2022-07

ASSESSMENT OF SAFETY MANAGEMENT SYSTEM PERFORMANCE AT ADDISABABA BOLE INTERNATIONAL AIRPORT

GIRMA, MISGANAW

ASSESSMENT OF SAFETY MANAGEMENT SYSTEM PERFORMANCE AT ADDISABABA BOLE INTERNATIONAL AIRPORT

A THESIS SUBMITTED TO THE GRADUATE SCHOOL OF RESEARCH AND GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF INDUSTRIAL MANAGEMENT.

SUBMITED BY: GIRMA MISGANAW

ADVISOR: BEREKET HAILE (PhD)

July 2022
Bahir Dar, Ethiopia

DECLARATION

I, the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have acknowledged and refereed all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation/ fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the University and can also evoke penal action from the sources which have not been properly cited or acknowledged.

Prepared by: Name GIRMA MISGANAW Signature_____Date /_____/____

Place: Bahir Dar

This thesis has been submitted for examination with my approval as a university advisor.

Advisor Name: _____

Advisor's Signature: _____

Bahir Dar University

Bahir Dar Institute of Technology-

School of Research and Graduate Studies

Faculty of Mechanical and Industrial Engineering

THESIS APPROVAL

Prepared by; Name Girma Misganaw Signature_____Date /____/____

The following graduate faculty members certify that this student has successfully presented the necessarily written thesis proposal and oral presentation of this research for partial fulfillment of the thesis-option requirements for the Degree of Master of Science in Industrial Management.

Approved by:

Advisor; Name_____Signature_____Date ____/____/____

External Examiner; Name_____Signature_____Date____/____/____

Internal Examiner; Name_____Signature_____Date____/____/____

Chair Holder; Name_____Signature_____Date____/____/____

Faculty Dean; Name_____Signature_____Date____/____/____

BAHIR DAR UNIVERSITY

BAHIR DAR INSTITUTE OF TECHNOLOGY

SCHOOL OF RESEARCH AND GRADUATE STUDIES

FACULTY OF MECHANICAL AND INDUSTRIAL ENGINEERING

Approval of thesis for defense result

I hereby confirm that the changes required by the examiners have been carried out and incorporated in the final thesis.

Name of Student Girma Misganaw Signature _____ Date 15/11/22

As members of the board of examiners, we examined this thesis entitled "Assessment of safety management system performance at Addis Ababa Bole international airport" by Girma Misganaw. We hereby certify that the thesis is accepted for fulfilling the requirements for the award of the degree of Masters of Science in "Industrial Management".

Board of Examiners

Name of Advisor Bereket Haile	Signature	Date 17/11/2022
Name of External examiner Shiferaw S.	Signature	Date 15/11/22
Name of Internal Examiner Sisay Geremew	Signature	Date 17/11/2022
Name of Chairperson Befekadu T. (PhD)	Signature	Date 17/11/2022
Name of Chair Holder Bereket Haile	Signature	Date 17/11/2022
Name of Faculty Dean Ephrem Zelelie	Signature	Date 17/11/22

Faculty Stamp

ACKNOWLEDGMENT

My special thanks to my advisor Dr. Bereket Haile, for his support and advice throughout the accomplishment of this research. He was well supportive and polite about everything I asked him.

Then, my heart is full of thanks to my family, they always put strength and love inside of me, and all things can be possible with God and their love and support.

Then, to data collectors and my friends, those who support me for everything I ask them.

Finally, I would like to thank Addis Ababa Bole International Airport and the committed respondents who have answered the survey questionnaires.

ABSTRACT

To comply with the International Civil Aviation Organization's requirements, all certified airports were required to implement and operate a Safety Management System (SMS) from November 2005. This study is conducted to examine the safety management system performances in the case of Addis Ababa Bole International Airport. To achieve the objectives of this study the researcher applied a survey research design. The study used a deductive research strategy to test the hypotheses and theories. Standardized questionnaires were prepared for required data collection and the target populations are the Addis Ababa Bole International Airport the researcher takes the working population at Addis Ababa Bole International Airport that is working in head office Addis Ababa. For the analysis purpose, statistical package for social science (SPSS) software version 21 was used. According to the federal aviation administration (2019), there are four factors that determine the safety management system :(i.e., Safety Policy, Safety Promotion, Safety Risk Management, and Safety Assurance). Finally, multiple linear regression analysis used as the data consist of the single dependent variable, and multiple independent variables to examine the safety management system performance in Addis Ababa Bole International Airport and the study concluded that there is a statistically significant relationship between safety policy, safety promotion, safety risk management, safety assurance, and Safety management system performance in Addis Ababa Bole International Airport.

Contents **Page No**

Acronyms iii
CHAPTER ONE: INTRODUCTION 1
1.1 Background of the Study 5
1.2 Statement of the problem 9
1.2 Research Questions 9
1.4 Objective of the Research 9
1.4.1 General Objective 9
1.4.2 Specific Objective 10
1.5 Significance of the Study 10
1.6. Scope of the Research 10
1.7 Limitation of the Study 10
1.8 Organization of the Study 11
CHAPTER TWO: REVIEW OF RELATED LITERATURE 12
2. Introduction 12
2.1 Concept of Safety Management System 12
2.2 Approaches to safety management 14
2.3 Theories 19
2.3.1 Safety Policy 19
2.3.2 Safety Promotion 21
2.3.3 Safety Risk Management 25
2.3.4 Safety Assurance 28
2.4 Safety Performance Indicators 32
2.5 Measuring Safety 33
2.6 Conceptual Framework 37
2.7 Research Hypothesis 39
CHAPTER THREE: RESEARCH METHOD 43
3. Introduction 43
3.1 Research Approach 44
3.2 Research Design 45
3.3 Source of Data 45
3.5. Data Collection Tools 46
3.6. Population and Sampling 46
3.7 Measurement of Variables 46

3.7.1 Independent Variable Measure 47
3.7.2 Dependent Variable Measure 48
3.8 Data Analysis 51
3.9 Validity and Reliability 52
3.10 Ethical Consideration 52
CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION..... 53
4. Introduction 53
4.1 Response Rate 53
4.2 Demographic Characteristics of Respondents 53
4.3 The Extent Prevalence of Different component factors of Safety Management System Performance 55
4.4 The Associational Analysis of Safety Management System Performance 56
4.5 Assumption of Multiple Linear Regression 56
Multicollinearity 56
Homoscedasticity..... 57
Test of Normality 58
Test of Linearity 59
4.6 Hypothesis Testing 63
4.7 Discussion on Major Findings of the Study and Alignment with Previous Studies 66
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION 78
5. Introduction 78
5.1 Summary of Major Findings 78
5.2 Conclusion 81
5.3 Recommendations 83
5.4 Recommendations for future practice 84
References 85
Appendix-A..... 94

LIST OF FIGURES

Fig-1.1: The management dilemma (ICAO, SMS) 7

Fig-1.2: High-risk accident categories worldwide (2010–2014 9

Fig-2.1: plan-do-check-act (PDCA) model, adopted from (ACI) 19

Fig-2.2: Safety Risk Assessment Matrix(ACI)..... 31

Fig-2.3: The Integrated Components of the SMS(ICAO). 34

LIST OF TABLES

Table-1.1: The Contributing Factor of Airport Facility 10

Table-3.1: Sample size Distribution based on the Categories 44

Table-4.1: Demographic Characteristics of the Respondents 52

Table-4.2: Descriptive Statistics 53

Table-4.3: Correlations 54

Table-4.4: The Correlation among the Independent Variables Coefficients 55

Table4.5: Model Summary 60

Table-4.6: ANOVA Regression 61

Table-4.7. Coefficients 62

Table-4.8: Summary of Hypothesis 65

Acronyms

ACI	Airports Council International
ALoSP	Acceptable level of safety performance
ATC	Air traffic controller
CAA	Civil aviation authority
CFIT	Controlled flight into terrain
DDM	Data-driven decision-making
EA	Ethiopian Airlines
EAE	Ethiopian Airports Enterprise
EASA	European Aviation Safety Agency
EASAMSA	European Aviation Safety Agency
ECAA	Ethiopian Civil Aviation Authority
ERP	Emergency response plan
FAA	United States Federal Aviation Administration
FMS	Financial management system
GASP	Global Aviation Safety Plan
GASPRG	Global Aviation Safety Plan Roadmap Group
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LOC-I	Loss of control in flight
OHSMS	Occupational health and safety management system

QMS	Quality management system
RST	Runway safety team
SARPs	Standards and Recommended Practices
SARS	Severe Acute Respiratory Syndrome
SD	Standard deviation
SM ICG	Safety Management International Collaboration Group
SMM	Safety management manual
SMP	Safety Management Panel
SMS	Safety management system(s)
SRM	Safety risk management
SPI	Safety performance indicator
SPT	Safety performance target
SSP	State safety program
SSO	State safety oversight
SSP	State safety program
STDEVP	Population standard deviation

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

In the history of aviation in 1921, Ethiopian government officials visited the British Royal air force based in Yemen and wished to have the technology for the nation (Million, 2015). After seven years, the first France-made aircraft, Potez-25, piloted by Andre Miller had landed some 18 km in the Western parts of Addis Ababa at a place called "Gefersa" on August 18, 1929. Also, on September 5, 1929, Germany made Jenker plane was landed, at Janmeda, which has been recorded as the second airstrip after Gefersa hosted Potez-25. Since then the aviation sector has grown significantly. From 1929 and up until the conquest of Ethiopia by the Italian Fascist, some airstrips were constructed throughout the country.

Ethiopian Civil Aviation was established in 1944 to oversee and regulate the industry. In the same year, in 1944, Ethiopia has become one of the signatory countries of the Chicago Convention and a founding member of the International Civil Aviation Organization (ICAO). Ethiopian Airlines, a pioneer in the African aviation industry, was also established in 1945 in a joint venture with Trans World Airlines. On the other hand, four airports: Bole International, Dire Dawa, Jimma, and Asmara were built and inaugurated on 20 November 1962. Bole International Airport was constructed to accommodate the then larger Boeing 720 jetliner. Air transport service in Ethiopia established and has been operating by three major independents:

- Ethiopian Civil Aviation Authority (ECAA),
- Ethiopian Airports Enterprise (EAE),
- Ethiopian Airlines (EAL)

ECAA is a regulatory body under the Ministry of Transport's oversight. It regulates safety, licenses for air transport service providers, inspects and licenses airports, licenses aviation personnel, and registers aircraft (Session et al., 2017). On the other hand, the Ethiopian Airports Enterprise part of the aviation industry was under the Ethiopian Civil Aviation for a long time. However, it was established and had become an independent entity by the Council of Ministers Regulation No. 82/2003 per the Public Enterprise proclamation no. 25/1992. And it is mandated to construct, maintain and administer airports throughout Ethiopia. Nonetheless, since July 2017, Ethiopian Airports enterprise was merged with Ethiopian airlines group and become one of the

Strategic Business Units (SBU) of Ethiopian Airlines Group by the Council of Ministers Regulation No. 406/2017 and continues its role of constructing, maintaining, and administering aerodromes, to provide safe, reliable, and efficient airport service for aircraft, passengers, and other users. And to coordinate and develop in the aerodrome non aeronautical services and to ensure a reliable aviation security service in the aerodrome (ETG, 2017).

Currently, the enterprise administers 23 airports in the country. Among these airports, four of them Addis Ababa Bole, Dire Dawa, Mekelle, and Bahir Dar are international and the rest are domestic airports. Addis Ababa Bole International Airport is the main hub airport in Ethiopia. Which is carries out almost the entire international air transport operation of the country and is the busiest airport in East Africa with a capacity of providing world-class passengers (ETG, 2017). On the other hand, the national carrier, Ethiopian Airlines (ET) is the fastest-growing airline company in Africa and it is one of the most competitive airlines service providers on the continent (EAL, 2016). It is the national airline of Ethiopia with its main hub at Bole International Airport. As of June 2018, more than 450 flights per day were departing from and arriving at the airport. It is the 3rd busiest airport in Africa based on 2019 stats recording a 20% pace in passenger traffic growth.

Historically, aviation safety has been built upon the reactive analysis of past accidents and the introduction of corrective actions to prevent the recurrence of those events. With today's extremely low accident rate, it is increasingly difficult to make further improvements to the level of safety by using this approach. Therefore, a proactive approach to managing safety has been developed that concentrates on the control of processes rather than solely relying on inspection and remedial actions on end products. This innovation in aviation system safety is called a Safety Management System (SMS), an expression indicating that safety efforts are most effective when made a fully integrated part of the business operation.

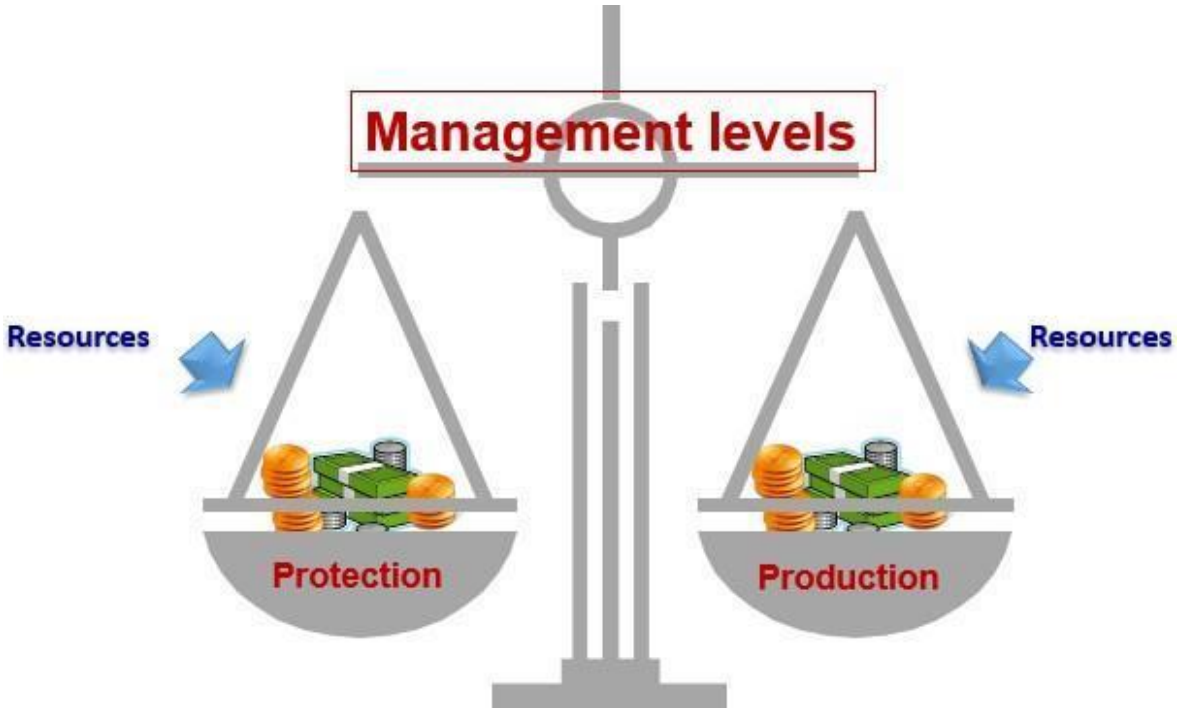
It is now generally accepted that most aviation accidents result from human error. It would be easy to conclude that these errors indicate carelessness or incompetence on the job, but that would not be accurate. Investigations are finding that the human is only the last link in a chain that leads to an accident. These accidents will not be prevented by merely changing people; increased safety can only occur when the underlying causal factors are addressed.

Enhancing overall safety in the most efficient manner requires the adoption of a systems approach to safety management. Every segment and level of an organization must become part

of a safety culture that promotes and practices risk reduction. Safety management is based on the premise that there will always be safety hazards and human errors. SMS establishes processes to improve communication about these risks and take action to minimize them. This approach will subsequently improve an organization's overall level of safety.

Two important forces to determine strategy in the aviation industry are safety and customer service (Mak Ing It Fit, 2002). Safety Management System (SMS) is a business-like approach to managing safety risks. 'Management of safety risk is a core activity in the aviation industry. The airport service provider must embrace and implement the SMS, ensure that actions reflect words, establish a positive safety culture and provide appropriate resources. The goal of the safety management system is to minimize the number of accidents and serious incidents and maximize safety (Boustras *et al.,* 2017). Safety and business are a positive correlation between production and safety, accomplishment time and safety cost (Story, 2001).

*Figure 1.1: The **management dilemma (ICAO, SMS)***



- Quality and SMS have more than 70 % in common, they both have need planning &

Managing, measuring & monitoring, and both need continuous improvement. So the difference is safety management system focus on human and organizational factors because they control the risks in all types of methods (Story, 2001). Safety management

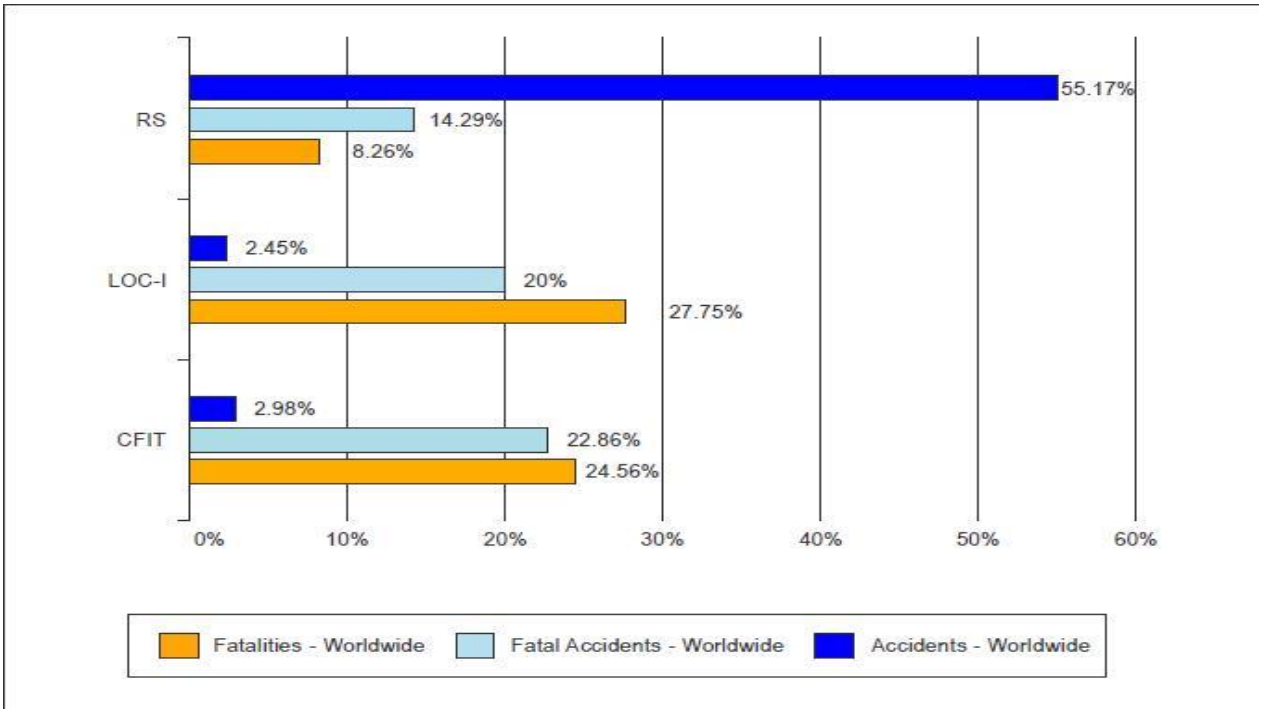
system (SMS) is a method for handling safety; organize structures, accountabilities, policies, and procedures (Civil *et al*., 2014). Also, Transportation Research Board indicates achieving goal four SMS principles those are management commitment to safety, proactive identification of hazards, action taken to control risk and Assess and correct safety actions. International civil aviation organization (ICAO) is responsible for managing, planning and safeguarding the safety of all aviation industry, and conform all aviation industry used and implement safety management system (SMS) (Boustras et al., 2017). According to Ethiopian safety management regulation, need compliance with international standards, National safety program, and safety management system implementation plan applicable to all aviation services providers under the Ethiopian civil aviation authority. So state safety regulation required implementing the safety management system (SMS) and mandatory for all aviation services providers operating in Ethiopia. Also, the state safety regulation conforms by Ethiopian ministry of transport and approved in January 2014 (Civil *et al*., 2014). In aviation industry safety is need continuously flow up, new hazards and risk incessantly happening and must be control. A safety management system can help us identify potential hazards, categorize severity and manage the risk continuously. Professor James Reason says" I compare managing safety to fighting a guerrilla war in which there are no final victories, it is a never-ending struggle to identify and eliminate or control hazards(Story, 2001).ICAO recommends for safety management system performance measurements are four pillars (i.e., Safety policy and objectives, Safety risk management, Safety assurance and Safety Promotion).The international governing body for air transportation ICAO involves that airports must implement a safety management system. SMS is just a tool to ensuring safe operation and eliminating or reducing the likelihood of low frequency high consequence incidents. ICAO safety report 2019 indicate the 84 % of an accident is occurred by the runway related safety and ground safety (OACI, 2019). According to Global aviation safety plan, High-risk accident categories worldwide (2010–2014) :(ICAO, 2017).

- *Runway safety events were identified as one of the main high-risk accident categories*
  - ✓ *Abnormal runway contact,*
  - ✓ *Bird strikes,*

- ✓ *Ground collision,*
- ✓ *Runway excursion,*
- ✓ *Runway incursion,*
- ✓ *Loss of control on the ground, collision with obstacle(s)*
- ✓ *Undershoot/overshoot.*

- ➢ *Controlled flight into terrain*
- ➢ *Loss of control in flight*

Figure 1.2: Global aviation safety plan, ***High-risk accident categories worldwide (2010–2014):***



Also according to the IATA safety report 2019, section 3, 2019 Review, shows between 2015 and 2019**:** The top environmental and airline threats were (IATA, 2020).

- ➢ *Adverse Weather Conditions, Wind/Wind Shear/Gusts,*
- ➢ *Airport Facilities,*

- ✓ *Poor signage, faint markings*
- ✓ *Runway/taxiway closures*
- ✓ *Contaminated runways/taxiways*
- ✓ *Poor braking action*
- ✓ *Trenches/ditches*
- ✓ *Inadequate overrun area*
- ✓ *Structures in close proximity to runway/taxiway*
- ✓ *Inadequate airport perimeter control/fencing*
- ✓ *Inadequate wildlife control*
- ➢ *Aircraft Malfunction.*

NB: THREAT is an event or error that occurs outside the influence of the flight crew.

