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Aviation Maintenance Technician Decision-Making

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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Walden University
2020

Abstract

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by

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MA, Embry-Riddle University, 2012

BS, Embry-Riddle University, 2009

Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Aircraft accidents caused by human decision-making errors cause property loss and fatalities on a global scale in the aviation industry. Aviation repair technician decision-making perceptions influence aviation safety. The purpose of transcendental phenomenological study was to explore the lived experiences of aviation repair technicians related to decision-making perceptions regarding aviation safety. The central research question and sub-question focused on the lived experiences of repair technicians' decision-making perceptions. The naturalistic decision-making framework, decision theories, and decision-making models comprised the lens to assess the impact of aviation maintenance technician decision-making perceptions in aviation safety. Data were collected using semistructured interviews with 12 aviation repair technicians in a maintenance repair and overhaul facility. Transcribed interviews were coded and thematically analyzed. Five themes emerged: decision-making experience, decision-making application, importance of decision-making, technician job experience, and decision-making influence. Four subthemes also emerged: situational awareness, aviation hazards, aviation safety, and personal safety. Recommendations for future studies include conducting the study in aviation repair facilities abroad and specifically targeting female aviation technicians for comparison and studying the effectiveness of current training and safety programs. Aviation leadership and federal agencies can use the findings of this study to create social change at policy and organizational levels to mitigate accidents, aircraft damage, and personnel injuries.

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Dedication

First, I would like to thank God, without him none of this would have been possible. I must thank my beautiful wife Chief Master Sergeant Rochelle Hemingway for always being there and providing me the inspiration and push needed to complete my degree. I would also like to thank my son Andrew “AJ” Hemingway: You can do anything and be anything in this world. Life is full of adventures and you can navigate them all. Never give up; never quit.

I would like to thank my mother and father, Connie and Harold, for giving me the foundation to be successful in life. I would also like to thank Greg Sanders, my brother at arms. A great portion of this dissertation would have been difficult to accomplish without his support. I would also like to thank Fred and Deborah King; without their support, love, and help, I would not have reached this milestone.

Finally, to the people serving in the U.S. Air Force: You continue to motivate and impress me every day. Work to reach all goals, and remember to reach for the moon because even if you miss, you are still among the stars.

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Chapter 1: Introduction to the Study

In 2014, there was an estimated 7,000 aircraft operated and repaired in 4,800 domestic maintenance repair facilities in the United States (Government Accountability Office [GAO], 2016). According to the U.S. Department of Labor (2016), an estimated total of 128,570 aviation technicians perform aircraft maintenance repairs and modifications for air carriers operating domestically. The aviation industry leaders made a profit of $13.5 billion in 2015, spending 35% of operating costs on maintenance repairs and overhauls (Department of Transportation [DOT], 2017; International Air Transport Association [IATA], 2014). Aviation technicians make numerous decisions pertaining to modifying and repairing aircraft (GAO, 2016). The lived experiences of aviation technicians' decision-making perceptions impact aviation safety worldwide.

Stress, complacency, fatigue, and work environment are human factors perceived to influence aviation technician decision-making and can lead to fatal errors and aircraft accidents (Federal Aviation Administration [FAA], 2014). The primary focus of this dissertation was to explore how the lived experiences of aviation maintenance technician decision-making perceptions influence aviation safety. Exploring technician decision-making perceptions can provide aviation organizations with a clear understanding on how to effectively identify and reverse any negative decision-making problems.

Chapter 1 includes the background of the study and an initial introduction to the main research ideas. The problem statement aligns with the purpose of the study to provide a clear blueprint for the research and to foster reader comprehension. The theoretical and conceptual framework is essential to identifying appropriate research questions. The nature of the study explains the strategy behind the method and design used in the study. After the nature of the study, key aviation terminology and definitions are identified to provide content clarity. Next, assumptions, scope and delimitations, and limitations are included to add meaningfulness and identify boundaries. Finally, the significance of the study is identified, and a summary of Chapter 1 is presented at the end.

Background of the Study

Leaders in the aviation industry have been responsible for affecting the environment on a global scale by producing high levels of air and noise emissions and being involved in aviation accidents (Mayor & Tol, 2009). Aviation technicians perform numerous modifications and repairs on complex aircraft operating systems. Ineffective decision-making choices by aviation technicians negatively impact communities and the aviation industry (Jackson, Wood, & Zboja, 2013). Despite scholarly studies about aviation accidents caused by cognitive human error factors (Sheikhalishahi, Pintelon, & Azadeh, 2016; Shanmugam & Paul, 2015), there is a gap in the knowledge of how aviation maintenance technicians' decision-making perceptions influence aviation safety.

This qualitative phenomenological study addressed the gap previously researched by Klein, Orasanu, Calderwood, and Zsambok (1993) and Zsambok and Klein (2014) about how the naturalistic decision-making (NDM) framework may improve decision-making in field settings. The findings of this study can fill the gap in the previous study by exploring the decision-making perceptions of technicians with 5 to 20 years of aviation maintenance experience performing aircraft maintenance in aviation repair facilities. Thus, aviation industry leaders can develop effective safety and training programs capable of mitigating aviation accidents and decreasing technician injuries.

Previous NDM framework research is limited pertaining to aviation maintenance technicians operating in maintenance and repair overhaul (MRO) organizations. The majority of NDM framework studies focus on firefighting, military, and medical operations (Flin, Stanton, & Wong, 2013). Aviation technicians have varied skill and experience levels that can be explored to comprehend safety perceptions in aviation. The exploration of aviation technician decision-making perceptions is essential to the comprehension of how aviation maintenance technicians perceive aviation safety.

Problem Statement

In the United States, there were 1,298 aviation accidents with 429 fatalities in 2013 (NTSB, 2015). The FAA and the NTSB are two government agencies responsible for categorizing and investigating aviation accidents caused by human error. The FAA is responsible for risk-based oversight of 4,800 certificated repair stations domestically and abroad (GAO, 2016). Despite federal government oversight, the general problem is that poor or inappropriate aviation repair technician decision-making can cause aircraft accidents (Barrage, 2016; Sheikhalishahi et al., 2016; Scheelhaase et al., 2016). The study of human error related aviation accidents and decision-making is not new, but the examination of the lived experiences of aviation technician decision-making perceptions of aviation repair technicians working in MRO organizations regarding aviation safety is relatively new (Klein, 2015). The specific problem of this qualitative phenomenological study is that poor or ineffective aviation repair technician decision-making adversely affects aviation safety (Barrage, 2016; Sheikhalishahi et al., 2016; Scheelhaase et al., 2016).

Human error has been identified as the cause of nearly 80% of aircraft accidents and mishaps (Begur & Babu, 2016). Zsambok and Klein (2014) discussed NDM in health care, nuclear power, and military management disciplines. Zsambok and Klein (2014) did not apply the NDM framework to technicians working in aviation maintenance repair organizations. The study could fill the gap in the NDM framework research of Klein et al. (1993) and Zsambok and Klein (2014) by including aviation maintenance technicians working in maintenance repair organizations in the study.

Purpose of the Study

The purpose of this transcendental phenomenological study was to explore the lived experiences of aviation repair technicians related to decision-making perceptions regarding aviation safety. To understand the lived experiences of aviation technicians' decision-making and aviation safety in MRO facilities, I used the qualitative research method and a phenomenological design. I used the qualitative method to focus on observation and interpretation of the collected data (Johnson, 2015). The qualitative research method ensured decision-making perceptions were expressed through aviation technicians' lived experiences to explore decision-making perceptions further (Adams & van Manen, 2017; Johnson, 2015).

