

EVALUATION AND REVIEW OF THE SAFETY  
MANAGEMENT SYSTEM IMPLEMENTATION IN  
THE ROYAL THAI AIR FORCE

By

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Title of Study: EVALUATION AND REVIEW OF THE SAFETY MANAGEMENT  
SYSTEM IMPLEMENTATION IN THE ROYAL THAI AIR FORCE

Major Field: AVIATION AND SPACE SCIENCE

Abstract:

Scope and Method of Study:

This study was designed to determine situation and effectiveness of the safety management system currently implemented in the Royal Thai Air Force. Reviewing the ICAO's SMS and the RTAF's SMS was conducted to identify similarities and differences between the two safety management systems. Later, the researcher acquired safety statistics from the RTAF Safety Center to investigate effectiveness of its safety system. The researcher also collected data to identify other factors affecting effectiveness of the safety system during conducting in-depth interviews.

Findings and Conclusions:

The study shows that the Royal Thai Air Force has never applied the International Civil Aviation Organization's Safety management System to its safety system. However, the RTAF's SMS and the ICAO's SMS have been developed based on the same concepts. These concepts are from Richard H. Woods's book, Aviation safety programs: A management handbook.

However, the effectiveness of the Royal Thai Air Force's safety system is in good stance. An accident rate has been decreasing regularly but there are no known factors to describe the decreasing rate, according to the participants' opinion. The participants have informed that there are many issues to be resolved to improve the RTAF's safety system. Those issues are cooperation among safety center's staffs, attitude toward safety of the RTAF senior commanders, and safety standards.

## TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION .....	1
Background .....	1
Statement of the Problem .....	1
Purpose of the Study .....	2
Assumptions .....	3
Limitations of the Study .....	3
Definition of Terms .....	3
Significance of the Study .....	6
II. REVIEW OF LITERATURE .....	7
Introduction .....	7
Risk in Aviation Safety .....	7
Concept of Safety Management System .....	14
Current Aviation Safety System of the RTAF .....	15
Evaluation Concept .....	20
III. METHODOLOGY .....	21
Introduction .....	22
Selection of Subjects .....	22
Instrument .....	22
Collection of Data .....	23
Compilation and Analysis of the Data .....	24

Chapter	Page
IV. RESULTS OF THE STUDY .....	26
Introduction.....	26
Summary of ICAO’s SMS and the RTAF’s SMS .....	27
The Royal Thai Air Force’s Safety Statistics .....	29
In-depth Interviews Results .....	30
V. CONCLUSION.....	65
Summary .....	65
Findings.....	65
Conclusion .....	70
Recommendation .....	71
REFERENCES .....	72
APPENDICES .....	74

LIST OF TABLES

Table	Page
1. Safety Statistics.....	29
2. Budget and Personnel Statistics .....	30
3. Comparison between ICAO’s SMS and RTAF’s SMS .....	66

## LIST OF FIGURES

Figure	Page
1. Accident, Fatalities, and Hull-Loss .....	67
2. Accident and Trend .....	68
3. Fatalities and Trend .....	68
4. Hull-Loss and Trend.....	69

## CHAPTER I

### INTRODUCTION

#### **Background**

The Royal Thai Air Force (RTAF) has the mission to prepare and practice air warfare. In order to achieve the mission, the RTAF has to conserve its capabilities including aircraft and pilots that may be lost due to accidents. To reduce accident rate, the RTAF has been seeking ways to manage aviation safety. To date, the RTAF has adopted International Civil Aviation Organization's (ICAO) Safety Management System to improve safety.

In 2006, the International Civil Organization (ICAO) introduced and published Safety Management Manual (SMM). The International Civil Organization (ICAO) required that all member states implement the Safety Management System (SMS) by 2009. Even though this requirement does not apply to military aviation, it is beneficial to military aviation safety. Therefore, the RTAF has gradually implemented the SMS since 2006. However, the effectiveness of the SMS implementation has not been reviewed and evaluated.

#### **Statement of the Problem**

The aircraft accident rate of the RTAF has decreased from eight cases per year in 2005 to one in 2007. However, it has not been determined that the reduction of accidents is the result of the SMS implantation or if there are other affecting factors. Also, no evaluation has been conducted to determine the effectiveness of this implementation.



## **Purpose of the Study**

The aim of this study was to evaluate the implementation of the Safety Management System in the Royal Thai Air Force as to whether the SMS can effectively prevent aircraft accidents. This study also determined the effectiveness of this implementation. Furthermore, the researcher investigated others factors that affected the implementation of SMS. Then, the researcher made recommendations to improve the SMS to reduce the aircraft accident rate. To achieve the purpose of this study, the researcher created in-depth interview questions to interview administrators of the Safety Center, Royal Thai Air Force. Together with the in-depth interviews, the researcher also reviewed all pertinent documents to investigate the effectiveness of the implementation. In-depth interviews and document reviews explored the following questions:

1. What is the current status of the RTAF's aviation safety effort?
2. What are the scope and depth of the implementation?
3. What parts of ICAO's SMS have not been implemented?
4. What are the perceptions of the RTAF Safety Center's administrators on this implementation?
5. What changes were made to start each element of the ICAO's SMS?
6. What budget is needed to implement the ICAO's SMS?

## **Assumptions**

In this study, the researcher assumed that

1. The ICAO's Safety Management System can be an effective tool to prevent aircraft accident.
2. The ICAO's Safety Management System is suitable to be implemented in the Royal Thai Air Force.
3. The interviewees will be sincere in their responses.

## **Limitations of the Study**

Due to geographical difficulty, the researcher could not do in-depth face to face interviews. The interviews were conducted via teleconference, during which the interviewer could not observe body language. Another limitation of this study was the availability of the RTAF's documents.

## **Definition of Terms**

The researcher will use the following definitions and aviation terminology in this study.

**Accident.** An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

- a) a person is fatally or seriously injured as a result of:
  - being in the aircraft, or
  - direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
  - direct exposure to jet blast,

*except* when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

- b) the aircraft sustains damage or structural
  - adversely affects the structural strength, performance or flight characteristics of the aircraft, and
  - would normally require major repair or replacement of the affected component,

*except* for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or

- c) the aircraft is missing or is completely inaccessible.

Note 1. - For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO. Note 2.— An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located. (ICAO Annex 13, 2001)

**Aircraft.** Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface. (ICAO Annex 13, 2001)

**Causes.** Actions, omissions, events, conditions, or a combination thereof, which led to the accident or incident. (ICAO Annex 13, 2001)

**Incident.** An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation. (ICAO Annex 13, 2001)

**Safety recommendation.** A proposal of the accident investigation authority of the state conducting the investigation, based on information derived from the investigation, made with the intention of preventing accidents or incidents. (ICAO Annex 13, 2001)

**Serious incident.** An incident involving circumstances indicating that an accident nearly occurred.

Note 1.- The difference between an accident and a serious incident lies only in the result.

Note 2. - Examples of serious incidents can be found in Attachment C of Annex 13 and in the Accident/Incident Reporting Manual (Doc 9156). (ICAO Annex 13, 2001)

**Serious injury.** An injury which is sustained by a person in an accident and which:

- a) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or
- b) results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
- c) involves lacerations which cause severe hemorrhage, nerve, muscle or tendon damage; or
- d) involves injury to any internal organ; or
- e) involves second or third degree burns, or any burns affecting more than 5 per cent of the body surface; or
- f) involves verified exposure to infectious substances or injurious radiation. (ICAO Annex 13, 2001)

**Safety.** Safety is the state in which the risk of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management. (ICAO's Doc 9859, 2006)

### **Significance of the Study**

Loss of aircraft and flight crew caused by an accident has adverse effects on both ethics and economics. However from the government agency perspective, an accident can reduce the Air Force's ability to perform its mission. Also the Air Force may lose its capability to protect its country. Richard H. Wood stated in his book, *Aviation Safety Programs: A Management Handbook* that an aircraft accident will result in loss of productivity of injured personnel and loss use of equipment (Wood, 2003). Therefore, the Air Force has to seek methods to improve its air defense capability. Safety Management System has been implemented by the RTAF since 2006, but the implementation has not been evaluated and reviewed. Therefore, the researcher investigated this program to determine its success and effectiveness.

## CHAPTER II

### REVIEW OF THE LITERATURE

#### **Introduction**

According to the International Civil Aviation Organization, safety is “the state in which the risk of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management. (ICAO’s Doc 9859, 2006, p4-1) Therefore, the concept of “risk” must be clarified.

#### **Risk in Aviation Safety**

Risk has been used in many fields including aviation. The meaning of risk varies from field to field. Researchers need to identify the meaning of risk in their field in order to determine a clear understanding of risk in that field. In the field of aviation safety, researchers also need to identify the meaning of risk to make standard agreement of risk in the aviation safety community. To illustrate a clear picture of risk in aviation, researchers should address all definitions, attributes, uses, antecedents, and consequences of risk.

#### **Definition of “risk”**

The definition of “risk” varies depending on the context or field. a general definition for the word “risk”, as determined by the Oxford Dictionary (2010), is “a situation involving exposure to danger.” In this meaning, risk will exist when someone gets into potential hazardous conditions. The Society for Risk Analysis (SRA) (2010) provides more details about “risk”.

“Risk” is “the potential for realization of unwanted, adverse consequences to human life, health, property, or the environment; estimation of risk is usually based on the expected value of the conditional probability of the event occurring times the consequence of the event given that it has occurred.”(p. 23) SRA’s meaning provides more attributes of risk than that stated by the Oxford Dictionary. SRA also provides a method to calculate level of risk. The attribute of risk as stated in the Oxford dictionary is exposure to danger. The SRA enhanced meaning of risk is that when a situation is exposed to danger, an adverse consequence may occur. Molak (1997) provided more details in that risk is “a probability of an adverse effect of an agent (chemical, physical, or other), industrial process, technology, or natural process” (p.15). Looking at the general meaning provided by many sources it can be concluded that risk’s attributes are probability of exposure to danger and the degree of adverse consequences. However, risks as used in different fields have their own definitions of risk. It is these definitions that need to be investigated to determine a clearer understand of risk.

### **Business Risk**

In the field of business, risk is one of many factors that affect investment. Christoffersen (2003) defined business risk that “changes in variables of a business plan will destroy that plan’s viability, including quantifiable risks, such as business cycle and demand equation risk, and nonquantifiable risks, such as changes in competitive behavior or technology” (p. 5). Investigating deep into financial risk, Horcher (2005) defined financial risk as “the likelihood of losses resulting from events such as changes in market prices” (p. 1). Horcher explained more about financial risk that “financial risk arises through countless transactions of a financial nature, including sales and purchases, investments and loans, and various other business activities” (p. 1). From a business perspective, risk can be defined as probability to the loss of profit due to encounter with changes of business plan and financial transactions. (Horcher, 2005)

## **Health and Insurance Risk**

In health and insurance's perspective, risk can be identified within their own contexts. Insurance business mainly deals with insuring that so when adverse outcomes occur, compensation will be provided to involved parties to relieve losses. Thus, the definition of risk in the business of insurance also has attribution of probability, exposure, and compensation. Anderson and Brown (2005) defined risk as "the possibility of losing economic security" (p. 2). They also explained that "hazards are conditions that increase the probability or expected magnitude of a loss including include smoking when considering potential healthcare losses, poor wiring in a house when considering losses due to fires, or a California residence when considering earthquake damage" (p. 3).

## **Engineering Risk**

In the field of engineering, risk can be defined in the same way as in other fields. However, they identify factors or events that contribute to raise the level of risk in their contexts. Those factors or events affect both the financial and safety of a project. According to Roger Flanagan and George Norman (1993), those factors or events are "failure to keep within the cost budget/forecast/ estimate/tender; failure to keep within the time stipulated for approvals, design, construction and occupancy; and failure to meet the required technical standards for quality, function, fitness for purpose, safety and environment preservation" (p.22). They state further that "the effect of adverse events will be financial loss."

## **Military**

Military has its own definition of risk. The Department of the Army (1998) states, in its field manual, that "risk is characterized by both the probability and severity of a potential loss that may result from hazards due to the presence of an enemy, an adversary, or some other hazardous condition."(p.1-1) From military perspective, the attributes of risk are probability and



severity of a potential of loss. However, military added enemy as cause of loss into their definition. The rests of attributes are similar to other fields.

### **Aviation Safety**

When investigating the definition of risk from an aviation safety perspective, the Federal Aviation Administration's definition should be used. FAA (2000) defined risk in aviation safety as "the probability and severity of accident or loss from exposure to various hazards, including injury to people and loss of resources" (p.15-2). International Civil Aviation Organization (2006) also provides explanation that risk should "always take into account both the likelihood of occurrence of the hazard and the severity of its potential consequences" (p. 6-1). From definitions of two trusted organizations, risk in aviation safety can be defined as a combination of probability to produce adverse consequences when exposed to hazards and severity of those consequences. However, hazards are limited to those involving aviation and excluding intentionally human created hazards.

### **Attributes and Uses of Risk**

The word "Risk" is used in a variety of fields. In this paper the concentration is on risk in aviation safety. The primary goal of aviation safety is to maintain a safe environment for aviation activities. In order to keep aviation activities safe, we need to manage risk involving aviation safety. Risk can be categorized into two main levels. There are acceptable risk and unacceptable risk. Level of risk is a value judgment. Level of risk can be obtained by risk assessment. To assess risk we need to know its attributes. Risk consists of two main attributes. There are probabilities to get adverse consequences when expose to hazards and severity when accidents occur.

## **Probability to Get Adverse Consequences**

Probability as defined in the Oxford Dictionary is “the likelihood of something happening or being the case”. Probability to get adverse consequences varies depend on condition. For example, the probability of complete engine loss of a Cessna 172, a single engine aircraft, is higher than a B747, a four engine jet liner. To determine the probability of a particular case, we need to analyze probability by using statics or expert judgment. Probability is a quantitative value that can be obtained.

