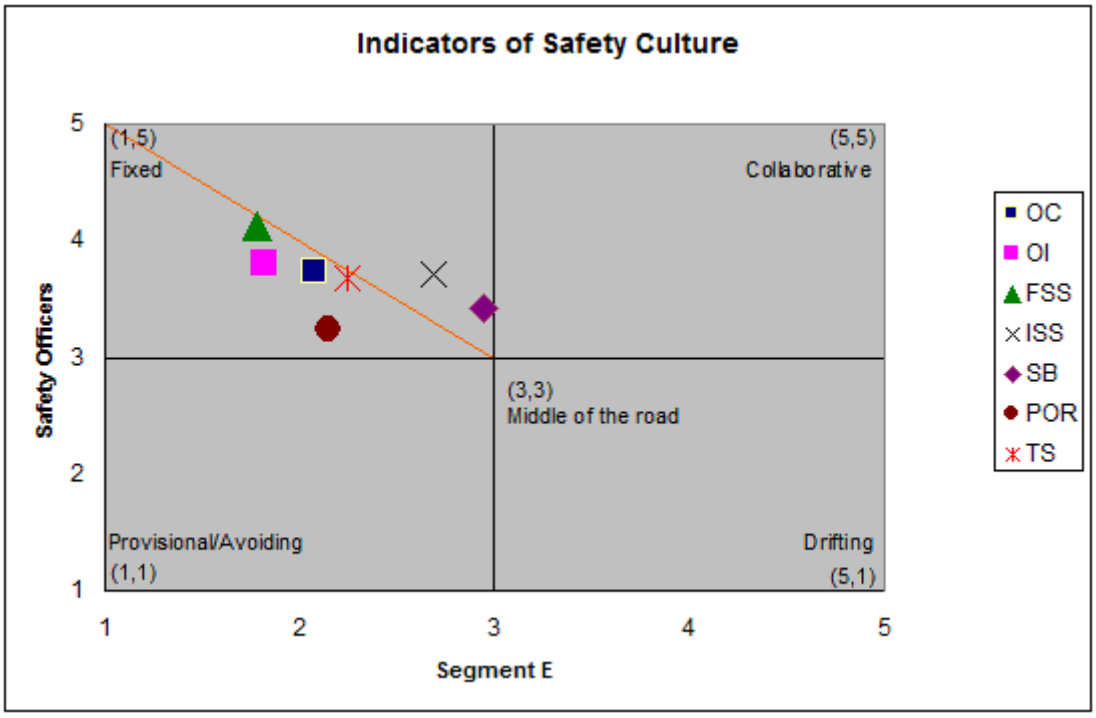



Figure 8.8: Grid