Research Question

Qualitative research questions are designed to be open-ended to facilitate data collection about a researcher-identified phenomenon (Jacob & Furgerson, 2012). The central question in a phenomenological research study may have several qualities to ensure clarity and comprehension. The central question in qualitative research is composed of key words, such as how and what to foster exploration of the specified phenomenon (Moustakas, 1994). Bevan (2014) stated that qualitative phenomenological research questions are broad and open-ended to foster a thorough gathering of data from the participants' lived experiences. The research question was designed to obtain detailed information about the participants' lived experiences and decision-making perceptions pertaining to aviation safety. The overarching question for the study is: What are the lived experiences of aviation repair technicians and how do their decision-making perceptions influence aviation safety?

RQ: What decision-making processes do aviation repair technicians go through that could influence aviation safety?

Conceptual Framework

The conceptual framework is used in qualitative research to ensure unbiased information is obtained through a specific set of concepts versus assumptions (Green, 2014). The main phenomenon addressed in this study was the lived experiences of aviation maintenance technicians regarding their decision-making perceptions in MRO organizations. Decision-making could have been used as a single concept to explore decision-making models; decision theories and the NDM framework were more appropriate for this qualitative phenomenological study. The decision models, theories, and the NDM framework provided the conceptual framework for how aviation repair technician decisions are made.

The conceptual framework used to guide this study was the NDM framework by Klein et al. (1993) and Zsambok and Klein (2014), which I used to explore aviation technician decision-making perceptions, as suggested by Klein (2015). The NDM framework shares key points with Simon's (1959) bounded rationality theory, while focusing on how decision makers choose alternatives (Klein, 2015). The exploration of decision-making models, decision theories, and the NDM framework facilitated the examination of the lived experiences of aviation technicians regarding their decision-making perceptions pertaining to aviation safety. Chapter 2 includes an in-depth explanation of Klein et al.'s (1993) NDM framework.

Theory in phenomenological studies serves as a systematic method to display scholarly information and explore lived experiences and studies through a focused lens (Pascal, Johnson, Dore, & Trainor, 2011; Adams & van Manen, 2017). The literature review in Chapter 2 includes decision-making models, decision theories, and the NDM framework by Klein et al. (1993), forming the conceptual framework for the study.

Simon's (1955, 1972) bounded rationality theory suggested that human decision-making is limited due to (a) partial information, (b) inability to foresee future problems, and (c) human behavior predictability limitations. The bounded rationality theory is based on the human limitations of identifying alternatives when making decisions (Simon, 1972). Simon (1956) suggested that human decision-making is a combination of satisfying and sufficing, a term he identified as *satisficing*. Decision makers use satisficing to make choices, alleviating the need to evaluate each alternative (Berg, Prakhya, & Ranganathan, 2018).

The bounded rationality theory has been used across various disciplines including education, economy, and management (Cristofaro, 2017; Simon, 1959). The theoretical approach provides details on bounded rationality of decision makers based on skills, education, ability, and the decision-making process. The bounded rationality theory was used in the study to provide guidance about organizational choice and how aviation repair technicians make decisions. Image theory also served as a foundational component in this study.

Beach and Mitchell (1987) suggested that image theory is essential for the comprehension of organizational and individual goals and mindsets. To explore how aviation maintenance technicians' experiences and mindsets are developed I used the four components of image theory: (a) focuses on self, (b) trajectory, (c) action, and (d) projected images (Beach et al., 1988). Further explanation of the relevant theories, decision models, and NDM framework is detailed in Chapter 2.

Nature of the Study

The nature of this study was qualitative with a transcendental phenomenological design. The qualitative method facilitated the collection of essential data from semistructured interviews and the lived experiences of participants (Mukhopadhyay & Gupta, 2014). The use of qualitative research is consistent with the exploration of aviation technician decision-making processes and aviation safety. The qualitative approach is appropriate to learn and interpret more about the experiences and perceptions of participants when little is known (Johnson, 2015).

Rosenthal (2016) stated that researchers use qualitative research to comprehend the background of a specific behavior or action performed by people. Researchers also use the qualitative method to explore a selected phenomenon from different perspectives to aid in the comprehension of the issue (Baxter & Jack, 2008). Researchers use qualitative research to gather extensive data about a chosen phenomenon, which may involve a long data analysis and collection process (Watkins, 2017). I performed in-depth qualitative data collection and analysis using semistructured interviews and transcribing and coding the data using MAXQDA Analytics Pro 2018 qualitative software.

Researchers use the phenomenological research design to facilitate an in-depth exploration of lived experiences of specific participants (Adams & van Manen, 2017). Moon, Brewer, Januchowski-Hartley, Adams, and Blackman (2016) stated that a phenomenological design is useful when exploring a phenomenon from the actual perspective of a specific individual or a chosen population. Adams and van Manen (2017) stated that phenomenology may be transcendental, hermeneutic, or a combined version of both. Researchers have used several types of phenomenology to explore and comprehend human experience (Gill, 2014). In this study, I used the transcendental phenomenological design to focus on the lived experiences of aviation technicians and not knowledge of the phenomenon from a personal perspective.

Moustakas (1994) modified the transcendental phenomenological design based on key principles from Husserl, the father of the phenomenological transcendental design. Moustakas (1994) stated that transcendental phenomenological design is useful in exploring participants' perceptions and experiences. A transcendental design is used to gather participant descriptions independent of the researcher to facilitate a different perspective (Moustakas, 1994). I used transcendental design to collect semistructured interview data descriptions about decision-making perceptions from participants. I used a modified version of the Stevick-Colaizzi-Keen method to organize and analyze the qualitative research data.

Moustakas (1994) suggested that a modified version of the Stevick-Colaizzi-Keen method could be used to analyze phenomenological data. The steps of the Stevick-Colaizzi-Keen method consist of (a) epoché/bracketing, (b) transcendental reduction, (c) imaginative variation, (d) description synthesis, (e) repeat process until saturation, and (f) description combination (Moustakas, 1994). These detailed steps facilitated the exploration of decision-making perceptions of aviation repair technicians from the participants' perspectives. The detailed modified Stevick-Colaizzi-Keen phenomenological data analysis method, as stated by Moustakas (1994), is identified in Chapter 3.

The phenomenological design fosters the exploration of aviation technicians' decision-making perceptions (Gill, 2014; Adams & van Manen, 2017). The participants in this study consisted of 15 to 20 aviation repair technicians actively performing aircraft maintenance in MRO facilities. The collected semistructured interview data facilitated the information analysis and creation of relevant themes (Gill, 2014).

Definitions

The following are key terms and definitions for this study.

Aviation maintenance technician (AMT): Technicians who perform specialized aircraft repairs and modifications on aircraft and components. They are also known as *aircraft mechanics* and *specialists* (Bureau of Labor and Statistics, 2017).

Epoché/bracketing: The separation of the researcher's biases and experiences from the phenomenon being explored to obtain the perspective of the participants (Moustakas, 1994).

Imaginative variation: Using imagination to develop structural themes from textual descriptions (Moustakas, 1994).

Intuition: The ability to decide on suitable choices or choice without completely analyzing a situation (Vanlommel, Gasse, Vanhoof & Van Petegem, 2017).

Maintenance repair and overhaul (MRO): Facilities in which aviation maintenance technicians make aircraft modifications or repairs (GAO, 2016).

Naturalistic decision-making (NDM): The examination of how decisions are made by experienced personnel in nonlaboratory-controlled circumstances (Zsambok & Klein, 2014).