Probability to get unwanted events can increase or decrease depending on the number of times that risky events occur. Wood (2003) commented that “If you intend to expose yourself to that risk more than once, then that exposure must be considered” (p. 57). Assume the chance of an accident during the landing of Cessna 172 is 0.01% of landings. If we land two times in one flight, chance to get accident will increase to 0.02%. Therefore, the probability of adverse consequences varies depending on the exposure to dangers. However, there is another attribute to determine level of risk, severity.

## **Severity When Accident Occurs**

Severity can be defined as loss of life, injury, damage of aircraft or equipment, and operational difficulties. Severity can be both a qualitative and quantitative value. We can estimate tangible cost of accidents but we cannot justify intangible value such as life, loss of opportunity, or environmental recovery. Therefore, severity of an accident varies depending on value judgment.

From attributes of risk, they can be used as tools to maintain aviation activities safety. Risk is defined as a combination of probability to produce adverse consequences when exposed to hazards and severity of those consequences. Then,

$$\text{Risk} = \text{Probability} \times \text{Severity}$$

If a particular risk is assessed and determined to be unacceptable, then there is a need to decrease the probability and/or severity to an acceptable level. However, the probability of an aviation accident sometimes cannot be referred to as engineering risk. For example, chance of human error differs from material failure. Human error cannot be quantified. It is a nonlinear value which an engineering method cannot be applied to reduce the chance of human error. So, we need alternative methods to decrease probability of human error such as Crew Resources Management training, motivation, punishment, and reward.(Wood, 2003)

### **Previous use of risk**

MG Ng Chee Khern (2008) of the Republic of Singapore Air Force (RSAF) stated that the Singapore Air Force was free of aircraft accidents during 1994 to 2000. He stated that “No Air Force flies 53,000 hours without accident due to luck.” RSAF applied risk management into the operation level. Each flight crew has had to assess their risk before flight by using Risk Assessment Matrix (RAM). Then, they applied Risk Minimization Effort (RME) to ensure they were safe. If flight crews brought good ideas to minimize risk, then “time and resources are allocated accordingly” (p. 8). RSAF had a good record on aircraft accident from 1994 to 2000 because they applied risk management to minimize risk as much as possible.

## **Consequences**

Risk is important to aviation safety. Risk exists in any operation of aircraft. ICAO (2006) suggests that “risk is a by-product of doing business. Not all risks can be eliminated, nor are all conceivable risk mitigation measures economically feasible” (p.6-1). If risk cannot be minimized, loss of life or aircraft due to accidents may occur. Therefore, minimizing risk is the way to avoid and reduce the chance or severity of accidents. The Federal Aviation Administration (FAA) (2000) stated that “Risk management must be a fully integrated part of planning and executing any operation, routinely applied by management, not a way of reacting when some unforeseen problem occurs” (p. 15-1). Therefore, risk should be managed at all levels of the organization. Information about risk should be spread to all personnel of the company. Then, cooperation of all involved parties will help to eliminate or reduce risk to acceptable level, creating a safer environment.

## **Concept of Risk in this Study**

Risk has no universal meaning. Its meaning depends on its context or field. However, meanings of risk from all fields share some common attributes. All fields agree that risk is a chance to get adverse consequences when exposed to dangers. In the field of aviation safety, degree of severity is also an indicator to measure the level of risk. Thus, the definition of risk in aviation safety is the probability to get adverse consequences when exposed to dangers which relate to aviation excluding intentionally human created hazards. If we minimize risk as much as possible, we can avoid loss of life or equipment caused by accidents. Many organizations have suggested that risk be assessed and mitigated to acceptable levels. Singapore Air Force is an example of a successful risk management organization. The FAA provides a guide to manage risk. All effort of concerned people and organizations to manage

risk is to improve aviation safety and to ensure that we will be safe when we travel by air. (FAA, 2000)

### **Concept Safety Management System**

According to the Safety Management Manual (ICAO Doc 9859), ICAO described the responsibility of each stakeholder such as the ICAO, state members, Civil Aviation Administrations, manufacturers, aircraft operators, service providers, third party contractors, and business and professional associations. The manual provided more detail on how state members develop their regulations pertaining to the SMS. Other than regulatory framework, the manual also provides\nd basic concepts of safety management including risk management, hazard and incident reporting, safety investigations, safety analysis and safety studies, safety performance monitoring, emergency response planning, establishing a safety management system, safety assessments, and safety auditing. In addition, the manual provided instruction to establish SMS for aircraft operators, air traffic service providers, aerodrome operators, and aircraft maintenance providers. The ICAO Safety Management Systems (SMS) Course (ICAO Revision No.13, 2009) indicated that implementation of ICAO's SMS consists of 4 elements:

1. Safety policy and objectives
2. Safety hazard identification and risk management
3. Safety assurance
4. Safety promotion

## **Current Aviation Safety Status of the RTAF**

The mission of the Royal Thai Air Force is to develop and maintain combat readiness for air operations. The RTAF operates approximately 200 aircrafts. These aircrafts are fighter jet, bomber, carrier, trainer, and utility aircraft. It has roughly 45,000 military personnel and 11 wings. Each wing has its own safety officer. Below the wing, there are squadrons. Each squadron also has a safety officer.

### **The RTAF's Safety Policy**

According to the RTAF's safety policy, the Royal Thai Air Force acknowledges that aviation safety is a key factor in satisfying its mission. The RTAF provides a safe and healthful working environment for all personnel. One strategy used to do this is early identification and the elimination of potential hazards.. The RTAF encourages all personnel to participate in the program and to take an active role in the identification, assessment, and elimination of potential hazards. Aviation safety is not just a matter of compliance with rules, regulations, and standards but a matter of commitment, training, planning, motivation, communication, collaboration, and initiative of all commanders and personnel of the RTAF. It is, therefore, not only the concern of flight operations but the result of total commitment to safety and efficiency both in the air and on the ground. (Royal Thai Air Force, 2006)

### **Organization**

The Royal Thai Air Force has a safety center which reports directly to the RTAF's commander. The safety center is staffed by the RTAF's commander and acts as the secretary of the RTAF's aviation safety committee. Each wing's safety officer reports directly to the wing commander. Each wing also has an aviation safety committee which is appointed by the wing commander. All branch commanders work together with the aviation safety unit of the wing in the matter of any aviation safety issue.

### **Authority and responsibility**

The safety center of the RTAF is responsible for all safety related activities of the Royal Thai Air Force. The RTAF safety center represents the RTAF regarding aviation safety matters in dealing with government agencies and other aviation organizations. The wing safety officer is responsible for the safety branch and reports directly to the wing commander. All branch commanders are responsible for all safety issues in their units and report to the wing safety officer. The wing safety officer will work with all involved units to resolve the issues. If the safety officer cannot get any resolution for problems, then the problems will be raised in the meeting of the Aviation Safety Committee. The Wing safety officer is also responsible for an investigation of any aviation safety-related event except an aircraft accident. The wing safety officer has the authority to conduct aviation safety audits on any wing's operation or facility.

### **Reporting System of Accidents, Incidents and Hazards**

*Accidents.* All accidental damage to the wing's aircraft; injury to wing's personnel resulting from aircraft operation; or damage to non-wing property or injury to other personnel resulting from the air force's operations will be reported to the wing's operation center. The wing's operation center will notify the wing commander and safety center of the RTAF as soon as possible.

*Incidents.* All incidents related to aircraft operations will be documented to the wing's operation center. The wing's safety officer will take responsibility to conduct an investigation of all aircraft incidents.

*Hazards.* Any personnel observing a hazardous situation that could affect aviation safety is encouraged to report it to the wing's safety officer by using the Hazard Report Form. The wing's safety unit will provide hazard reporting forms,

which are available at all facilities of the wing. Anonymous reporting is accepted. On receipt of a hazard report, the wing's safety officer will verify the existence of the hazard, assign a priority to the hazard, and notify the involved branch commander for investigation and resolution. (Royal Thai Air Force, 2006)

### **Information Distribution System**

The wing's safety officer is responsible for obtaining and distributing any aviation safety-related information. Critical information is distributed via the wing's dispatch system and flight crew briefings. Non-critical information will be distributed through the squadron safety officer with instructions on how the information is to be sub-distributed.

### **Aviation Safety Committee**

The aviation safety committee of the RTAF is chaired by the RTAF chief of staff. At the wing level, the aviation safety committee is chaired by the deputy wing commander for operations. Members of the wing's aviation safety committee are all branch commanders. Both the chair and the membership are appointed by the wing commander. The wing safety officer serves as a secretary of the committee. The secretary of the committee prepares agendas and minutes in cooperation with the chairs. The committee meets every three months or at the call of the chair. The committee is responsible for revision the status and actions taken of current accidents, incidents, hazard reports, and any aviation safety issues that may brought to before the committee. The committee may approve, reject, or make a recommended action on any matters brought before them. Review of the minutes and signed by the deputy wing's commander for operations constitutes approval and the minutes then become a directive. The records of the aviation safety committee meeting are kept by the wing safety officer. Agendas and minutes are destroyed after five years.



### **Aviation Safety Audits**

In order to verify compliance with safety standards and determine the effectiveness of the overall aviation program, the RTAF safety center will develop an aviation safety audit program and checklists to be used during the audits. The RTAF safety center staff will conduct aviation safety audits once a year. Reports will be prepared and sent to the RTAF's commander. After the RTAF's commander has signed and approved the reports, recommended actions will be routed to the involved unit commanders. Reports, recommended actions, and responses will be reviewed by the aviation safety committee for adequacy. Records will be maintained by the RTAF's commander for five years. (Royal Thai Air Force, 2006)

### **Aviation Safety Training**

The RTAF safety center is responsible to develop to provide an aviation safety training program to train all new wing safety officers. This training will include all needed knowledge to prepare the wing safety officers for their new job. The aviation safety training program will also be provided to all wing commanders at the management level. Records of the training will be kept in the RTAF safety center. (Royal Thai Air Force, 2006)

### **Aviation Safety Awards**

There will be two aviation safety awards; one for individuals and one for branches. Individual aviation safety awards will be presented to those who contribute significantly to the aviation program or improvement of the safety program. Nominations for the individual award will be initiated by branch commanders in the form of a memorandum to the wing safety officers who will collect and bring to the attention of the aviation safety committee. The committee will review and approve awards for individuals. Aviation safety awards for branches will be granted to the branch that has the highest rating of safety effectiveness based on the annual aviation safety audits.

## **Aircraft Accident Investigation**

The RTAF safety center will develop a guideline for the wing safety officer to use in preparing their pre-accident plans. The pre-accident plan is a separated document from the aviation safety regulation. The pre-accident plan will be coordinated with each unit's emergency response plan. The wing's pre-accident plan will be carried out at least once a month and be revised by the wing's aviation safety committee every year.

In case of an accident, the wing's operation and air traffic control tower controller will be notified. The air traffic control tower controller will sound the crash alarm which will notify all emergency response units. All involved units will follow the pre-accident plan and procedures. The wing's operation center will notify the wing's commander and safety officer. The RTAF's safety center will be notified of the accident by the wing safety officer. An investigation team of the RTAF's safety center will go to the accident site immediately. The wing's safety officer will cooperate with the RTAF's safety center investigation team as they conduct an investigation of the accident. All personnel of the wing will provide information related to the accident upon request of the investigation team. Any other safety related issues will be investigated by the wing's safety officer and aviation safety investigation team of the wing which is appointed by the wing's commander. The report of the investigation will be kept by the RTAF's safety center. (Royal Thai Air Force, 2006)

## **Aviation Safety Analysis**

The RTAF safety center will collect and analyze all pertinent data to make the air force safer. The wing's safety officer is responsible for an analysis system using data derived from the air force and the wing's accident and incident data base. The wing's safety officer will ensure that trends and areas requiring action have been identified. Results of the analysis program will be routed to involved branches for further actions at least once a month.

## **Review and Revision of Aviation Safety Program**

The RTAF's safety center will maintain its aviation safety program. The program will be revised annually by the RTAF's aviation safety committee and approved by the chair of the committee.

## **Evaluation Concept**

Fitzpatrick et. al (2004) defined evaluation as "the identification, clarification, and application of defensible criteria to determine the object's value (worth or merit) in relation to those criteria." ( ) In short, evaluation means the process to justify value of something based on its characteristics and standards.

In order to observe and identify as many concerns, issues, and consequences connected to the implementation program, the participant-oriented evaluation approach is suitable. By using this approach, the researcher aims to solve problems by using evaluation data. To be effective, the researcher should work in partnership with parishioners.

## CHAPTER III

### METHODOLOGY

The purpose of this study was to evaluate and review implementation of the ICAO's Safety Management System in the Royal Thai Air Force. The researcher investigated whether the SMS can prevent aircraft accidents. This study also determined the effectiveness of this implementation. Furthermore, the researcher investigated other factors that have an effect on the implementation of SMS. Then, the researcher developed recommendations to improve the SMS to reduce aircraft accident rate. To achieve the objectives of the study, the researcher developed in- depth interview questions and reviewed pertinent documents. In-depth interview questions were utilized to obtain executive's opinions with regard to characteristics, scope, and depth of each SMS's elements that the RTAF have implemented. A review of all involved documents provided information in evaluating the effectiveness of this implementation. This chapter describes the selection of subjects, instrument, collection of data, and compilation and analysis of the data.

Qualitative data collected from interviews provided information to interpret the success and effectiveness of this implementation. It also shows the degree of satisfaction of interviewees in this implementation.