Table 1.1: The Contributing Factor of Airport Facility (IATA safety report 2019)

Region	Airport facility	Contribution
Africa	Wildlife/Birds/Foreign Object	22%
	Airport perimeter control/fencing/wildlife control	13%
	Poor/faint marking/signs or runway/taxiway closure	9%
Asia/Pacific	Wildlife/Birds/Foreign Object	11%
	Airport perimeter control/fencing/wildlife control	3%
	Poor/faint marking/signs or runway/taxiway closure	2%
C.I.S	Wildlife/Birds/Foreign Object	7%
	Airport perimeter control/fencing/wildlife control	7%
	Poor/faint marking/signs or runway/taxiway closure	4%
Europe	Wildlife/Birds/Foreign Object	3%
Latin America & Caribbean	Wildlife/Birds/Foreign Object	3%
	Airport perimeter control/fencing/wildlife control	3%
	Poor/faint marking/signs or runway/taxiway closure	3%
M E & N A		-
North Asia		-
N America	Wildlife/Birds/Foreign Object	4%

9/8/2021

This study aims to assess the performance of the existing safety management system, in the case

of Addis Ababa bole international airport. Addis Ababa Bole International Airport is located in Bole area, 6 km (3.7 miles) southeast of Addis Ababa city center.

1.2 Statement of the problem

It is important to note the fact that "there will always be hazards and risks in the airport environment. Proactive management is needed to identify and control these safety issues before they lead to mishaps" (Transportation Research Board, 2007). Despite being able to fully eliminate all risks, airports will certainly benefit from SMS in several ways. First, SMS should not be burdensome to any employee and should be incorporated in daily work activity. SMS will allow the analysis of airport accidents and injuries and provide feedback for overall improvement of the safety and efficiency of airports. The TRB states that, The SMS approach reduces losses, improves productivity, and is generally good for business, (Transportation Research Board, 2009). Another huge benefit is cost, both directly and indirectly. While SMS costs to implement initially and other costs will be incurred for on-going training, it will be significantly reduced overall if airport personnel can recognize the early signs of incidents and accidents. An effective SMS contributes to good company morale and communication among top management and each individual person (Transportation Research Board, 2007). Furthermore, SMS allows for airports to have formalized meetings and processes, building "a safety culture by increasing airport staff awareness of safety and risk," and allows for "maximizing the effect of safety investments by ensuring that the highest priority needs are identified" (Transportation Research Board, 2007). Other benefits include developing a tradition of good safety practices, learning from mistakes, and overall improved practices (Transportation Research Board, 2007). More than eighteen percent of all aircraft accidents in civil aircraft transportation operations happened in the airport or around the aerodrome at the time of landing and takeoff, standing and taxi, and approach (Distefano & Leonardi, 2014). But according to the ICAO safety report 2019, 84 % of an accident has occurred on the run way related safety and ground safety (Sumathi et al., 2018). That means the airport area is a high contributor to safety events. Therefore, to control these events, the International Civil Aviation Organization's recommends, all certified airports were required to implement and operate a Safety Management System (SMS) from November 2005.According to the Ethiopian state safety program manual, the organization being accountable for the construction, development, and operation of all airports in Ethiopia. As a fully autonomous entity, the Airport Authority is responsible for implement the SMS structure,

data collection, identification of performance indicators, assessment and evaluation of risks, safety performance measurement, and process, all ICAO Standards and Recommended Practices (SARPS) *(Civil et al.,* 2014). But according to the Ethiopian Airports Enterprise (EAE) institutional Transformation study 2013 (Final Strategy Paper). Ethiopian airports are SMS complete and approved by Ethiopia Civil Aviation Authority (ECAA). But according to regulatory body audit finding, there are still problems to close safety audits finding. Here is a few of them to list the complaint of Ethiopian civil aviation authority (ECAA): i.e., Lack of activity to hazard identification and risk assessment, Lack of a plan to conduct training as per training schedule and quality, Lack of awareness of safety reports includes self-reporting culture, Post ponding of safety audit finding closing action plan over the schedule, paying more attention, to close external safety audit finding but with low achievement to the internal safety audit. So, this study will have proposed to examine the major practices affecting safety management performance in case of Addis Ababa Bole International Airport, this paper focus on critically discussing the safety management system performance.

1.2 Research Questions

1. What is the association between safety practices, Safety Policy, Safety Promotion, Safety Risk Management and Safety Assurance and performance in Addis Ababa Bole International Airport?
2. What is the perceived level of safety management practices in Addis Ababa Bole International Airport?
3. What type of safety management system practiced in Addis Ababa Bole International Airport?

1.4 Objective of the Research

1.4.1 General Objective

The general objective of the study is to examine the major practices affecting safety management system performances in case of Addis Ababa Bole International Airport.

1.4.2 Specific Objective

In line with the general objective, the following specific objectives derive as:

- To examine if there is association between Safety Policy, Safety Promotion, Safety Risk Management and Safety Assurance and performance in Addis Ababa Bole International

Airport.

- To examine the perceived level of safety management practices in Addis Ababa Bole International Airport.
- To investigate which type safety management system component (i.e., Safety Policy, Safety Promotion, Safety Risk Management and Safety Assurance) practiced in Addis Ababa Bole International Airport.

1.5 Significance of the Study

The study is expected to provide multitude of purpose for the Client Addis Ababa Bole International Airport Consultants to make informed decision towards improving Safety practices in the Addis Ababa Bole International Airport. Also, the assessment will be useful in providing information in terms of current safety practices in Addis Ababa Bole International Airport. Also, preventing accidents is the main significant point to improve the safety in the aviation industry and that can be achieved by increasing the awareness of all concerned persons and by identifying areas of safety deficiencies in aviation industry.

1.6. Scope of the Research

The scope of the study delimited in conceptual, geographical, methodological and time scopes.
On the geographic delimitation, the spatial and temporal coverage of this paper is limited to Addis Ababa Bole International Airport.
Methodologically the research used survey research design, quantitative research approach and deductive strategy to test the existing theories about safety management performance. The sampling method will probability sampling for selecting the respondents and the study used purposive sampling technique based on their position. The study is undertaking employees working in the Addis Ababa Bole International Airport.
The main source of data is primary data that collect from distributed questionnaires. Apart from the geographical and methodological delimitation, the research has conceptual scope; the study encompasses four selected safety management that the author classified practices affecting safety management system performance.

1.7 Limitation of the Study

Conducting a social research of this nature will comes with some foreseen and unforeseen challenges. For the foreseen challenges, the researcher took steps to address them while

collecting data. An example is the anticipation that not all respondents cooperate with the researcher in filling of the questionnaires. Because of the busy nature of the work and it is usually difficult getting their full cooperation in such an academic exercise. The unforeseen challenges the undue delay in returning the questionnaires. The researcher expects to retrieve the questionnaires within three four weeks, but it takes more weeks to collect the number of questionnaires retrieved. Another limitation is due to time and financial factors it is difficult to analyze the practices affecting safety management in detail.

1.8 Organization of the Study

The chapters of the thesis have organized as follows. Chapter one incorporates introduction, back ground of the study, statement of the problem, research question, objectives of the study, scope of the study, significance of the study and definition of terms.

Chapter two provides an overview of the state of the art analysis of the existing literature which includes definitions of terms, theoretical, empirical related literature review, conceptual frame work of the study and hypothesis of the study. Chapter three presents the methodology used in this thesis which includes the research approach as well as describes the data collecting and analysis methods used. Chapter four analyses and presents the research findings obtained through the thesis methodology by showing how each of the research questions would answer and how these findings together contribute to the main purpose of the study. Chapter five finalize the thesis with summary, conclusions and a set of recommendations derived from the research findings and the conclusions of this work. At last of the thesis document, references and a set of appendices were including that contain the questionnaires of the survey forms used to collect primary data for the study and other supplementary documents of the study.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2. Introduction

Under this chapter the researcher discusses the literature review of the research study. Literature review provides the study with an explanation of the theoretical rationale of the problem being studied as well as what research has already been done and how the findings relate to the problem at hand. Relevant theoretical literature has been discussed to explore the research problem and it presents empirical literature reviewed and a summary of the conceptual framework by the researcher.

2.1 Concept of Safety Management System

Safety is a broad and abstract concept, which is.; this state is freedom from „something" that could have negative outcome, such as harm to humans or animals, economic loss, or any other form of damage or loss. In other words, safety is the condition whereby unexpected events, such as accidents and series incidents, are being avoided. In specific contexts, safety can be defined in more practical terms (Doe, 1910).

Safety is the state in which risks associated with aviation activities are related to or indirectly support the operation of aircraft. Aviation safety is dynamic. New hazards and risks continuously come out and must be mitigated as long as safety risks are at an acceptable level of control a system as open and dynamic as aviation can still be kept safe. Also, it is important to note that acceptable safety performance is often defined and influenced by domestic and international norms and culture (Li & Guldenmund, 2018).

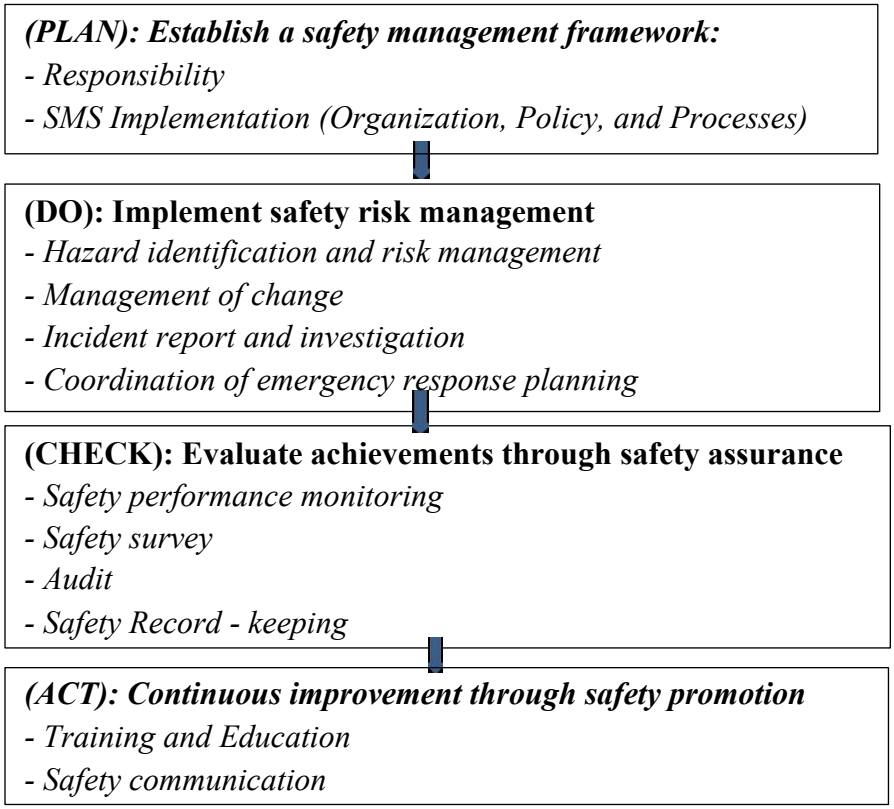
Currently, aviation safety used a total system; this system more focused on individual safety performance and local control, so all-around in the organization are part of the aviation system (Li & Guldenmund, 2018). But aviation safety evolution first passes in technical factor from the early 1900s until the late 1960sof safety is focused in technical factors and technological failures, human factor emerged at 2970 the aviation accidents had minimized due to technological advances aviation became a safer, and the focus of safety events was focused human factors. Organization factor emerged in the mid1990s, safety initiated as organizational factors as well as

human and technical factors. This viewpoint the impact of policies and organizational culture on the effectiveness of safety risk controls (ICAO, 2013).

Safety is a foundation in all aviation industry and extremely expected by aviation customers, governments and stakeholders. Safety management is a proactive way to pursue the mitigation of safety risks and improve safety performance safety management effectively implemented can lead to a documented, process-based approach to safety (Li & Guldenmund, 2018). After 1908 safety regulatory implement as a management issue because of management pay for accident victim workers. Now a day the aim of safety management is protecting the human being's injury and fatal, environmental condition, equipment, and property intolerable risk (Chang et al., 2015). Safety Management System is the formal, top-down business approach to managing safety risk with a systemic approach to managing safety, including the necessary organizational structures, accountability, policies, and procedures. (Smart, 2016)

A safety management system (SMS) is either a system that is used to manage and control safety or it is a management system specifically aimed at safety. It designed to improve safety performance through continuously the identification of hazards, the collection, and analysis of safety data and safety information, and continuous assessment of safety risks (Li & Guldenmund, 2018). Also Safety management is the concept of the management safety like other area of management. Which is used the same principle and techniques. According to Safety Management Systems Handbook, the PDCA control loop is a central idea applied in safety management systems and all component of SMS principles implement by: plan-do-check-act (PDCA) model as per Fig 2.1.

Figure 2.1: plan-do-check-act (PDCA) model, adopted from (ACI)



System safety is the application of engineering and management principles, criteria, and techniques to achieve an acceptable level of safety throughout all phases of a system. Since 1973, safety management systems have gradually evolved into the main topic of safety science. SMS is generally defined as management procedures, elements, and activities, aimed to improve the performance of an organization. To structure this systematic control, the safety management system includes all safety management activities. The goal of SMS is protecting human beings, the environment, equipment and property from unacceptable risk. There are four tools of Safety Management Systems this is Safety Policy, Safety Risk Management, Safety Assurance and Safety Promotion (Bruno, 2019).

2.2 Approaches to Safety Management

In the occupational safety literature, three different approaches to safety management can be identified. The first approach is based upon best practices, the second approach advocates a systems approach, and the third approach focuses on cultural aspects. These approaches should

not be considered mutually exclusive and may be used to guide the choice of focus and aims in safety research and practice.

2.2.1 The Best Practice Approach

The best practice approach focuses mainly on auditing practices developed within processing industries for the detection of organizational aspects that could potentially pose a threat to safe functioning. According to this approach, safety auditing involves the evaluation of such management practices as planning, implementing, organizing, and controlling. The accountability of safety-related events is also an issue of concern in these audits (Wright, 1994). Since the best practice approach is primarily based on expert opinion and practical experience within organizations, it could be considered more of a set of practices than a general safety management approach (Glendon *et al*., 2006).

Some also claim that basing an organization's safety management on a best practice approach is limited, since it mainly focuses on developing accident prevention plans that are based on investigations of previous accidents and their likely causes. These investigations often are superficial and miss the root causes of the accidents (Howell, Ballard, Abdulhamid, & Mitropoulos, 2002). Implementing the best practice approach involves setting up rules in order to try to meet a set of safety standards, which is considered by some to be insufficient for dealing with unexpected system abnormalities (Hale & Borys, 2013). According to Rasmussen (1997), completely standardizing procedures and enforcing work rules is impossible when facing the complexities and dynamics of modern workplaces, where discretionary decision making to a large degree is replacing routine tasks. It is not possible to establish rules for how to behave in every possible circumstance or in unpredictable and less-structured situations. Instead, he suggests that managerial practices should aim at helping employees develop and apply their judgment rather than simply following rules. This argument is also supported by Grote, Weichbrodt, Günter, Zala-Mezö, and Künzle (2009), who claims that a complex and diverse environment requires a balance between standardization and flexibility, and that one way to accomplish this is through the adaptation of more specific process rules that will be functional even under exceptional circumstances. These criticisms of the best practice approach to safety management could be interpreted as limitations due to not taking sufficient account of the broader and more complex context.

2.2.2 The Systems Approach

With the many different organizational aspects that may affect safety, safety management has been recognized as a complex matter that requires a systems approach (Etienne, 2008; Kaufman & McCaughan, 2013; Thomás et al., 1999). Systems thinking involves recognizing that all components of an organization are interconnected and that changes to one aspect of a system are likely to produce organization-wide consequences (Sterman, 2000). In advocating such a systems approach, Perezgonzalez (2005) claims that focusing on one object of study at a time, which typically characterizes safety research (as with the technological perspective, human factor perspective, and human in organization perspective, etc.), is insufficient and inappropriate. Instead of dismissing one area of study as incompatible with another, as has been done previously in this field, he advocates a more systemic and multidimensional approach where all of the accumulated knowledge is integrated into complex models that incorporate different perspectives. Perezgonzalez (2005) further argues that a systems approach is not only needed within theoretical research but is needed even more within the practical realm, in that there is often a mismatch between research findings (which are many times systemic) and subsequent recommendations and implementations (which tend to be individual and one-dimensional). This can be illustrated by the fact that although previous major accident investigations (e.g., Chernobyl, Kings Cross, Costa Concordia) each identified the same types of contributory factors, such as system failures, organizational failures, design or management failures, communication failures, and poor safety culture (Corrigan, 2002; Schröder-Hinrichs et al., 2012), their recommendations still tended to be reduced to suggesting future improvements to a combination of administrative procedures and individual attitudes to safety (e.g., Pidgeon & O‟Leary, 1994).

Given that unsafe situations often arise as a consequence of the interaction of several workplace factors, a major task for safety management, according to a systems perspective, is to coordinate both functional and human safety management practices in such a way that conflicting demands could be avoided or at least prevented from causing harm. One such conflict that is common is between the demands for productivity and for safety. Employees in work situations characterized by high pressure related to, for example, tight time scheduling or quantitative performance demands have to make decisions about which tasks and behaviors to prioritize. In organizations where a great emphasis is placed on production, employees may get the impression that safety is subordinate to the demands of production (Janssens, Brett, & Smith, 1995). Unsafe behaviors

may even be perceived to be rewarding in situations where such behavior enables work tasks to be performed more quickly (Slappendal, Laird, Kawachi, Marshall, & Cryer, 1993). Refraining from the use of personal protective equipment which is perceived as bulky or inconvenient for performing tasks more efficiently is one such example. This is supported by research showing that employees often view the organizational demands of safety and production as being at odds with each other (Fahlbruch & Wilpert, 1999; Janssens et al., 1995).

The perception of safety and production as two incompatible and competing aspects could have severe consequences for safety within organizations in several ways. For example, Probst (2002) found that employees who were threatened with layoffs chose to focus more on production at the expense of safety. In another study, Probst and Graso (2013) also found that employees who experienced high levels of production pressure had more negative attitudes towards reporting accidents and incidents to the organization and had more accidents overall. Thus, in organizations where production pressure is high and the emphasis on safety and safe work procedures is low, the risk is substantial that employees will act in ways that compromise the safety of themselves and others.

Despite the often held perception of safety and production being competing functions in organizations, evidence suggests that in successful organizations, safety and productivity are not considered to be separate functions but rather to be complementary and supportive of each other (Warrack & Sinha, 1999). In their study, Warrack and Sinha found that productivity and quality were driven by similar goals as safety and health activities in organizations, both contributing to the achievement of business objectives. The rationale for this is that safety management practices minimize the risk and severity of non-planned events or incidents that can not only cause harm to workers but also lead to an unwanted variability in product quality (Krause, 1994). These findings suggest that organizations have much to gain by taking a systems perspective.

2.2.3 The Cultural Approach

In terms of general theory, the cultural approach to managing safety represents an institutional perspective on organizations (Selznick, 1957), emphasizing the informal (alongside the formal) side of organizational functioning. Thus, safety culture management is concerned with the norms, beliefs, and attitudes surrounding hazards and risks as well as with the practices for

handling hazards and risks (Pidgeon, 1991). Provided that key aspects of safety culture and climate are considered to consist of issues related to managerial policies, such as safety training, management attitudes toward safety, the effect of safety practices on promotions, the presence and status of safety officers or committee, foremen's behavior, and the priority given to safety by management (Thomas et al., 1999), it appears evident that the cultural element of management practices should be vital for the achievement of workplace safety. Following the realization that poor safety culture was the main factor contributing to the Chernobyl accident, the development of "appropriate" safety cultures became an important area for safety management within organizations (Broadbent, 1989).

One of the most important factors distinguishing a good safety culture from a poor one is whether safety is perceived to be prioritized by all employees and is also presented as being prioritized by management and, especially, top management. Another essential factor for the achievement of a good safety culture is having openness in communications about failures and a "creative mistrust" in the risk control system (Hale, 2000). This view implies that management should aim at achieving a culture that is characterized by openness to learning experiences and to the imagination and sharing of potential new dangers, which results in a reflexivity about the working of the whole risk control system. In order to achieve such a responsible learning culture, the way in which the reporting of failures, accidents, and incidents is handled is of vital importance. A so-called blame culture, where the purpose of collecting incident and accident data is to assign blame and take disciplinary action (Webb, Redman, Wilkinson, & Sanson-Fisher, 1989), is considered to have a considerable negative impact on safety, as it carries with it problems with underreporting. Instead, the objective of safety management should be to create a no-blame culture, characterized by mutual trust between managers and employees, and where the reporting of incidents and accidents is encouraged as a means of improving safety without looking to assign blame (Turner, 1991). According to Pidgeon and O"Leary (2000), the success of a safety culture strongly depends on the degree of trust that those who report errors and near misses have in those who analyze and act on the reports. When managing safety culture, it is therefore important to restrict the blaming to obvious cases of unusual thoughtlessness or recklessness, so that the blaming does not end up limiting the reporting of incidents and accidents and, in turn, the opportunities to learn from it (Hale, 2000).

2.3 Theories

2.3.1 Safety Policy

The Safety Policy pillar is comprised of three elements: policy statement, organizational structure and procedures. The policy statement describes in detail the operation of the entire organization and includes the roles, responsibilities and relationships between all individuals involved in the organization (Transportation Research Board, 2007). It specifically includes the involvement of top management in SMS. Having top management involved is a key component to the success of SMS. Furthermore, the policy statement defines the procedural framework, which describes the responsibilities of all departments, including the training, processes measurement and the change in the system, if there should be one. The organizational structure is the next element of the Safety Policy pillar. To begin the implementation of SMS at any airport, at least one person must be appointed (depending on the size of the airport) to oversee the project and ensure a successful implementation (Transportation Research Board, 2009). The organization structure allows for the company to clearly see the responsibilities of fellow employees. The organizational structure is a part of SMS because it is needed in order for employees to follow the proper procedures for the organization. The procedure element of the Safety Policy pillar describes the way hazards are identified and mitigated. This section may be subject to changes, such as a new way of logging water damage in the terminal, and therefore those changes are made. When changes are made, it is critical that they are properly communicated throughout the entire organization and readily available to any person (Transportation Research Board, 2007). Should an accident or incident occur, this section discusses the proper protocol during that time. The procedure element further defines who to contact, the order in which people are contacted, and are readily available to any person.

The management of safety is a top-down approach, in which the senior management of the organization is responsible for the development, implementation and compliance of the SMS. The safety management commitment and responsibility function is therefore essential for the success of every SMS. It starts with the development of the safety policy and objectives of the organization by its senior management. The Accountable Executive, who has the final responsibility for the effective and efficient performance of the organization's SMS and ultimate accountability, must sign the policy. The safety policy should reflect the organization's commitment regarding safety and should contain a clear statement about the provision of the

necessary resources for its implementation. This includes, for example, safety reporting procedures, or types of operational behavior that are considered unacceptable. Most importantly, the safety policy must be communicated throughout the organization. The organization should also identify the accountabilities of all management members and employees with respect to the safety performance of the SMS. Responsibilities, accountabilities and authorities (e.g. to make decisions regarding the safety risk tolerability) should be documented and communicated throughout the organization. In addition, the appointment of key safety personnel is crucial for the successful implementation of a SMS. In this context, a safety manager should be the responsible individual and focal point for the implementation and maintenance of the SMS. After the safety policy has been defined and key safety personnel and accountabilities assigned, the organization develops a SMS implementation plan. This defines the organization's approach to safety management in a manner that meets the organization's safety objectives while supporting an effective and efficient delivery of services. The process of developing a SMS must be documented clearly. The most important piece of the SMS documentation is the SMS manual (SMSM), which is a key instrument for communicating the organizations" approach to safety and should document all aspects of the SMS, including the safety policy and objectives, processes and procedures, accountabilities, responsibilities and authorities. Finally, although the aim is to control safety risks, an organization needs to be prepared for the worst foreseeable situation, i.e. the occurrence of an accident. Therefore, every service provider must have an emergency response plan to facilitate the timely and appropriate response to occurrences and must coordinate this plan with those organizations it interacts with during the provision of its services.