On-the-job training: Critical skills training encompassing physical aircraft work, technical repair data use, or computer training (Shanmugam & Paul, 2015).

Assumptions

Tracy (2012) defined assumptions in qualitative studies as what is previously known or believed about a phenomenon or group of people by the researcher. Qualitative researchers identify and separate themselves from preconceived notions about a phenomenon to ensure new knowledge is learned and to acknowledge possible affects

(Tracy, 2012). Gill (2014) suggested that qualitative phenomenological researchers use bracketing to mitigate assumptions. In this study, two assumptions were identified and epoché (bracketing) was conducted to address any preconceived notions about the study.

The first assumption of the study was that the interview participants would be open and clear about answering questions about how they make decisions pertaining to aviation safety. The aviation technicians were open and provided detail information on how decision-making influences aviation safety. In MRO facilities, long repair times cost the most money, and employees want to be perceived as safety conscious and compliant (GAO, 2016). Rosenthal (2016) noted that when participants are comfortable in a conversation, complete data are presented. The participants were given a letter of consent explaining in detail the purpose of the study to alleviate any angst from any perceived retribution. The security of all participants' data and the voluntary nature of the study was reiterated and fostered an information rich environment.

The second assumption is that all participants truly wanted to learn more about identifying ways to enhance decision-making processes and aviation safety. The 12 repair technicians in this study wanted to learn how to enhance decision-making processes. In a quantitative study conducted by Littlejohn, Lukic, and Margaryan (2014), safety and learning culture were examined. The results of the study indicated a strong relationship between safety and learning cultures and how both concepts affect organizational safety (Littlejohn et al., 2014). Safety culture in aviation organizations is created through norms, mindsets, and experiences, and it is difficult to change (Strauch, 2016). Aviation repair technicians wanted to change how repair technicians negatively influence aviation safety through training and safety education.

Scope, Delimitations, and Limitations

The scope of a qualitative study is the identified boundaries used by the researcher as a blueprint to explore a phenomenon within a specified domain (Simon & Goes, 2013). The researcher should carefully and methodically select the scope of a study to adequately synthesize relevant literature (Noy, 2015). Sim, Saunders, Waterfield, and Kingstone (2018) suggested that researchers start with a clear definition of the scope of the study to ensure saturation. The scope of the study determines the research questions and the participants for the study (Soilemezi & Linceviciute, 2018).

This study included 12 participants from one large MRO facility providing aircraft maintenance services to civilian domestic airlines. The participants were aviation maintenance technicians who have been performing aircraft maintenance for 5 to 20 years or more. The year range was chosen due to the levels of aviation time and experience. According to Payscale Inc. (2010), entry-level aviation repair technicians range from 0 to 5 years of experience, mid-career-level technicians range from 5 to 10 years, and experienced technicians range from 10 to 20 years or more.

Interviews were conducted with aviation repair technicians who have been actively performing maintenance to explore how decision-making perceptions influence aviation safety among mid-career and experienced technicians. The data and information collected can be used in small or large MRO organization. The results can be used in domestic or global aircraft MRO organization.

The conceptual framework for the study was on aviation technician decision-making and how technicians' perceptions influence aviation safety. The NDM framework established the basis for the study. Moon et al. (2016) suggested that transferability is achieved when a researcher can use the results in other disciplines or enhance current concepts. Transferability was enhanced when the data were examined at a large MRO organization. Other disciplines can use the results of the study to explore decision-making perceptions and organizational safety.

Delimitations complement the scope in terms of narrowing the borders of the study (Simon & Goes, 2013). Delimitations are determined and used by researchers in qualitative studies to state specific choices about why a research design, location of study, or participant were chosen. A researcher also identifies why other choices were not appropriate for the study (Simon & Goes, 2013). Researchers use delimitations in a study to meticulously rationalize the research framework and study objectives (Simon & Goes, 2013).

In this study, two possible delimitations were identified. The first was the selection of the qualitative versus the quantitative design. The quantitative methodology was not chosen because the method seeks to justify variables of phenomena versus exploration (Park & Park, 2016). Researchers use the quantitative design to assess statistics to accept or reject a stated hypothesis (Tumele, 2015). The qualitative design is used to better comprehend a phenomenon and the lived experiences of aviation repair technicians (Barnham, 2015).

The second delimitation was the selection of aviation repair technicians from a large MRO organization located in Arizona. The participants were specifically chosen from repair facilities in Arizona due to the amount of maintenance facilities located there. The repair facilities in Arizona were chosen due to the various experience levels of aviation repair technicians there.

In the beginning of this study, the intent was to gather a variety of aviation repair technicians' perspectives. Because of the small female repair technician population, I was not able to interview any female technicians. I also initially planned to interview a variety of technicians who have been performing aviation maintenance for between 5 and 20 years, but many of the technicians in the organization were experienced technicians with more than 20 years of experience as aviation repair technicians.

The first limitation of the study is that the results cannot be generalized across all aviation facilities, domestic and abroad. The study was conducted in an MRO organization in Arizona. The mindsets of domestic repair technicians could differ from those operating in foreign repair facilities. The various cultures for foreign technicians were not accounted for in this study and vary based on organizational norms. Aligning with the first limitation, the second limitation was the absence of perspectives of female technicians.

The third limitation developed due to the amount of experienced aviation technicians. I only had representation from two mid-level technicians who possessed 5 to 10 years of experience. Most of the repair technicians were experienced aviation technicians with 20 years or more of experience. The final limitation was my novice semistructured qualitative interview experience. To address this limitation, I conducted mock interviews to gain experience in preparation for the qualitative interviews.

Significance of the Study

This research fills the gap in Zsambok and Klein's (2014) research by applying the NDM framework to explore how aviation technician decision-making perceptions may influence aviation safety. The findings in this study addressed how aviation technicians make decisions in the aviation industry and explored how aviation safety was influenced. Past scholars used the NDM framework to explore expertise in aviation, health, and military disciplines (Gore, Flin, Stanton, & Wong, 2015; Militello, Sushereba, Branlat, Bean, & Finomore, 2015; Reiter-Palmon, Kennel, Allen, Jones, & Skinner, 2015; Zsambok & Klein, 2014).

Significance to Practice

The results of this study may provide airline shareholders, aviation maintenance leaders, and aviation management with details about how repair technician decision-making perceptions' real and perceived strengths influence aviation safety. A deeper comprehension of the lived experiences of aviation technicians' decision-making skills may aid in the development of an experienced workforce capable of mitigating aviation accidents. The findings of the qualitative research project provided the aviation industry with knowledge about how employee decision-making perceptions influence aviation safety. The findings also confirmed knowledge about decision models, decision theories, and NDM and their use in aviation MRO organizations (Klein, 2015).

Significance to Social Change

This qualitative phenomenological study of aviation repair technician decision-making perceptions could lead to positive social change. If organizations conduct regular organizational safety meetings, social change may happen. Organizations must develop effective training programs to enhance aviation safety and repair technician decision-making. The enhancement of aviation repair decision-making impacts aviation safety on organization and policy levels. Maintenance organizations can implement positive social change in mitigating aircraft delays and accidents and saving the aviation industry money.