### **Selection of Subjects**

Since this was a descriptive study, in-depth interviews were used to probe executive's opinions. The total number of selected participants of this study was 24 executives of the Royal Thai Air Force Safety Center. These participants were chosen because they are currently conducting the implementation. They know both the advantages and disadvantages of the program. Each executive is responsible for each element of the SMS. 12 of them responded to recruiting e-mails. The researcher managed to conduct in-depth interviews with 11 participants.

To investigate the effectiveness of the implementation, the researcher evaluated the program by using the benefit-cost analysis approach. Documents concerning budget, aircraft accident, and corrective action were reviewed.

### **Instrument**

In-depth interview questions were developed by the researcher with assistance from the former RTAF's safety center executives. The validation of the questions for content and consistency were reviewed by the following three individuals; they are experts in the aviation safety management in Thailand.

- Director of the RTAF Safety Center
- Chief of aircraft accident prevention, RTAF Safety Center
- Former chief of aircraft accident investigation, RTAF Safety Center.

Questions were developed in the following areas:

1. Concept of safety and understanding of the safety management system
2. Basics of safety management

3. Risk management
4. Hazard and incident reporting
5. Safety investigations
6. Safety analysis and safety studies
7. Safety performance monitoring
8. Emergency response planning
9. Establishing a safety management system
10. Safety assessments
11. Safety auditing
12. Practical considerations for operating a safety management system

All questions were developed corresponding to each element of the SMS. The 17 questions are in Appendix B.

### **Collection of Data**

Due to geographic difficulty, the researcher set up interviews with the participants via voice over internet protocol (VOIP) at convenience times of the participants. Since the target participants are RTAF Safety Center personnel, the researcher asked for permission to interview selected participants from the director of the RTAF Safety Center (as shown in Appendix A). Permission to interview the participants was obtained by written consent from the director of the RTAF safety center as shown in Appendix A. Then the researcher directly contacted each potential participant. There were 11 selected participants. Each participant spent approximately 40 minutes answering the questions. The researcher conducted in-depth interviews with each

participant during August through October 2011. Follow-up questions, interviews were set during November and December 2011. The researcher conducted individual semi-structured interviews with participants via telephone. Interview questions are provided in Appendix B. The interviews were recorded in Thai and later translated into English for analysis. The records were kept in digital format for future reference. The interviews responses were stored as “Interview A, B, C, etc.” to protect participants’ anonymity. The records were stored in the researcher’s computer external hard drive in a locked drawer to which only the researcher has access.

Permission was obtained from the Director of the RTAF Safety Center to review and request pertinent safety information. Some of the information was sent to the researcher electronically.

### **Compilation and Analysis of the Data**

The responds from 11 participants were recorded in Thai and translated into English by the researcher. Both data from the interviews and reviews were evaluated to identify concerns, issues, or consequences generated by the implementation.

### **Research Timeline**

2011-2012

Sent recruiting e-mail to participants	Aug, 2011
Conducted in-dept interviews	Aug to Oct, 2011
Follow up interviews	Nov and Dec, 2011
Reviewed concerned documents	Sep to Dec, 2011
Sorted data	Nov and Dec, 2011

Analyzed	Jan to Feb, 2012
Writing and Formatting	Jan to Mar, 2012
Dissertation defense	Apr, 2012



## CHAPTER IV

### RESULTS OF THE STUDY

#### **Introduction**

The results of the study are summarized in this chapter. The results are divided into three parts; 1). summaries of the ICAO's SMS and the RTAF's SMS, 2). the RTAF's safety statistics, 3). in-depth interviews.

The first part was designed to distinguish similarities and differences between the ICAO's SMS and the RTAF's SMS. The second part was to acquire information to measure the effectiveness of the RTAF's SMS. And the last portion was designed to obtain needed information by in-depth interviews from RTAF Safety Center's executives.

#### **Summary of International Civil Aviation Organization's Safety Management System and the Royal Thai Air Force's Safety System**

In order to compare the similarities and differences between the ICAO's SMS and the RTAF's SMS, the researcher summarized concepts and elements of the two systems.

## **Summary of International Civil Aviation Organization's Safety Management System**

### **Elements**

The concept of modern systematic safety management was first introduced by Richard H. Wood in his book “Aviation Safety Programs: A Management Handbook” in 1991. Gradually, many aviation regulators have adapted his concepts to their regulations. These regulatory organizations are the Federal Aviation Administration of the United State of America, Civil Aviation Authority of the United Kingdom, Civil Aviation Safety Authority of Australia, and the Transport Canada. Among these authorities, the Transport Canada is the most advanced in developing Safety Management System. In 2006, International Civil Aviation Organization (ICAO) published its first Safety Management Manual which was developed based on its member states' safety management systems, especially concepts of the system from Transport Canada. The International Civil Aviation Organization issued its second edition of Safety Management Manual in 2009. The manual was designed to assist member states and operators to establish their safety systems to meet requirements of Standards and Recommended Practices which stated Annex 1 Medical assessment process and ATOs, Annex 6 - Aircraft operations, maintenance and general aviation, Annex 8 Type design or manufacture of aircraft, Annex 11 ATS, Annex 13 Incident reporting, data systems and information exchange, and Annex 14 Aerodromes. The Safety Management Manual (Doc 9859), second edition, consisted of four components and twelve elements. These components and elements are

#### **1. Safety policy and objectives**

1.1 Management commitment and responsibility

1.2 Safety accountabilities

1.3 Appointment of key safety personnel

1.4 Coordination of emergency response planning

1.5 SMS documentation

- 2. Safety risk management
  - 2.1 Hazard identification
  - 2.2 Risk assessment and mitigation
- 3. Safety assurance
  - 3.1 Safety performance monitoring and measurement
  - 3.2 The management of change
  - 3.3 Continuous improvement of the SMS
- 4. Safety promotion
  - 4.1 Training and education
  - 4.2 Safety communication.

### **Summary of the Royal Thai Air Force's Safety Regulation Elements**

The Royal Thai Air Force established its safety regulations first in 1977. The regulation has been revised regularly since. In 1999, one of the staff members from the RTAF graduated from Central Missouri State University and started revising safety regulations. He adapted the concept of safety management system from Richard H. Wood's book "Aviation Safety Programs: A Management Handbook". This revision was completed in 2002. The revision of this regulation in 2002 contained more modern safety management system elements. These elements are as follows:

- 1. Definition
- 2. Policy
- 3. Organizational Structure
- 4. Responsibilities
- 5. Safety Committees
- 6. Safety Meeting

7. Reporting Systems
8. Information Distribution
9. Safety Audit
10. Safety Training and Education
11. Safety Award
12. Emergency Response Plan
13. Accident Investigation
14. Safety Analysis

Later in 2009, this regulation was revised again but it has not changed in its concepts.

### **The Royal Thai Air Force's Safety Statistics**

To investigate performance of the Royal Thai Air Force safety system, the researcher acquired safety statistics from the RTAF Safety Center. These statistics include accidents, incidents, fatalities, hull-loss, budget, and personnel. The results are shown in the Table 1 and 2 below:

Table 1. Safety Statistic

Year	Accident (case)	Incident (case)	Hazard report (Case)	Fatalities	Hull-loss
2001	5	31	-	1	2
2002	4	47	109	2	4
2003	3	37	78	1	2
2004	6	32	65	5	3
2005	8	39	44	6	6
2006	6	37	62	8	5
2007	1	43	50	2	1
2008	4	34	109	11	2
2009	4	48	59	2	3
2010	6	44	86	2	1
2011	1	32	145	-	2

Table 2. Budget and Personnel Statistic

Year	Administration (Budget THB)	Safety Program Budget(THB)	Personnel
2001	-	1,000,000.-	-
2002	-	1,000,000.-	-
2003	-	1,000,000.-	-
2004	-	1,000,000.-	-
2005	-	1,000,000.-	-
2006	-	1,000,000.-	-
2007	-	1,000,000.-	-
2008	2,105,234.- (OCT- DEC)	1,000,000.-	-
2009	14,070,468.-	1,000,000.-	84
2010	50,627,326.	1,000,000.	94
2011	49,014,061.	1,000,000.	95

Remarks: 1 US\$ = 32 THB

### **In-depth Interviews Results**

The researcher conducted in-depth interviews with 11 executives of the RTAF Safety Center to probe their attitudes toward the safety system. These interviews were conducted in Thai language via telephone. The results of the interviews are as follow:

#### **I. The current status of the RTAF's aviation safety effort**

According to the executives of the RTAF safety center, the RTAF has implemented the safety system since the U.S. government provided military aid to Thailand after World War II. The RTAF revised its safety system regularly. In 1979, the RTAF developed its first safety regulation. After the first safety regulation was implemented, the aircraft accident rate decreased. Thus, the safety system of the RTAF has been executed and followed the safety regulations. Furthermore, the safety policy of the Chief of the RTAF has been strictly executed. The executives of the safety center are satisfied with a decreasing rate of accident but they think the current safety system can be improved.

Along with safety regulation and policy, the safety center also implemented new methods and ideas to raise safety conditions of the RTAF. They implemented Crew Resources Management, Operational Risk Management, Human Factors, and Foreign Object Damage to the safety system. These new methods and concepts are under pilot projects.

## **II. The perceptions of the RTAF's Safety Officers on this implementation**

When talking about the International Civil Aviation Organization's Safety Management System, most of the executives knew about this. But only three of them could provide a brief explanation about it. All the executives believed that the

RTAF's SMS and the ICAO's SMS are almost the same. The difference is the ICAO's SMS has well written manual while the RTAF's SMS does not have. So, the executives of the RTAF safety center agreed that the RTAF should implement the ICAO's SMS and develop its clear written manuals.

## **III. The scope and depth of the implementation**

Almost all of the executives could not tell scope of the ICAO's SMS but they said the RTAF should implement the ICAO's SMS. Three of them suggested that the RTAF enhance its risk management and safety assurance to the same level as the ICAO's SMS.

## **IV. Changes were made to start each element of the ICAO's SMS**

The ICAO's SMS has never been applied to the RTAF. In order to start implementing the ICAO's SMS to the RTAF, the executives suggested that attitude toward safety of the senior commanders must be changed. Furthermore, safety education must be provided sufficiently.

## **V. Parts of ICAO's SMS have not been implemented**

According to the opinion of the RTAF safety center's staffs, the ICAO's SMS has never been implemented to the RTAF. Even though they agreed that both systems have the same concepts and elements.

## **VI. Budget to implement this implementation**

To implement or apply the ICAO's SMS to the RTAF, the staffs of the safety center said a small budget may be required. However, many of them said that the current budget may be enough to improve the current system, but budget management methods must be changed.

### **The results of individual interviews**

#### **Interview A**

##### **I. The current status of the RTAF's aviation safety effort**

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

The aviation safety management system has been implemented to the Royal Thai Air Force since the end of World War II. The U.S. brought the system to the RTAF by providing educational aid to the RTAF. The safety system has been established ever since. The RTAF has developed its own safety system based on the Air Force safety system. The system can be found in the RTAF's safety regulation. If there is any safety issue, the RTAF personnel follows this regulation and concerning manuals. However, all the manuals or T.O. are written in English which is difficult to understand by Thais. Currently, the RTAF has emphasized on human factor problem.

- What is your concept or principle of aviation safety management?

I follow the RTAF's regulation to conduct my duty. In there, it contains all you need to manage safety system. The aim of this regulation is to reduce loss of lives and equipment.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

Not really. According to statistic, an accident rate is decreased. However, there is no known factor related to this decreasing. If we know this factor, we may reduce the rate to lower than this.

- What elements of the RTAF's safety management system should be changed or improved?

All elements of the RTAF need not to be changed. Only make them clearer, especially developing guidelines or manuals so that each individual can follow them easily.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS? If yes, please explain it briefly. If No, please skip to question 17.

ICAO's SMS is not new to aviation community. ICAO sought methods to improve safety standards among its member states. Then, it set safety standards by providing the Safety Management Manual to be a guideline to implement safety management system into respective organizations. The Royal Thai Air Force has developed its safety regulations similar to the ICAO's SMS before ICAO set up its Safety Management System.

- In your opinion, what parts of the RTAF's SMS differ from or are similar to the ICAO's SMS?



The similarities between RTAF's SMS and the ICAO's SMS are accident prevention or safety program, safety training and education, aircraft accident investigation, and safety promotion. There are no different between these two SMS. However, there are some elements that should be enhanced such as safety assurance, safety standards, and risk management.

- Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how.

The Royal Thai Air Force should improve its current Safety Management System to be more systematic. To do so, we may use ICAO's SMS as a guideline to improve our SMS.

- Has the RTAF implemented the ICAO's SMS yet?

I cannot say that the RTAF has implemented ICAO's SMS. The RTAF already has a Safety System which similar to the ICAO's SMS.

### III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF to implement?

My suggestion is risk assessment. The RTAF should develop tools or guidelines for operators to assess risk.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

If the word "implementation is the same as improve" then yes, the RTAF can improve its safety system degree to be the same as ICAO's SMS.

### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

To make the current safety system better, documentation of the system should be improved.

- What else should the RTAF do to prepare for implementation?

All manuals or T.O. written in English should be translated to Thai. A culture of safety culture and safety mind must be fostered.

#### V. Parts of ICAO's SMS have not been implemented

- If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

There is no need to acquire more budgets. The budget allocated to the RTAF Safety Center is currently enough to run the safety system.

#### VI. Budget to implement this implementation

- What are the advantages or disadvantages of elements of ICAO's SMS that have not been implemented?

The RTAF has not done risk assessment. If risk assessment can be done, it will help to seek proper methods to handle the risks.

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

Yes, the RTAF Safety Center is always provided sufficient budget as required.

## **Interview B**

### **I. The current status of the RTAF's aviation safety effort**

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

Currently, Chief of Staff of the RTAF has raised more effort to the safety system by assigning senior officer from his office to assist the Safety Center to audit safety of wings. The Safety Center is trying to conduct new creative safety programs as policy of the Director of the Safety Center. The Director has also established special teams to conduct these programs which were lacking enforcement or have never been implemented before.