Policy Statement

The Safety Policy is a written document from senior management that is communicated to all employees. Other affiliated entities with a stake in organizational safety should also be informed. In an airport environment these might include airlines and other operators, local police, and concourse vendors. The Safety Policy should include the following:

- Commitment to implementation of the SMS.
- Assurance that executives are monitoring safety performance just as keenly as financial performance.

- Encouragement for all employees to report potential safety issues without fear of reprisal.
- Establishment of clear standards for acceptable behavior related to safety.
- Commitment to providing the necessary resources.

Organizational Structure

The Safety Policy also includes the organizational structure that will be relied upon to achieve and maintain the stated safety objectives. The organizational structure should be appropriate to the size, complexity, and operating environment of the organization. Large organizations may be best served by a formal SMS that utilizes a cross-functional Safety Committee, while smaller organizations may adequately perform the same functions with a more informal approach.

Regardless of the size of the organization, a Safety Manager should be designated as the focal point for implementation and maintenance of the SMS. While it is preferable for the Safety Manager to have no additional roles, this may not be possible in smaller organizations. In that case, the Safety Manager's other responsibilities should not present a conflict of interest with safety management. The Safety Manager should be high enough in the organization to be able to communicate directly with top management.

Procedures

Safety procedures will lay out the process by which the organization identifies and remedies safety risks. They are subject to revision as circumstances change or more effective procedures are developed. It is critical that any changes be clearly communicated to all affected staff, and that the procedures are easily accessible to all for reference or continuing education purposes.

2.3.2 Safety Promotion

Safety Promotion represents the second pillar of SMS (Transportation Research Board, 2009). Safety Promotion, as defined by the FAA is a combination of safety culture, training, and data sharing activities that supports the implementation and operation of an SMS in an organization (2007). Safety Promotion consists of culture, training and communication. SMS should not only be the priority of management, but all employees (Transportation Research Board, 2007). Therefore, it is top management's responsibility to not only release a policy statement advising

the organization of their commitment to safety but they must also be proactively engaging themselves as well (Transportation Research Board, 2007). This directly affects the safety culture of the organization. It is imperative for top management to remain and exhibit a positive attitude about SMS. They must not only be on board in the beginning, but also remain committed because they are the fundamental and necessary requirement of building a positive safety culture.

The next step is for the organization to assess its current culture, which can be difficult (Transportation Research Board, 2007). This requires an assessment of the current company culture to determine the direction necessary for future growth. The Safety Promotion pillar is all about fostering that safety culture, which has proven to be one of the most difficult and challenging aspects of the entire SMS process (Stolzer *et al*, 2008). Safety Culture is the first

element under the safety promotion pillar (Transportation Research Board, 2007). Getting people to change their ways or get on board with something completely new is a difficult task. People are set in their ways and hate when something new comes in and changes it; the integration process of SMS will help with this. Employees like to feel like they are a part of things. In order for any program to work, you must first get the organization's top management involved, and believing in the program (Stolzer *et al,* 2008). Belief is the key word. No employee wants to work for top management that does not support or obey the new rules or believe in a program. Having management involved gives the employees assurance that they need and seek (Stolzer *et al*, 2008). This is where communication is vital, which is another part of the safety promotion pillar that will be discussed later. Training is the second element of Safety Promotion. This element is such a crucial element because it allows for the organization to properly demonstrate SMS (Transportation Research Board, 2007). After promoting a positive safety culture, the next step is to properly train all employees on the policies of the organization, the procedures on how to respond to certain situations and to discuss their roles and responsibilities and how it relates to SMS. It is important to note that training not only occurs as part of implementation training, but it also involves recurrent training (Transportation Research Board, 2007). Communication is the last element under Safety Promotion. Communication is the key to any successful organization or program. Written forms of communication, such as the policy statement, should not be the only form of communication. In addition to written communication, it is important for employees to witness evidence of the commitment of top management to safety (Transportation Research Board, 2007). The communication process allows for growth in many areas, such as

seeing what went wrong, how issues can be fixed, and what lesson each member of the team can take away to ensure that the lessons learned will not recur (Transportation Research Board, 2007). Communication must be open and employees must feel like they are contributing to the operation because information has no value unless the organization or employees learn from it. The Safety Promotion pillar is the foundation of SMS because each element affects the other profoundly; without having a solid foundation SMS will not be successful. Often companies already have their policies, procedures, and organizational structure, so all they need to do is revamp and put these in one location, creating a safety manual. But actually properly training and communicating with all employees can be difficult. If this pillar is not the best, it can be then the success of SMS at that organization is jeopardized. An organization must have the best possible safety manual, training, and communication before moving forth with the last two pillars of SMS.

The safety policy and objectives, safety risk management and safety assurance components provide the functional framework of a SMS. However, the strict implementation of safety policies, procedures and processes is not enough for the effective management of safety. These three components must be supported by a positive organizational safety culture that creates an environment of trust and advocates safety on all levels (i.e. from senior management to operational personnel). An organizational culture reflects the value system of an organization. In particular, the safety culture reflects the values, beliefs and behaviors of an organization towards safety. A safety culture is created at the organizational level and must be developed top-down. The commitment of the senior management and the Accountable Executive to SMS and its promotion is key for the establishment of a positive safety culture. The organization and its management are therefore the major determinants of the behavior employees engage in while performing operational activities. The organizational culture can be affected by factors such as safety objectives, policies and procedures, employee's training and motivation, and the organizations‟ response to unsafe behavior. For a SMS to be effective an organization should create a just culture in which human deviation is not punished, and which aims to encourage an open reporting of incidents. A clear line is drawn, however, such that willful violations are not tolerated (International Civil Aviation Organization, 2009). Such a culture relies on a high degree of trust and respect between operational personnel and management. The staff must believe that they will be supported in any decisions they make in regards to safety. Likewise, the

staff must understand that intentional breaches of safety that jeopardize operations are not tolerated. To create a positive safety culture an organization must actively promote safety. The safety promotion cornerstone includes the two key elements of training and education and safety communication. To support the former, an organization should develop and maintain a safety training program that ensures that all personnel are trained and competent to perform the SMS duties. The scope of the safety training varies depending on the involvement of the individual in the safety management process. The provision of training to all staff, regardless of their level in the organization, is an indication of management commitment to safety and SMS. The safety training standards for operational personnel, managers and supervisors, as well as senior management and the Accountable Executive should be documented in the SMS manual. The communication of the importance of safety and its management is a critical element for the success of a SMS and the creation of a just culture. The organization should communicate the SMS objectives and procedures to all operational personnel and the SMS should be visible in all aspects of an organization‟ operations. The safety manager is responsible for communicating the SMS throughout the organization with the aim of actively encouraging operational personnel to identify and report hazards. Safety communication, therefore, aims to ensure that all employees are fully aware of the SMS, to convey safety-critical information, to explain why particular actions are taken, and finally why safety procedures are introduced or changed.

Culture

The main goal of safety promotion is to create a "safety culture" that allows the SMS to succeed. Having a safety culture means that all employees are responsible for safety. Such a culture is led by top management example, especially in the manner with which they deal with day-to-day activities. Employees must fully trust that they will have management support for decisions made in the interest of safety, while also recognizing that intentional breaches of safety will not be tolerated. The result is a non-punitive environment that encourages the identification, reporting, and correction of safety issues.

Training

In order to fulfill their responsibilities in an SMS-based organization, each employee must be trained in, or at least be aware of, safety principles. All personnel must understand the

organization's safety philosophy, policies, procedures, and practices. They must also know their roles and responsibilities within the safety management framework. The depth of the training should be appropriate to each individual's position and vary from general safety familiarization to expert-level training for safety specialists. Recurrent training may also be necessary to keep personnel up to date on any changes to SMS procedures.

Communication

Individual safety training is supplemented by an ongoing two-way communication process that helps ensure that employees benefit from safety lessons learned, see the results of their actions, and continue to improve their understanding of the organization's SMS. When new procedures are introduced, the associated underlying safety analysis should also be communicated to the appropriate employees. In addition to written communications, it is important for employees to witness evidence of the commitment of top management to safety.

2.3.3 Safety Risk Management

The third pillar in SMS is Safety Risk Management (SRM). The SRM pillar describes operation processes across all departments and agency boundaries, identifies key performance indicators and regularly measures them, methodically assesses risk, and exercises controls to mitigate that risk. The concept of risk management is about understanding the operational systems (Transportation Research Board, 2007). The SRM pillar analyzes systems, identifies risks, and conducts a risk analysis and hazard assessments. It further involves risk acceptance, causal analysis, controlling those risks and system operation. The SRM pillar defines the specific systems that are in place at the airport and includes the following elements:

- identifying the hazards,
- assessing and analyzing the risks,
- Controlling the risk (Federal Aviation Administration, 2007).

The first element of the Safety Risk Management Pillar is hazard identification. This pillar allows for one to really dig deep and take a hard look at the hazards that the airport faces (Transportation Research Board, 2007). Often times it is hard for people to do this without being biased. If this is discovered, then the airport should have an external source perform an audit on the airport. The next step after all hazards are identified is to conduct a risk assessment. In an

SMS, all identified hazards are documented and analyzed to determine what action is required to eliminate or reduce the safety risk assessment associated with the hazard, (Transportation Research Board, 2007). The risk assessment addresses the severity of consequences and the likelihood of occurrence happening again. For example, if an aircraft went off the runway, due to the conditions of the runway, this would be a hazard. If this hazard was identified as likely to happen frequently and the severity is major, the hazard would need to be mitigated. The final element of the third pillar in SRM is risk mitigation and tracking. When a hazard is identified and mitigated, that hazard should be thoroughly analyzed to ensure that the reason it was mitigated was in fact the cause of the hazard. This process is completed through a system that allows one to neutralize any risk that allows for a safe operation. SMS is not only about identifying and mitigating errors, but it is also about tracking the issue. Therefore, once a system in place to ensure that the hazard does not recur, the system must be constantly monitored to make certain that the risk mitigation remains effective (Transportation Research Board, 2007).

At the core of a SMS is the safety risk management that supports the development of evidence-based measures for the overall safety management process. The aim is to control the safety risks of the consequences of hazards in critical activities to a level as low as reasonably practicable (ALARP). Safety risk management consists of two distinct activities: I) hazard identification, and ii) safety risk assessment and mitigation. In practical terms, safety risk management is concerned with reporting and data collection, investigation, data analysis and the mitigation of safety risks. A mature safety risk management strategy should combine reactive, proactive and predictive elements. Reactive methods respond to occurrences that have already happened, such as accidents and incidents. Proactive methods on the other hand look actively for the identification of hazards and associated safety risks, while predictive methods capture system performance as it happens in real-time normal operations to identify potential failure problems.

Safety risk management must be supported by the routine collection of safety data. This includes the collection of historical accident and incident data, the identification of hazards, and the collection of operational data on a daily basis in order to feed reactive, proactive and predictive methods. The collection of historical occurrence data requires the implementation of effective reporting schemes. This needs to be supported by the active promotion through the organization and senior management of an open reporting culture. Reporting procedures should be anchored

in the organizational safety policy and be easily accessible for the whole organization. The central role and importance of reporting systems for SMS is discussed further in section 4.3.2.6.

Besides the collection of accident and incident data, the organization must also ensure adequate investigation of both accidents and incidents in order to identify the causes underlying their occurrence. The identification of hazards in the context of safety risk management uses the description of the system. The system's components and interfaces are analyzed for the presence of hazards and their potentially damaging consequences identified. In addition, a SMS should collect operational data to monitor the performance of real-time operations in order to detect deviations from normal as early as possible. The collected data are analyzed using adequate methodologies and tools (e.g. statistical analysis), to allow the prioritization of safety risks. Based upon this analysis, safety risk mitigation strategies are developed and implemented with the objective of controlling safety risks to a level ALARP.

Hazard Identification

The first step in Safety Risk Management is to identify hazards that the organization faces in its operational environment. A description of the system or operation that is going to be changed or implemented must be developed as part of this step in order to be able to identify what could go wrong. A hazard is any existing or potential condition that can lead to an accident or incident. In an SMS, all identified hazards are documented and analyzed to determine what action is required to eliminate or reduce the safety risk associated with the hazard.

Risk Assessment

Each identified hazard undergoes a risk assessment to determine its potential consequences. The assessment considers both the severity of the consequences and the probability of such an event occurring. A risk assessment matrix like the one shown in Figure 2.2 could be used in this analysis. The assessment may show that certain hazards have an acceptable level of risk, while others require mitigation.

Figure 2.2: *Safety Risk Assessment Matrix(ACI)*

RISK ASSESSMENT MATRIX				
SEVERITY / PROBABILITY	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	High	High	Serious	Medium
Probable (B)	High	High	Serious	Medium
Occasional (C)	High	Serious	Medium	Low
Remote (D)	Serious	Medium	Medium	Low
Improbable (E)	Medium	Medium	Medium	Low
Eliminated (F)	Eliminated			

Risk Mitigation and Tracking

Mitigating actions should be fully analyzed to ensure that they address the root cause of the hazard. It may be beneficial to explore a range of mitigating strategies before choosing the preferred option, basing the decision upon factors such as timeliness, cost, organizational capabilities, and overall effectiveness. It is essential that management provide adequate resources to address the identified safety concerns. A system must be in place to determine logical approaches to counteract any risks to safe operation. This can be accomplished by reducing or eliminating a hazards likelihood of occurrence. Alternatively, a risk might be managed by reducing the severity of its effects. Occasionally, both may be possible. Finally, the mitigations that have been put in place must be monitored and tracked in order to ensure that the control strategies are working correctly.

2.3.4 Safety Assurance

Safety Assurance is the fourth pillar of Safety Management Systems and is defined as process management functions that systematically provide confidence that organizational products/services meet or exceed safety requirements (Federal Aviation Administration, 2007). Fundamentally, it is the morale booster pillar because it gives the organization assurance that

what they are doing to identify, mitigate and track hazards are actually working. Once polices, process (Safety Policy pillar) measures, assessments, and controls (Safety Risk Management pillar) are in place, the organization must incorporate regular management reviews to assure safety goals are being achieved. The components of Safety Assurance are the relationship between safety risk management and safety assurance, information for decision making, internal audits, external audits, internal evaluations, integration of regulatory and voluntary programs, analysis and assessments and monitoring the environment. Thus, Safety Assurance consists of three elements: internal audits, external audits and corrective action (Transportation Research Board, 2007). The first element of the Safety Assurance pillar is internal audits. It is important to note that not only should internal audits be conducted but external audits, which will be discusses shortly, should be conducted as well (Transportation Research Board, 2007). The airport safety auditor should conduct both formal and informal audits across all departments. These audits should be conducted on a regular basis and should include both scheduled and non-scheduled audits (Transportation Research Board, 2007). Internal Audits allow for the airport to use their own employees to complete an audit. This cannot only have positive effects, but negative as well. One of the positive, includes being familiar with the policies and procedures of the airports, which then allows the person to quickly identify the hazards. A negative effect is that the person could be biased and overlooks issues because it could get the airport in trouble, or simply be used to seeing the hazard and actually not identify it as one. Therefore, external audits should be completed, which is the second element in the Safety Assurance pillar. External Audits mimic those of Internal Audits but have one difference; these audits must be completed by an external-independent agency (Transportation Research Board, 2007). This allows for the unbiased approach to identifying risks, but is also at the expense of the airport (Transportation Research Board, 2007). Sometimes airports do not like to use this option because independent agencies often see other issues that the airport previously did not recognize. The third and final element of the Safety Assurance pillar is Corrective Action, which is the consequences bearing element. This element is the checks and balances of the pillar. This pillars ensures they incur the proper penalties be enforced, should someone not follow the appropriate actions when an accident or incident occurs. The Corrective Action element is further used ensure that hazards are actually being addressed (Transportation Research Board, 2007).

Safety risk management requires constant feedback on its performance. This is delivered through

the safety assurance function of SMS, which includes safety performance monitoring and m**easurement**, management of change, and the continuous improvement of the SMS. The primary task of safety assurance is control, requiring the continuous monitoring and evaluation of the performance of the SMS and, in particular, the safety risk management. If changes are necessary, their requirements are fed back to the safety risk management process. In addition, safety assurance provides stakeholders with an indication of system safety performance.

In order to monitor and measure the safety performance of an organization, KPIs and targets must be defined and the organizational safety performance must then be verified in reference to these. Safety measures should capture the performance of the operational safety risk management, including the effectiveness of operational procedures or safety risk controls. In addition, the elements falling under the safety policy and objectives cornerstone must be monitored. This is to ensure that safety responsibilities and accountabilities are assigned and that the SMS is documented as required. In addition to the constant monitoring and evaluation of the system's safety performance, an organization should develop and maintain a formal process to identify changes in the organization that may affect the established processes and services. The aviation industry, in particular, is fast moving and service providers experience permanent change due to expansion, changes to existing systems, equipment, programs and services, or the introduction of new equipment and procedures. As change can introduce new hazards, the appropriateness of existing safety risk management processes and safety risk controls must be verified. A formal change management process should identify organizational changes and their implications and the organization must ensure effective safety risk controls before, during and after the implementation of these changes. This includes the adjustment of safety risk controls to changes in the operational environment and the elimination of controls that are no longer needed or effective. Finally, an effective SMS must continuously strive for improvement. An organization should develop and maintain processes to identify the causes of substandard performance, to determine the implications for its operations of a degraded SMS performance, and to eliminate or mitigate such causes.

Internal Audits

Internal audits are performed by each department within the organization to ensure that they are following the proper procedures and are achieving their safety objectives. These audits should be performed on a regular basis and may include surveys of employees and formal or informal inspections performed within a department. Both short- and long-term effectiveness of safety actions should be evaluated.

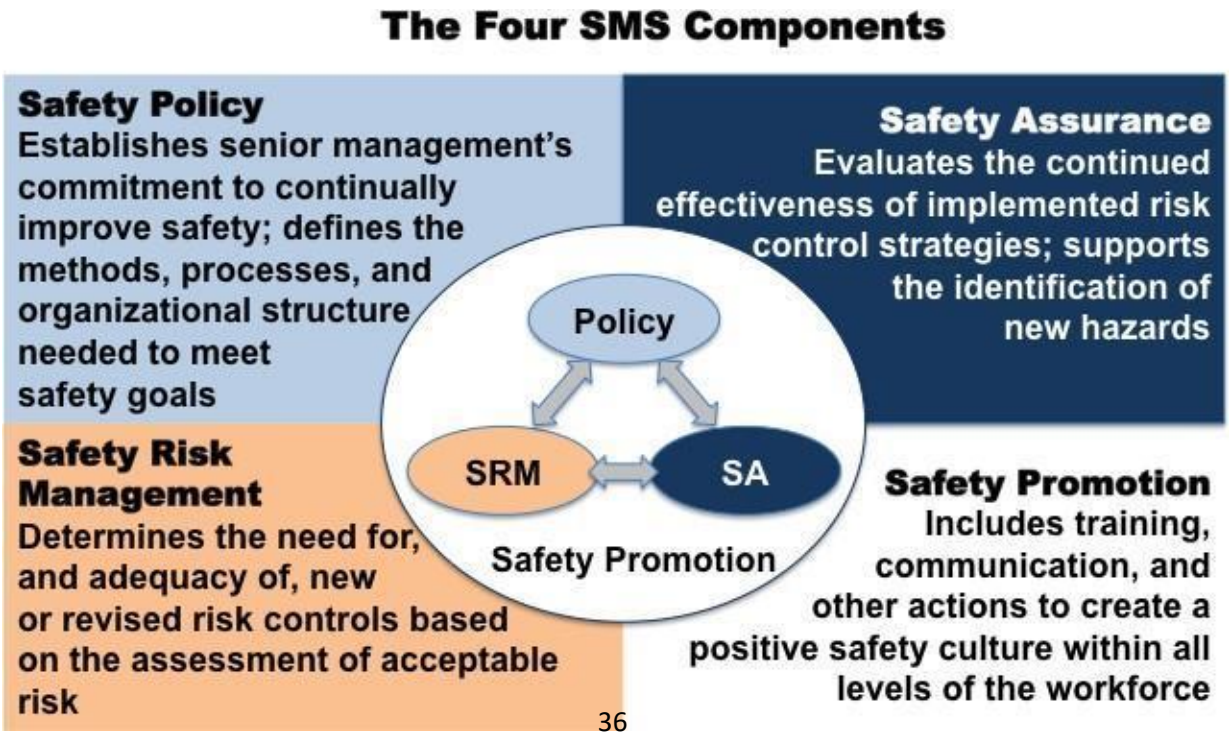
External Audits

External audits are conducted as part of the independent safety oversight of the organization. Audits can be scheduled or unscheduled and they provide a means for ensuring compliance with SMS standards, policies, and processes. For example, in a regulatory environment, the regulatory agency may conduct external audits.

Corrective Action

If an audit finds that prescribed procedures are not being followed, then corrective action should be taken by that department within the framework of Safety Assurance. Corrective action may also be taken to ensure that identified safety hazards are resolved.

Figure 2.3: The Integrated Components of the SMS(ICAO)



2.4 Safety Performance Indicators

The FAA and ICAO recommend organizations and airports measure their safety performance to evaluate their current standards. Measuring safety performance also validates the effectiveness of safety risk controls (ICAO, 2013). The safety policy of an organization can be defined as the safety related objectives and the corresponding safety targets. However, the basis of safety policy is the assessment and analysis of how the organization functions and delivers the product. Safety performance should be evaluated considering improvements to safety, efficiency and capacity, therefore, safety performance is the overall assessment of the safety culture and organization's overall efficiency and effectiveness (SCI, 2004). Safety management is highly dependent on an airport's capability of systematically analyzing, monitoring, and further developing the organizational safety performance. Effective safety management process can only be fully developed by understanding organizational systems and procedures. Organizational systems, procedures, and achievability cannot be understood without some type of measurement (SCI, 2004). Therefore, organizations should select safety performance indicators to correctly evaluate the process and provide feedback for further development. However, these indicators cannot be random outcomes that are easy to measure. Indicators should provide the necessary feedback to evaluate and improve the safety management process.