Summary and Transition

The numbers of aviation technicians will continue to grow as more aircraft frequent the skies across the globe. Aviation technicians perform essential repairs and modifications to ensure aircraft airworthiness (GAO, 2016). The aviation industry is a profit-driven cyclical organization with critical decisions being made at various levels. The cost for maintenance on aircraft is climbing continuously, and aviation repair organizations must focus on the decision-making perceptions of technicians to enhance aviation safety. Organizations that do not focus on how technicians make decisions and the factors that impact those decisions may not be operating at maximum safety levels. The significant impact to social change on organizational and policy levels is identified in Chapter 5.

Chapter 2 includes an in-depth literature review about the conceptual framework of decision-making, decision-making models, decision-making theories, and the NDM framework. Scholarly articles and journals were explored from relevant qualitative, quantitative, and mixed-method designs. Aviation technician decision-making perceptions were reviewed regarding aviation safety.

Chapter 2: Literature Review

Introduction

In past studies, federal agencies, aviation safety organizations, and airline industries have examined aviation accidents caused by human decision-making (Barrage, 2016; FAA, 2014; Strauch, 2016). Despite extensive identification and preventive research, gaps exist on aviation technician decision-making perceptions in MRO organizations and how aviation safety is affected (Zsambok & Klein, 2014). I used a qualitative transcendental phenomenological design to explore the essence of aviation repair technicians' lived decision-making experiences about aviation safety.

Husserl is known as the founder of the phenomenological method and creator of transcendental phenomenology (Christensen, Welch, & Barr, 2017). Husserl's phenomenological method was created to better explore the foundational core of human experience (Gill, 2014). The Husserlian descriptive phenomenology seeks to view a phenomenon through the eyes of members who experienced the action or event (Christensen et al., 2017; Creely, 2018). Husserl's (1969) method contains four essential components of descriptive phenomenology: (a) bracketing, (b) experience description, (c) eidetic information, and (d) transcendental reduction. Husserl laid the foundation that led to numerous variations to phenomenology (Gill, 2014). Two Husserlian-inspired phenomenologists were Patricia Sanders and Clark Moustakas.

Sanders and Moustakas followed Husserl's descriptive phenomenological method (Gill, 2014; Moustakas, 1994; Sanders, 1982). Separation of the researcher from the participants' views (bracketing) is an important part of phenomenology (Moustakas, 1994; Sanders, 1982). Sanders' (1982) transcendental approach is composed of four levels and is a general use of the Husserlian descriptive phenomenology (Gill, 2014). The first level of Sanders' phenomenological method is focused on complete identification of the specific phenomena (Gill, 2014; Sanders, 1982). In this study, the phenomena were the decision-making perceptions of aviation maintenance technicians. The second level is the consolidation of themes from interview data collected from the participants (Gill, 2014; Sanders, 1982). The third level is the researcher's reflection on gathered data to examine the meaning of the human experience by the participants. The fourth level is reviewing collected participant data to conclude on why the experiences are felt by the members. (Gill, 2014; Sanders, 1982).

Phenomenology fosters a deeper comprehension of a phenomenon from the participants' lived experiences through both descriptive (Edmund Husserl) and interpretive (Martin Heidegger) methods (Gill, 2014; Giorgi, 2012). Perry (2013) stated the two types of phenomenology commonly used in qualitative research studies are the interpretive and descriptive designs. The interpretive phenomenological design focuses on discovering the meaning of lived experiences and does not use bracketing (Gill, 2014; Perry, 2013; Reiners, 2012). The descriptive phenomenological design focuses on the exploration of the essence of the phenomenon using epoché to eliminate bias (Reiners, 2012). The descriptive method was used in this study to explore and describe the lived experiences of aviation technicians' decision-making perceptions minus interpretation or bias. Moustakas' (1994) qualitative transcendental phenomenological design was used to explore the lived experiences of aviation technicians in the study.

The transcendental phenomenological design was used as the focus of the study to gather and analyze the lived experiences of aviation repair technicians. Transcendental phenomenological methods facilitate viewing a phenomenon by separating researcher presuppositions from the study (Moustakas, 1994). Epoché or bracketing was used in this study to ensure that repair technicians' decision-making perceptions were clearly captured. Epoché is essential in the creation of a fresh researcher's view when exploring a phenomenon (Moustakas, 1994; Butler, 2016).

This qualitative transcendental phenomenological study explored the gap that was previously researched by Klein et al. (1993) and Zsambok and Klein (2014) about how the NDM framework may improve AMT decision-making in field settings. The specific problem explored in this study was how aviation repair technician decision-making perceptions influences aviation safety. To mitigate aviation accidents, it is essential that aviation MRO organization leaders explore how aviation technicians' decision-making perceptions influence aviation safety. Aviation technicians represent a critical human resource to prevent aviation accidents (Begur & Babu, 2016).

This study is essential to the aviation industry, particularly in MRO organizations, because it explores how aviation technician decision-making perceptions influence aircraft safety using Klein et al.'s (1993) and Zsambok and Klein's (2014) NDM framework. Twelve aviation repair technicians participated in semistructured interviews to share their lived experiences. The results of this study impact aviation safety and enhance aviation repair technician decision-making processes.

This chapter begins with relevant literature pertaining to decision-making models, theories, and the NDM framework. Chapter 2 also includes a synthesis of historical and current decision-making and aviation safety literature. In Chapter 2, relevant decision-making models, decision-making theories, and the gap in the literature are explored. The focus is on decision-making and aviation safety management.

Literature Search Strategy

The literature review is composed of four distinct components: (a) conceptual framework, (b) decision-making theories, (c) aviation safety management, and (d) literature gap. The concept model in Figure 1 lists the key elements that will be explored in the literature review.

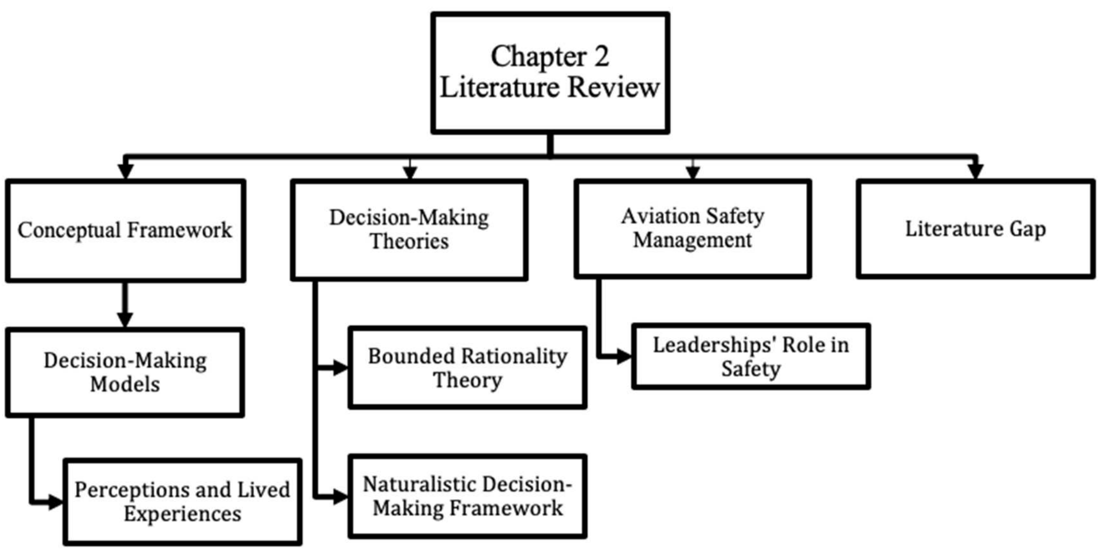

Figure 1. Literature review concept map.