- What is your concept or principle of aviation safety management?

As a staff of the Safety Center, I adhere to policies of the Director and the RTAF's Safety Regulation.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

The RTAF somewhat succeeded in aviation safety management. Accident rate is decreasing. However, the RTAF should have done better than this according to its personnel performance and budget.

- What elements of the RTAF's safety management system should be changed or improved?

There is no element of the RTAF's safety management system to be changed. But all of them need to be improved. All of these elements need manuals or guidelines to assist the operators to follow them.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS? If yes, please explain it briefly. If No, please skip to question 17.

I have studied about the ICAO's SMS and found that it is similar to the RTAF's safety system. The RTAF's safety system can be found in the RTAF's safety regulation. However, the elements of the RTAF's safety system are not placed in the same order as in the ICAO's SMS.

- In your opinion, what parts of the RTAF's SMS differ from or similar to the ICAO's SMS?

There are no differences between the RTAF's safety system and the ICAO's SMS. The parts that the RTAF's safety system does not have are airworthiness and licensing. Currently, the RTAF acquired new aircraft from the government of Sweden, JAS-39 Gripen. The Sweden authority required the RTAF to get airworthiness approval and licenses for operators and pilots. Thus, the RTAF is in the process of setting units to responsible for Airworthiness and licensing.

- Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how.

The RTAF has to improve its safety system to be at least equal to international standards. To do so, the special team is needed to be established. Then the process will start from there. When all documents are in place, the implementation process can gradually be executed.

- Has the RTAF implemented the ICAO's SMS yet?

The ICAO's SMS is similar to the RTAF's SMS. One cannot claim that the RTAF has implemented the ICAO's SMS because the two systems are the same.

## III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF implement?

The RTAF does not have an airworthiness and licensing section which are the parts of safety assurance according to the ICAO's SMS. In my opinion, the RTAF must establish these two parts as soon as possible. Otherwise, an operation of the new aircraft will be hassle.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

Yes, the RTAF is ready to apply all the elements of the ICAO's SMS to its current system. Some parts have been unofficial applied as a pilot project such as Operational Risk Management and Airworthiness.

#### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

No need to change the current system. Only make it clearer by developing all concerning manual and guidelines.

- What else should the RTAF do to prepare for implementation?

The RTAF should promote a culture of safety to the senior officers who are the commanders of units.

#### V. Parts of ICAO's SMS have not been implemented

- If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

I can estimate the budget to apply the ICAO's SMS to the current system. My estimated budget is not too much according to the current budget allocated to the RTAF Safety Center and safety programs.

## VI. Budget to implement this implementation

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

The Safety Center has been provided budget as required. Only this year, the budget has been cut due to national flooding tragedy. The government of Thailand has to allocate the budget to restore our nation. So, the budget for safety education was cut.

## Interview C

### I. The current status of the RTAF's aviation safety effort

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

I did not plan to join the RTAF's Safety Center. I did plan to be an airline pilot. So, I don't know much about safety system. I have been assigned to be aircraft accident investigator. I have done my job for only one year. In my opinion, the safety system of the RTAF is "window dressing". When the audit team comes, the unit will do anything to deceive the audit team that the system is in good situation. Everyone is working according to their job descriptions. They work only when the audit team or the commanders come to inspect them. This is happening in both operation level and administrative level. There are no procedures or manuals for jobs to follow, just do as usual. So, the RTAF's safety system is lacking standards.

- What is your concept or principle of aviation safety management?

My concept to do my duty is to follow the commander's policies.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

The RTAF did not succeed in its aviation safety as it should be. As long as true causes of the problem cannot be found, the accident will still occur.

- What elements of the RTAF's safety management system should be changed or improved?

Finding cause of the accident must be discussed. Punishment must not be part of accident investigation. If the accident occurs, the operators or pilots should be honored as they died during performing their mission. Do not rush to blame the pilots or operators. So, the involved persons will be brave to tell the truth.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS? If yes, please explain it briefly. If No, please skip to question 17.

I do not really sure that I know about this system. I would like to avoid this.

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

I am not sure about the budget. What I have heard is special equipment are sufficient for our personnel, especially personal protective equipment.

## **Interview D**

### I. The current status of the RTAF's aviation safety effort

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

At the administrative level, there is lack of coordination. All of the tasks should be integrated so that all administrators will be aware working process of others. The Safety Center

has performed its role less than is expected of other units. Therefore, the other units will prioritize safety lower than operation. Safety Officers of each unit performed their safety duty as part-time jobs. For example, the nurse from the wing's hospital was assigned to be safety officer but she still had to do her nurse duty.

- What is your concept or principle of aviation safety management?

Accident is caused by human factors so all safety programs must be performed to reduce accident caused by human factors.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

It is difficult to tell that the RTAF succeeded in its aviation safety management. However, the Safety Center has developed so much during the past 10 years. There is no concrete evidence to show that the RTAF succeeded its safety goal. Even though the accident rate of this year, 2011, is favorable with 1 case and no fatality, there is no guarantee that an accident will not happen next year as long as we could not find the real factors to reduce accident rate. Analogy with eating street vended food without having diarrhea later, but it does not mean street vended food was hygienically cooked. In general, the RTAF has not succeeded in its safety system.

- What elements of the RTAF's safety management system should be changed or improved?

Actually it is not the safety system that is the problem, coordination and information sharing among administrative unit is the first priority to be resolved.

II. The perceptions of the RTAF's Safety Officers on this implementation



- Have you ever known the ICAO's SMS? If yes, please explain it briefly. If No, please skip to question 17.

Yes, I studied the ICAO's Safety management System when I attended my Master degree at Chulalongkorn University. It is the system that ICAO requires its member states to implement this system. In this system, it comprises designed safety manager, safety audit, safety standard, and office for safety staff. It is comparable to the RTAF safety system. But it has no standard and person in charge of each element.

- In your opinion, what parts of the RTAF's SMS differ from or similar to the ICAO's SMS?

As I said, the two systems are similar, only different in the degree of implementation.

- Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how.

The RTAF will apply the ICAO's SMS anyway. Even though the ICAO's standards and recommended practices exclude military operation, the RTAF still fly in the same sky as civilians. Thus, the RTAF must follow the same rules as civilian.

- Has the RTAF implemented the ICAO's SMS yet?

No

### III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF implement?

What I have known about ICAO's SMS is not quite clear, so I have no idea what to suggest the RTAF do.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

The RTAF is not ready to implement the ICAO's SMS because higher commanders still not understand concept of modern safety system. Only some staff of the Safety Center knows about the ICAO's SMS.

#### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

To implement the ICAO's SMS, the RTAF need to change its organization's culture to be safety culture, improve or develop standards for safety, assign person to responsible for each elements, and gradually implement.

- What else should the RTAF do to prepare for implementation?

No

#### V. Parts of ICAO's SMS have not been implemented

- If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

To implement ICAO's SMS to the Air Force, big amount of budget must be provided. How big is that? It may be less than cost of accident but it is big enough to get attention from financial audit team.

#### VI. Budget to implement this implementation

- What are the advantages or disadvantages of elements of ICAO's SMS that have not been implemented?

I see only the advantages of the ICAO's SMS. If the RTAF can apply the ICAO's SMS to the current system, it will be good.

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

Yes, the budget is not a problem of the Safety Center.

## **Interview E**

### **I. The current status of the RTAF's aviation safety effort**

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

The safety system is already in place. But it is not quite effective due to unit commanders are not courageous to face the truth of accident's causes. Therefore, corrective actions are not correct because of incorrect information. In general, punishment and ranking promotion involve in commanders' decision to admit their errors. Also, it is not unity among the Safety Center's administrators.

- What is your concept or principle of aviation safety management?

To do my jobs, I follow safety regulation and try to do routine tasks. I believe that job description is good enough to follow. If all staffs of the Safety Center do their best, effectiveness of safety system will be improved.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

The RTAF succeeded in only some safety program such as safety promoting to have safety mind for student pilot. Their attitudes toward safety are in a good way. They understand Human Factors “HFAC”, SHELL model, and other safety theories.

- What elements of the RTAF’s safety management system should be changed or improved?

The system is no problem. To manage the system is the problem. Staffs of the Safety Center did not get promoted to be higher position or rank due to rotation of higher rank officer. The higher rank outsiders often took high position at the Safety Center. Therefore, morale of the insider staff dropped. Effectiveness of safety system was also dropped. Other than morale dropping, leadership is another factor affecting safety system.

## II. The perceptions of the RTAF’s Safety Officers on this implementation

- Have you ever known the ICAO’s SMS? If yes, please explain it briefly. If No, please skip to question 17.

The ICAO’s SMS is not new to me. It consists of four elements, policy, hazard identify, safety audit, and safety education.

- In your opinion, what parts of the RTAF’s SMS differ from or similar to the ICAO’s SMS?

All elements of the ICAO’s SMS are already in the RTAF’s safety system. Only documents to support each element are not sufficient. Standardization and manuals must be provided.

- Should the RTAF implement the ICAO’s SMS? If yes, please describe briefly of how.

Yes, the RTAF should improve its safety system to ICAO’s standards.

- Has the RTAF implemented the ICAO's SMS yet?

No

### III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF implement?

All of them.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

No, the RTAF is not ready to implement this system as long as the higher rank staffs of the Air Force do not understand safety concepts.

### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

Safety culture and safety mind of the high rank staffs have to be changed first. Then the current safety system will be improved.

- What else should the RTAF do to prepare for implementation?

Only attitude of the commanders towards safety needs to be changed.

### V. Parts of ICAO's SMS have not been implemented

- If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

No need to acquire more budgets. The currently allocated budget is sufficient to improve the RTAF Safety System to reach ICAO's safety standards.

#### VI. Budget to implement this implementation

- What are the advantages or disadvantages of elements of ICAO's SMS that have not been implemented?

They are all good. We only need to apply them seriously.

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

The Safety Center received budget as required.

#### **Interview F**

##### I. The current status of the RTAF's aviation safety effort

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

The RTAF is a government agency. Its organizational culture is bureaucratic. Regulations and ordinances are the principles to follow. In my opinion, I do not see any difference during the past 15 years I have worked here. However, outsiders think our safety system is better than their system. But I think we can make it better than this.

- What is your concept or principle of aviation safety management? I do follow regulations, ordinances, and government policies.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

If we are looking at accident statistics, which the rate of accident is decreasing, we can say that the RTAF succeeded in managing the safety system. However, it is difficult to use other methods to probe effectiveness or success of the safety system.

- What elements of the RTAF's safety management system should be changed or improved?

The RTAF should promote safety mind to all personnel. Commanders of the units should give safety higher priority than this.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS? If yes, please explain it briefly

I have just heard about it but I do not know what it is about. I think it might be the same system as our safety system.

## VI. Budget to implement this implementation

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

The Safety Center has been provided budget as usual. The budget is enough to run all administrative jobs and safety programs. However, budget is the problem at the operation level, which budget is somewhat related to safety system.

## **Interview G**

### I. The current status of the RTAF's aviation safety effort

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

The current safety system of the RTAF can be improved to reach international standards or other lead air forces. Tactics to implement safety system are in place but implementation is not quite successful. Senior administrators are still only looking at accident rate. They will act only when an accident occur. If a mission has been done completely, seniors officers or commander are satisfied. They have never revised process of performing a mission to find any blemish of the process. They have been waiting until an accident happens to be aware that there is a problem in safety system. Safety assurance should be implemented because there is no absolute safety in any system.

- What is your concept or principle of aviation safety management?

To conduct my duty, I have compared our system to other aviation organizations to find better ideas to improve our safety system.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

I can say the RTAF succeeded in managing safety system but I am still not satisfied with this success.

- What elements of the RTAF's safety management system should be changed or improved?

Safety culture of the RTAF is the first thing to be changed. The attitudes of middle to high rank administrators, especially ones who are involved in decision making process, toward safety are still reactive. Second, English language is also difficult for operation level personnel. Teaching them in English is useless. They can remember contents of lesson just to pass the test. Later on, they will forget whatever taught in the class. Third, competence staff is not sufficient to effectively perform our current safety system. We need to educate them more. Forth, raising



priority of safety system to be core function of the RTAF, the same as operation department or finance department. Other than that training, technology, and regulation are also important.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS?

Yes, I know the ICAO's SMS well. It is the system that ICAO developed to be used in aviation operators of its member states.

- In your opinion, what parts of the RTAF's SMS differ from or similar to the ICAO's SMS?

They are all the same. No difference between them.

- Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how.

The RTAF should definitely implement the ICAO's SMS. It will help us raise our safety standard and make our system clearer.

- Has the RTAF implemented the ICAO's SMS yet? If yes, please skip to question 14.

It is not quite implemented. The ICAO's SMS and our safety system are the same.

## III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF implement?

To make our system more effective, we should develop all concerning definitions, describe clearly all involve safety positions and units. Also assessment and action plan should be in place. Promoting staff to higher position should be based on performance.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

No, the RTAF is not ready to implement the ICAO's SMS.

#### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

There are two things that the RTAF has to prepare, one is competent personnel another one is documentation of all concerned regulations, manuals, and guidelines.

- What else should the RTAF do to prepare for implementation?

The RTAF's senior staffs should be educated with safety system. Then they will change their attitudes toward safety.

#### V. Parts of ICAO's SMS have not been implemented

If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

Budget is not a problem to implement the ICAO's SMS to the RTAF. We can adjust methods to manage allocated budget.

#### VI. Budget to implement this implementation

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

The Safety Center always receives a budget as required. Furthermore, the Safety Center can acquire more budgets if special tasks need to be performed.