"Safety performance indicator is the data based safety parameter used for monitoring and assessing performance" (ICAO, 2013) and "safety performance target is the planned or intended objective for safety performance indicator over a given period (ICAO, 2013). Safety Performance Indicators (SPI"s) are classified in different areas according to the conceptual information required. There are two different types of safety performance indicators; these are referred to as Lagging and Leading indicators. Lagging indicators are measures of safety incidents that had a negative impact on the organization's safety performance; they are used to measure the unwanted safety events that already happened. Lagging indicators measure safety outcomes and they are mainly used to validate the safety performance and effectiveness of the system. Lagging indicators can be used for accidents or incidents with high severity negative outcomes or lower safety system failures with lower negative outcomes (S.C.I., 2004). Leading indicators are metrics that provide information about the possible negative outcomes that may ensue from the current situation. Leading indicators measures both the positive effects contributing to safety performance and negative effects that may have negative outcome in the

future. Providing positive safety indicators encourages employees to focus more on the system and increases safety management capability. Leading indicators are used to influence safety priorities and provides information for safety improvement (S.C.I., 2004). However, safety performance measurement should consider combination of lagging and leading indicators. Both indicators should be used to ensure that the safety management is effective; specifically, lagging indicators can be used to evaluate the safety risk management process since they are the indicators for lower system failures with lower negative outcomes.

2.5 Measuring Safety

In order to be able to study organizational safety, it is essential that an appropriate measure of the level of safety is utilized. The question of what the most reliable way of measuring safety is within an organization has received increasing attention among safety researchers. This is due to the fact that safety can be operationalized in a number of different ways which each have their own advantages and disadvantages.

Considering that objective and quantifiable data is often considered to be the most valid kind of outcome data within research, many researchers have used official records of injury or accident rates as indications of the level of safety within an organization (e.g., Barling, Loughlin, & Kelloway, 2002; Michael, Guo, Wiedenbeck, Charles, & Ray, 2006; Zohar, 2004). This kind of data is also convenient for research, given that these organizational accident records are often available from organizations due to regulatory reasons. However, data based on organizations‟ accident and injury records have been shown to contain considerable flaws. One problem concerns the fact that extraordinary events, such as accidents, occur relatively infrequently in organizations. The often much skewed distribution of these data due to the low number of accidents and injuries makes it difficult to detect any variance in the outcomes (Zohar, 2000). Another problem associated with this kind of register data is related to the high rates of under reporting of injuries and accidents within organizations (Probst et al., 2008). When a large number of accidents and injuries go by unreported, the validity and reliability of this kind of data as a measure of safety can be seriously questioned (Turner & Parker, 2004). Different solutions have been developed in order to come to terms with the acknowledged problems with under reporting, such as automatic logging systems on trains, confidential reporting, and legal requirements (within aviation) to report not only actual incidents but also near misses. Others

have focused on reducing any tendency towards a blame culture within the organization, since a culture characterized by blame and disciplinary actions is considered to result in less reporting of incidents. However, under reporting is still a problem when it comes to measuring safety in many situations (Clark & Cooper, 2004). The problems associated with distribution and reporting biases could be one reason for the lack of significant results when it comes to the relationship between different organizational factors and accident and injury outcomes in safety research.

It has therefore become more common to use conceptually broader and presumably more valid measures of safety in research and practice. These measures often involve ratings of employee safety-related behaviors (Griffin & Hu, 2013). Individual work behaviors related to organizational safety are usually conceptualized as safety performance. There is evidence suggesting that safety performance is a two-dimensional construct, consisting of behaviors related to safety compliance and to safety participation (Griffin & Neal, 2000). Safety compliance refers to the core activities that individuals need to perform in order to maintain workplace safety. Such activities include wearing personal protective equipment, following rules and regulations, and adhering to standard safety procedures. Safety participation, on the other hand, can be seen as a kind of contextual performance (see Borman & Motowidlo, 1993) and thus includes behaviors that do not directly affect the personal safety of the individual but which contribute to the development of a safe work environment. Examples of these behaviors are activities such as attending safety meetings, making suggestions for safety improvements, helping co-workers with safety-related issues, and voluntarily participating in safety activities (Neal & Griffin, 2006). Safety performance is an increasingly preferred measure for several reasons. To start with, safety performance is considered a more positive and motivational alternative to measures indicating negative safety outcomes such as injuries and accidents and is therefore now considered more appropriate and accepted as a basis for safety-improvement efforts (Clark & Cooper, 2004). Safety performance also has the advantage of a more normal base-rate distribution and can be predicted with greater accuracy (Christian et al., 2009). In addition, safety performance is assumed to be more closely related to psychological factors than to accidents, which can facilitate the understanding of causal relationships. Even though most studies have investigated the role of safety performance as a mediator between other

organizational variables, safety performance has also become accepted as a measure of safety outcomes, based on the assumption that a reduction in injuries and accidents will automatically follow an increase in safety behaviors (Ray, Purswell, & Bowen, 1993). Many organizational factors have hence been investigated in terms of the extent to which they affect the safety behaviors of the employees.

When it comes to methods of accounting for safety performance, it has been studied through workplace observations (e.g., Komaki, Collins, & Thoene, 1980) and through supervisors‟ ratings of their subordinates‟ safety-related behaviors (e.g., Simard & Marchand, 1995). The most common method for measuring safety behaviors, however, is through employee self-reports (e.g., Neal & Griffin, 2006). Despite self-reports sometimes being criticized as suffering from biases such as social desirability, this method of data collection has been shown to be a more valid measure of safety than data from organizational records. Employees are often more willing to be frank when sharing their experiences through anonymous questionnaires since there is little fear of reprisals from reporting negative incidents. The results from a study by Lusk, Ronis, and Baer (1995), for example, revealed that self-report measures of accidents and unsafe behaviors were highly correlated with independent observations of such events, whereas supervisor ratings of employee unsafe behaviors did not show the same congruence with independent observations. This implies that self-reports of safety behaviors appear to be a relatively accurate measure of safety outcomes.

Recently, self-reports have also become more accepted as a presumably more valid alternative for collecting information regarding accident and injury frequency than consulting organizational accident and injury records. By using anonymous self-reports to determine the number of accidents and injuries experienced, the problem with under reporting due to fear of reprisal is minimized. This is supported by a study by Probst and Estrada (2010) which found that employees reported three times as many experienced accidents in anonymous self-reports than were reported in the official accident and injury registers of the organization. In addition, some researchers have recommended the use of minor injury indexes (Hemingway & Smith, 1999; Zohar, 2000). These indexes are also based on self-reports, but measure the number of smaller injuries (which often fall outside the reporting obligation of the organization). Self-reporting of minor injuries is considered less prone to social desirability while also providing a more even distribution of the data due to their more frequent occurrence compared to major events. Despite

the lesser impact of a small or seemingly insignificant injury compared to a severe injury, the occurrence of minor injuries is considered to be an important indicator of safety, given that they often predicate more severe yet less frequently occurring injuries within organizations (Turner & Parker, 2004).

Other ways of examining the level of safety in organizations involve using different composite outcome measures, such as the number of people receiving safety training, the number of safety audits and weekly inspections conducted, risk assessments, the number of near-misses reported, and the number of completed remedial actions within the organization. Observation and inspection of an organization's policies, regulations, operating procedures, management systems, control systems, communication flows, and workflow systems could also be utilized as a measure of organizational safety (Cooper, 2000). In addition, occupational safety can be examined through case studies, where real accidents are analyzed in terms of the antecedents and the consequences associated with the event (e.g., Meshkati, 1991; Schröder-Hinrichs, Hollnagel, & Baldauf, 2012). In other words, the patterns and antecedents leading to a particular accident are investigated post-hoc in order to draw conclusions about the factors that may be considered risky in different workplace environments.

The appropriateness and applicability of different safety outcome measures also depend on the context and the nature of the organizational activities in question. One sector which has gained increasing attention in recent years when it comes to safety research is the health care sector, due to a realization of the risks that deficient working conditions and organizational problems can pose to patient safety (see e.g., Eklöf, Törner, & Pousette, 2014). The concept of patient safety encompasses any efforts made towards avoiding and preventing adverse outcomes and injuries that arise during the process of delivering health care to patients (Vincent, 2010). The work environment, behavior, and safety of health care workers are involved in patient safety, but it is the avoidance of harm to patients due to mistakes committed by health care workers that is the main focus. Examples of worker behaviors that affect the safety of patients include errors, rule violations, and risk-taking in relation to caregiving. These behaviors could lead to adverse events, such as distributing medications incorrectly, performing faulty blood transfusions, and spreading infections (Flin & Yule, 2004). There are indications that hospital patient deaths due to preventable adverse events may exceed the eighth leading cause of death (Kohn, Corrigan, & Donaldson, 1999), which indicates the urgency of placing patient safety at the center of health

care delivery alongside the safety of the employees. As with research focused on employee safety, patient safety can be measured in a number of ways, such as through hospital incident and accident records, reports or ratings provided by patients, and self-reports given by health care staff regarding either patient accident and injury frequency or their own safety behaviors.

2.6 Conceptual Framework

The study used the following conceptual framework that shows the interactions of the key study variables. The independent variables are: safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action). SMS is a systematic approach to safety that strives to assess and continuously improve the safety of an entire system. It therefore requires the assessment of all system components and their interactions for hazards and associated safety risks. The management of safety comprises two core operational processes or activities: safety risk management, and safety assurance. A SMS consists of four components that represent the two core operational processes and their supporting organizational arrangements. The four SMS cornerstones contain a total of twelve elements in the areas of planning, achievement, assurance and promotion

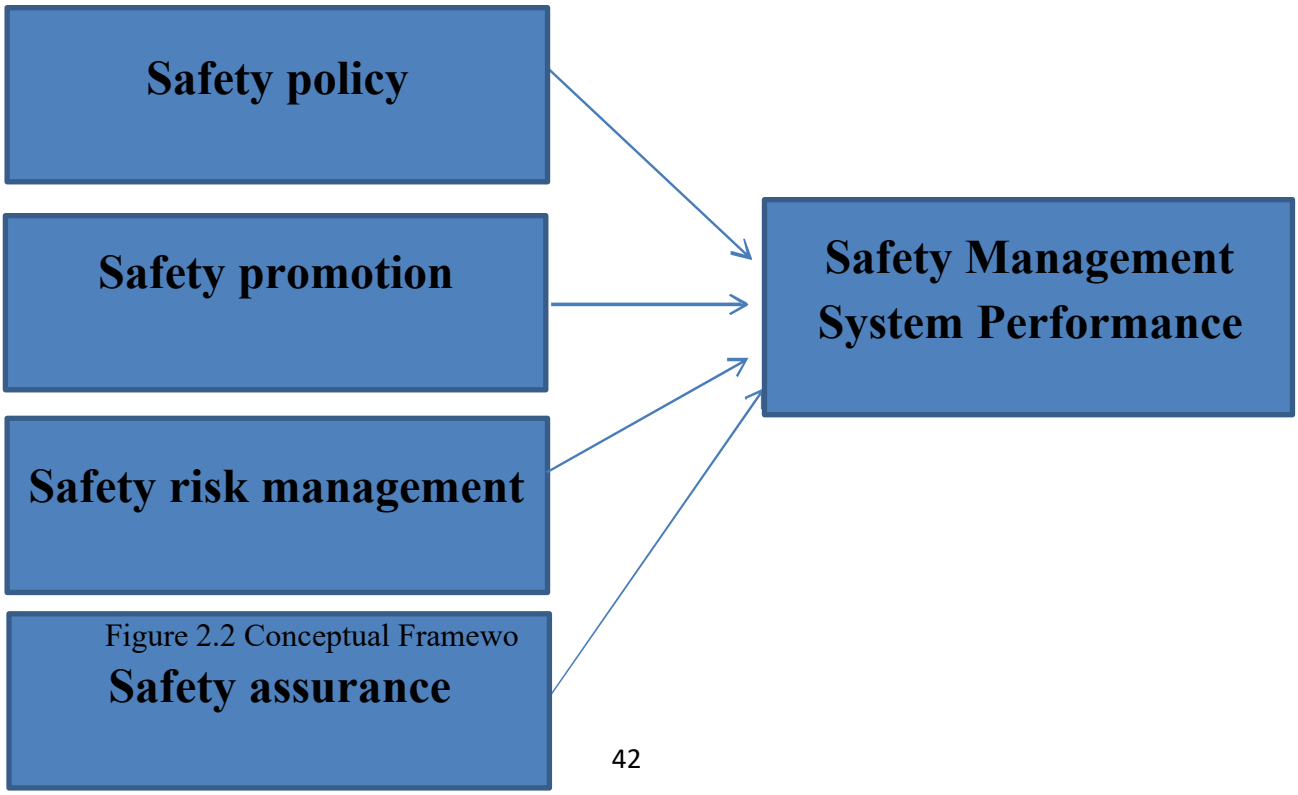


Figure 2.2 Conceptual Framewo

2.7 Research Hypothesis

Based on the review of theoretical and empirical literature the following hypothesis developed to guide the empirical work of this study: -

H1: Safety management system performance, measured by safety policy, has significant positive influence on Addis Ababa Bole International Airport.

H2: Safety management system performance, measured by safety promotion, has significant positive influence on Addis Ababa Bole International Airport.

H3: Safety management system performance, measured by safety risk management, has significant positive influence on Addis Ababa Bole International Airport.

H4: Safety management system performance, measured by safety assurance, has significant positive influence on Addis Ababa Bole International Airport.

CHAPTER THREE: RESEARCH METHOD

3. Introduction

This chapter present in detail the research paradigm and approach, research design, data type and sources of data, population and sample frame, sample size, sampling technique, data collection tools, measurements of variables, data analysis techniques, validity, reliability and ethical considerations of the study.

3.1 Research Approach

The study was following a positivist paradigm that are using for theory or hypothesis testing for survey research design. Positivist holds that science or knowledge creation should be restricted to what can be observed and measured, and tends to rely exclusively on theories that can be directly tested (Bhattacherjee, 2011). In addition, the quantitative research approach was best to investigate the perceptions and problem of the study and to discover the hidden values, feelings, attitudes and motivations (Svensone, 2003). So, to achieve the aim of this study, the researcher followed quantitative research approach. The study used deductive research strategy to test the hypotheses and theories; deduction is the process of drawing conclusions about a phenomenon or behavior based on theoretical or logical reasons and based on an initial set of premises (Cooper & Emory, 1995).

3.2 Research Design

In order to achieve the objectives of this study the researcher was apply a survey research design. A survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. From sample results, the researcher generalizes or makes claims about the population (Creswell, 2003). In other words; survey design is best suited for studies that have individual people as the unit of analysis. Survey research is a research method involving the use of standardized questionnaires to collect data about the major practices affecting safety management performance in case of Addis Ababa Bole International Airport Moreover, cross-sectional survey research design applies to measure the dependent and independent variables and survey research has several inherent strengths

compared to other research methods. First, surveys are an excellent vehicle for measuring a wide variety of un observable data, such as people's preferences, traits, attitudes, beliefs, behaviors or factual information. Second, survey research is also ideally suited for remotely collecting data about a population that is too large to observe directly (Bhattacherjee, 2011).

3.3 Source of Data

The researcher used primary data to undertake the study. The major advantage of primary data collection is that it can be collected with the research's purpose in mind. The information resulting from primary data is more consistent with the research questions and purpose. As a primary source of data collection the researcher used permanent and volunteer employees working for the Addis Ababa Bole International Airport. According to Biggam (2008), primary data is the information that the researcher finds out by him/herself regarding a specific topic.

3.4 Data Collection Tools

The primary data collected through structured self-administered questionnaire. The questionnaire measures to examine the major practices affecting safety management performance in case of Addis Ababa Bole International Airport. Thus, safety management system using a five point Likert scale, on which label given for respondent to express their level of agreement for each item among the scales and then the average score on each trait used during data analysis and interpretation.

3.5. Population and Sampling

The target populations are the Addis Ababa Bole International Airport the researcher takes the working population of Addis Ababa Bole International Airport that are working in head office Addis Ababa. The total study population of the study contains 120 employees. To determine the sample size and representative of the target population, statistical instrument formula. The mathematical formula that is adopted from Yamane (1997) cited in Israel, G. D. (2003).

$$n = \frac{N}{1 + N(e)^2} \qquad n = \frac{120}{1 + 120(0.05)^2} \qquad \text{n = 92}$$

Table 3.1: Sample size Distribution based on the Categories

Employees	Number of employees	Proportion of samples	Sample size
Air traffic control and Air side facility technician	89	89*92/120	68
Firefighting and rescue	31	31*92/ 120	24

Source; Survey data (2021)

3.6 Measurement of Variables

As the measuring instrument, close-ended Likert type questionnaires were used. This questionnaire type is selected because it is easy to administer to groups of people simultaneously; it is less costly and less time consuming than other measuring instruments. Likert scale is a widely used rating scale which requires the respondents to indicate a degree of agreement or disagreement with each of a series of statements or questions i.e. from (1) strongly disagree to (5) strongly agree. The questionnaire was also including some questions about educational back ground of respondents, employee level of the respondents, experience.

3.7.1 Independent Variable Measure

According to federal aviation administration (2019), there are four factors that determine safety management system :(i.e., Safety Policy, Safety Promotion, Safety Risk Management and Safety Assurance)

Safety Policy: The documented organizational policy that defines management's commitment, responsibility, and accountability for safety. Safety Policy identifies and assigns responsibilities to key safety personnel. Safety policy operationalized into three (i.e., Policy Statement, Organizational Structure and Procedures)

Policy Statement: The Safety Policy is a written document from senior management that is communicated to all employees. Other affiliated entities with a stake in organizational safety should also be informed. In an airport environment these might include airlines and other operators, local police, and concourse vendors.

Organizational Structure: The Safety Policy also includes the organizational structure that will be relied upon to achieve and maintain the stated safety objectives. The organizational structure should be appropriate to the size, complexity, and operating environment of the organization. Large organizations may be best served by a formal SMS that utilizes a cross-functional Safety Committee, while smaller organizations may adequately perform the same functions with a more informal approach.

Procedures: Safety procedures will lay out the process by which the organization identifies and remedies safety risks. They are subject to revision as circumstances change or more effective procedures are developed. It is critical that any changes be clearly communicated to all affected staff, and that the procedures be easily accessible to all for reference or continuing education purposes.

Safety Risk Management: A process within the SMS composed of describing the system; identifying the hazards; and analyzing, assessing, and controlling risk. SRM includes processes to define strategies for monitoring the safety risk of the aerodrome. SRM complements Safety Assurance. Safety risk management operationalized into three (i.e., Hazard Identification, Risk Assessment and Risk Mitigation and Tracking)

Hazard Identification: The first step in Safety Risk Management is to identify hazards that the organization faces in its operational environment. A description of the system or operation that is going to be changed or implemented must be developed as part of this step in order to be able to identify what could go wrong. A hazard is any existing or potential condition that can lead to an accident or incident. In an SMS, all identified hazards are documented and analyzed to determine what action is required to eliminate or reduce the safety risk associated with the hazard.

Risk Assessment: Each identified hazard undergoes a risk assessment to determine its potential consequences. The assessment considers both the severity of the consequences and the probability of such an event occurring.

Risk Mitigation and Tracking: Mitigating actions should be fully analyzed to ensure that they address the root cause of the hazard. It may be beneficial to explore a range of mitigating strategies before choosing the preferred option, basing the decision upon factors such as timeliness, cost, organizational capabilities, and overall effectiveness. It is essential that management provide adequate resources to address the identified safety concerns.

Safety Assurance: A set of processes within the SMS that verify that the organization meets or exceeds its safety performance objectives and that function systematically to determine the

effectiveness of safety risk controls through the collection, analysis, and assessment of information. Safety assurance operationalized into three (i.e., Internal Audits, External Audits and Corrective Action)

Internal Audits: Internal audits are performed by each department within the organization to ensure that they are following the proper procedures and are achieving their safety objectives. These audits should be performed on a regular basis and may include surveys of employees and formal or informal inspections performed within a department. Both short and long term effectiveness of safety actions should be evaluated.

External Audits: External audits are conducted as part of the independent safety oversight of the organization. Audits can be scheduled or unscheduled and they provide a means for ensuring compliance with SMS standards, policies, and processes. For example, in a regulatory environment, the regulatory agency may conduct external audits.

Corrective Action: If an audit finds that prescribed procedures are not being followed, then corrective action should be taken by that department within the framework of Safety Assurance. Corrective action may also be taken to ensure that identified safety hazards are resolved.

Safety Promotion: The communication and distribution of information to improve the safety culture and the development and implementation of programs and/or processes that support the integration and continuous improvement of the SMS within the aerodrome. Safety Promotion allows the aerodrome to share and provide evidence of successes and lessons learned. Safety promotion operationalized into three (i.e., Culture, Training and Communication)

Culture: The main goal of safety promotion is to create a "safety culture" that allows the SMS to succeed. Having a safety culture means that all employees are responsible for safety. Such a culture is led by top management example, especially in the manner with which they deal with day-to-day activities. Employees must fully trust that they will have management support for decisions made in the interest of safety, while also recognizing that intentional breaches of safety will not be tolerated. The result is a non-punitive environment that encourages the identification, reporting, and correction of safety issues.

Training: In order to fulfill their responsibilities in an SMS based organization, each employee must be trained in, or at least be aware of, safety principles. All personnel must understand the organization's safety philosophy, policies, procedures, and practices. They must also know their roles and responsibilities within the safety management framework. The depth of the training should be appropriate to each individual's position and vary from general safety familiarization

to expert-level training for safety specialists. Recurrent training may also be necessary to keep personnel up to date on any changes to SMS procedures.

Communication: Individual safety training is supplemented by an ongoing two-way communication process that helps ensure that employees benefit from safety lessons learned, see the results of their actions, and continue to improve their understanding of the organization's SMS. When new procedures are introduced, the associated underlying safety analysis should also be communicated to the appropriate employees. In addition to written communications, it is important for employees to witness evidence of the commitment of top management to safety.

3.7.2 Dependent Variable Measure

There are two ways of measuring performance; using objective and subjective measures. The objective measure uses real figures from the organization, while the subjective measure uses perception of respondents. In this study, the researcher decided to use a subjective measure to assess organizational performance because: It is a more consistent measure of performance and it does not vary broadly from the objective measure in terms of accuracy; and Asking respondents for specific financial measures may generate anxiety in them over the confidentiality of the information they provide (Asree, Zain, & Razalli, 2010). Employee performance is measured by employee performance scale developed by Good man and Svyantek (1999). The scale consists of 16 items and is measured on a 5-point scale ranging from strongly disagree (1) to strongly agree (5). Borman and Motowidlo, (1993) conceptualized employee performance having two dimensions namely task and contextual performance. The totality of performance of employees on their job should be the aggregation of both task and contextual performance. The task performance is related to the activities of the organizations which are linked with the core transformation process of the organization (Motowidlo & Schmit, 1999). According to this notation, the task performance captures the core behaviors or expected behaviors on the job by the formal authority of the firm (Befort & Hattrup, 2003). On the other hand, contextual performance includes the behavior exhibited by an employee‟s which are related to the culture and the context of the organization. Example, for such behaviors are helping core workers, following organizational rules and regulations and be loyal to the organization (Motowidlo & Schmit, 1999).