A review of past and present relevant literature is essential to the comprehension of scholarly literature about how aviation technician decision-making perceptions influence aviation safety. The literature review includes research conducted since 1946 with a concentration on scholarly research literature produced between 2013 and 2019. The exploration of existing literature enables insight on basic decision-making, NDM, and aviation safety. The literature review includes data from the following research engines and databases: Academic Search Complete (ASC), Business Source Complete (BSC), ProQuest Central, PsycArticles, PsycINFO, Science Direct, SAGE Online Journals, and the Walden University Library. Additional resources and reports were gathered from the Government Accountability Office (GAO), aviation organizations, and other government websites.

Key terms used to access scholarly sources in the study were *decision-making definition, history, rational decision-making, intuitive, bounded rationality theory, decision-making models, sensemaking, naturalistic decision-making, perception, risk, mindset, image theory,* and *human errors in aviation.* To ensure only relevant sources were explored, I excluded the terms *military aviation* and *global repair facilities.*

Table 1

Literature Review Search Strategy

Key words searched	Database	Dates	Number of documents	Literature type
Naturalistic decision-making	PsycArticles	1989–2018	5	5 peer-reviewed scholarly journals
Naturalistic decision-making	PsycINFO	1989–2018	193	193 peer-reviewed scholarly journals
Aviation safety culture	ProQuest Central	2013–2018	1,302	1,302 scholarly journals
Descriptive decision-making models	ASC	1982–2017	16	15 academic journals
Decision-making models	PSC	2013–2018	556	534 scholarly journals
Decision-making models in aviation	Science Direct	2014–2018	584	584 scholarly journals
Decision-making models in aviation maintenance	Sage Journals	2014–2018	834	834 scholarly journals
Rational decision-making in aircraft maintenance	ProQuest Central	2014–2018	164	158 scholarly journals
Rational decision-making in aviation	Sage Journals	2014–2018	239	239 scholarly journals
Cognitive intuition	Science Direct	2013–2018	352	288 scholarly journals
Disadvantages of intuitive decision-making	ProQuest Central	2013–2018	2,639	2,639 scholarly journals
Recognition-primed decision-making	ProQuest Central	2013–2018	1,399	1,301 scholarly articles
Lived experiences in aviation	ProQuest Central	2013–2018	627	607 scholarly journals
Image theory in aviation	Sage Journals	2013–2018	411	411 scholarly journals
Decision-making definition	ASC	2013–2018	1,194	1,159 scholarly journals
Decision-making history	BSC	1946–2018	2,287	2,238 scholarly journals
Rational decision-making	ASC	1963–2018	700	680 academic journals
Decision-making and satisficing	ASC	2013–2018	40	40 academic journals
Herbert Simon bounded rationality theory	ProQuest Central	2013–2018	344	344 peer review journals
Maintenance repair and overhaul facilities	ProQuest Central	2013–2018	256	249 scholarly journals
Aviation maintenance culture	ProQuest Central	2013–2018	745	730 scholarly journals

Note. The literature search strategy is composed of the keywords searched, database, timeframe, number of documents, and the reviewed literature type.

Conceptual Framework

The conceptual framework was used to explore how aviation technician decision-making perceptions influenced aviation safety. The conceptual framework was composed of decision-making models, the NDM framework, and relevant decision-making theories. Through the study, I explored how aviation technician decision-making perceptions and lived experiences influence aviation safety in MRO facilities. The selected decision-making models, decision theories, and the NDM framework were used to explore how technicians' decisions are made.

The NDM framework was partially derived from Simon's (1959) bounded rationality theory (Zsambok & Klein, 2014). The examination of literature using a conceptual framework about NDM and decision-making theories provided aviation management with methods to identify how aviation repair technician decision-making perceptions influence aircraft safety. Aviation repair facility leadership can use the findings of this study to enhance aviation safety and comprehend technician decision-making processes.

Decision-Making Models

McFall (2015) defined decision-making as choices from alternatives made in the pursuit of a specific outcome or goal. Researchers have explored human decision-making models across various disciplines, such as government, psychology, and economics with the goal of identifying how choices are made in various circumstances (McFall, 2015). Early decision models were economical and operated on the premise of the decision maker possessing all pertinent information to make effective choices (Groeneveld et al., 2017). Current decision-making efforts focus on the examination of processes from a cognitive viewpoint. The cognitive view is essential to understanding the continual process of making choices, pattern identification, and workplace interaction (Rizun & Taranenko, 2014). An introduction to the rational, intuitive, and recognition primed decision models was a foundation for this study.

Rational Decision Model

The rational decision model is used when organizational rules and regulations are not ambiguous and possess a substantial amount of time to make a choice (Rehak, Adams, & Belanger, 2010). Simon (1956) defined rational decision-making as being able to carefully make a choice based on past and present information with consideration to the various potential outcomes. Rational decision makers use a devised systematic process to make choices without utilizing intuition using organized patterns (Uzonwanne, 2015). Decision makers determine rational choice through scenario examination and select the option that provides the best results for a specific goal (Del Campo, Pauser, Steiner, & Vetschera, 2016; Simon, 1955).

According to Nathanael, Tsagkas, and Marmaras (2016), rational decision models are used in aviation organizations to foster a systematic approach to exploring detailed alternatives. MRO facility managers are responsible for ensuring that rules and regulations are followed and that aviation maintenance technicians select positive alternatives to ensure aircraft are safe and reliable (Nathanael et al., 2016). Aviation maintenance organizational leadership must develop an effective decision-making strategy to optimize resources (Velmurugan & Dhingra, 2015).

Rational decision-making models are limited due to the extensive amount of time and resources used to develop numerous assumptions (Calabretta, Gemser &, Wijnberg, 2017). Rational decision makers assume all personnel affected by the specific decision comprehend the information and terms related to the process. Rational decision-making is also limited by the assumption that all decisions being made are done in a logical or organized manner (Calabretta et al., 2017; Kaufmann, Meschnig, & Reimann, 2014). Li, Ashkanasy, and Ahlstrom (2014) stated that humans seldom use calculations to make rational decisions, which introduces a combined effort of rational and intuitive decision-making to make effective choices. Simon (1992) suggested that decision-making involves human emotion or intuition when making choices in management.

Intuitive Decision Model

The organizational benefits of intuitive decision-making have been explored in aviation, and medical industries (Kahneman & Klein, 2009; Lamb, Green, Vincent, & Sevdalis, 2011). Intuition, as defined by Klein (2015), is the quick ability to subconsciously choose a positive, effective option among a variety of alternatives. Klein’s definition of intuition is similar to Simon’s (1992) concept pertaining to decision-making and expertise as dual components of the decision-making process. Decision makers use intuition to develop and identify learned patterns to enhance speed and effectiveness of the decision process (Klein, 2008, 2015).

Organizational leaders should not rely solely on the emotional nature of the intuition model but on the experience and analytical reasoning structure behind making choices (Klein, 2015). Klein stated that time and stress are two major factors that can impede effective decision-making. Aviation technicians are tasked with repairing aircraft and returning aircraft to owners in a safe, reliable state (GAO, 2016). MRO organization employees adhere to set timelines or face penalties. Penalties can range from financial charges to the exclusion of future services. Managers and repair technicians can apply cognitive intuition initiatives to organizational strategies to foster decision-making (Klein, 2015; Patterson & Eggleston, 2017).