## **Interview H**

### **I. The current status of the RTAF's aviation safety effort**

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

In my opinion, our safety is not quite satisfying both administrative and operation level. Safety is not important from the senior administrative point of view. Safety should be equal to or more important than operation. They are also not strict to policy. The Safety Center must be improved more than this, especially the academic division. Currently, the academic division may not perform even half of its missions. When administrative level did not hold the operation level to strict to safety regulation, they do anything to just get pass an audit. Administrative level always executes the same measures as last year. So, there is no creative safety program being executed. The Safety Center should be a leader to perform proactive safety program but many senior staff still adhere to traditional program which is reactive. The ways the Safety Center managed safety program resulted in its reputation. Other units of the RTAF see us as lack of performance. In some cases, the Chief of Staff had to bypass the Safety Center to direct operation unit to execute safety program. For example, a safety audit team leader had been assigned to the outside staff instead of the director of the Safety Center. The Chief of Staff ordered the Safety Center to revise our safety system but senior staffs of the Safety Center did not quite understand what it meant.

- What is your concept or principle of aviation safety management?

Based on my experience and background knowledge, I compared our safety system to other organization's systems. I found that our safety policy was quite vague, especially safety enforcement. Sometimes pilots had to fly even though the aircraft was not airworthy, due to lack of spare parts. There is no clear regulation for the pilots to deny performing risky operation.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

In my opinion, the RTAF succeeded with only half of its safety programs. The accidents still occur regularly so that there is a word saying that pilots will not rely on the Safety Center to help them from accident.

- What elements of the RTAF's safety management system should be changed or improved?

There are a couple of topics to be discussed to improve our safety system. Traditional safety management concepts should be changed to modern safety management concepts. The Safety Center must be the facilitator to lead operators to have a safety culture. The other element is our reactive safety system must be changed to be more proactive safety system.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS? If yes, please explain it briefly. If No, please skip to question 17.

Yes, I know about the ICAO's SMS. It has four elements. There are policy, hazard identify, safety assurance, and safety promotion. All of these elements are already in our safety regulation but they have not been used correctly at the right time and the right place.

- In your opinion, what parts of the RTAF's SMS differ from or similar to the ICAO's SMS?

They both have the same elements. The difference is our safety system is too general. If we can revise it to be more specific, our system will be standard as ICAO's SMS. Currently our regulation has detailed only 60%-70% of the whole system.

- Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how.

Yes, the RTAF should implement the ICAO's SMS.

- Has the RTAF implemented the ICAO's SMS yet?

No, we cannot say the RTAF has implemented the ICAO's SMS. Even though our current system is the same as the ICAO's SMS but it is too vague to say that they are exactly the same.

### III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF implement?

All of them should be implemented to the RTAF. Actually, we need only to improve our own system to be more specific so that it will be easy for operators to follow.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

Yes, the RTAF is ready to implement the ICAO's SMS. We have competence staffs and budgets to do that. However, we need to change our senior staffs' attitude to accept modern safety management concepts. Also we need to improve our coordination among our divisions.

### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

As I said previously, senior staffs' attitude and coordination must be changed.

- What else should the RTAF do to prepare for implementation?

If it is possible, I would like to reorganize our organizational structure. Currently, the structure is not suitable for staff members' career paths. I also need to improve working coordination by setting up brainstorming seminars every three months. However, my ideas need the Chief of the RTAF's support which I am not sure I can get.

#### V. Parts of ICAO's SMS have not been implemented

- If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

I think it will not be too much.

#### VI. Budget to implement this implementation

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

Budget for safety programs are allocated as required. Safety education budget is currently cut down due to flooding.

### **Interview I**

#### I. The current status of the RTAF's aviation safety effort

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

Currently, we have safety committee to take care of all safety issues. The committee has the Chief of Staff being a chair of the committee. Commanders of each technical unit are the member of the committee. The secretary of the committee is director of the Safety Center. However, most of the members do not understand safety system thoroughly. This is a problem of executing safety policy. Then, the chief of staff did a safety audit by himself.

- What is your concept or principle of aviation safety management?

Safety regulation is the bible for us to follow. However, it does not cover all safety issues as the ICAO's SMS. I revised our safety regulation in 2002 to make it more systematic. The ICAO's MS did not exist at that time. The regulation was revised again in 2009.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

I am satisfied with its success. However, if we put it on scale 1-10, I would rate its success as 7. All staffs are still working as routine. They are not dedicated and ambitious enough to run the system effectively. Safety officers are not properly promoted.

- What elements of the RTAF's safety management system should be changed or improved?

At the administrative level, policy has gone in the wrong direction. The policy only need mission to be completed not success. Therefore, pilots had to perform mission even though it was not safe to fly.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS?

The ICAO's SMS is similar to our current safety system.

- In your opinion, what parts of the RTAF's SMS differ from or similar to the ICAO's SMS?

They are both the same except risk management. We have not put risk management to our safety regulation yet but we are in the process of doing so.

- Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how.

Yes, the RTAF should implement the ICAO's SMS. We can just rearrange our current regulations to be in the same order as the ICAO's SMS and add more elements to it. Furthermore, another mission of the Safety Center is to develop our safety system to more of an international standard.

- Has the RTAF implemented the ICAO's SMS yet?

Not quite implemented.

### III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF implement?

We should apply all elements of the ICAO's SMS to our system because the RTAF has all aviation activities. We have aircraft operation, airport, air traffic control units, and maintenance units. So, I think the RTAF must follow the ICAO's SMS.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

The RTAF is not ready to implement the ICAO's SMS.

### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

First, we need to educate our staff about modern safety systems such as ICAO's SMS. Then operation level personnel need to be educated. However, all concerning documents must be in place before implementing the new system.



- What else should the RTAF do to prepare for implementation?

Persuading high level commanders to change their attitudes toward safety is needed to be done in order to implement the new system smoothly. We must talk the commanders to accept that safety has more priority than operation.

#### V. Parts of ICAO's SMS have not been implemented

- If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

To implement the ICAO's SMS to the RTAF, it may need more budget but not too much. We may need more personnel to responsible for new elements and budget for safety audits and education.

#### VI. Budget to implement this implementation

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

The Safety Center has been provided budget as required every year. Only this year, the budget has been cut due to flooding.

### **Interview J**

#### I. The current status of the RTAF's aviation safety effort

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

First, I would like to talk about the RTAF Safety Center organization structure. It has three divisions; academic, aviation safety, and ground safety. Academic division is responsible for safety education and training. Currently, it focuses on human factors. This topic is up to date

and suitable for the RTAF personnel. However, academic division provides them only theory, no guideline or manual. Therefore, students cannot apply it to their missions. Aviation safety division is responsible for aircraft accident prevention and investigation. Prevention is not quite effective due to lack of information. Accident investigation also has an obstacle. Technical units did not provide information to support investigation process. Ground safety division has the same missions as the aviation safety division except aircraft related issues. Since safety policy is not clear, staffs of the Safety Center perform their duty just for show to the boss.

- What is your concept or principle of aviation safety management?

My concept to perform my duty is research based execution. I always plan ahead. My work is scientific so they are required personal skills to do that.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

I think the RTAF succeeded in aviation safety system. However, effectiveness of the system is only 50%. To be positive side, it has been better than 10 years ago.

- What elements of the RTAF's safety management system should be changed or improved?

All elements of the RTAF's safety management system should be revised. Academic division should be the host to revise the system. We should have a manual or guidelines for each elements of the system.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS? If yes, please explain it briefly. If No, please skip to question 17.

I know a little bit about ICAO's SMS. I think it has many modules which are integrated into one system.

- In your opinion, what parts of the RTAF's SMS differ from or similar to the ICAO's SMS?

I am not sure. I think we may have some elements which are similar to the ICAO's SMS.

- Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how.

Yes, the RTAF should apply the ICAO's Safety Management System to its safety system. I believe the ICAO's SMS is inclusive all safety issues. However, we have to apply it seriously to make it work.

- Has the RTAF implemented the ICAO's SMS yet?

I think we already applied some elements.

### III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF implement?

It is quite blur to identify. I think we need to acquire in-depth information, set up standards, an earnest investigation.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

No, I think the RTAF is not ready to implement the ICAO's SMS to its system. The Safety Center still depends on technical units to support. Personnel and knowledge are not sufficient to apply the ICAO's SMS for now.

### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

There are three things to be changed. All three divisions must improve their coordination. The Safety Center must have an annual plan. Lastly, they have to head into the same direction.

- What else should the RTAF do to prepare for implementation?

The same as I said before.

#### V. Parts of ICAO's SMS have not been implemented

- If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

To implement the ICAO's SMS, it may need more budget but it will not be too much.

#### VI. Budget to implement this implementation

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

No, the Safety Center has not been provided budget as required. Only routine budget is allocated, but budget to get special equipment has never been provided.

### **Interview K**

#### I. The current status of the RTAF's aviation safety effort

- Please tell me briefly about the current status of the RTAF's aviation safety effort.

Since the RTAF's Safety Center has been established in 2009, general picture of safety system has been changed to be more positive. The Safety Center has been recognized and admired by the RTAF Personnel. However, we still have more things to do.

- What is your concept or principle of aviation safety management?

My concept is to perform my jobs, which are education, engineering, and enforcement. Nodaway, my division, has raised modern safety management system to be applied to the RTAF, but it is still in initial phase.

- In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?

The RTAF succeeded in its aviation safety management in some level. We still need more cooperation from all other units to make our air force safer. Safety is everyone's responsibility.

- What elements of the RTAF's safety management system should be changed or improved?

Safety education must be the first thing to be developed. Then cooperation among concerning units must be improved.

## II. The perceptions of the RTAF's Safety Officers on this implementation

- Have you ever known the ICAO's SMS?

I attended Safety Management System course at Global Air Training in England. The course is certified by CAA. Safety Management System is an integrated system. It has 10 modules which will help us to improve our proactive safety management system.

- In your opinion, what parts of the RTAF's SMS differ from or similar to the ICAO's SMS?

Our Safety Center's organization's structure covers all modules of the ICAO's SMS. We need only to implement all those modules.

- Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how.

Yes, the RTAF should implement the ICAO's SMS to its system. However, some elements of the ICAO's SMS may be difficult to apply in the RTAF. We may not be able to develop our system to be proactive and predictive.

- Has the RTAF implemented the ICAO's SMS yet?

See my answers in earlier questions

### III. The scope and depth of the implementation

- What elements of the ICAO's SMS would you suggest the RTAF implement?

I would suggest the RTAF apply module 5, risk, and module 10, approaches to SMS implementation phase to be applied to our current system.

- In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

Yes, but it takes time to implement. We should gradually educate personnel to have safety mind which is the first thing to do. We already have provided concept of the ICAO's SMS in our safety officer course.

### IV. Changes were made to start each element of the ICAO's SMS

- In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?

See question above

- What else should the RTAF do to prepare for implementation?

See question 10

V. Parts of ICAO's SMS have not been implemented

- If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?

My division may need 40,000-50,000 for safety training.

VI. Budget to implement this implementation

- Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.

Yes, we always receive budget as required.

## CHAPTER V

### SUMMARY, FINDINGS, CONCLUSION, AND RECOMMENDATION

#### **Summary**

The purpose of this study was to determine the situation and effectiveness of the safety management system currently implemented by the Royal Thai Air Force. A review of the ICAO's SMS and the RTAF's SMS was conducted to identify similarities and differences between the two safety management systems. Later, the researcher acquired safety statistics from the RTAF Safety Center to investigate effectiveness of its safety system. The researcher also collected data to identify other factors affecting effectiveness of the safety system by conducting in-depth interviews.

#### **Findings**

Comparison between the International Civil Aviation Organization's Safety Management System and the Royal Thai Air Force's Safety management System

From reviewing the ICAO's SMS and the RTAF's SMS, the researcher found that they were developed based on the same concept. This concept is from the book written by Richard H. Woods. In his book, "Aviation Safety Programs: A Management Handbook", stated that an aviation safety program should consists of eight elements. All of which are adapted to both the ICAO's SMS and the RTAF's SMS. Furthermore, his concepts about basic aviation safety and risk management are also found in both systems. The ICAO's SMS was developed based on



information given by its member states. One of the useful sources of information was Transport Canada which developed its own safety system based on Wood's concepts. The RTAF's safety system was also developed based on Wood's concepts. The RTAF safety system was developed by an officer, who attended a safety management course, which was based on Wood's concept. So, he revised the RTAF safety regulation based on concepts written in Wood's book.

Looking at the details of both systems, the researcher found that they have almost the same elements. The RTAF's SMS covers fewer topics than the ICAO's SMS. The elements of ICAO's SMS that are not indicated in the RTAF's SMS are hazard identification, risk assessment and mitigation, safety performance monitoring and measurement, the management of change, and continuous improvement of the SMS. Other than these missing elements, they both have the same elements. Comparisons between ICAO's SMS and RTAF's SMS are shown in Table 3.

Table 3. Comparison between ICAO's SMS and RTAF's SMS

Elements	ICAO's SMS (Effective 2006)	RTAF's Safety Regulation (Effective 2002)
1	Management commitment and responsibility	Safety Committees
		Safety Meeting
2	Safety accountabilities	Policy
3	Appointment of key safety personnel	Organizational Structure
		Responsibilities
4	Coordination of emergency response planning	Emergency Response Plan
5	SMS documentation	* All documents related to Safety regulation
6	Hazard identification	-
7	Risk assessment and mitigation	-
8	Safety performance monitoring and measurement	-
9	The management of change	Safety Audit
10	Continuous improvement of the SMS	Safety Analysis
		Accident Investigation
11	Training and education	Safety Training and Education
12	Safety communication	Information Distribution
		Reporting Systems
		Safety Award

## The Royal Thai Air Force's Safety Statistics Analysis

In order to determine effectiveness of the Royal Thai Air Force, the researcher acquired safety data from the RTAF Safety Center. These data were collected by the RTAF Safety Center from 2001 to 2011. The statistics provided are accident, incident, hazard report, fatality, and hull-loss. To see trend of accident and loss, the researcher has plotted a graph as shown in Figure 1 below.