This conceptualization of employee performance has received much empirical supports from numerous studies (Luo, Shi, Li, & Miao, 2008). Later, this conception of employee performance

expanded further by identifying three constructs namely, task performance, job dedication and interpersonal facilitation (Conway, 1996). The job dedication and interpersonal facilitation are two dimensions of contextual performance identified later. Job dedication includes self-disciplined, aggressive and following rules and regulations of the organization which are formulated for achieving organizational goals. On the other hand, interpersonal facilitation encompasses the behaviors such as cooperating with others, understanding others and helping colleagues (Luo, Shi, Li, & Miao, 2008).

3.8 Data Analysis

This section explains how the data is to be captured and analyzed, and would also define the statistical terms of frequency, means, standard deviation, which used to analyze the data.

Data analysis usually involves reducing accumulated data to a manageable size, developing summaries, looking for patterns, and applying statistical techniques (Cooper & Emory, 1995). After the data is collected the researcher used in-house editing before coding, data entry and analysis has made. The purpose of editing is to check and adjust the data for omission, legibility and consistency. After editing, the data coded, entered and analyzed using statistical techniques based on the information. Therefore, the data enter on statistical package for social sciences (SPSS) software version 21 in order to generate results and draw the simple tabulations. The descriptive statistics will have used to analyze the demographic characteristics of respondents and then the results were presented by tables, frequency distributions and percentages. This will have achieved through summary statistics, which includes the mean values and standard deviation computed for each variable in this study. In this study Pearson correlation coefficient used in order to determine the strength and their relationships between (i.e., safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action) and safety management system performance in Addis Ababa Bole International Airport to see whether the independent variables related positively, negatively or no relationship between with the dependent variable.

Finally, multiple linear regression analysis used as the data consist of single dependent variable, and multiple independent variables to examine the safety management system performance in Addis Ababa Bole International Airport. The equation of multiple linear regressions for the

purpose of this study was generally built based two sets of variables, as dependent variable system performance and as independent variables safety management system performance components (i.e., safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action) and to achieve the objectives of the study, the researcher was used purely quantitative approach to conduct this study. Quantitative approach is used to addresses research objectives through empirical assessments. It involves numerical measurement and analysis approaches (Creswell, 2008). Consequently, the researcher sought to use this approach because the objective of the research is to analyze the practices of safety management system in case of Addis Ababa Bole International Airport and the researcher attempting to test the following regression models:

SPER = β0 + β1**SP**+ β2**SRM** + β3**SA** +β4**SP**+e ..... equation 1

Where: SPER = Safety Performanceβ0 = Constant term β1, β2, β3, β4 = Beta coefficients ß = Independent variable, α = Intercept, e= Error terms (residual term that includes the net determinacy of other factors not in the model and measurement errors in the dependent and independent variables). SP= Safety Policy, SRM=Safety Risk Management, SA=Safety Assurance and SP=Safety Promotion. Hypothesis testing was carried out using multiple regression statistics. The structured questionnaire used Likert scale in order to obtain research participants preference of agreement on the given statements. The participants indicated one of the choices given in order to tell their level of agreement. To present the data efficiently, the researcher assign value to each response allowing it to represent a single character.

3.9 Validity and Reliability

The FAA and ICAO recommend organizations and airports measure their safety performance to evaluate their current standards. Measuring safety performance also validates the effectiveness of safety risk controls (ICAO, 2013). Reliability and validity characterized by trustworthy, credibility, conformability and data dependability (U.S Government Accountability Office, 1990) should always be in the mind of researchers (Yin, 2009). He defines validity as the ability of an instrument to measure exactly what it is supposed to measure. And according to Yin (2009), reliability refers to the consistency of findings using the same research techniques repeatedly. Safety management is highly dependent on an airport's capability of systematically

analyzing, monitoring, and further developing the organizational safety system management.

3.10 Ethical Consideration

Respect and consideration to the participants is an important aspect of research. Research ethics calls for responsible conduct of research. The research work was started after getting the willingness of the stated organizations. Respondents were clearly communicated about the objective of the research before they are asked to give their answer. The researcher ensures the quality and integrity of this project work. The confidentiality and privacy of the voluntary respondents was also guaranteed. This independent and impartial project work considered not to cause harm to respondents in what so ever way. Accordingly, the researcher optimally considers all the ethical perspectives.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4 Introduction

This chapter presents the data analysis and discussion of the research findings obtained from data collected from the survey questionnaire that was held on employees of Addis Ababa Bole International Airport. Respondents for the measures on the questionnaire are summarized and presented using tables to facilitate easy understanding. The demographic profiles of the study have been described using descriptive statistics and also different inferential statistics were employed in order to analyze data obtained from the survey. Accordingly, standard multiple regressions were used to test hypothesis and achieve the study objective that focuses on identifying organizational factor with higher influence to the dependent variable. Furthermore, Pearson correlation coefficient and Cronbach‟s Alpha coefficient were used to test goodness and internal consistency of the measure.

4.6 Response Rate

To conduct the research 92 questionnaires were distributed to the respondents and the response rate indicated, out of 92 distributed questionnaires 87 were collected while five of the questionnaire remained uncollected.

4.7 Demographic Characteristics of Respondents

For this study, this section summarizes demographic characteristics of the respondents such as sex, level of education and year of experience. The purpose of the demographic analysis in this research is to describe the characteristics of the respondent such as the proportion of males and females, education level, and year of experience.

As it shown in Table 4.1 below, the data provides sex profile of respondents by frequency and percent. The results revealed that out of 87 respondents, 67 (77.0%) of the respondents were males and 20 (23.0%) were female respondents. In this paper compare to female employees more of the respondents are male employees.

The level of education of respondents in the below table 4.1 indicated that from 87 respondents 69(79.3%) of the respondents was employees who are degree holders, 16 (18.4%) was employees who have master’s degree and 2 (2.3%) was diploma holders. The result indicates that most of the employees were degree holders.

Table 4.1 below shows that, 34 (39.1%) respondents have experience in the range of 1 to 5 years,

34 (39.1%) of the respondents have from 6 to10 years of experience, 13 (14.9%) of the respondents have a range of 11 to 15 years of experience and 6 (6.9%) of the respondents above 15 years. The result indicates that majority of the employees are youngsters within the range of to 5 years‟ experience. The Personal and demographic characteristics of the respondents are presented in the table below.

Table 4.1: Demographic Characteristics of the Respondents

Items	Options	Frequency	Valid Percent	Cumulative Percent
Sex	Male	67	77.0	77.0
	Female	20	23.0	100.0
	Total	87	100.0	
Level of education	Diploma	2	2.3	2.3
	First degree	69	79.3	81.6
	Master Degree 16		18.4	100.0
		87	100.0	
Year of experience	1 –5 years	34	39.1	39.1
	6 – 10 years	34	39.1	78.2
	11 – 15 years	13	14.9	93.1
	Above 15 years 6		6.9	100.0
	Total	87	100.0	

Source; Survey data (2021)

4.8 The Extent Prevalence of Different component factors of Safety Management System Performance

The mean scores have been computed for all the four safety management system performance factors that includes (i.e., safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action)and also the dependent variable safety management system performance by equally weighting the mean scores of all the items under each dimension. The descriptive statistics used as a way of examining valid (N), mean and standard deviation in this study. It was needed to determine the respondents' perception. The average mean result of each independent and dependent variable were separately presented, analyzed and interpreted as follows.

Table 4.2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SP	87	1.00	4.56	3.6450	.63937
SRM	87	1.00	4.67	3.3142	.64237
SA	87	1.33	4.67	3.4649	.70732
SPR	87	1.33	4.89	3.3985	.72377
SMSP	87	1.81	4.19	3.3685	.49937
Valid N (listwise)	87				

4.9 The Associational Analysis of Safety Management System Performance

The Pearson Product Moment Correlation Coefficient is a statistic that indicates the degree to which two variables are related to one another. The sign of a correlation coefficient (+ or -) indicates the direction of the relationship between -1.00 and +1.00. Variables may be positively or negatively correlated. A positive correlation indicates a direct positive relationship between two variables. A negative correlation, on the other hand, indicates an inverse, negative relationship between two variables. As per Marczyk, Dematteo and Festinger, (2005) correlations of .01 to .30 are considered small, correlations of .30 to .70 are considered moderate, correlations of .70 to .90 are considered large, and correlations of .90 to 1.00 are considered very

large.

Accordingly, the below Pearson correlation coefficients shows that the four safety system management components measuring safety system management were all positively related with safety system management within the range of 0.248 to 0.703, all were significant at $p<0.01$ level. All the independent variables i.e., safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action) show a moderate level of positive relation with the dependent variable (safety management system performance).

Table 4.3: Correlations

		SP	SRM	SA	SPR	SMSP
SP	Pearson Correlation	1	-.287**	.047	.000	.248*
	Sig. (2-tailed)		.007	.668	.998	.021
	N	87	87	87	87	87
SRM	Pearson Correlation	-.287**	1	.202	.038	.338**
	Sig. (2-tailed)	.007		.061	.729	.001
	N	87	87	87	87	87
SA	Pearson Correlation	.047	.202	1	.060	.703**
	Sig. (2-tailed)	.668	.061		.578	.000
	N	87	87	87	87	87
SPR	Pearson Correlation	.000	.038	.060	1	.233*
	Sig. (2-tailed)	.998	.729	.578		.030
	N	87	87	87	87	87
SMSP	Pearson Correlation	.248*	.338**	.703**	.233*1	
	Sig. (2-tailed)	.021	.001	.000	.030	
	N	87	87	87	87	87

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

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

4.10 Assumption of Multiple Linear Regression

The researcher carried out analysis for multiple regression assumptions to ensure that the data violated none of the multivariate assumptions. As such, the researcher tested for linearity, Normality, multicollinearity and homoscedasticity whose results are as shown below.

Multicollinearity

In multiple regression analysis, the term multicollinearity indicates to the linear relationships among the independent variables. Collinearity indicates two variables that are close perfect linear combinations of one another. Multicollinearity occurs when the regression model includes several variables that are significantly correlated not only with the dependent variable but also to each other (Young, D.S., 2017). Multicollinearity is the event of great inter-correlations among the factors in a multiple regression model. Multicollinearity can prompt skewed or deluding results when an investigator endeavors to decide how well every factor can be utilized most viably to foresee or comprehend the response variable in a statistical model (Frank, E.H. Jr., 2001). All in all, multicollinearity can prompt more extensive confidence interval and less solid likelihood esteems for the predictors. That is, the findings from a model with multicollinearity may not be trustworthy (Frank, E.H. Jr., 2001).

Table 4.4: The Correlation among the Independent Variables

Coefficients

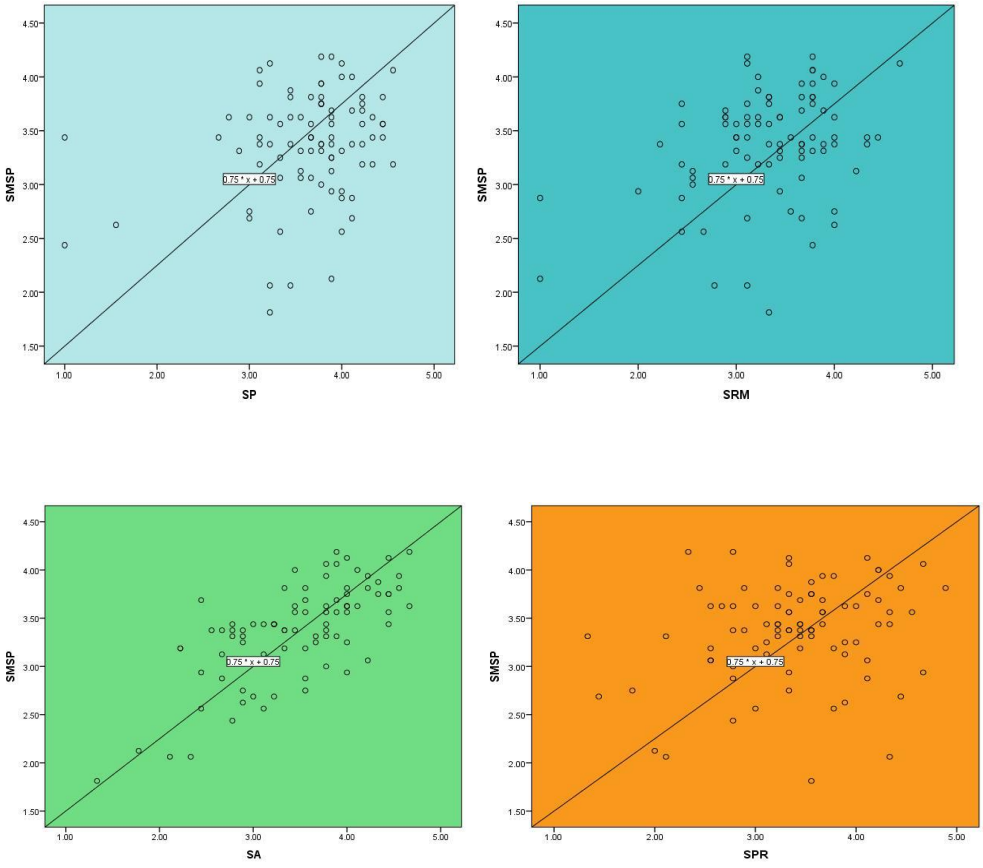
Model		Collinearity Statistics	
		Tolerance	VIF
1	PRF	.906	1.103
	PERF	.945	1.058
	PMTF	.871	1.148
	SLIF	.996	1.004

a. Dependent Variable: SMSP

Homoscedasticity

In Homoscedasticity assumption, the variances of error terms are similar across the independent variables. At each level of the predictor variable(s), the variance of the residual terms should be constant. This just means that the residuals at each level of the predictor(s) should have the same

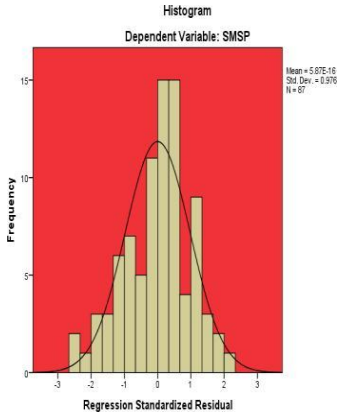
variance (homoscedasticity); when the variances are very unequal there is said to be heteroscedasticity (Field, 2009). According to the statistical solution (2017), to test the linear relationship assumption, Intellect's in the statistics plot the standardized residuals verses the predicted Y' values can show whether points are equally distributed across all values of the independent variables or not. Biased standard errors lead to biased inference, so results of hypothesis tests are possibly wrong. For a basic analysis, we first plot *ZRESID (Y-axis) against *ZPRED (X-axis) on SPSS because this plot is useful to determine whether the assumptions of random errors and homoscedasticity have been met (Field, 2009).

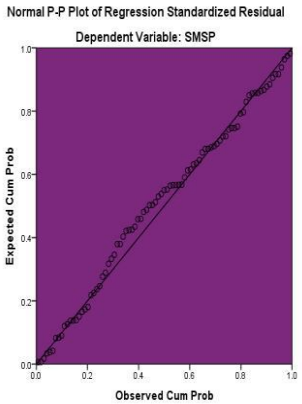


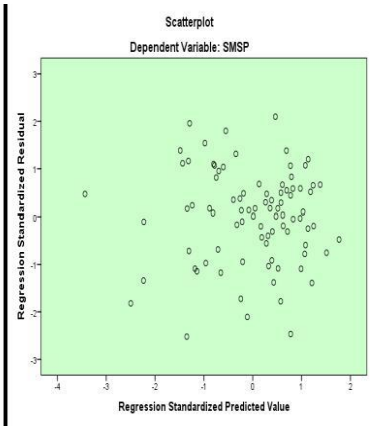
Test of Normality

The assumption of normally distributed error states that the residuals in the model are random, normally distributed variables with a mean of 0. This assumption simply means that the

differences between the model and the observed data are most frequently zero or very close to zero and that differences much greater than zero happen only occasionally. In general, the normal distribution makes a straight diagonal line, and the plotted residuals are compared with the diagonal. If a distribution is normal, the residual line will closely follow the diagonal (Field, 2009)

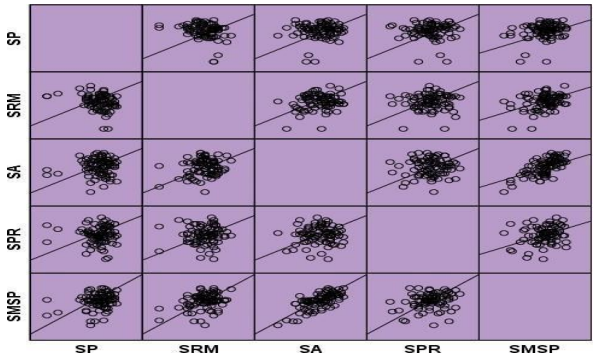






Test of Linearity

The other assumption is the linearity of the relationship between dependent and independent variables, which represents the degree to which change in the dependent variable is associated with the independent variable (Hair, 2006). In other words, the relationship between the two variables should be linear. This means that when one looks at a scatter plot of scores a straight line (roughly) should be seen, not a curve (Pallant, 2007). Linearity is checked using scatter plots and results are satisfactory and the all variables relationships are positive.



The multiple correlation coefficient (R) is a measure of the strength of the relationship between Y (in this case the safety system management) and the four predictor variables selected for inclusion in the equation as the safety management system performance (i.e., safety policy

(policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action). Large values of the multiple R represent a large correlation between the predicted and observed values of the outcome. A multiple R of 1 represents a situation in which the model perfectly predicts the observed data. Adjusted R^2 is a measure of the loss of predictive power or shrinkage in regression. The adjusted R^2 tells us how much variance in the outcome would be accounted for if the model had been derived from the population from which the sample was taken Adjusted R-squared is always smaller than R-squared, but the difference is usually very small unless you are trying to estimate too many coefficients from too small a sample in the presence of too much noise (Statistical solution, 2017).

Table 4.5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.808[a]	.652	.635	.30161	38.437	30.490	4	82	.000

a. Predictors: (Constant), SPR, SP, SA, SRM[a]

b. Dependent Variable: SMSP[b]

The model summary above predicts that R=0.808, while R square is predicted as 0.652, R square adjusted is 0.635 which shows that 63.5% of the variance of the safety system management can be predicted by the

independent variables (i.e., safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action).

Basically as in normal terms a healthy variation dependent variable must not be below 60% (Zygmont & Smith, 2014). However, the finding we generated from the regression summary shows 63.5% which is perfectly above the minimum requirement there the model is fit. The remaining 36.5% of the variation of safety system management was explained by components not included in this model. The F-statistic value of 38.437 was significant at $p<0.05$ level of significance. This meant that component taken together were significant for variation in safety management system performance of Addis Ababa Bole International Airport.

Table 4.6: ANOVA Regression

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.986	4	3.497	38.437	.000[b]
	Residual	7.459	82	.091		
	Total	21.446	86			

a. Dependent Variable: SMSP[a]
b. Predictors: (Constant), SPR, SP, SA, SRM[b]
Source; Survey data (2021)

There is an application of ANOVA statistics that is use for the representation of the regression model significance. An F-significant value of P = 0.000 was derived which indicates that there is a probability of 0.0% of regression model representing an untrue information as this indicates that the model is highly significant. The table 4.6 above presented the significant relationship between safety management system performance with safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action). Therefore, based on a given results the multiple linear regression model is appropriate to this research to predict the component factors safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action) with safety management system performance.

As it is stated in the objectives of this study the main aims to identify the determinant level of independent variables in the prediction of the dependent variable (safety management system performance). Thus, the strength of each predictor (independent) variable influence on the criterion (dependent) variable can be investigated via unstandardized Beta coefficient. Hence, the regression coefficients explain the average amount of change in safety management system performance (dependent variable) that caused by a unit of change in the determinant component factor (independent variable). It revealed the relative predictive power of each variable independently after the considerations of all other variables in the model were controlled. In order to determine which of the factors contributed to prediction of safety management system performance, the unstandardized regression coefficients or beta weights (ß) were examined in

below Table 4.7.

Table 4.7. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.196	.344		-.569	.571		
	SP	.237	.053	.303	4.428	.000	.906	1.103
	SRM	.228	.054	.293	4.202	.000	.871	1.148
	SA	.437	.047	.619	9.234	.000	.945	1.058
	SPR	.127	.045	.185	2.827	.006	.996	1.004

a. Dependent Variable: SMSP

Source; Survey data (2021)

The results presented in Table 4.7 revealed that the four component factors have a significant relationship with safety management system performance.

The study found out that safety policy has a positive and significant relationship with safety management system performance (B=0.237, p=0.000). Additionally, the results also found out that safety assurance are positive and significant relationship with safety management system performance (B=0.437, p=0.000) in Addis Ababa Bole International Airport employees. Furthermore, the findings showed that safety risk management have positive and significant relationship with safety management system performance (B=0.228, p=0.000) Addis Ababa Bole International Airport employees. Finally, the study also found that safety promotion is significant (B=0.127, p=0.006) in explaining the variations of safety management system performance in Addis Ababa Bole International Airport.

The equation of multiple regressions on this study is generally built on the set of variable safety management system performance as dependent variable and safety policy (SP), safety risk management (SRM), safety assurance (SA) and safety promotion (SPR) as independent variables of determinant component. Based on the result shows in table 4.7 the significance value of the component variables less than 5% the relationship between safety policy (SP), safety risk management (SRM), safety assurance (SA) and safety promotion (SPR) and safety management system performance is significant. Therefore, based on the finding of this study result safety policy (SP), safety risk management (SRM), safety assurance (SA) and safety promotion (SPR) significantly related with safety management system performance.

4.11 Hypothesis Testing

In order to achieve the objectives of this study the following hypothesis of the study were tested as stated in chapter two and the result of the analysis presented and to confirm the model presented in this study via testing of the hypotheses, a multiple regression analysis results are presented at the significant level of $p < 0.05$. The multiple regression analysis is conducted to determine the dimension that has stronger or weaker relationships to project implementation as literature has revealed (Hair *et al*., 2010; Pallant, 2007). As it stated in the earlier in first chapter, the main objectives of this study was to explain assessment of safety management system performance at Addis Ababa Bole International Airport. Therefore, in order to achieve the objectives of this study the following hypothesis of the study were tested as stated in chapter two and the result of the analysis presented below. The tests are done based on the unstandardized coefficient of beta and *p*-value refer table 4.8.

H1: Safety management system performance, measured by safety policy, has significant positive influence on Addis Ababa Bole International Airport.

As a result, indicated in table 4.8, there is a significant ($\beta = 0.237$, $p=.000$) positive relationship between safety policy and Safety management system performance in Addis Ababa Bole International Airport. Based on these finding, hypotheses one there is statistically significant relationship between safety policy and Safety management system performance to be accepted. The study concluded that there is statistically significant relationship between safety policy and Safety management system performance in Addis Ababa Bole International Airport.

H2: Safety management system performance, measured by safety promotion, has significant positive influence on Addis Ababa Bole International Airport.

As a result, indicated in table 4.8, there is a significant ($\beta = 0.127$, $p=0.006$) positive relationship between Safety promotion and Safety management system performance in Addis Ababa Bole International Airport. Based on these finding, hypotheses one there is statistically significant relationship between Safety promotion and Safety management system performance to be accepted. The study concluded that there is statistically significant relationship between Safety promotion and Safety management system performance in Addis Ababa Bole International Airport.