Intuitive cognition. Patterson and Eggleston (2017) suggested the concept of intuitive cognition could be used to identify the positive impact of how pattern recognition may invoke effective decision-making in organizations. The use of the cognitive intuition theory highlighted three key essential characteristics of intuitive decision-making: (a) universal comprehension (b) extended process to use and (c) beneficial for various situations. Salas, Rosen, and DiazGranados (2010) agreed with the importance of intuition being an effective decision model but stated intuition might imbue the decision maker with a false sense of security.

Kahneman and Klein (2009) examined several phenomena that fostered problematic intuitive decision-making. Kahneman and Klein also stated intuitive decision model flaws are composed of quick assumptions made by inexperienced decision makers. In a quantitative study by Rusou, Zakay, and Usher (2013), the authors explored the benefits of both intuitive and rational models. The authors conducted experiments and concluded with findings reinforcing the use of both models to enhance the decision-making process. Lipshitz, Klein, and Carroll (2006) suggested sensemaking is an essential characteristic when using pattern recognition and making intuitive based decisions.

Sensemaking. Universal comprehension or sensemaking as explained by Patterson and Eggleston (2017) is an essential part of cognitive intuition. Scholars have used a variety of definitions attributed to sensemaking, but for this study, the term meaning-making as stated by Patterson and Eggleston (2017) was used. Patterson and Eggleston clarified the term meaning-making as the examination of sign interpretation by the decision maker.

Intuitive decision makers utilize sign interpretation to recognize (interpret) a specific event or pattern (sign) and relate the event to a past problem or occurrences (Patterson & Eggleston, 2017). Maitlis and Christianson (2014) defined sensemaking as the ability to decipher or systematically comprehend ideas, processes, or concepts ranging from complex to menial levels. Decision makers use sensemaking as a blueprint to develop a definitive path to intuitive decision-making. Researchers such as, Simon (1992) and Macquet (2009) examined recognition as an effective component of the decision-making process and identified numerous benefits. The center component in the recognition-primed decision (RPD) model is intuitive cognition and warrants further examination to determine decision-making impact in aviation repair facilities (Patterson & Eggleston, 2017).

Recognition Primed Decision Model

The RPD model was created as an effort to enhance decision-making without mentally evaluating every possible, plausible alternative (Klein et al., 1993; Klein, 2008).

The model was first used to enhance decision-making of experienced personnel needed to make fast, effective decisions. Klein, Calderwood, and Clinton-Cirocco (1986) created the foundation of the RPD model during a military-sponsored decision initiative. The model has been used in military, emergency response situations, and by various sports organizations Klein et al., (1993) and Richards, Collins, and Mascarenhas (2017) to strengthen decision-making. The recognition model was explored and more research is needed to determine the impact on repair technician decision-making.

Key limitations to the RPD model have been identified by Groenendaal and Helsloot (2016) as automated responses and application of previously learned rules and regulations. Groenendaal and Helsloot (2016) suggested automated responses and learned rules and regulations are difficult to change during an incident or emergency situations. Groenendaal and Helsloot (2016) stated organizational leadership must be cognizant of employees' decision-making capacity to prevent overload. Managers and supervisors should also observe task complexity and communicate organization goals to all employees to mitigate angst and confusion (Groenendaal & Helsloot, 2016).

Aviation repair technicians make decisions concerning aircraft airworthiness, safety, and operate in a time-restricted environment (Nathanael et al., 2016). Aviation technicians utilize recognition, experience, and on-the-job training to select effective safety alternatives when modifying or repairing aircraft (Shanmugam & Paul, 2015). Decision makers may use the RPD model to enhance decision-making processes and positively impact aviation safety.

Perceptions and Lived Experiences

Liberman, Fischer, and Whitney (2014) suggested all past perceptual activities and mindsets affects human perception. Mindsets are developed from individual morals, values, concepts, and environment and identify cognitive processes from which people view the world (French, 2016). Individual mindsets can be used to determine how humans perceive concepts such as safety and risk (French, 2016). In the aviation industry, risk perception is essential to the management of uncertainties and the organizational safety culture of aviation MRO organizations (Kubicek, Bhanugopan, & Fish, 2013).

Risk Perception

Xia, Wang, Griffin, Wu, and Liu (2017) examined risk perception to identify ways in which the safety behaviors of aviation employees were affected. The risk is a variable that can either be accepted or mitigated in aviation operations. Risk perception is how personnel view and to react to risk in the organization (Xia et al., 2017). Keller and Gollwitzer (2017) expanded on Xia et al. (2017) and stated risk assessment and behaviors are due to individual mindsets and how personal risk is assessed specific situations. The findings of Keller and Gollwitzer (2017) may further expand risk perception data exploration.

Risk Taking

In a quantitative study by Keinan and Bereby-Meyer (2017), three experiments were conducted to explore the perceptions of active, passive risk, and personal responsibility. The exploration of the study by Keinan and Bereby-Meyer (2017) was used to explore the research questions on aviation maintenance technician decision-making perceptions. Keinan and Bereby-Meyer examined passive risks to determine if participants took the least resistant alternative, the perception level of risk would be decreased. Active risk accomplishment was identified as performing an action while acknowledging a level of risk is involved. Passive risk-taking actions are created when personnel fail to choose an alternative due to individual biases. Keinan and Bereby-Meyer (2017) described the status quo bias and the omission bias as two passive components that contribute to the perceptions of risk.

Status quo bias. The status quo bias is when personnel chooses alternatives that have become the organizational norm (Keinan & Bereby-Meyer, 2017). There may be other alternatives to the norm, but personnel consciously select current choices for fear of failure. The status quo bias is enforced and fostered when employees and leadership are resistant to change (Keinan & Bereby-Meyer, 2017). The status quo approach is reinforced through personal rewards and stimulus from the human brain when employees follow normal operating procedures (Keinan & Bereby-Meyer, 2017).

Omission bias. The omission bias is based on passive risk takers choosing to incur problems by being reluctant to take action and not explore the possibility of reviewing the active risk results (Keinan & Bereby-Meyer, 2017). The omission bias has been commonly identified in the medical discipline when personnel refuse medicine or treatment such as vaccinations even though the more severe result may be death (Keinan & Bereby-Meyer, 2017).

Lived Experiences

The collection of lived experiences provided the reader with a detailed perspective from the participants' view (Adams & van Manen, 2017). The use of the qualitative phenomenological inquiry strategy facilitates the collection of actual experiences from participants and provides a humanistic level to the research (Adams & van Manen, 2017). The lived experiences from aviation repair technicians performing aircraft maintenance was paramount to the qualitative phenomenological data collection phase of the study.

Gathering information from lived experience added a personal perspective to the study. Paley (2014) stated phenomenological studies are composed of two main components that guide the collection of data. The first component is processes or actions that can be physically viewed such as incidents, accidents, or mishaps. The second component is events that are not viewed but are important to collecting lived experience data and includes perceptions, emotions, and mindsets (Paley, 2014). Both components are critical to the comprehension of the lived experience from the participants' perspective (Paley, 2014). Data from the lived experiences of aviation repair technicians was collected in the study to explore how safety perceptions may influence aviation safety.

Decision Theories

Image Theory

Beach and Mitchell (1987) identified a method as to which decision makers utilized four diagrams or images when selecting decision alternatives. The first image is the self-image and is composed of the decision maker's mindsets and determines actions by the individual. The second image is the trajectory image, and the image focus are on the short and long-term organizational achievements. The image also represents a future view of the decision maker's actions or behaviors (Beach, Smith, Lundell, & Mitchell, 1988). The third image is called the action image, and it represents action made by the decision maker to reach goals identified in the second image. The final image is the projected image and is composed of the results of actions chosen in the third stage (Beach et al., 1988). The four image theory components were utilized in conjunction with exploring perceptions to identify how mindsets of aviation technician decision makers influence aviation safety.