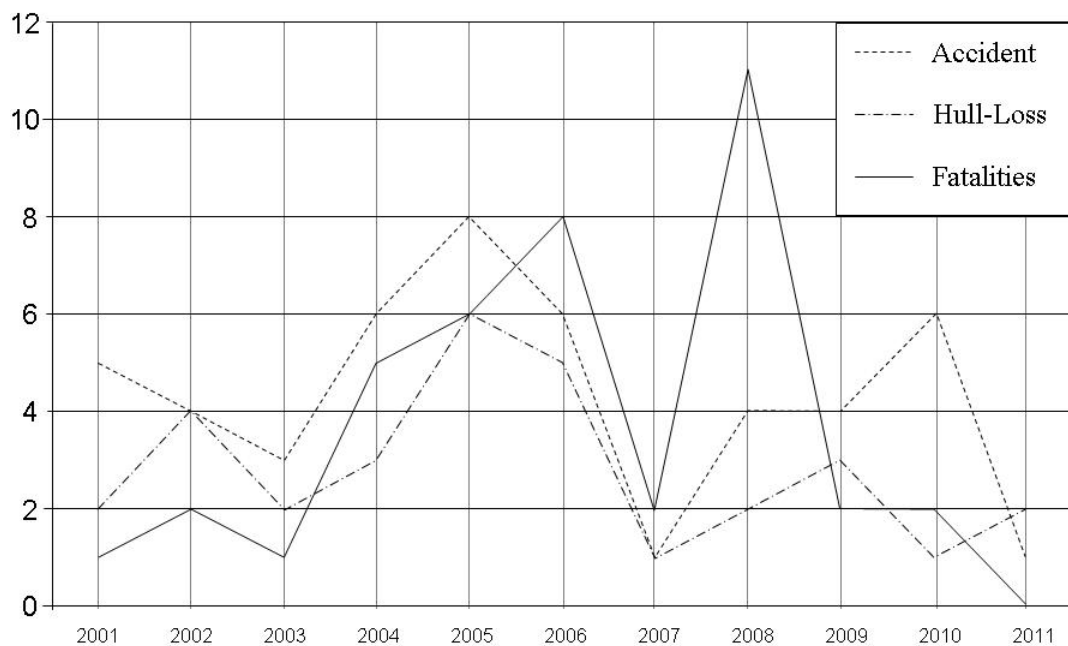


Figure 1. Accident, Fatalities, and Hull-Loss

According as shown in Figure 2, the slope of the trend line for accidents is negative. This means the accident rate is decreasing. In 2001, the RTAF had five accidents. The accidents have fluctuated from one to eight cases per year. However, its trend had been decreasing. In 2011, the RTAF had only one accident with no fatality. It is the best safety record ever.

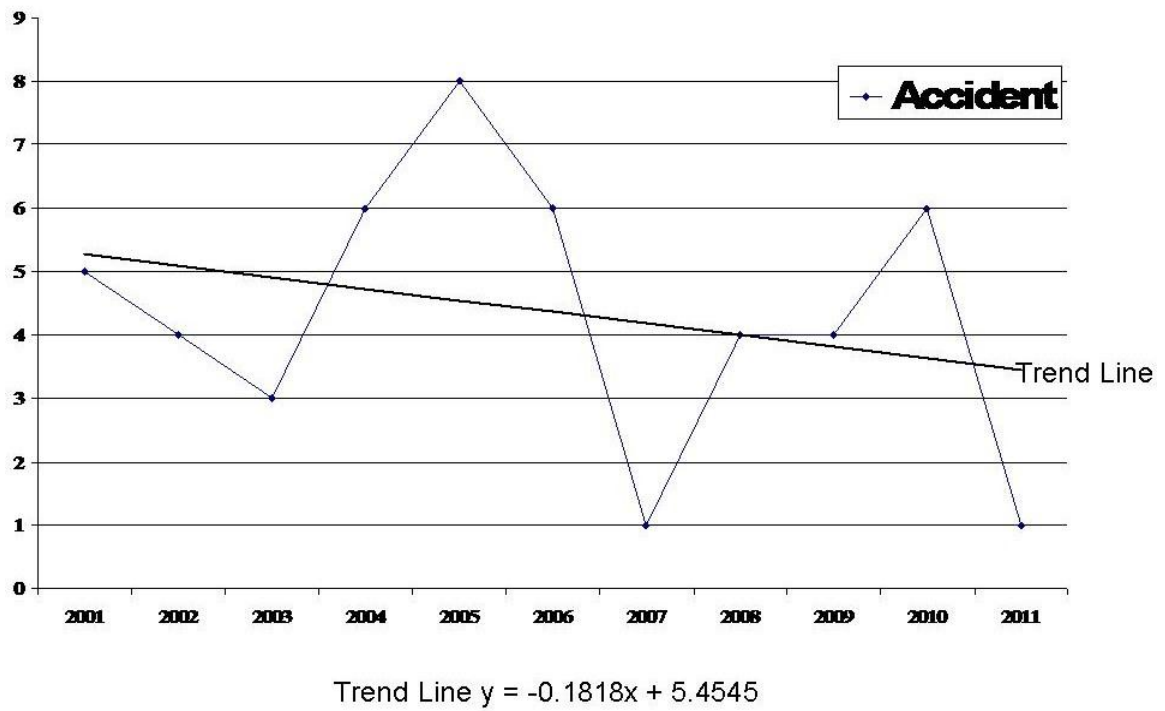


Figure 2. Accident and Trend

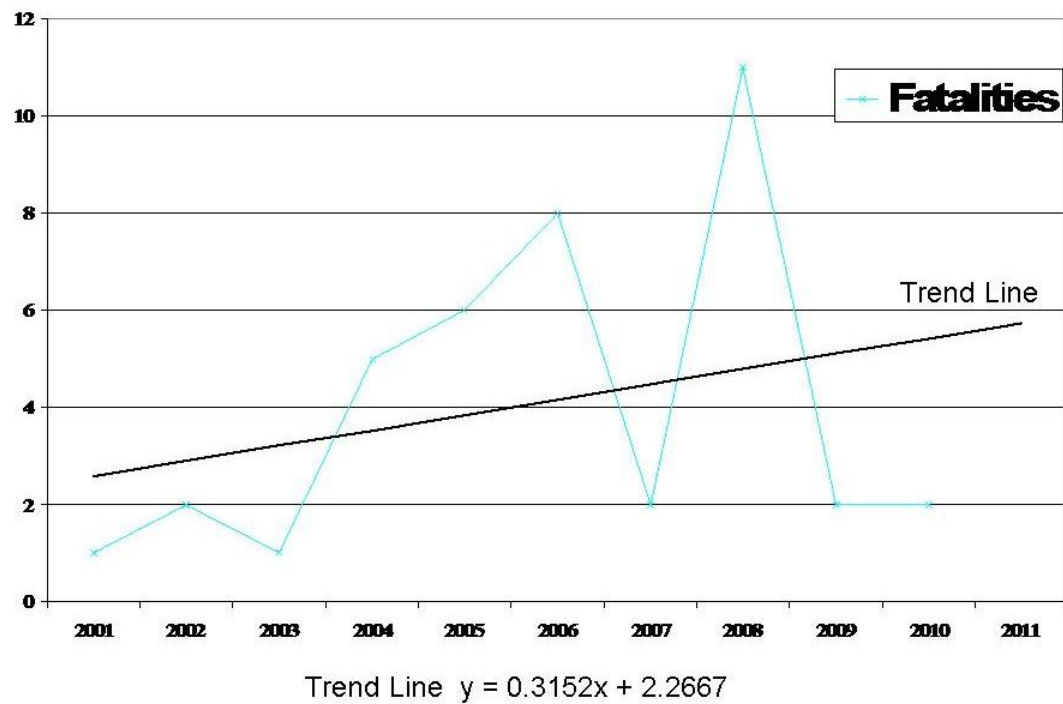


Figure 3. Fatalities and Trend

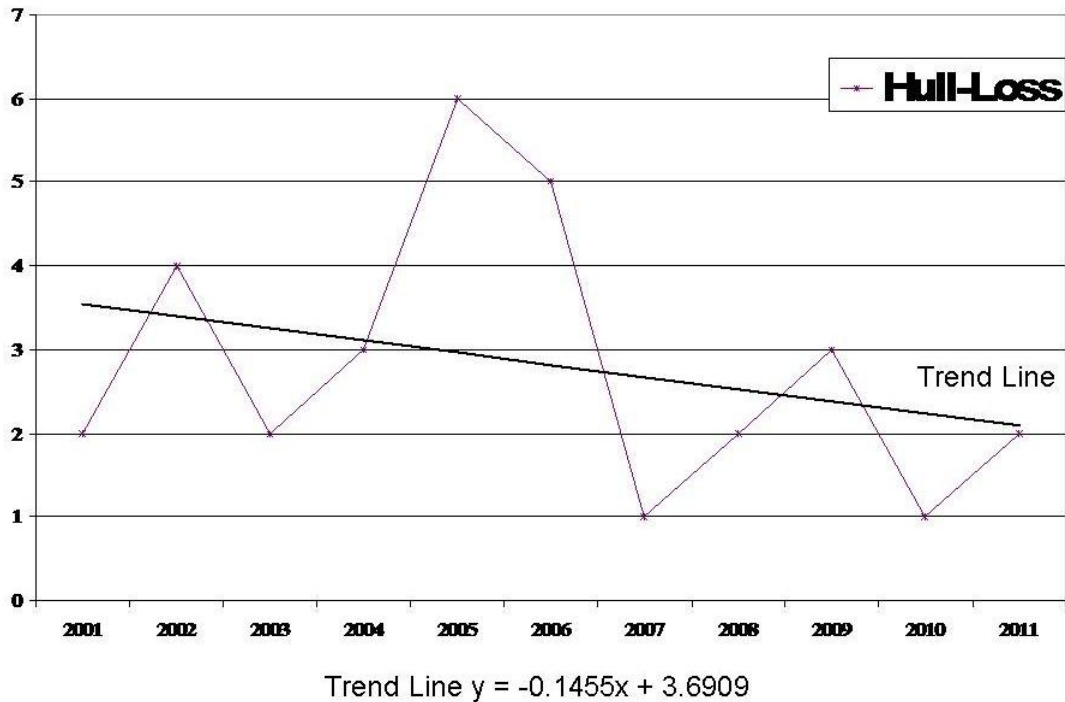


Figure 4. Hull-Loss and Trend

According to the graphs shown in Figure 2, 3, and 4, all recorded rates are decreasing except fatality. These means there were more fatalities per accident. However, statistics has shown that the RTAF safety management system is effective, it has reduced accident rate.

#### Perceptions of the Royal Thai Air Force Safety Center's Executives

The researcher conducted in-depth interviews with the RTAF Safety Center's senior staff members to probe their perceptions toward safety system. The researcher created 17 semi-structured questions to interview participants. The researcher sent e-mails to recruit 24 potential target participants, 11 participants replied back and agreed to join this study (As shown in Appendix D). The researcher interviewed them in the Thai language and transcribed their responses into English. Their responses are summarized as follow.

The current status of the RTAF's aviation safety effort

Most of participants agreed that the RTAF's safety system is in good position, but some participants stated that they were not quite satisfied with the current effort. The safety system could be made better. Most of participants adhered to the RTAF's safety regulations as their principle guide to conduct their duties. However, they all agreed that the obstacle to improve the safety system is better cooperation among the Safety Center's staff, senior commanders' negative attitude toward safety, and lack of clear written manuals regarding safety guidelines.

With regard to participants' perceptions toward the International Civil Aviation Organization's Safety Management System, only 4 out of 11 participants were able to briefly describe the ICAO's SMS and identify the similarities and differences between the two systems. All of them agreed that the RTAF should implement the ICAO's SMS. They believed that the RTAF will not spend too much effort to apply the ICAO's SMS in its safety program.

## **CONCLUSION**

The study was intended to discover the effectiveness of the International Civil Aviation Organization's Safety Management System as implemented in the Royal Thai Air Force. The researcher also investigated other factors affecting the effectiveness of the implementation including scope and depth of the implementation, parts of ICAO's SMS that have not been implemented, the perceptions of the RTAF Safety Center's administrators on this implementation, changes made to start each element of the ICAO's SMS, and budget needed to implement the ICAO's SMS.

The study shows that the Royal Thai Air Force has never applied the International Civil Aviation Organization's Safety management System in its safety program. However, it was found that the RTAF's SMS and the ICAO's SMS were developed based on the same concepts. These concepts are from Richard H. Wood's book, Aviation safety programs: A management handbook.

However, the effectiveness of the Royal Thai Air Force's safety system according to the participants is in good stance. The accident rate has been decreasing regularly but there are no known factors to describe the increasing rate, according to the participants' opinions. The participants, however, stated that there are many issues yet to be resolved to improve the RTAF's safety system. Those issues are cooperation among safety center's staffs, attitude toward safety of the RTAF senior commanders, and safety standards.

### **Recommendations**

The current safety system of the Royal Thai Air Force is successful. However, it can be improved to be more effective. To do so, the RTAF Safety Center should:

1. Provide sufficient safety education to all RTAF's personnel to change their attitude toward safety.
2. Establish safety standards and develop safety manuals so that the operators will have clear guidelines to follow.
3. Apply hazard identification, risk assessment and mitigation, and safety performance monitoring and measurement to the current safety system.
4. Improve cooperation among the staffs of the Safety Center.