H3: Safety management system performance, measured by safety risk management, has significant positive influence on Addis Ababa Bole International Airport.

As a result, indicated in table 4.8, there is a significant (β = 0.228, p=0.000) positive relationship between Safety risk management and Safety management system performance in Addis Ababa Bole International Airport. Based on these finding, hypotheses one there is statistically significant relationship between Safety risk management and Safety management system performance to be accepted. The study concluded that there is statistically significant relationship between Safety risk management and Safety management system performance in Addis Ababa Bole International Airport.

H4: Safety management system performance, measured by safety assurance, has significant positive influence on Addis Ababa Bole International Airport.

As a result, indicated in table 4.8, there is a significant (β = .437, p=0.000) positive relationship between safety assurance and Safety management system performance in Addis Ababa Bole International Airport. Based on these finding, hypotheses one there is statistically significant relationship between safety assurance and Safety management system performance to be accepted. The study concluded that there is statistically significant relationship between safety assurance and Safety management system performance in Addis Ababa Bole International Airport.

The determined outcome or result of the above table of Beta coefficient shows that the four components have a significant and positive on Safety management system performance. Accordingly, the regression coefficients analysis of this study the following optimal regression model is developed.

Model specification:

$$SPER = \beta_0 + \beta_1 \text{SP} + \beta_2 \text{SA} + \beta_3 SRM + \text{SPR} + e$$

$SPER$= -.196+ .237(SP) + .437(SA) +.228(SRM) +127(SPR) + e ---- this the optimal model based on the finding of this study.

Table 4.8: Summary of Hypothesis

	Hypothesis	Beta Coefficient	Significant (P<0.05)	Decision
H1	Safety management system performance, measured by safety policy, has significant positive influence on Addis Ababa Bole International Airport	0.237	0.000	**Accepted**
H2	Safety management system performance, measured by safety assurance, has significant positive influence on Addis Ababa Bole International Airport.	0.437	0.000	**Accepted**
H3	Safety management system performance, measured by safety risk management, has significant positive influence on Addis Ababa Bole International Airport.	0.228	0.000	**Accepted**
H4	Safety management system performance, measured by safety promotion, has significant positive influence on Addis Ababa Bole International Airport.	0.127	0.006	**Accepted**

4.12 Discussion on Major Findings of the Study and Alignment with Previous Studies

The study investigated safety management system performance at Addis Ababa Bole International Airport. The researcher conducted linearity, mulicolliearity, homoscedasticity and normality test which all are the basic preconditions of multiple linear regression analysis and the test confirms that all of the above assumptions are satisfied with this study. Based correlation analysis of these findings, all the components were shown to be positively correlated with safety management system performance. Further, multiple linear regression analysis indicated that safety policy (SP), safety risk management (SRM), safety assurance (SA) and safety promotion (SPR) and safety management system performance was significant in explaining variation in safety management system performance of Addis Ababa Bole International Airport.

Moreover, the findings this study indicated that safety management system performance safety policy (SP), safety risk management (SRM), safety assurance (SA) and safety promotion (SPR) explaining 63.5% variation in safety management system performance and the remaining 36.5 % of the variation in safety system management was explained by other factors not included in this model. The study found out that safety policy has a positive and significant relationship with safety management system performance (B=0.237, p=0.000). Additionally, the results also found out that safety assurance are positive and significant relationship with safety management system performance (B=0.437, p=0.000) in Addis Ababa Bole International Airport employees. Furthermore, the findings showed that safety risk management have positive and significant relationship with safety management system performance (B=0.228, p=0.000) Addis Ababa Bole International Airport employees. Finally, the study also found that safety promotion is significant (B=0.127, p=0.006) in explaining the variations of safety management system performance in Addis Ababa Bole International Airport. The FAA and ICAO recommend organizations and airports measure their safety performance to evaluate their current standards. Measuring safety performance also validates the effectiveness of safety risk controls (ICAO, 2013). The safety policy of an organization can be defined as the safety related objectives and the corresponding safety targets. However, the basis of safety policy is the assessment and analysis of how the organization functions and delivers the product. Safety performance should be evaluated considering improvements to safety, efficiency and capacity, therefore, safety performance is the overall assessment of the safety culture and organization's overall efficiency and effectiveness

(SCI, 2004). Safety management is highly dependent on an airport's capability of systematically analyzing, monitoring, and further developing the organizational safety performance. Effective safety management process can only be fully developed by understanding organizational systems and procedures. Organizational systems, procedures, and achievability cannot be understood without some type of measurement (SCI, 2004). Therefore, organizations should select safety performance indicators to correctly evaluate the process and provide feedback for further development. However, these indicators cannot be random outcomes that are easy to measure. Indicators should provide the necessary feedback to evaluate and improve the safety management process.

Safety Risk Management on Safety Management System Performance

According to (Umut Oztekin, 2018) Results from correlation analysis, r=0.7348, indicated that employee attitudes toward safety risk management have a significant positive relationship with safety performance at U.S. airports. Airports with employees that have stronger attitudes towards safety risk management have better safety performance. Findings from the background questions indicated that airport employees with higher level of experience with safety risk management procedures has stronger attitude toward safety risk management. Employees with higher experience are aware of the importance of safety risk management and have a stronger attitude because of the training and the issues they have witnessed during their careers. As explained in Swiss cheese model, failure does not happen with one mistake, it is most of the time combination of mistakes and negligence. Experienced employees are more aware of the results of negligence which makes them have stronger attitudes towards the work they are performing. Experienced and trained employees would bring safety awareness to the airport. In this study, it is shown that employees with higher levels of experience has stronger attitude toward Safety Risk Management and has higher Airport Safety Performance scores. Airports with responsible safety employees, safety committees and suitable rules would have a safety culture. Building a safety culture would be the most efficient way to enhance safety within employees at the airport and ensure high levels of safety performance. Therefore, we can conclude that airports with employees having higher levels of experience would create a better safety culture and enhance airport safety performance.

Safety risk management had an estimated coefficient (0.305, standardized coefficient), p-value = 0.000 which indicated that it was significant with a correlation of 0.716. This implied that the null hypothesis was rejected and it was concluded that safety risk management has a significant effect on firm performance (Capt. Njeru Lukas Maina, 2017). This suggested that there was up to 0.305-unit increase in firm performance for each unit increase in safety risk management. The effect of safety risk management was more than 3 times the effect attributed to the error, this was indicated by the t-test value = 3.878. Based on these findings, Hwang (2011) point out that the concept of risk management is about understanding the operational systems. Furthermore, the positive effect of safety risk management is highlighted by Beguería (2006) who notes that it allows for the elimination or reduction of the risk while Abu el Ata and Schmandt (2016) note that such a system where there is proper attention given to safety risk management, allows one to neutralize any risk that allows for a safe operation. In line with previous studies the multiple linear regression analysis of this study also indicated that safety risk management influenced the variation in project implementation in a positive significant level in Addis Ababa Bole International Airport (β =0.228, p=0.000).

Safety rules and procedures refer to the degree to which an organization creates a clear mission, responsibilities, and goals, sets up standards of behavior for employees, and establishes safety system to correct workers‟ safety behaviors (Lu, C.S. and Yang, C.S.,). Even though employers have the legal duty to fulfill their duty of care (Hopkins, 2002), the OSH Act 1994 is silent on how employers should enforce it. Despite the absence of explicit legal provision, enforcing of safety rules and procedures reflect the management commitment toward safety at work (Lu, C.S. and Yang, C.S, 2011), (Fernández-Muñiz, B., Montes-Peón, J.M. and Vázquez-Ordás, C.J, 2007). In order to help employees, understand the safety rules and procedures, and, hence, comply with them, the management has to communicate them in a language that the employees can easily understand. This is because studies have found that safety rules and procedures influenced workers‟ safety behaviors (Lu, C.S. and Yang, C.S, 2011).

Safety promotion on Safety Management System Performance

Safety promotion policies are policies that aim to ensure the presence and maintenance of conditions that are necessary to reach and sustain an optimal level of safety (Welander, G.,

Svanström, L. and Ekman, R., 2004). Studies indicate that safety reporting by employees plays a crucial role in accident prevention at work (Chen, C.P. and Lai, C.T, 2014), (Barach, P. and Small, S.D, 2000). In SMEs where employer-employee relationship tends to be personal and informal, employee reporting should be encouraged as long as it does not threaten the esprit de corps of the organization. The implementation of safety promotion policies reflects not only the management commitment toward safety, but it also signifies the proactive attitude toward safety. Indeed, studies have demonstrated the positive contribution of safety promotion and policies toward reducing workplace accidents and injuries (Vinodkumar, M.N. & Bhasi, 2010), (Ali, H., Azimah Chew Abdullah, N. & Subramaniam, 2009.)

Safety communication and feedback has been recognized as an effective way of improving safety performance in organizations. Dissemination of information through various communication media, such as safety meetings, regular personal contacts, and sign posts, etc. on safety rules and regulations can serve as a reminder to employees of the need to be safety conscious and work safely (Hopkins, A, 2002). But, to be effective, safety communication and feedback should be a two-way process rather than simply a top-bottom approach. Employees should also be encouraged to give their feedback on safety-related matters to the management and suggest ways of improving the work processes and activities that can be made safer. Safety feedback, whether it comes from the employer or employee, serves as a reinforcement tool for appropriate behavior modification (Prue, D.M. and Fairbank, J.A, 1981)

In emphasizing the importance of communication, it becomes apparent that information sharing can be conducted by management in a number of different ways and can have many functions within an organization. As has been noted, one such function is to provide employees with information about what is expected from them and what is valued in the organization. Another function of communication is to provide feedback to employees regarding their performance. For the purpose of communicating important organizational values and information regarding performance status, contingent rewards and incentives of different kinds have become increasingly common (Sinclair & Tetrick, 2004). Contingent compensation is often considered to be a tool that management can utilize to unambiguously indicate which behaviors are most valued by the organization and to encourage employees to make efforts to achieve certain goals (Zacharatos & Barling, 2004). The rewarding of employees for desirable performance has long

been established as one of the main functions of human resource management (HRM) who typically utilize bonus or incentive system/programs that apply to all or part of the staff. These kinds of systems can vary greatly between organizations in their aim and design, which could potentially lead to substantial differences in their effectiveness when it comes to affecting employee performance. Considering that goalsetting and feedback is also important for the enhancement of workplace safety, the managing of rewards related to performance appraisals and to motivation for safe performance should be a highly relevant matter (Sinclair & Tetrick, 2004). The multiple linear regression analysis of this study also indicated that safety promotion influenced the variation in project implementation in a positive significant level in Addis Ababa Bole International Airport (β =0.127, p=0.006). The researcher finding is in line with the finding of (Capt. Njeru Lukas Maina, 2017) Safety promotion had an estimated coefficient (0.327, standardized coefficient), p-value = 0.001which indicated that it was significant with a correlation of 0.582. This implied that the null hypothesis was rejected and it was concluded that safety promotion has a significant effect on firm performance. This suggested that there was up to 0.327-unit increase in firm performance for each unit increase in safety promotion. The effect of safety risk management was more less 3 times the effect attributed to the error as indicated by the t-test value = 3.445. In line with these findings, Käppler *et al,* (2014) noted that without a solid foundation SMS will not be successful. As such, an organization must have the best possible safety manual, training, and communication. Regardless of the degree of safety built into a job, unsafe actions on the part of employees will always be a cause of injuries; teaching employees safe work habits means showing them how to do their tasks with less risk to themselves and less damage to equipment (Ganapathi *et al*., 2013). OSH related training for the implementation of the OSHMS program should be carried out on a continuous basis at all levels, from top managers to shop floor workers, and updated regularly ensuring knowledge of the system and keeping up with changes in the organization (Armstrong, 2011). According to Adel (2012) stated that training is one of the best methods that can be sued to influence human behavior for the purpose of developing sound and safe work habits; Employee training shall be in the first day of employment and should continue periodically for the length of the worker‟s affiliation with the company. Benjamin (2008) found that a safety training program needed for newly hired employees, employees reassigned to other jobs; employees returning to work after an extended lay-off period or medical leave; when new equipment and processes are introduced

or installed in and procedures. The ILO guide line (2001) also has a provision for employee safety and health training underlined as: It should cover all members of the organization as appropriate; it should provide effective and timely initial and refresher training at appropriate intervals; it should include participants evaluation of their comprehension and retention of the training; it should be reviewed periodically and It needs to be documented as appropriate and according to the size and nature of the organization's activity. The Safety Culture comprises of organizational elements such as structures, requirements and limitations, social and psychological factors as well as the implementation of these elements. The Safety Culture illustrates the organizational ability to comprehend the nature of safety in its operations, recognize safety hazards and to prevent them and thereby develop safety within the organization. (Demichela et al. 2004) Safety Culture is a dynamic state which can be influenced on multiple levels such as experiences, views and sentiments, social phenomena and operational activities. (Muniz et al. 2009: 980) A functional Safety Culture includes sufficient means to conduct work in a safe manner where safety matters have been recognized and considered. This also includes the development of safety and possibilities to influence on this development. The Safety Culture includes the entire organization on all organizational levels where all participators communicate with each other and therefore affect safety. It can only be developed as a result of an effective Safety Management. Safety Management can be regarded as a comprehensive management of safety related issues. The target of Safety Management is to develop work and working environment from safety perspective fulfilling both legislative and organizational guidelines and requirements. Safety Management is a combination of methods, procedures and managerial entities. (Muniz *et al.* 2007: 54) Safety Management is used to enable the organization to implement and develop a safety policy which fulfills the legislative requirements concerning Occupational Health and Safety, in addition to organizational dimensions, the Safety Culture includes a psychological dimension which includes subjective experiences and views of work related safety and risks. The management of work, appreciation of safety, responsibility and awareness of safety matters are psychological phenomena as they are subjective sentiments and comprehensions. However, the psychological dimensions can be regarded as cultural dimensions of the organization as they are born upon the collaboration of individual members and the social environment of the organization (Reiman et al. 2008: 89) In addition to organizational and psychological dimensions the Safety Culture can be seen as a phenomenon with social processes.

All these three dimensions are considered when the Safety Culture of an organization is evaluated as the organizational dimensions influence the psychological dimensions and the social processes. Moreover, the psychological dimensions such as individual abilities and motivations to perform work tasks in a safe manner also influence the organizational dimensions and social processes. From a motivational perspective it is essential that the various members of the organization have an understanding of the significance of a functioning work safety culture. (Reiman *et al*. 2008)

One of the findings from HRO research is that high levels of reliable and safe management are not synonymous with invariance in behavior. High reliability organizations, including elements of their safety culture, are not established once and for all in their creation. High levels of attention, trust between departments and units, rich communication across multiple information channels, continuous scanning for system implications of specialized work, maintenance of mindfulness and warding off complacency in routine tasks all are hard to sustain and subject to erosion under the press of time, heavy workloads and intense pressures for service outputs (Schulman, 1993). Instead, a key to high process reliability and safety management is the close monitoring and management of fluctuations in key components of both management and culture. A successful safety management system has to ward off drift toward lapses in its integrity, integration and energy. It has to take its own temperature in regard to precursor conditions not only in operations but also in management and culture themselves. One strategy to avoid drift into complacency is an embrace of a constant search for improvement. This may be reflected in formal practices but is also grounded in culture.

In one well-managed nuclear power plant formal procedures were taken very seriously throughout the organization and none were disregarded in actual work. But at the same time, procedures were continuously reviewed for clarity and relevance and employees were encouraged to submit suggestions for revisions that would improve procedures. As a consequence, many procedures had undergone multiple changes through a formal revision process. Because many of these revisions had originated at the operations and shop levels, the employees came to "own" the procedures – they took them seriously as custodians and they, among others, were always on the lookout for improvements to them. The procedures were, in effect, a living document\ capturing the current plant knowledge base and state of the art in operations and maintenance (Schulman, 1993).

The essential role of leaders in ensuring the effectiveness of work accident prevention within organizations was acknowledged early on in the 20th century. Heinrich (1931) was one of the first occupational researchers to claim that supervisors, which generally refers to managers at the lower levels of organizations, are key persons when it comes to accident prevention, as they are the only ones who are in a position to detect and handle, on a day- 29 to-day basis, potential hazardous conditions and dangerous actions or situations likely to result in work accidents. However, it was not until the beginning of the 1990s that organizational psychologists started conducting empirical research on the influence of managers‟ and supervisors‟ leadership behaviors on safety outcomes (Flin & Yule, 2004). Since then, several studies have provided evidence that leadership plays a vital role in promoting workplace safety in a number of different sectors, such as the nuclear energy production industry (e.g., Martínez-Córcoles et al., 2011), manufacturing (e.g., Michael et al., 2006), transport (e.g., Hofmann et al., 2003), restaurant and fast food industry (e.g., Barling et al., 2002), and health care industry (e.g., Agnew, Flin, & Mearns, 2013; Mullen & Kelloway, 2009). A meta-analysis by Nahrgang, Morgeson, and Hofmann (2007) provided evidence for leadership being related to safety climate and safety behaviors as well as to the occurrence of injuries and accidents. Although there has been some research on the role of leadership for occupational safety and theoretical advancement regarding the concept of safety leadership, it is still relatively scarce compared to the research on general leadership (Clarke, 2013). In addition, even though there is support for leadership being important for workplace safety, the ways managers should behave in order to enhance the safety performance of their subordinates are still relatively unclear (Martínez-Córcoles et al., 2011). Nevertheless, some interesting conclusions have been reached regarding leadership behaviors within high risk organizations. The focus in these studies has been on the actions of leaders that influence safety performance and how they relate to different leadership styles (Hofmann & Morgeson, 2004). In most cases, the studies investigated the relationships between leadership styles, as derived from general leadership research, and safety outcomes (e.g., Clarke & Ward, 2006; Hofmann & Morgeson, 1999). Formal leadership is also a necessary, if not sufficient, factor in the development of a safety culture within an organization. A chief executive can elevate, and symbolize as well, a commitment to safety as a top, if not the top, priority in an organization. As has been discussed, in the relationship between leadership and managerial practices and safety, communication has been shown to play a key role in a number of contexts.

For example, leaders‟ communicating a clear vision of what a safe workplace entails and clearly expressing that safety is prioritized are essential in establishing a safety climate. Communication failures have also been identified as a contributory factor in inquires of several major disasters (Reason, 1990; Turner, 1978). Underlying many organizational accidents are situations characterized by different types of informational shortcomings and communication failures (Turner, 1992). Likewise, the prominent role of communication has been acknowledged within the health care-related area of patient safety. There is evidence that communication breakdowns are the root cause of as much as 70% of adverse events experienced by patients within health care (Joint Commission, 2009). In relation to these findings, it has been argued that communication that is accurate, complete, timely, and easy to grasp by the recipients should be aimed for, since it has been concluded to result in fewer employee errors and improved patient safety (Donahue, Miller, Smith, Dykes, & Fitzpatrick, 2011). Since few would disagree on the value of these communication characteristics, the main challenge lies in actually achieving communication of this quality in organizations in addition, although these aspects of communication are surely important, it is reasonable to assume that the issue of communication in relation to workplace safety is presumably more multifaceted and complex, being affected also by other factors such as the cultural and relational elements of communication. Communication is a matter that is important and relevant at and between all hierarchical levels in an organization. The main focus of this chapter, however, is on leaders‟ communication with their employees, and how it could affect workplace safety. The role of communication within organizations Communication is often defined as a process whereby information is transferred or exchanged between a sender and a receiver, and where the receiver perceives some kind of meaning in the message (Katz & Kahn, 1978). The meaning of the message interpreted by the receiver, however, 36 may not be the meaning that was intended by the sender, since effective communication requires more than just the transfer of information (Kaufmann & Kaufmann, 2010). Communication has come to be considered an essential parameter in the development, functioning, maintenance, and change processes of organizations (Müller & Kieser, 2003). Successful organizations are often held to be characterized by effective communication, i.e., communication which is consistent, forthright, relevant, and timely (Vredenburgh, 2002). This is especially true in modern organizations that have fast-changing technology, complex work routines, a large amount of flexibility, and a diverse staff. In these kinds of organizations, the

clarity and quality of the communication of information is often especially vital (Allvin, Aronsson, Hagström, Johansson, & Lundberg, 2006; Dencker, Mårtensson, Fasth, & Stahre, 2011; Jacobsen, & Thorsvik, 2002). Thus, it becomes apparent that communication is a vital part in the managing of organizations. It is generally assumed by both researchers and practitioners that having communicative competence, i.e., the ability to properly understand and transmit information, is essential for the effectiveness of leaders, regardless of type of organization of hierarchical level (e.g., Penley, Alexander, Jernigan, & Hernwood, 1991; Riggio, Riggio, Salinas, & Cole, 2003; de Vries, Bakker-Pieper, & Oostenveld, 2010). Some even suggest that the ability to develop and communicate a vision that gives meaning to the work of others is vital in the role as a leader (Handy, 1993). This claim is reasonable, as many of the managerial roles (Mintzberg, 1973) involve an element of communication, such as being a spokesperson, a liaison, a negotiator, and a disseminator of information. Communication is also involved in the more relational aspects associated with leadership. These aspects include behaviors such as clarifying the role of subordinates, providing feedback on performance and showing concern for subordinates (Avolio & Bass, 2004; Riggio et al., 2003; Schuler, 1979). The communication of leaders within an organization can also be seen from a power perspective, considering that information is one of the most important organizational resources (Pfeffer, 1998). Receiving shared information can be vital when it allows employees to gain a better understanding of the operations, the goals, and the functioning of the organization. Another potential benefit is that leaders who share information with subordinates send a signal to them that they are trusted (Zacharatos & Barling, 2004). Despite the common assumption that communication is vital for the performance of leaders and organizational functioning, it has received surprisingly little attention in research within occupational psychology compared to other workplace matters.

Safety assurance on Safety Management System Performance

According to Thomas (1989) depending on the company‟s safety organization and interest of the safety manager, various methods of carrying out inspections have been devised. He mentioned the most used methods as information inspection; general planned inspection and Critical parts inspection. It is not necessary to wait for an external inspector to inspect the work area for safety hazards; inspections may be done by a safety committee or a committee composed of management and employee Armstrong (2010). They should be done on a regular basis in order to

inspect all premises for possible safety and health problems. When accidents occur, they should be investigated by the employer‟s safety committee or safety coordinator in the scene of an accident, it is important to determine the physical and environmental conditions that contributed to the accident like, poor lighting, poor ventilation, and wet floors are some possible contributors (Dessler, 2006). As described by Armstrong (2011) Health and safety audits provide for a much more comprehensive review and evaluation of all aspect of health and safety policies, procedures practices and efforts. According to Saundets (1992) cited by Mengesha (2013) stated that a safety audit will examine the whole organization in order to test whether it is meeting its safety goals and objectives. It will examine hierarchies, safety planning processes, decision making delegation, policies making and implementation. Armstrong (2011) stated that safety audit will examine the whole organization in order to test whether it is meeting its safety aims and objectives. It will examine hierarchies, safety planning processes, decision making, delegation, policy making and implementation as well as all areas of safety program planning. Safety assurance had an estimated coefficient (0.023, standardized coefficient), p-value = 0.811 which indicated that it was not significant with a correlation of 0.518. This implied that the null hypothesis was not rejected and it was concluded that safety assurance has no significant effect on firm performance. This suggested that although there was up to 0.023-unit increase in firm performance for each unit increase in safety assurance, this effect was not significant. The effect of safety risk management was more less 0.5 as indicated by the t-test value = 0.241. Safety assurance is implemented through audits and the Transportation Research Board (2012) notes that not only should internal audits be conducted but external audits should be conducted as well.