Human action or inaction was responsible for 80% of aviation accidents (Begur & Babu, 2016). The exploration of how technician mindsets are developed will impact perspectives pertaining to aviation safety. The use of the self-image aspect may explore how technician lived experiences develop decision-making perceptions (Beach et al., 1988). Rae (2016) suggested story telling use as an effective method tool to develop mindsets in academic settings.

Examination of the self, trajectory, action, and projected image by Beach et al. (1988) provided a sound insight on how repair technicians develop decision-making experience. The components of the image theory list key stages on how aviation employees progress from learning foundational decision concepts to the actual implementation of personal and organizational goals. The concepts in the image theory were also utilized to explore the social impact of aviation hazards from aircraft operations

(Singh, 2016). There are numerous past and present theories that could have been examined for the study; the chosen three will foster answers to the research question in the study.

Bounded Rationality Theory

Nobel Memorial Prize-winning economist Herbert A. Simon created the bounded rationality theory as an alternative method of decision-making (Kalantari, 2010). The initial foundation of the theory stemmed from the business management and economic disciplines and had expanded into various fields such as medical, biology, and aviation (Cristofaro, 2017). Simon's bounded rationality theory focus was to transition from early economic rational computational decision-making models to a cognitive model (Simon, 1959). Simon's cognitive studies explored recognition as the main factor when making decisions (Simon, 1959). Simon's bounded theory acknowledged limitations to human rationality when making decisions (Kalantari, 2010).

Satisficing

Simon (1956) coined the term satisficing, a combination of satisfy and suffice. The term provides decision makers with the best choice for any specific task versus reviewing all associated alternatives (Simon, 1956). Brown (2004) suggested Simon's knowledge and experience helped transition decision-making maximization to satisficing. Satisficing would be the foundation as to which the NDM framework would build upon (Klein et al., 1993; Zsambok & Klein, 2014).

Aviation repair technicians operating in MRO organizations are tasked with performing intricately detailed aircraft modifications (GAO, 2014). How decisions are made from a situational awareness perspective identified how repair technicians decision-making perceptions influence aviation safety. I examined how technicians choose alternatives when repairing or modifying aircraft or components in the repair facility.

Naturalistic Decision-Making Framework

The NDM framework was developed by Klein et al. (1993) to enhance decision-making for personnel operating in a fast-paced environment. Klein (2008) stated the NDM framework was created due to a gap in how people decided on alternatives when making decisions. Prior to the NDM framework, researchers utilized detailed mathematical systematic and rational decision-making approaches to decide on specific alternatives (Groeneveld et al., 2017; Klein, 2015). The U.S. military and the federal government initiated and funded several NDM studies during the 1980s to explore experienced decision-making after high visibility accidents occurred (Klein, 2008, 2015).

The NDM framework is used by organizations to explore how decisions are made outside of a laboratory in an operational work environment (Lipshitz et al., 2006). Lipshitz et al. (2006) and Klein (2008) stated decision makers choose alternatives which must be observed in the actual environment to eliminate inaccuracy of controlled variables. The NDM framework is used in organizations with ambiguous roles and tasks, cyclic conditions, and experienced members (Klein & Klinger, 2008). The NDM framework is beneficial in organizations which have: (a) poorly defined goals, (b) ambiguous tasks with incomplete information, (c) cyclic goals, (d) fluctuation of conditions, (e) constant adjustment to transforming conditions, (f) limited task completion time for high-stake actions, and (g) decision makers possessing experience levels (Drillings, 2014; Klein et al., 1993; Klein & Klinger, 2008; Shattuck & Miller, 2006).

The NDM framework is not intended for decision makers to cycle through all available alternatives (Klein et al., 1993; Zsambok & Klein, 2014). The purpose of the model is to facilitate selection of the best choice by the decision maker (Azuma, Daily &, Furmanski, 2006; Rehak et al., 2010; Simon, 1956). The NDM framework can be used by MRO organization leadership to enhance operations by effectively using experienced personnel to mitigate decision processing times (Rehak et al., 2010). The four main components of the NDM framework are situation assessment (awareness), pattern matching (recognition), story generation, and mental simulation (Rehak et al., 2010).

Situation assessment. Technician situation assessment ensures a clear focus on the operational environment and fosters insight to make an effective decision (Rehak et al., 2010). Dekker (2015) stated effective assessment and awareness of life impacting disciplines warrants the highest level of attention. Many factors can impact situational awareness such as complacency, environment, and negligence (Dekker, 2015). Decision makers must remain aware of the task being performed and the perceptions involved to correctly assess the situation (Endsley, 2014).

Failure to conduct an accurate situation assessment in aviation or any discipline may cause lives to be lost (Dekker, 2015). In MRO organizations, situational awareness is paramount to ensure aircraft are not damaged and mitigation of personnel injury (Endsley & Robertson, 2000). Aviation repair facility environments pose hazards from fall; electrocution, or fire, failure to properly assess a situation may facilitate injury or death (Endsley & Robertson, 2000). Examining repair and modification processes provided essential data on how repair technicians view situational awareness and impact aviation safety and personnel injuries. Endsley (2015a) stated situational awareness is critical in decision-making involving critical systems.

Pattern matching. The recognition of patterns in the NDM framework is crucial for decision makers to choose relevant options when making decisions (Klein, 2015). Technician pattern recognition is used to facilitate expedient decision-making and ensures the best option for the specific task is chosen (Klein, 2015). Rehak et al. (2010) stated pattern matching focuses on the decision maker recalling past experiences and aligning them with present situations. Past action observation may decrease failure probability but may foster false assumptions about all circumstances being similar between past and present events (Rehak et al., 2010).

Story generation. Story generation is the creation of stories from segmented related components that enable the decision maker to remember a composition of the event (Rehak et al., 2010). Decision makers utilize story generation as a tool to identify past chains of events to ensure the best alternative is chosen amongst choices (Rehak et al., 2010). Story generation has also been called story building by Lipshitz, Klein, Orasanu & Salas (2001) with the intent of identifying specific event characteristics. Story generation is closely tied to mental stimulation in the NDM framework (Rehak et al., 2010).

Mental simulation. Mental simulation is when the decision makers develop a mental blueprint of the situations as they occur (Rehak et al., 2010). The development of the simulation enables the decision maker the ability to identify errors, failures, and successes of the alternatives (Lipshitz et al., 2001). The time associated with how fast and effective the mental simulation process occurs is dependent upon experience and expertise of the individual (Lipshitz et al., 2001). Experienced decision makers are faced with several biases or deviations from the norm when utilizing the NDM framework (Rehak et al., 2010). The four components of the NDM framework provide the decision maker with a method to enhance decision-making with associated challenges in the form of decision maker biases.

Decision-Making Bias

Availability bias. Situation assessment, pattern matching, and story generation components are affected by the availability of information bias. The individual has a portion of data about the environment and places a high value on it due to information accessibility (Rehak et al., 2010). Blumenthal-Barby and Krieger (2015) suggested decision makers select current alternatives based on personal experience with the phenomena. The use of availability biases did not provide a skewed perspective regarding aviation safety, and how decisions are made in the field of aviation.

Representative bias. Representative bias is when decision makers select alternates from assumption of past decisions that have similar characteristics (Rehak et al., 2010). All NDM framework components are impacted when the decision maker falsely aligns new problem data with old information (Rehak et al., 2010). The aviation industry is cyclic, and decision makers are challenged with making decisions from evaluating current information void of assumption.