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## APPENDICES

## Appendix A

### Letter asking Permission and Consent Form

#### Letter asking Permission

March 11, 2012

To Director of the Royal Thai Air Force Safety Center:

I am pursuing my Doctor of Education in Aviation and Space Science, at Oklahoma State University, with a research emphasis on Aviation Safety, and in order to complete the requirements of my studies, I have to complete a doctoral dissertation. My dissertation research topic is to evaluate the safety management system implemented by the Royal Thai Air Force. To collect data, I will conduct in-depth interviews with executives of the Royal Thai Air Force's Safety Center. Therefore, I need your permission to interview your subordinates as well as release of concerning documents. The data collection will take place from March to April 2012.

If you have any question or concerns, please feel free to contact me either by phone at +1 405-334-3337 or email me at [sakkarin.chaiwan@okstate.edu](mailto:sakkarin.chaiwan@okstate.edu)

Sincerely,

Wing Commander Sakkarin Chaiwan, RTAF  
Oklahoma State University, Graduate Student

Approved by:

Dr. Steven K. Marks, Professor

Doctoral Dissertation Advisor  
Aviation and Space Education  
Collage of Education  
Oklahoma State University  
300 N.Cordell Hall  
Stillwater, OK 74074  
USA  
Tel. +1 405-744-8125  
E-Mail [steve.marks@okstate.edu](mailto:steve.marks@okstate.edu)

Permitted



Sompol Poontaveethom, AVM

Director of the Royal Thai Air Force Safety Center  
Donmuang  
Bangkok  
Thailand 10210  
Tel. +66811731517  
E-Mail [sompoln\\_p@rtaf.mi.th](mailto:sompoln_p@rtaf.mi.th)  
[sompolrtaf@yahoo.com](mailto:sompolrtaf@yahoo.com)

## **Consent Form**

Project Title: Evaluation and Review of the Safety Management System Implementation in the Royal Thai Air Force

Investigator: Wing Commander Sakkarin Chaiwan, RTAF  
Oklahoma State University

Purpose: The purpose of this research study is:

- to evaluate the implementation of Safety Management System in the Royal Thai Air Force
- to obtain executive opinions with regard to characteristics, scope and depth of each SMS's elements that the RTAF has applied

Procedures:

- You are asked to participate in an interview about your perception of the RTAF safety management system. The interview should last no more than 40 minutes.
- The interview will be conducted via voice over internet protocol, VOIP, at a convenient time for the participant.
- The researcher will conduct in-depth interviews with participants during March-April 2012.
- If there are any follow-up questions, interviews will be set during April, 2012.

Risks of Participation:

There are no known risks associated with this project which are greater than those ordinarily encountered in daily life.

Benefits: The researcher will provide a copy of the results of this research study to the participants for their use.

Confidentiality:

The interviews will be recorded in digital format and stored as "Interview A, B, C, etc" to protect participant's anonymity. The records will be stored in the researcher's external hard drive in the locked drawer that only the researcher has access. The records will be transcribed by the researcher and kept for recheck until this study is finished. After finishing this study, both records and transcriptions will be destroyed. The data from this research will be reported as anonymous opinions.

Compensation: There is no compensation for your participation in this research.

**Contacts:** If you have any question or concerns, please feel free to contact me either by phone at +1 (405)-334-3337 or email me at [sakkarin.chaiwan@okstate.edu](mailto:sakkarin.chaiwan@okstate.edu) or Dr. Steve K. Marks at +1(405) 744-8125 email [steve.marks@okstate.edu](mailto:steve.marks@okstate.edu)  
If you have questions about your rights as a research volunteer, you may contact the Oklahoma State University Institutional Review Board (IRB) Chair, Dr. Shelia Kennison at 219 Cordell North, Stillwater, OK 74078, 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu).

**Participant Rights:**

Participation in this research is voluntary; there is no penalty for refusal to participate. The participants can withdraw the consent and participation in this project at any time.

**Consent:** By replying to this email: [sakkarin.chaiwan@okstate.edu](mailto:sakkarin.chaiwan@okstate.edu), I hereby give consent to participate in this research study.

**Thai translations of consent form**

**ใบแบบให้ความยินยอม**

หัวข้อการวิจัย: การประเมินและการทบทวนการประยุกต์ใช้ระบบบริหารนิรภัยการบินในกองทัพอากาศ

ผู้ดำเนินการวิจัย: นาวาอากาศโท ศักรินทร์ ไชยวาน

มหาวิทยาลัย Oklahoma State University

วัตถุประสงค์ของการวิจัย: การศึกษาวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ

- ประเมินการประยุกต์ใช้ระบบบริหารนิรภัยการบินในกองทัพอากาศ
- ศึกษาความคิดเห็นของผู้บริหารของสำนักงานนิรภัยทหารอากาศที่มีต่อการประยุกต์ใช้ระบบบริหารนิรภัยการบินในกองทัพอากาศ

**ขั้นตอนการดำเนินการ:**

- ท่านจะได้รับการสัมภาษณ์ในหัวข้อเกี่ยวกับความรู้และความคิดเห็นของท่านที่มีต่อการประยุกต์ใช้ระบบบริหารนิรภัยการบินในกองทัพอากาศ การสัมภาษณ์ครั้งนี้จะใช้เวลาไม่เกิน ๔๐ นาที
- การสัมภาษณ์จะทำผ่านระบบโทรศัพท์อินเทอร์เน็ตในวันและเวลาที่ท่านสะดวก
- การสัมภาษณ์จะมีขึ้นระหว่างเดือน มีนาคม – เมษายน ๒๕๕๕

- หากมีข้อมูลที่ต้องติดตามผล ผู้วิจัยจะติดต่อท่านเพื่อขอทราบผลในระหว่างเดือนเมษายน ๒๕๕๕

ความเสี่ยงในการเข้าร่วมในการวิจัยครั้งนี้:

- การวิจัยครั้งนี้ไม่มีอันตรายหรือความเสี่ยงที่มากกว่าอันตรายหรือความเสี่ยงที่มีในชีวิตประจำวัน

ประโยชน์ในการเข้าร่วมในการวิจัย:

- ผู้วิจัยจะมอบสำเนาผลการวิจัยครั้งนี้เพื่อใช้ประโยชน์ในการปฏิบัติงานของท่าน

การปกป้องข้อมูลส่วนบุคคล

- การสัมภาษณ์จะถูกบันทึกเป็นไฟล์ดิจิทัลและจัดเก็บในรูปแบบ “การสัมภาษณ์ A, B, C, เป็นต้น” เพื่อรักษาความลับของผู้ให้สัมภาษณ์ ไฟล์ดิจิทัลจะถูกเก็บไว้ในฮาร์ดดิสก์ภายนอกและเก็บไว้ในตู้ที่มีเพียงผู้วิจัยเท่านั้นที่สามารถเปิดดูได้ ผลการสัมภาษณ์จะถูกเรียบเรียงและแปลโดยผู้วิจัยและจะถูกทำลายเมื่อการวิจัยนี้เสร็จสิ้นลง ข้อมูลจากการสัมภาษณ์จะถูกนำเสนอโดยไม่เปิดเผยชื่อผู้ให้สัมภาษณ์

สิ่งตอบแทน:

- การเข้าร่วมในการวิจัยครั้งนี้ ผู้วิจัยไม่มีสิ่งใดตอบแทนท่านนอกจากความขอบคุณเป็นอย่างสูง

การติดต่อ:

- หากท่านมีข้อสงสัยหรือคำถามที่เกี่ยวกับการวิจัยในครั้งนี้ ท่านสามารถติดต่อผู้วิจัยได้ที่โทรศัพท์หมายเลข +๑ (๔๐๕) - ๓๓๔ - ๓๓๓๗ อีเมล [sakkarin.chaiwan@okstate.edu](mailto:sakkarin.chaiwan@okstate.edu) หรือ ดอกเตอร์ สตีฟ เค มาร์กส์ ที่โทรศัพท์หมายเลข +๑ (๔๐๕) - ๗๔๔ - ๘๑๒๕ อีเมล [steve.marks@okstate.edu](mailto:steve.marks@okstate.edu) หากท่านมีข้อสงสัยหรือมีคำถามเกี่ยวกับสิทธิของท่านในการวิจัยครั้งนี้ ท่านสามารถ

ติดต่อคณะกรรมการตรวจสอบการวิจัย (Institute Review Board: IRB) ผ่าน  
ประธานคณะกรรมการ ดอกเตอร์ เซเลีย เคนนิสสัน ที่อยู่ ๒๑๙ คอร์ทเดเลนอร์ท  
เมืองสตีลวอเตอร์ รัฐโอกลาโฮมา สหรัฐอเมริกา ที่โทรศัพท์หมายเลข +๑ (๔๐๕) –  
๗๔๔ – ๓๓๗๗ อีเมล [irb@okstate.edu](mailto:irb@okstate.edu)

สิทธิ์ของท่านในการวิจัยครั้งนี้:

- การเข้าร่วมในการวิจัยของท่านครั้งนี้เป็นไปโดยสมัครใจ ไม่มีการลงโทษใดๆ หาก  
ท่านปฏิเสธการเข้าร่วม ท่านสามารถถอนตัวออกจากการวิจัยครั้งนี้ได้ตลอดเวลา

การให้ความยินยอม:

- โดยการตอบกลับอีเมลนี้ ข้าพเจ้ายินดีเข้าร่วมในการวิจัย

## **Appendix B**

### **Semi-structured questions for in-depth interviews**

The researcher developed the questions for in-depth interviews. The questions were meant to probe participants' perception in the RTAF safety management system. They were also designed as a tool to assess the effectiveness of each element of safety management system. Where questions led to a yes/no answer, the researcher asked the participants for further explanation. Some participants provided case examples to support their opinions.

The questions were arranged respectively to the ICAO's SMS elements as follows:

#### **I. The current status of the RTAF's aviation safety effort**

1. Please tell me briefly about the current status of the RTAF's aviation safety effort.
2. What is your concept or principle of aviation safety management?
3. In your opinion, did the RTAF succeed in its aviation safety management in the past 10 years?
4. What elements of the RTAF's safety management system should be changed or improved?

#### **II. The perceptions of the RTAF's Safety Officers on this implementation**

5. Have you ever known the ICAO's SMS? If yes, please explain it briefly. If No, please skip to question 17.
6. In your opinion, what parts of the RTAF's SMS differ from or similar to the ICAO's SMS?
7. Should the RTAF implement the ICAO's SMS? If yes, please describe briefly of how to do.
8. Has the RTAF implemented the ICAO's SMS yet? If yes, please skip to question 14.

### **III. The scope and depth of the implementation**

9. What elements of the ICAO's SMS would you suggest the RTAF to implement?
10. In your opinion, is the RTAF ready to implement the ICAO's SMS? If yes, why do you think so?

### **IV. Changes were made to start each element of the ICAO's SMS**

11. In order to implement the ICAO's SMS, what changes of the current RTAF's SMS should be made?
12. What else should the RTAF do to prepare for implementation?

### **V. Parts of ICAO's SMS have not been implemented**

13. If you are not aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS should be acquired?
14. If you are aware that the RTAF has already implemented the ICAO's SMS, What elements of ICAO's SMS have not been implemented?

### **VI. Budget to implement this implementation**

15. What are the advantages or disadvantages of elements of ICAO's SMS that have not been implemented?
16. If you are aware that the RTAF has already implemented the ICAO's SMS, what the budget for implementation the ICAO's SMS has been acquired?
17. Has the Safety Center of the RTAF been provided sufficient budget to run its aviation safety system? If no, please describe how the Safety Center overcame the budget difficulty.



### Thai Translation of the Semi-structured questions for in-depth interviews

1. การดำเนินงานนิรภัยในปัจจุบันทำอะไร
2. หลักคิดในการดำเนินงานนิรภัยคืออะไร
3. ในความเห็นของท่าน ในรอบ ๑๐ ปีที่ผ่านมา ทอ.ประสบความสำเร็จในการดำเนินงานด้านนิรภัยหรือไม่
4. ควรมีการปรับปรุงการดำเนินงานนิรภัยในด้านใดบ้าง
5. ท่านรู้จัก ICAO's SMS หรือไม่ ถ้ารู้จัก กรุณาอธิบายเกี่ยวกับ ICAO's SMS สั้นๆ เท่าที่ท่านทราบ
6. ในความเห็นของท่าน ท่านคิดว่าส่วนของ RTAF's SMS ที่แตกต่าง หรือ เหมือนกันกับ ICAO's SMS
7. ท่านคิดว่า ทอ.ควรประยุกต์ใช้ ICAO's SMS หรือไม่ เพราะเหตุใด หากสมควรประยุกต์ใช้ ICAO's SMS ทอ.ต้องดำเนินการอย่างไร
8. ในความเห็นของท่าน ท่านคิดว่า ทอ.มีความพร้อมที่จะดำเนินการตาม ICAO's SMS หรือไม่ หากท่านคิดว่า ทอ.มีความพร้อม ทำไมท่านจึงคิดเช่นนั้น
9. ทอ.ควรจะได้ประยุกต์ใช้ ICAO's SMS หรือยัง
10. ส่วนใดของ ICAO's SMS ที่ท่านเห็นว่า ทอ.ควรนำมาประยุกต์ใช้
11. ทอ.ควรปรับปรุงระบบนิรภัยเดิมอย่างไรบ้างเพื่อประยุกต์ใช้ ICAO's SMS
12. ทอ.ควรทำอะไรอีกบ้างเพื่อเตรียมความพร้อมในการประยุกต์ใช้ ICAO's SMS
13. ถ้าท่านคิดว่า ทอ.ได้ประยุกต์ใช้ ICAO's SMS แล้ว ท่านคิดว่ามีส่วนใดของ ICAO's SMS ที่ ทอ.ยังไม่ได้ประยุกต์ใช้
14. ข้อดีข้อเสียของ ICAO's SMS ในส่วนที่ ทอ.ยังไม่ได้ประยุกต์ใช้ มีอะไรบ้าง
15. ถ้าท่านคิดว่า ทอ.ยังไม่ได้ประยุกต์ใช้ ICAO's SMS แล้ว ท่านคิดว่า ทอ.ต้องใช้งบประมาณเท่าใดในการประยุกต์ใช้ ICAO's SMS
16. ถ้าท่านคิดว่า ทอ.ได้ประยุกต์ใช้ ICAO's SMS แล้วท่านทราบหรือไม่ว่า ทอ.ใช้งบประมาณเท่าใดในการประยุกต์ใช้ ICAO's SMS
17. สำนักงานนิรภัยทหารอากาศได้รับงบประมาณตามที่ร้องขอหรือไม่ หากไม่ กรุณาอธิบายว่า สนภ. ทอ.ดำเนินงานที่ผ่านมาได้อย่างไร

## Appendix C

### Draft of the email to be sent with the consent forms to potential participants

#### English Version

Asking to interview for research study

Dear.....