In line with the previous studies the multiple linear regression analysis of this study also indicated that safety assurance influenced the variation in project implementation in a positive significant level in Addis Ababa Bole International Airport (β =0.437, p=0.000). The previous findings have shown that safety assurance has no significant effect on firm performance which ideally indicates that there are aspects of audits that are overlooked such as external audits and Gingerich (2010) notes that external audits allow for the unbiased approach to identifying risks, but is also at the expense of the firm and as such firms do not like to use this option because independent agencies often see other issues that the firm previously did not recognize and thus avoid this pillar. Thus, effect of safety assurance is not significant.

Safety policy on Safety Management System Performance

The policy statement describes in detail the operation of the entire organization and includes the roles, responsibilities and relationships between all individuals involved in the organization. It specifically includes the involvement of top management which is a key component to the success of SMS (Tzempelikos, 2015). Furthermore, the policy statement defines the procedural framework, which describes the responsibilities of all departments, including the training, processes measurement and the change in the system, if there should be one (Tzempelikos & Gounaris, 2015). According to (Capt. Njeru Lukas Maina, 2017) Safety policy had an estimated coefficient (0.529, standardized coefficient), p-value = 0.000 which indicated that it was significant and carried the largest significant effect with a correlation of 0.709. This implied that the null hypothesis was rejected and it was concluded that safety policy has a significant effect on firm performance. This suggested that there was up to 0.529-unit increase in firm performance for each unit increase in safety policy. The effect of safety policy was more than 7 times the effect attributed to the error, this was indicated by the t-test value = 7. 336.The findings are in line with O‟Toole (2012) and Pawlowska (2015) who highlight importance of various aspects of safety policy especially their effect on the employees and how this would influence the performance of the organization and in general, safety policy, with its various aspects has a positive influence on the performance of the firm.

The organizational structure is the next element of the Safety Policy pillar which allows for the company to clearly see the responsibilities of fellow employees. The organizational structure is a part of SMS because it is needed in order for employees to follow the proper procedures for the organization (O'Toole, 2012). The procedure element of the Safety Policy pillar describes the way hazards are identified and mitigated. Should an accident or incident occur, this section discusses the proper protocol during that time (Pawłowska, 2015). The procedure element further defines who to contact, the order in which people are contacted, and are readily available to any person. Beach (2000), also revealed that management's commitment to safety is a major factor affecting the success of safety programs in industries and this parameter is capable of discriminating between high and low accident rate organizations. The multiple linear regression analysis of this study also indicated that Safety policy influenced the variation in project implementation in a positive significant level in Addis Ababa Bole International Airport (β =0.237, p=0.000).

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

5 Introduction

This study was aimed at examining the safety management system performances in case of Addis Ababa Bole International Airport. In this chapter, the major findings of the study are summarized in accordance with the basic research questions raised (objectives) to be addressed.

Therefore, this chapter consists of summary of the major findings, conclusions and key recommendations followed by Implications and future scope.

5.6 Summary of Major Findings

The mean scores have been computed for all the four safety management system performance factors that includes (i.e., safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action)and also the dependent variable safety management system performance by equally weighting the mean scores of all the items under each dimension.

Pearson correlation coefficients shows that the four safety system management components measuring safety system management were all positively related with safety system management within the range of 0.248 to 0.703, all were significant at $p<0.01$ level. All the independent variables i.e., safety policy (policy statement, organizational structure, and procedure), safety promotion (culture, training, and communication), safety risk management (hazard identification, risk assessment, risk mitigation and tracking), safety assurance (internal audit, external audit, corrective action) show a moderate level of positive relation with the dependent variable (safety management system performance).

The study found out that safety policy has a positive and significant relationship with safety management system performance (B=0.237, p=0.000). Additionally, the results also found out that safety assurance are positive and significant relationship with safety management system performance (B=0.437, p=0.000) in Addis Ababa Bole International Airport employees. Furthermore, the findings showed that safety risk management have positive and significant relationship with safety management system performance (B=0.228, p=0.000) Addis Ababa Bole

International Airport employees. Finally, the study also found that safety promotion is significant (B=0.127, p=0.006) in explaining the variations of safety management system performance in Addis Ababa Bole International Airport.

The first objective of the study was to examine if there is association between Safety Policy, Safety Promotion, Safety Risk Management and Safety Assurance and performance in Addis Ababa Bole International Airport. The correlation analysis of the research shows; all the components of safety system management were shown to be positively correlated with safety system management performance. (i.e., Safety Policy, Safety Promotion, Safety Risk Management and Safety Assurance) ($r = 0.248$, $p<0.01$, $r = 0.233$, $p<0.01$, $r = 0.338$, $p<0.01$ $r = 0.703$, $p<0.01$, respectively) in Addis Ababa Bole International Airport.

The second objective of the study was to examine the perceived level of safety management practices in Addis Ababa Bole International Airport. Based on the descriptive statistics result of the research variables of this study safety policy has the highest mean score of 3.64, which is the highest among the other components. This result indicates that most respondents perceived their organization has safety policy. The second factor which is perceived by respondents is safety assurance which has a mean score of 3.46. The third factor which is perceived by respondents is safety promotion which has a mean score of 3.39. Lastly, compare to other determinant factors the least popular factor perceived by the respondents is safety risk management which has the mean score of 3.31and safety management system performance in Addis Ababa Bole International Airport has a mean score of 3.36, which is above average. From the data collected, most respondents from Addis Ababa Bole International Airport perceived their organization had a safety policy and all mean score of independent and dependent variables has above average mean score.

The third objective of the study was to investigate which type safety management system component practiced in Addis Ababa Bole International Airport.

The correlation analysis of the research shows; all the components of safety system management were shown to be positively correlated with safety system management performance. (i.e., Safety Policy, Safety Promotion, Safety Risk Management and Safety Assurance) ($r = 0.248$, $p<0.01$, $r = 0.233$, $p<0.01$, $r = 0.338$, $p<0.01$ $r = 0.703$, $p<0.01$, respectively) in Addis Ababa Bole International Airport.

In addition to this, the multiple linear regression results of these findings indicate that safety policy has a positive and significant relationship with safety management system performance (B=0.237, p=0.000). Additionally, the results also found out that safety assurance are positive and significant relationship with safety management system performance (B=0.437, p=0.000) in Addis Ababa Bole International Airport employees. Furthermore, the findings showed that safety risk management have positive and significant relationship with safety management system performance (B=0.228, p=0.000) Addis Ababa Bole International Airport employees. Finally, the study also found that safety promotion is significant (B=0.127, p=0.006) in explaining the variations of safety management system performance in Addis Ababa Bole International Airport. Therefore, Safety Policy, Safety Promotion, Safety Risk Management and Safety Assurance practiced in safety management in Addis Ababa Bole International Airport.

To sum up this, the findings of this study depicted that based the correlation coefficient results of this study allover SMS components have a statistically significant strong positive relationship with safety system management performance Addis Ababa Bole International Airport.

5.7 Conclusion

The importance of a well-designed safety management program is known by most, but unfortunately not implemented by all. An organization's ability to keep its employees safe depends on its ability to design, implement, and improve upon safety management processes and programs within their company. Air accidents frequently occur near, rather than at, airports. Therefore, integrating the activities of local and airport emergency services becomes a major issue for planning. ICAO requires major accident simulations and exercises on regular annual basis. However, this requirement does not encompass planning for potential accidents outside the airport limits. Furthermore, recent experience of major disasters has highlighted the importance of planning to manage the traumatic aftermath of major disasters for survivors, relatives and operational personnel. Consideration should be given to how such a scheme could be instituted in Ethiopia. Planning for an effective response to disaster at or near an airport places a particular requirement for co-ordination between emergency services, for both short term and long term response; it should encompass such aspects as the accessibility of potential accident sites near the airport to emergency vehicles. Experience has also shown the critical importance of effective and comprehensive debriefing following emergency exercises. Such debriefing should include all staff that has a role in the disaster response and is essential if the organization is to

evaluate its preparedness and to learn how to improve its disaster planning.

The communication between leaders and their subordinates was presented as having a particularly vital role in the achievement and maintenance of workplace safety. Different approaches to leader subordinate communication, with respect to directionality and the degree of mutual interaction in the flow of information, have also been described, and several ways in which they can be assumed to affect safety have been suggested. Although there has been an increase in research on leader communication in recent years, more research into the influence of different leadership communication approaches on safety outcomes is needed in order to gain a more thorough understanding of the mechanisms involved in the relationship. Different theories regarding what drives human behavior have been put forth and discussed in relation to various incentive programs and their impact on performance and, in particular, safety. The importance of taking a holistic view in the design of incentive programs in order to avoid conflicts related to interrelated goals has been highlighted.

Considering the complex organizational context in which incentive programs are introduced, it could be concluded that a one-size-fits-all approach is unlikely to work. Instead, it should be vital that the implementation of an incentive program allows for some flexibility. It has been suggested that leader behaviors which are oriented towards communicating a vision of a safe workplace, which involve expressing concern for the well-being and safety of individual employees, and which emphasize that safety is a priority are vital for achieving workplace safety. Considering that all these leader behaviors encompass some element of leader subordinate communication, the way in which leaders chose to communicate their vision, concern, and priority should be crucial for safety.

The Organizations with outstanding safety records develop a systematic method to measure what's going on throughout their entire safety operation. It enables them to quickly and easily understand why something went wrong if it ever does. However, most organizations are far from this type of systematic reporting capability. Many organizations primarily utilize lagging indicators a measure of what's happened in the past such as lost workdays, workers" comp costs, or injury frequency. As safety leaders know, these reactive metrics do very little for future prevention of accidents and injuries. The ability to quickly and precisely identify high-risk situations is something that should be on every safety leader's checklist for safety performance.

Leading indicators can provide insight so that the organization can predict what could happen and take action to avoid accidents from occurring. Leading indicators include measures such as frequency of safety training, number of and results of safety audits and inspections, as well as the behaviors reflecting operations including mean time of completion of corrective action, employee involvement in proactive activities and even leadership involvement. Through gaining insights into leading and lagging indicators, organizations can gain a complete picture of all safety program activity, with the ultimate goal of preventing accidents before they ever happen.

Companies with low injury rates equip their employees for success and they do so through more than just processes and safety management programs. They leverage cutting edge tools and systems to keep their employees prepared and ready to handle whatever they need to.

The most impactful safety management program is one that equips any employee to quickly access the information they need and report an issue. Whether that information is an SDS Sheet, a training record, or the result of a safety audit, companies are now leveraging mobile safety management solutions to improve the timeliness of response and communication the best safety leaders recognize the importance of mobile safety software to improve their overall safety management program. This is becoming even more important as younger workers who grew up as digital natives look for employers that accommodate working in ways that are natural and preferred for them. They can't imagine having to fill out a paper form, fax it to someone, keep a copy for their file, etc. They expect employers to use tools that they use in their daily life to ease their adoption of organizational operations.

5.8 Recommendations

Investing on having a better foundation for safety risk management and safety promotion by utilizing various elements of the pillars would have an increased effect on performance. Furthermore, the management of the organization should be encouraged to embrace aspects of safety assurance such as external auditing in cost effective ways in order to ensure that the positive effects are tapped and utilized in improving the performance of the firm. Furthermore, the involvement of the workforce in the structuring and implementation of the safety policy as well as the pillars of safety risk management, safety assurance and safety promotion is critical towards the realization of the positives on the success of the firm.

In order to promote fair competition and equally high levels of safety across Ethiopia, there

should be a common frame of reference for the assessment of new procedures and technologies with regard to safety. While current regulations provide adequate guidance for Airport assessments of systems, they do not adequately support the procedural aspects of the safety assessment of new technologies and advanced procedures. In fact, a commonly accepted method which specifically addresses the human operator and the procedural aspects in an appropriate manner does not yet exist. Promising developments in this field are ongoing in the Ethiopian Air Traffic Control.

5.9 Recommendations for future practice

Future research could examine the Safety Risk Mitigation methods at the airports with SMS practice is not in place along with the employee attitude towards the safety procedures. By investigating these research topics, airports with SMS and without SMS in practice can be comparable.

Completion of the study demonstrates the benefits of different approaches to the safety system management and its contribution to the safety performance. Airport without SMS may also benefit from their own analysis of similar research and benefit, since the study contributes to airport safety. Airport with less experienced staff had lower scores for airport safety performance. Therefore, I would recommend the airport to have their staff trained on Safety Management Systems. FAA offers "Publicly Available Training" online for Safety Management Systems awareness. This study proves the importance of experienced staff, airport safety culture and airport safety committees. I would recommend airports to have airport safety committees with experienced employees and have weekly meetings to keep up with the updated risk mitigation methods and train new employees. Education must be given the most important role in this process. Educated employees would be more likely to understand the importance safety risk management and would have stronger attitude toward mitigation methods. Areas requiring further research Effective policy making on several of the safety concerns identified in this paper is impeded by a lack of essential knowledge. In order to bridge those gaps in knowledge the following issues require further research:

The establishment of common methods and tolerability criteria for third party risk.

- The development of adequate methods and models to incorporate the role of human operator and procedural aspects in formal safety assessments.

- The safety aspects of new technologies such as enhanced and synthetic vision systems, Head Up displays for civil cockpits.
- Airport wind and turbulence environments and their dynamic effects on aircraft in take-off or landing.
- The operation of safety systems in a multi organizational environment
- Methods of analysis of organizational precursors of accidents and incidents.
- Evaluation of planning for disasters

In order to effectively address the safety priorities discussed above, the following actions for the Ethiopian Addis Ababa Airport are recommended.

- Mandatory airport licensing including a requirement to establish, maintain and ensure adherence to an integrated safety management program.
- Mandatory collection of data on ground-based incidents, with appropriate emphasis on organizational and corporate culture factors.
- Mandatory inclusion of third party risk in Environmental Impact Statements for airports.
- The development of common standards for the safety assessment of operations.
- Research support on the issues identified above.

References

I. S. M. M.-D. (2018). Safety Management Manual- Doc 9859. In *International Civil Aviation Organization*.http://www.icao.int/fsix/_Library/SMM9859_1ed_en.pdf%5Cnfile:///C:/Users/Danilo/Downloads/Safety_management_and_risk_modelling_in_aviation.pdf%5Cnhttp://www.easa.eu.int/essi/documents/Methodology.pdf

ATO Safety Management System Manual. *April*(*2019*n.d.).

Boustras, G., Hadjimanolis, A., & Varianou-Mikellidou, C. (2017). Safety management. In *Safety Management in Small and Medium Sized Enterprises (SMEs)* (Issue November). https://doi.org/10.4324/9781315151847

Bruno, L. (2019). *Journal of Chemical Information and Modeling*, *53*(9), 1689–1699.https://doi.org/10.1017/CBO9781107415324.004

Chang, Y. H., Shao, P. C., & Chen, H. J. (2015). Performance evaluation of airport safety management systems in Taiwan. *Safety Science*, *75*, 72–86. https://doi.org/10.1016/j.ssci.2014.12.006

Civil, E., Authority, A., & Ababa, A. (2014). *Ethiopian State Safety Program (SSP) Manual*. *January*.

Distefano, N., & Leonardi, S. (2014). Risk Assessment Procedure for Civil Airport. *International Journal for Traffic and Transport Engineering*, *4*(1), 62–75. https://doi.org/10.7708/ijtte.2014.4(1).05

Doe, O. (1910). *U. S. Department of Energy Orders Self-Study Program*.

FAA. (2011). *Federal Aviation Administration Airport Safety Management Systems (SMS) Pilot Studies*. *May*.

GEREDE, E., & KURT, Y. (2018). an Assessment of Aviation Safety Management System Applications from the New Institutional Theory Perspective. *International Journal of Management Economics and Business*, *14*(1), 0–0. https://doi.org/10.17130/ijmeb.2018137576

Ali, H., Azimah Chew Abdullah, N. and Subramaniam, C. Management practice in safety culture

and its influence on workplace injury: An industrial study in Malaysia. Disaster Prevention and Management: An International Journal. 18(5): 470-477.2009.

Fernández-Muñiz, B., Montes-Peón, J.M. and Vázquez-Ordás, C.J. Safety culture: Analysis of the causal relationships between its key dimensions. Journal of safety research. 38(6): 627-641. 2007.

Young, D.S., (2017) Handbook of regression methods, CRC Press, Boca Raton, FL, , 109-136.

Frank, E.H. Jr., (2001) Regression modeling strategies: with applications to linear models, logistic regression, and survival analysis, Springer, New York, , 121-142.

Hosmer, D.W., Lemeshow, S. and Sturdivant, R.X., (2013) Applied Logistic Regression, John Wiley & Sons, New Jersey,.

Hopkins, A. Safety culture, mindfulness and safe behavior: converging ideas?. 2002.

Prue, D.M. and Fairbank, J.A. Performance feedback in organizational behavior management: A review. Journal of Organizational Behavior Management. 3(1):1- 16. 1981.

Lu, C.S. and Yang, C.S. Safety climate and safety behavior in the passenger ferry context. Accident Analysis & Prevention. 43(1): 329-341. 2011.

Kongolo, M.. Job creation versus job shedding and the role of SMEs in economic development. African Journal of Business Management. 4(11):2288. 2010.

Saleh, A.S. and Ndubisi, N.O. An evaluation of SME development in Malaysia. International Review of Business Research Papers. 2(1):1-14. 2006.

SME Annual Report, “SME Annual Report. (2013/2014).

Aziz, A.A., Baruji, M.E., Abdullah, M.S., Him, N.F.N. and Yusof, N.M. An Initial Study on Accident Rate in the Workplace through Occupational Safety and Health Management in Sewerage Services. International Journal of Business and Social Science. 6(2). 2015.

Surienty, L., Hong, K.T. and Hung, D.K.M. Occupational safety and health (OSH) in SMEs in Malaysia: A preliminary investigation. Journal of Global Entrepreneurship. 1(1):65-75.2011.

Arocena, P. and Núñez, I. An empirical analysis of the effectiveness of occupational health and safety management systems in SMEs. International Small Business Journal. 28(4);398-419. 2010.

Barling, J., Kelloway, E.K. and Iverson, R.D. High-quality work, job satisfaction, and occupational injuries. Journal of Applied Psychology. 88(2):276. 2003.

Hrymak, V. and Perezgonzalez, J. The Costs and Effects of Workplace Accidents: 20 Case Studies from Ireland. 2007.

Champoux, D. and Brun, J.P. Occupational health and safety management in small size enterprises: an overview of the situation and avenues for intervention and research. Safety Science. 41(4):301-318. 2003.

Legg, S.J., Olsen, K.B., Laird, I.S. and Hasle, P. Managing safety in small and medium enterprises. Safety Science. 71: 189-196. 2015.

Neal, A., Griffin, M.A. and Hart, P.M. The impact of organizational climate on safety climate and individual behavior. Safety science. 34(1): 99-109. 2000.

Clarke, S. The relationship between safety climate and safety performance: a meta-analytic review. Journal of occupational health psychology. 11(4): 315. 2006.

Neal, A. and Griffin, M.A. A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. Journal of applied psychology. 91(4):946. 2006.

Bottani, E., Monica, L. and Vignali, G. Safety management systems: Performance differences between adopters and non-adopters. Safety Science. 47(2):155-162. 2009.

Gordon, R., Flin, R. and Mearns, K. Designing and evaluating a human factors investigation tool (HFIT) for accident analysis. Safety Science. 43(3):147-171. 2005.

Díaz-Cabrera, D., Hernández-Fernaud, E. and Isla-Díaz, R. An evaluation of a new instrument to measure organisational safety culture values and practices. Accident Analysis & Prevention. 39(6):1202-1211. 2007.

Vinodkumar, M.N. and Bhasi, M. Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation. Accident Analysis & Prevention. 42(6): 2082-2093. 2010.

Hsu, S.H., Lee, C.C., Wu, M.C. and Takano, K. A cross-cultural study of organizational factors on safety: Japanese vs. Taiwanese oil refinery plants. Accident Analysis & Prevention. 40(1): 24-34. 2008.

Yule, S., Flin, R. and Murdy, A. The role of management and safety climate in preventing risk-taking at work. International Journal of Risk Assessment and Management. 7(2): 137- 151. 2006.

Gillen, M., Baltz, D., Gassel, M., Kirsch, L. and Vaccaro, D. Perceived safety climate, job demands, and coworker support among union and nonunion injured construction workers. Journal of safety research. 33(1):33-51. 2002.

Hare, B., Cameron, I. and Roy Duff, A. Exploring the integration of health and safety with pre-construction planning. Engineering, construction and architectural management. 13(5): 438-450. 2006.

Cooper, M. and Cotton, D. Safety training-a special case?. Journal of European Industrial Training. 24(9): 481-490. 2000.

Vredenburgh, A.G. Organizational safety: which management practices are most effective in reducing employee injury rates?. Journal of safety Research. 33(2): 259-276. 2002.

Gooding, R.Z. and Wagner III, J.A. A metaanalytic review of the relationship between size and performance: The productivity and efficiency of organizations and their subunits. Administrative science quarterly. 462-481. 1985.

Saks, A.M. Antecedents and consequences of employee engagement. Journal of managerial psychology. 21(7): 600-619. 2006.

D. L. Goetsch. Occupational Safety and Health for Technologists, Engineers and Managers, 6th edition. New Jersey: Pearson Education Inc. 2008.

Ford, M.T. and Tetrick, L.E. Relations among occupational hazards, attitudes, and safety

performance. Journal of Occupational Health Psychology. 16(1): 48. 2011.

Minter, S.G. The power of positive safety. Occupational Hazards. 65(3):39. 2003.

Kines, P., Andersen, L.P., Spangenberg, S., Mikkelsen, K.L., Dyreborg, J. and Zohar, D. Improving construction site safety through leader-based verbal safety communication. Journal of safety research. 41(5):399-406. 2010.

Comcare. Safe and sound: a discussion paper on safety leadership in government workplaces. Canberra, Australia. 2004.

Hopkins, A. Safety culture, mindfulness and safe behaviour: converging ideas?. 2002.

Airbus Industrie (April, 1998) Global Market Forecast 1998-2017 (GMF'98). Information published on Airbus Industrie Official Website http://www.airbus.com/

Anon (1998) Statistical Summary of Commercial Jet Aircraft Accidents, Worldwide Operations, 1988-1997, Boeing Commercial Airplane Group, Seattle, WA.