My name is Sakkarin Chaiwan, a doctoral student at Oklahoma State University. I am conducting a research emphasis on Aviation Safety to fulfill curriculum requirements. I would like to ask you to participate in in-depth interviews for this research study. If you agree to participate in the interview, please kindly reply this email along with your convenience date and time for the interview (Thailand time).

Wing Commander Sakkarin Chaiwan, RTAF

Graduate student

Oklahoma State University

#### Thai Version

เรื่อง ขอสัมภาษณ์เพื่อประกอบการวิจัย

เรียน .....

กระผมนาวาอากาศโท ศักกรินทร์ ไชยวาน นักศึกษาปริญญาเอกที่มหาวิทยาลัยโอกลาโฮมาสเตท ยูนิเวอร์ซิตี กำลังดำเนินการวิจัยเรื่อง การประเมินและการทบทวนการประยุกต์ใช้ระบบบริหารนิตยการบินในกองทัพอากาศ เพื่อประกอบการศึกษาหลักสูตรบริหารนิตยการบิน กระผมมีความประสงค์จะขอ สัมภาษณ์ท่านเพื่อประกอบการวิจัยในครั้งนี้ หากท่านยินยอมให้การสัมภาษณ์ กรุณาตอบกลับอีเมลนี้ พร้อม วัน/เวลา (เวลาประเทศไทย) ที่ท่านสะดวกให้สัมภาษณ์

น.ท.ศักกรินทร์ ไชยวาน

นักศึกษาระดับปริญญาเอก

มหาวิทยาลัยโอกลาโฮมาสเตท ยูนิเวอร์ซิตี

## Appendix D

### Oklahoma State University Institutional Review Board

Date: Friday, March 16, 2012  
IRB Application No ED1261  
Proposal Title: Evaluation and Review of the Safety Management System Implementation in the Royal Thai Air Force  
Reviewed and Processed as: Exempt

**Status Recommended by Reviewer(s): Approved Protocol Expires: 3/15/2013**

Principal Investigator(s):

Sakkarin Chaiwan	Steven Marks
16 N. Univ. Pl. Apt. #8	309 Cordell North
Stillwater, OK 74075	Stillwater, OK 74078

---

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,



Shelia Kennison, Chair  
Institutional Review Board

## Draft of the email to be sent with the consent forms to potential participants

### Thai version

ขอสัมภาษณ์เพื่อประกอบการวิจัย

เรียน.....

กระผม น.ท.ศักรินทร์ ไชยวาน กำลังดำเนินการวิจัยเรื่อง ระบบบริหารนิรภัยของกองทัพอากาศ เพื่อประกอบการศึกษาหลักสูตรบริหารการบิน ณ มหาวิทยาลัย Oklahoma State University กระผมมีความประสงค์จะขอสัมภาษณ์ท่านเพื่อประกอบการวิจัยในครั้งนี้ หากท่านยินดีให้การสัมภาษณ์ กรุณาตอบกลับอีเมลนี้ พร้อมทั้งวัน/เวลา (เวลาประเทศไทย) ที่ท่านสะดวกให้สัมภาษณ์ ขอแสดงความนับถือ  
น.ท.ศักรินทร์ ไชยวาน  
นักศึกษาระดับปริญญาเอก  
มหาวิทยาลัย Oklahoma State University

### English Version

Asking to interview for research study

Dear.....

My name is Sakkarin Chaiwan, a doctoral student at Oklahoma State University. I am conducting a research emphasis on Aviation Safety to fulfill curriculum requirements. I would like to ask you to participate in in-depth interviews for this research study. If you agree to participate in the interview, please kindly reply this email along with your convenience date and time for the interview (Thailand time).  
Wing Commander Sakkarin Chaiwan, RTAF  
Graduate student  
Oklahoma State University

Okla. State Univ.
IRB
Approved <u>3/16/12</u>
Expires <u>3/15/13</u>
IRB # <u>ED-12-01</u>

### Consent Form

Project Title: Evaluation and Review of the Safety Management System Implementation in the Royal Thai Air Force

Investigator: Wing Commander Sakkarin Chaiwan, RTAF  
Oklahoma State University

Purpose: The purpose of this research study is:

- to evaluate the implementation of Safety Management System in the Royal Thai Air Force
- to obtain executive opinions with regard to characteristics, scope and depth of each SMS's elements that the RTAF has applied

Procedures:

- You are asked to participate in an interview about your perception of the RTAF safety management system. The interview should last no more than 40 minutes.
- The interview will be conducted via voice over internet protocol , VOIP, at a convenient time for the participant.
- The researcher will conduct in-depth interviews with participants during March-April 2012.
- If there are any follow-up questions, interviews will be set during April, 2012.

Risks of Participation:

There are no known risks associated with this project which are greater than those ordinarily encountered in daily life.

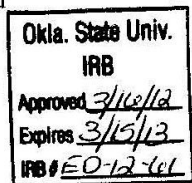
Benefits: The researcher will provide a copy of the results of this research study to the participants for their use.

Confidentiality:

The interviews will be recorded in digital format and stored as "Interview A, B, C, etc" to protect participant's anonymity. The records will be stored in the researcher's external hard drive in the locked drawer that only the researcher has access. The records will be transcribed by the researcher and kept for recheck until this study is finished. After finishing this study, both records and transcriptions will be destroyed. The data from this research will be reported as anonymous opinions.

Compensation: There is no compensation for your participation in this research.

Contacts: If you have any question or concerns, please feel free to contact me either by phone at +1 (405)-334-3337 or email me at sakkarin.chaiwan@okstate.edu. or Dr. Steve K. Marks at +1(405) 744-8125 email steve.marks@okstate.edu



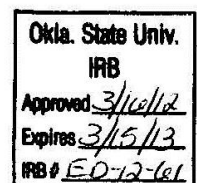
If you have questions about your rights as a research volunteer, you may contact the Oklahoma State University Institutional Review Board (IRB) Chair, Dr. Shelia Kennison at 219 Cordell North, Stillwater, OK 74078, 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu).

**Participant Rights:**

Participation in this research is voluntary; there is no penalty for refusal to participate. The participants can withdraw the consent and participation in this project at any time.

**Consent:**

By replying to this email: [sakkarin.chaiwan@okstate.edu](mailto:sakkarin.chaiwan@okstate.edu), I hereby give consent to participate in this research study.



## Thai translations of the consent form

ใบแบบให้ความยินยอม

หัวข้อการวิจัย : การประเมินและทบทวนการประยุกต์ใช้ระบบบริหารนิรภัยการบินในกองทัพอากาศ

ผู้ดำเนินการวิจัย : นาวาอากาศโท สักกรินทร์ ไชยวาน

มหาวิทยาลัย Oklahoma State University

วัตถุประสงค์การวิจัย : การศึกษาวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ

- ประเมินการประยุกต์ใช้ระบบบริหารนิรภัยการบินในกองทัพอากาศ
- ศึกษาความคิดเห็นของผู้บริหารของสำนักงานบริหารการอากาศที่ต่อการประยุกต์ใช้ระบบบริหารนิรภัยการบินในกองทัพอากาศ

ขั้นตอนการดำเนินการ :

- ท่านจะได้รับการสัมภาษณ์ในหัวข้อเกี่ยวกับความรู้และความคิดเห็นของท่านที่มีต่อการประยุกต์ใช้ระบบบริหารนิรภัยการบินในกองทัพอากาศ การสัมภาษณ์ครั้งนี้ใช้เวลาไม่เกิน ๔๐ นาที
- การสัมภาษณ์จะผ่านระบบโทรศัพท์อินเทอร์เน็ตในวันและเวลาที่ท่านสะดวก
- การสัมภาษณ์จะมีขึ้นระหว่างเดือน มีนาคม – เมษายน ๒๕๕๕
- หากมีข้อมูลที่ต้องติดตามผล ผู้วิจัยจะติดต่อท่านเพื่อขอทราบผลในระหว่างเดือนเมษายน ๒๕๕๕

ความเสี่ยงในการเข้าร่วมในการวิจัยครั้งนี้ :

- การวิจัยครั้งนี้ไม่มีอันตรายหรือความเสี่ยงที่มากไปกว่าอันตรายหรือความเสี่ยงที่มีในชีวิตประจำวัน

ประโยชน์ในการเข้าร่วมในการวิจัย :

- ผู้วิจัยจะมอบสำเนาผลการวิจัยครั้งนี้เพื่อใช้ประโยชน์ในการปฏิบัติงานของท่าน

การรักษาความเป็นส่วนตัว :

- การสัมภาษณ์จะถูกบันทึกเป็นไฟล์ดิจิทัลและจัดเก็บในรูปแบบ “การสัมภาษณ์ A, B, C, เป็นต้น”

เพื่อรักษาความลับของผู้ให้สัมภาษณ์

ไฟล์ดิจิทัลจะถูกเก็บไว้ในฮาร์ดดิสก์ภายนอกและเก็บไว้ในตู้ที่มีเพียงผู้วิจัยเท่านั้นที่สามารถเปิดดูได้

ผลการสัมภาษณ์จะถูกเรียบเรียงและแปลโดยผู้วิจัย และจะถูกทำลายเมื่อการวิจัยนี้เสร็จสิ้นลง

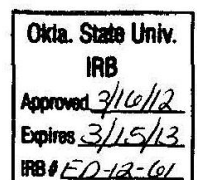
ข้อมูลจากการสัมภาษณ์จะถูกนำเสนอโดยไม่เปิดเผยชื่อผู้ให้สัมภาษณ์

สิ่งตอบแทน :

- การเข้าร่วมในการวิจัยครั้งนี้ ผู้วิจัยไม่มีสิ่งใดตอบแทนท่าน นอกจากความขอบคุณเป็นอย่างสูง

การติดต่อ :

- หากท่านมีข้อสงสัยหรือคำถามเกี่ยวกับการวิจัยในครั้งนี้ ท่านสามารถติดต่อกระผมได้ที่โทรศัพท์หมายเลข +๑ (๔๐๕)-๓๓๔-๓๓๓๓ อีเมล [sakkarin.chaiwan@okstate.edu](mailto:sakkarin.chaiwan@okstate.edu) หรือ ดอกเตอร์ สตีฟ เค มาร์กส์ ที่โทรศัพท์หมายเลข +๑ (๔๐๕)-๖๔๔-๘๑๒๕ อีเมล [steve.marks@okstate.edu](mailto:steve.marks@okstate.edu) หากท่านมีข้อสงสัยหรือคำถามเกี่ยวกับสิทธิของท่านในการวิจัยครั้งนี้



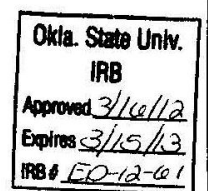
ท่านสามารถติดต่อคณะกรรมการตรวจสอบการวิจัย (IRB) ผ่านประธานคณะกรรมการ คอกเตอร์ เซเลีย  
เคนนิสสัน ที่อยู่ ๒๑๕ คอร์ทแลนด์ เมืองสตีลวอเตอร์ รัฐโอกลาโฮมา สหรัฐอเมริกา ที่โทรศัพท์หมายเลข  
+๑ (๔๐๕)-๗๔๔-๓๓๗๗ อีเมล irb@okstate.edu

สิทธิของท่านในการวิจัยครั้งนี้ :

- การเข้าร่วมในการวิจัยของท่านครั้งนี้เป็นไปโดยสมัครใจ ไม่มีการลงโทษใด ๆ หากท่านปฏิเสธการเข้าร่วม  
ท่านสามารถถอนตัวออกจากการวิจัยครั้งนี้ได้ตลอดเวลา

การให้ความยินยอม :

โดยการตอบกลับอีเมลนี้ ข้าพเจ้ายินดีเข้าร่วมในการวิจัย





## VITA

Sakkarin Chaiwan

Candidate for the Degree of

Doctor of Education

Thesis: EVALUATION AND REVIEW OF THE SAFETY MANAGEMENT  
SYSTEM IMPLEMENTATION IN THE ROYAL THAI AIR FORCE

Major Field: Aviation and Space Science

Biographical:

Education:

Completed the requirements for the Doctor of Education in Aviation and Space Science at Oklahoma State University, Stillwater, Oklahoma in May, 2015.

Completed the requirements for the Master of Science in Aviation Safety at Central Missouri State University, Warrensburg, Missouri, in 2003.

Completed the requirements for the Bachelor of Science in Electrical Engineering at the Royal Thai Air Force Academy, Bangkok, Thailand in 1997.

Experience:

Pilot	1997-1998
Instructor Pilot at Kampangsean AFB, RTAF	1999
Academic Officer at Directorate of Air Inspection, RTAF	2000
Deputy Chief of Academic Branch	2005
Chief of Aircraft Accident	2007- to date

Professional Memberships: -