Khatwa, R., Roelen, A.L., Enders, J.H., Dodd, R. and Tarrel, R. (1996). An Evaluation of Approach and Landing Factors Influencing Airport Safety. Paper presented at the FSF/IFA/IATA 49th International Air Safety Seminar (IASS), November 11-14, 1996, Dubai, United Arab Emirates.

Hulsey, A. L. (n.d.). *No Title*. *December 2012*.

IATA. (2020). *Safety Report 2019 Edition 56 IATA* (Issue April).

ICAO. (2017a). *Global Aviation Safety Plan 2017-2019*.

ICAO. (2017b). *Safety Report - 2017 Edition*. 13. https://www.icao.int/safety/Documents/ICAO_SR_2017_18072017.pdf

ICAO, I. C. A. O. (2013). Doc 9859, Safety Management Manual (SMM). In *Doc 9859 AN/474*.

January, F. E., Business, I., & Council, A. (2015). *SMS Tools for Business Aircraft Operators*.

January, T. E., Business, I., & Council, A. (2012). *SMS Guidance Manual*.

Li, Y., & Guldenmund, F. W. (2018). Safety management systems: A broad overview of the literature. *Safety Science*, *103*(November 2017), 94–123. https://doi.org/10.1016/j.ssci.2017.11.016 *mak ing it fit*. (2002). *April*, 22–28.

Mendonca, F. A. C., & Carney, T. Q. (2017). A Safety Management Model for FAR 141 Approved Flight Schools. *Journal of Aviation Technology and Engineering*, *6*(2), 33–49. https://doi.org/10.7771/2159-6670.1144

Mugnier, C. (2003). Federal democratic Republic of Ethiopia. *Photogrammetric Engineering and Remote Sensing*, *69*(3), 213. https://doi.org/10.1007/978-3-030-42088-8_11

OACI. (2019). State of global Aviation safety. *ICAO Safety Report 2019 Edition*, 108. https://www.icao.int/safety/Documents/ICAO_SR_2019_final_web.pdf

Safety Management International Collaboration Group. (2015). *SMS for Small Organizations: considerations for regulators*. *March*, 1–47.

Vinodkumar, M.N. and Bhasi, M. Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation. Accident Analysis & Prevention. 42(6): 2082-2093. 2010.

Session, O., Transportation, L., Abebe, G., Security, A., Civil, E., & Authority, A. (2017). *Ethiopian Civil Aviation Authority (ECAA) Ethiopian Civil Aviation Authority (ECAA)*. *June*, 27–29.

Sigurdsson, P. (1940). The University of Iceland. *Nature*, *146*(3711), 762–763. https://doi.org/10.1038/146762a0

Smart, E. (2016). Ready, set, implement: A road map for SMS success. *Journal of Airport Management*, *11*(1), 27–37. http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=121770831&site=ehost-live

Story, C. (2001). *IN SEARCH OF DREAMS: - In_Search_of_Dreams*. *October*, 25–26.

Sumathi, N., Sowmya, R., & Sudhan, R. H. (2018). *Modern Techniques for Enhancing the Safety and Security in Airports*. *VII*(April), 86–89.

Welander, G., Svanström, L. and Ekman, R., Safety promotion - An Introduction, 2nd Revised Edition. Textbook. Karolinska Institutet, Dept. of Public Health Sciences, Div. of Social Medicine, Stockholm. Kristianstad Boktryckeri AB. 2004.

Chen, C.P. and Lai, C.T. To blow or not to blow the whistle: the effects of potential harm, social pressure and organisational commitment on whistleblowing intention and behaviour.

Business Ethics: A European Review. 23(3): 327-342. 2014.

Barach, P. and Small, S.D. Reporting and preventing medical mishaps: lessons from nonmedical near miss reporting systems. British Medical Journal. 320(7237): 759. 2000.

Pettinger, C. B. (2000). *Improving occupational safety & health interventions: A comparison of safety self-efficacy and safety stagees of change* (Doctoral dissertation). Virginia Polytechnic Institute & State University, Blacksburg, Virginia. Retrieved from Digitial library and archives, 2015.03.13

Pfeffer, J. (1997). *New Directions for Organizational Theory. Problems and Prospects.* New York, NY: Oxford University Press.

Pfeffer, J. (1998). Seven practices of successful organizations. *California Management Review, 40*, 96-124.

Pfeffer, J., & Langton, N. (1993). The effect of wage dispersion on satisfaction, productivity, and working collaboratively: Evidence from college and university faculty. *Administrative Science Quarterly, 38,* 382-407.

Pidgeon, N. F. (1991). Safety culture and risk management in organizations. *Journal of cross-cultural psychology, 22*, 129-140.

Pidgeon, N. F., & O‟Leary, M. (1994). Organizational safety culture: implications for aviation practice. In N.A. Johnston, N. McDonald, & R. Fuller (Eds.), *Aviation Psychology in Practice* (pp. 21-43). Aldershot: Avebury Technical Press.

Pidgeon, N. F., & O‟Leary, M. (2000). Man-made disasters: why technology and organizations (sometimes) fail. *Safety Science, 34,* 15-30.

Piètre-Cambacédès, L., & Bouissou, M. (2013). Cross-fertilization between safety and security engineering. *Reliability Engineering and System Safety, 110,* 110–126.

Podskakoff, P. M., MacKenzie, S. M., Lee, J., & Podsakoff, N. P. (2003). Common method bias in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879-903.

Porter, L., & Lawler, E. (1968). *Managerial attitudes and performance*. Homewood, IL: Dorsey.

Pransky, G., Snyder, T., Dembe, A., & Himmelstein, J. (1999). Under-reporting of work-related disorders in the workplace: A case study and review of the litterature. *Ergonomics, 42*, 171-182.

Probst, T. M., & Brubaker, T. L. (2001). The effects of job insecurity on employee safety outcomes: cross-sectional and longitudinal explorations. *Journal of Occupational Health Psychology 6*, 139–159.

Probst, T. M. (2002). Layoffs and tradeoffs: production, quality, and safety demands under the threat of job loss. *Journal of Occupational Health Psychology, 7,* 211–220.

Probst, T. M. (2004). Job insecurity: Exploring a new threat to employee safety. In J. Barling & M. R. Frone. (Eds.), *The psychology of workplace safety (pp.63-80)*. Washington, DC: American Psychological Association.

Probst, T. M., Brubaker, T. L., & Barsotti, A. (2008). Organizational under-reporting of injury rates: an examination of the moderating effect of organizational safety climate. *Journal of Applied Psychology, 93,* 1147–1154.

Probst, T. M., & Estrada, A. X. (2010). Accident under-reporting among employees: Testing the moderating influence of psychological safety climate and supervisor enforcement of safety practices. *Accident Analysis and Prevention, 42,* 1438–1444.

Probst, T. M., & Graso, M. (2013). Pressure to produce = pressure to reduce accident reporting? *Accident Analysis and Prevention, 59*, 580– 587.

Ramaswami, S. N., & Singh, J. (2003). Antecedents and consequences of merit pay fairness for industrial salespeople. *Journal of Marketing, 67,* 46-66.

Rasmussen, J. (1997). Risk management in a dynamic society: a modelling problem. *Safety Science, 27*, 183–213.

Ray, P. S., Purswell, J. L., & Bowen, D. (1993). Behavioral safety program: Creating a new corporate culture. *International Journal of Industrial Ergonomics, 12,* 193-198.

Reason, J. (1990). *Human Error*. Cambridge, UK: Cambridge University Press.

Reason, J. (1993). Managing the management risk: new approaches to organizational safety. In B. Wilpert & T. Qvale (Eds.), *Reliability and Safety in Hazardous Work Systems* (pp. 7-22). Hove: Lawrence Erlbaum.

Rebitzer, J. B. (1995). Job Safety and Contract Workers in the Petrochemical Industry. *Industrial Relations, 34*, 40-57.

Reiman, T., & Rollenhagen, C. (2014). Does the concept of safety culture help or hinder systems thinking in safety. *Accident Analysis and Prevention, 68,* 5–15.

Richter, A., & Koch, C. (2004). Integration, differentiation and ambiguity in safety cultures. *Safety Science, 42,* 703–722.

Riggio, R. E., Riggio, H. R., Salinas, C., & Cole, E. J. (2003). The role of social and emotional communication skills in leader emergence and effectiveness. *Group Dynamics: Theory, Research, and Practice, 7,* 83–103.

Rollenhagen, C. (2005). *Säkerhetskultur* [Safety Culture]. Lidingö: RX Media.

Rundmo T, & Hale A. (2003). Managers‟ attitudes towards safety and accident prevention. *Safety Science, 41*, 557–74.

Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist, 55*, 68–78.

Saari, J. (1992). Successful implementation of occupational health and safety programs in manufacturing for the 1990's. *International Journal of Human Factors in Manufacturing, 2*, 55-66.

Schröder-Hinrichs, J. -U., Hollnagel, E., & Baldauf, M. (2012). From Titanic to Costa Concordia - a century of lessons not learned. *Journal of Maritime Affairs, 11,* 151–167.

Schuler, R. S. (1979). A role perception transaction process model for organizational communication – outcome relationships. *Organizational Behavior and Human Performance, 23*, 268-291.

Selznick, P. (1957). *Leadership in administration.* New York: Harper & Row.

Seo, D.-C., Torabi, M. R., Blair, E. H., & Ellis, N. T. (2004). A cross-validation of safety climate scale using confirmatory factor analytic approach. *Journal of Safety Research, 35*, 427-445.

Settoon, R. P., Bennett, N., & Liden, R. C. (1996). Social exchange in organizations: Perceived organizational support, leader-member exchange and employee reciprocity. *Journal of Applied Psychology, 78*, 774-780.

Sexton, J. B., & Helmreich, R. L. (2000). Analyzing cockpit communications: The links between language, performance, error, and workload. *Human performance in Extreme Environments, 5*, 63-68.

Shannon, H. S., Mayr, J., & Haines, T. (1997). Overview of the relationship between organizational and workplace factors and injury rates. *Safety Science, 26*, 201-17.

Simard, M., & Marchand, A. (1995). A multilevel analysis of organizational factors related to the taking of safety initiatives by work groups. *Safety Science, 21*, 113- 129.

Sinclair, R. R., & Tetrick, L. E. (2004). Pay and benefits: the role of compensation systems in workplace safety. In J. Barling & M. Frone (Eds.), *Psychology of Workplace Safety* (pp. 181–201). Washington, DC: American Psychological Association.

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. Oxford, England: Appleton-Century.

Skinner, B. F. (1953). *Science and Human Behavior*. New York: MacMillan.

Slappendal, C., Laird, I., Kawachi, I., Marshall, S., & Cryer, C. (1993). Factors affecting work-related injury among forestry workers: a review. *Journal of Safety Research 24,* 19–32.

Smith, M. J., Karsh, B-T., Carayon, P., & Conway, F. T. (2003). Controlling Occupational Safety and Health Hazards. In J. C. Quick & L. E. Tetrick (Eds.). *Handbook of Occupational Health Psychology* (pp. 35-68). Washington, DC: American Psychological Association.

Smits, M., Wagner, C., Spreeuwenberg, P., Timmermans, D. R. M., van der Wal, G., & Groenewegen, P. P. (2012). The role of patient safety culture in the causation of unintended events in hospitals. *Journal of Clinical Nursing, 21,* 3392–3401.

Spector, P. E. (2006). Method variance in organizational research: Truth or urban legend? *Organizational Research Methods, 9,* 221-232.

Staw, B. M. (1980). Rationality and justification in organizational life. In B. M. Staw and L. L. Cummings (Eds.), *Research in organizational behavior: Vol. 2* (pp. 45-80). Greenwich: JAI Press.

Sterman, J. (2000). *Business dynamics: Systems thinking and modeling for a complex world*. New York: McGraw-Hill.

Stogdill, R. M. (1974). *Handbook of Leadership*. New York: Free Press.

Storseth, F. (2006). Changes at work and employee reactions: Organizational elements, job insecurity, and short-term stress as predictors for employee health and safety. *Scandinavian Journal of Psychology, 47*, 541–550.

Tetrick, L. E., Perrewe, P. L., & Griffin, M. (2010). Employee Work-Related Health, Stress, and Safety. In J. L. Farr & N. T. Tippins. *Handbook of employee selection* (pp. 531-549). Routledge. New York.

The European Commission. (2009). The evolution of labour law in the EU-12 (08/04/2009). Retrieved from: http://ec.europa.eu/social/main.jsp?catId=738&langId=sv&pubId=94&type=2&furtherPubs=yes

Terminal, U. S., Terminal, U. S., Route, E., & Route, E. (2005). Advisory Circular. *Area*, *January*, 1–4.

The Swedish Work Environment Authority (Arbetsmiljöverket). (2014a). *Arbetsmiljöstatistik. Arbetsskador 2013 [Work Environment Statistics. Occupational accidents and work-related diseases 2013.] (Report No. 2014:1).* Retrieved from: http://www.av.se/dokument/statistik/officiell_stat/STAT2014_ 01.pdf

The Swedish Work Environment Authority (Arbetsmiljöverket). (2014b). *Arbetsmiljölagen* [The Work Environment Act]. Stockholm: Arbetsmiljöverket.

Tomás, J. M., Meliá, J. L., & Oliver, A. (1999). A cross-validation of a structural equation model of accidents: organizational and psychological variables as predictors of work safety. *Work & Stress, 13*, 49-58.

Tompkins, N. (1994). Looking forward to safety‟s rewards. *Occupational Health & Safety, 63, 10,* 54-57.

Turner, B. (1978). *Man-Made Disasters*. London: Wykenham Science Press.

Turner, B. A. (1991). The development of a safety culture. *Chemistry and Industry, 4,* 241–243.

Turner, B. A. (1992). The sociology of safety. In D. Blockley (Ed.), *Engineering Safety,* (chap.9). Maidenhead: McGraw-Hill International.

Turner, N., & Parker, S. K. (2004). The effect of teamwork on safety processes and outcomes. In J. Barling & M. R. Frone (Eds.), *The Psychology of Workplace Safety* (pp. 35-62). Washington, DC: American Psychological Association.

Sydney, U. of W. (2011). Hazard Identification , Risk Assessment and Control Procedure. *Hazard Identification , Risk Assessment and Control Procedure*, 1–9.

Range Leadership Model. *Personality and Individual Differences, 54,* 41–46.

Wickens, C. D., & Holland, J. G. (2000). *Engineering Psychology and Human Performance (3rd ed.).* Upper Saddle River, NJ: Prentice-Hall.

Williams, H. M., Turner, N., & Parker, S. K. (2000). *The compensatory role of transformational leadership in promoting safety behaviors*. Paper presented at the annual meeting of the Academy of Management, Toronto, Ontario, Canada.

Wright, M. S. (1994, March). *A review of safety management system approaches to risk reduction.* Paper presented at Risk Assessment and Risk Reduction Conference, Aston University.

Yukl, G. (1999). An evaluation of conceptual weaknesses in transformational and charismatic

leadership theories. *Leadership Quarterly, 10,* 285–305.

Yule, S. (2002, July). *Do transformational leaders lead safer businesses?* Paper presented at the 25th International Congress of Applied Psychology, Singapore.

Zacharatos, A., & Barling, J. (2004). High-Performance Work Systems and Organizational safety. In J. Barling & M. R. Frone (Eds.), *The Psychology of Workplace Safety* (pp. 203-222). Washington, DC: American Psychological Association.

Zohar, D. (1980). Safety climate in the industrial organizations: theoretical and applied implications. *Journal of Applied Psychology, 65,* 96–102.

Zohar, D. (2000). A Group-Level Model of Safety Climate: Testing the Effect of Group Climate on Microaccidents in Manufacturing Jobs. *Journal of Applied Psychology, 85*, 587-596.

Zohar, D. (2002a). The effects of leadership dimensions, safety climate, and assigned priorities on minor injuries in work groups. *Journal of Organizational Behavior, 23,* 75–92.

Zohar, D. (2002b). Modifying Supervisory Practices to Improve Subunit Safety: A Leadership-Based Intervention Model. *Journal of Applied Psychology, 87*, 156–163.

Zohar, D. (2004). Climate as a social-cognitive construction of supervisory safety practices: Scripts as proxy of behaviour patterns. *Journal of Applied Psychology, 89,* 322-333.

Zohar, D. (2008). Safety Climate and Beyond: A Multi-level Multi-climate Framework. *Safety Science, 46,* 376-387.

Zohar, D. (2010). Thirty Years of Safety Climate Research: Reflections and Future Directions. *Accident Analysis & Prevention, 42,* 1517–1522.

Zohar, D., & Luria, G. (2003). The Use of Supervisory Practices as Leverage to Improve Safety Behavior: A Cross-level Intervention Model. *Journal of Safety Research, 34,* 567-577

Appendix-A

Bahir Dar University

Post Graduate Program

A Thesis Submitted to The Graduate School of Research and Graduate Studies in Partial Fulfillment of the Requirements for The Degree of Master of Industrial Management.

Dear Sir/Madam

I am a Master's student at Bahir Dar University, Faculty of mechanical and industrial engineering. Currently, I am conducting a research study entitled "Assessment of safety management system Performance at Addis Ababa Bole International Airport". I have designed this checklist to collect data from Addis Ababa Bole International Airport**.**

The questioner will be used to collect the primary data for a research study. Therefore, I seek your assistance to be as open, fair, and honest in terms of responding to your response to each question as much as possible you can. The researcher assures you that no individuals will be identified from their responses and there are no requests for confidential information included in the questionnaire. The results of the analysis will be strictly used by the researchers for study purposes only.

Instructions:

[redacted]

Part One: Background Information /Socio-demographic characteristics/

1. Gender

[redacted]ale

[redacted]emale

2. Age

[redacted]0-30 [redacted] 30-40

[redacted]-50 [redacted] 51-60

3. Education

achelor Degree
igher Vocation
aster degree
nD

4. How many years of work experience you have been worked in this company?
1) 1-5 years
3) 5-10 years
5) 11-15 years
6) >15 years

Part Two: Safety Management System

Safety Management System Performance	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree
I. Safety policy					
There is a safety policy, signed by the Accountable Manager, which includes a commitment to continuous improvement; observes all applicable legal requirements and standards; and considers best practices.					
The safety policy includes a statement to provide appropriate resources and the organization is managing resources by anticipating and addressing any shortfalls.					
There are policies in place for safety critical roles relating to all aspects of Fitness for Duty (for example, Alcohol and Drugs Policy or Fatigue).					
There is a means in place for the communication of the safety policy.					
The Accountable Executive and the senior management team promote a positive safety/just culture and demonstrate their commitment to the safety policy through active and visible participation in the safety management system.					
An Accountable Executive has been appointed with full					

responsibility and accountability to ensure the SMS is properly implemented and performing effectively.					
The Accountable Executive is fully aware of their SMS roles and responsibilities in respect of the safety policy, safety standards, and safety culture of the organization.					
A competent safety manager who is responsible for the implementation and maintenance of the SMS has been appointed with a direct reporting line to the Accountable Executive.					
The organization has allocated sufficient resources to manage the SMS including, but not limited to, competent staff for safety investigation, analysis, auditing, and promotion.					
II. SAFETY RISK MANAGEMENT	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree
The organization has established appropriate safety committee(s) that discuss and address safety risks and compliance issues and includes the Accountable Executive and the heads of functional areas.					
An appropriate emergency response plan (ERP) has been developed and distributed that defines the procedures, roles, responsibilities, and actions of the various organizations and key personnel.					
The ERP is periodically tested for the adequacy of the plan and the results reviewed to improve its effectiveness.					
The SMS documentation includes the policies and processes that describe the organization's safety management system and processes and is readily available to all relevant personnel.					
SMS documentation, including SMS related records, are					

regularly reviewed and updated with appropriate version control in place.					
There is a confidential reporting system to capture errors, hazards, and near misses that is simple to use and accessible to all staff.					
There is a confidential reporting system that provides appropriate feedback to the reporter and, where appropriate, to the rest of the organization.					
Personnel express confidence and trust in the organization's reporting policy.					
There is a process that defines how hazards are identified from multiple sources through reactive and proactive methods (internal and external).					
III. SAFETY ASSURANCE	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree
The hazard identification process identifies human performance related hazards.					
There is a process in place to analyses safety data and safety information to look for trends and gain useable management information.					
Safety investigations are carried out by appropriately trained personnel to identify root causes (why it happened, not just what happened).					
There is a process for the management of risk that includes the analysis and assessment of risk associated with identified hazards expressed in terms of likelihood and severity (or alternative methodology).					

There are criteria for evaluating the level of risk the organization is willing to accept and risk assessments and ratings are appropriately justified.					
Safety performance indicators (SPIs) linked to the organization's safety objectives have been defined, promulgated, and are being monitored and analyzed for trends.					
Risk mitigations and controls are being verified/audited to confirm they are working and effective.					
Safety assurance takes into account activities carried out by all directly contracted organizations.					
Responsibilities and accountability for ensuring compliance with safety regulations are defined and applicable requirements are clearly identified in organization manuals and procedures.					
IV. SAFETY PROMOTION	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree
There is an internal audit program including details of the schedule of audits and procedures for audits, reporting, follow up, and records.					
Responsibilities and accountabilities for the internal audit process are defined and there is a person or group of persons with responsibilities for internal audits with direct access to the Accountable Manager.					
After an audit, there is appropriate analysis of causal factors and corrective/preventive actions are taken.					
The organization has a process to identify whether changes have an impact on safety and to manage any identified risks in accordance with existing safety risk management processes.					

Human Factor (HF) issues have been considered as part of the change management process and, where appropriate, the organization has applied the appropriate HF/human centered design standards to the equipment and physical environment design.					
There is a training program for SMS in place that includes initial and recurrent training. The training covers individual safety duties (including roles, responsibilities, and accountabilities) and how the organization's SMS operates.					
There is a process in place to measure the effectiveness of training and to take appropriate action to improve subsequent training.					
Training includes human and organizational factors including just culture and non-technical skills with the intent of reducing human error.					

Part three: Safety Management System Performance

Please indicate the degree of your agreement/disagreement with the following statements associated with the measurement of performance. (Put right mark the alternative choice that best describes your view): Strongly disagree (1), disagree (2), neither agree nor disagree (3), agree (4), strongly agree (5)

	Factor	1	2	3	4	5	
	TASK PERFORMANCE						
1	You achieve the objectives of your job						
2	You meet the criteria for performance						
3	You demonstrate expertise in all job-related tasks.						
4	You fulfill all the requirements of the job.						
5	You can manage more responsibility than typically assigned						
6	You appear suitable for a higher level role						

7	You are competent in all areas of the job, handle tasks with proficiency.						
8	You perform well in the overall job by carrying out tasks as expected.						
9	You plan and organize to achieve objectives of the job and meet deadlines.						
	CONTEXTUAL PERFORMANCE						
10	You help others employers with their work when they have been absent.						
11	You volunteer to do things not formally required by the job.						
12	You take initiatives to orient new employees to the department even though not part of your job description.						
13	You help others when their work load increases (assists others until they get over the hurdles).						
14	You assist your colleagues with their duties.						
15	You make innovative suggestions to improve the overall quality of the department.						
16	You willingly attend functions not required by the organization, but helps in its overall image.						