Overconfidence bias. This form of bias affects story generation and mental simulation. Human overconfidence can cause a heightened sense of skills when making decisions (Rehak et al., 2010). Organizational decision makers select choices based on an assumed or insufficient degree of confidence (Rehak et al., 2010). Application of the incorrect level of confidence or skill when making decisions may cause a flaw in the decision-making process (Rehak et al., 2010).

Confirmation bias. Confirmation bias affects situation assessment, pattern matching, and the mental simulation component of the NDM framework. The bias occurs when human mindsets and perceptions create the environment versus reality (Rehak et al., 2010). Decision makers are impacted by confirmation bias when information is sought to satisfy intended goals neglecting actual study data (Rehak et al., 2010). Decision makers in aviation under the effects of confirmation bias are narrow focused and may cause decision errors from excluding critical data (Rehak et al., 2010).

Scholars identified other challenges when using the NDM framework in organizational environments. Zsambok and Klein (2014) suggested the range of the NDM framework is narrow in disciplines that employ varying degrees of expertise, broad task processes, and utilize task simulations. The NDM framework is based on individual expertise and is plagued by numerous differences in what constitutes expertise and the various decision theories applied to the framework (Zsambok & Klein, 2014). Zsambok and Klein (2014) noted career fields define, pursue, and attain expertise in varying cognitive forms. The NDM framework will need to evolve further to ensure mitigations of variations between expertise differences and focus on systems operation (Zsambok & Klein, 2014).

Aviation Safety Management

Li and Guldenmund (2018) defined safety management as the systematic method of combining operations and processes. MRO facility leadership can improve safety management by implementing robust, effective quality assurance sections (Karanikas, 2016). Quality assurance sections track positive and negative safety data points and foster safety actions in the organization. The quality assurance team create safety reports and recommendations to MRO leadership (Karanikas, 2016). MRO organization leadership may also identify and mitigate occupational stressors to reduce aviation accidents and ensure effective safety management efforts (Wang, Keller, Huang, & Fanjoy, 2016).

Wang et al. (2016) conducted a mixed methods study which examined how occupational stress affects aviation repair technicians' job performance. The study gathered data from 82 repair technicians to assess the relationship between stress and coping mechanisms (Wang et al., 2016). The results of the study highlighted the importance of monitoring stresses such as environment and compensation which impact repair technicians' job performance (Wang et al., 2016). Coping mechanisms identified by Wang et al. (2016) were identified to enhance job performance and mitigate aviation accidents. Casual conversation and physical exercise were the coping mechanisms suggested to reduce occupational stressors in aviation organizations (Wang et al., 2016). Occupational stress management can provide MRO leadership with a foundation to address how repair technician decision-making is affected.

AMT Decision-Making Perceptions and Safety

Aviation leadership, managers, and technicians are tasked with promoting a safe environment and culture conducive to aircraft maintenance repair operations (Birkeland Nielsen, Eid, Mearns, & Larsson, 2013). Liberman et al. (2014) stated human perceptions were developed through mindsets, experience, and knowledge. Xia et al. (2017) agreed comprehending human risk perceptions are essential to mitigate and prevent accidents or mishaps. Keller and Gollwitzer (2017) argued specific components of human mindsets impact risk taking behaviors.

Keller and Gollwitzer (2017) stated deliberate versus implemental mindsets affect risk perception. Mindsets are created and developed through interaction, experience, and the environment (Liberman et al., 2014). Deliberative mindsets target strategic planning and implementation is the action taken to perform the event (Keller & Gollwitzer, 2017). The experiments by Keller and Gollwitzer (2017) identified deliberate mindset participants accepted more risk than implemental mindset individuals. The data from Keller and Gollwitzer's study show that personnel given time to plan a specific risk involved task take less time than deliberate mindset personnel.

Improving Aviation Technician Human Errors and Decision-Making

Rashid, Place, and Braithwaite (2014) suggested critical safety organizations could view safety through a proactive lens to mitigate or eliminate human error. Identifying and documenting human error trends and root cause analysis will aid in the mitigation of human error accidents (Rashid et al., 2014). Rashid et al. (2014) stated a comprehensive tool capable of uniformly tracking and documenting human error incidents would decrease the probability of decision-making incidents.

Aviation technicians are faced with many decisions when performing aircraft maintenance tasks. The results of decision-making accidents are a product of incomplete data, lack of experience, or biases (Strauch, 2016). Dekker (2015) suggested human decision-making could be improved by increasing the situational awareness of all personnel. Endsley (2015b) supported Dekker's assertions about the importance of situational awareness while stating the narrow focus of Endsley's article.

Maintenance Leadership's Role in Implementing Safety Management

The role of leadership operating in MRO facilities work to deliver safe aircraft in a timely order to mitigate lapses in flying operations (Bazargan, 2016). Airline organizations make conscious decisions based on operating cost to determine if aircraft maintenance will be completed within the organization or outsource to other organizations. One of the main deciding factors organizations choose to outsource maintenance or perform within is cost-effectiveness (Bazargan, 2016).

In a report by the Aeronautical Repair Station Association (2014), aircraft maintenance is the third largest driver in aircraft operating costs. In 2013, aircraft maintenance cost the industry $60 billion with $36 billion spent on routine scheduled maintenance on heavy airframe maintenance (Bazargan, 2016). Heavy airframe maintenance consists of aircraft inspections based on flying time and require extensive work hours dependent on the type of aircraft (Bazargan, 2016).

Aircraft maintenance costs have increased by 70 percent from 2000 to 2013 (ARSA, 2014). The aircraft fleet also is aging and requires increased work hours to complete scheduled maintenance to ensure airworthiness (Bazargan, 2016). The aging aircraft fleet combined with costly maintenance force aviation repair facility leaders to focus on safety and human factor errors.

MRO organizations are divided into four distinctive areas of aircraft maintenance: (a) airframe, (b) engines, (c) component, (d) line (ARSA, 2014). Each area in aviation repair facilities operating in FAA certificated maintenance facilities are bound by numerous operating and safety rules and regulations (GAO, 2016). Information in the GAO (2016) report suggested the federal regulatory rules are not strong enough to enforce compliance with standard rules and regulations concerning aircraft safety in aviation repair facilities. The numbers of FAA inspectors are inferior compared to the superior number of technician performing repairs and modifications in MRO facilities (GAO, 2016). The underlying themes associated with aviation MRO organizations are aging fleets, maintenance costs, and minimal regulatory oversight. The culture in aviation maintenance may influence the aviation maintenance culture.

Education and Training

One of the roles of aviation repair managers is to ensure all personnel are trained to perform aviation repairs and modifications (Li & Guldenmund, 2018). Initial and refresher training concerning critical task and systems operations must be provided to prevent human errors (Rashid et al., 2014). Ceschi, Costantini, Phillips, and Sartori

(2017) stated aviation organizations provide cognitive programs aimed at eliminating decision-making biases.

Aviation maintenance technicians working in repair organizations range from novice to the highly experienced (GAO, 2014). Various backgrounds of personnel and time spent working in the aviation industry determine the level of expertise of each repair technician. Technicians accrue experience based on formal training and on-the-job training (GAO, 2014). All FAA certificated technicians are required to complete 1900 hours of aviation maintenance training and 30 months of performing aircraft maintenance to receive Airframe and Power plant certification and to be considered proficient (GAO, 2014).

Gap Identification

As the literature review noted, the number of relevant studies related to decision-making in naturalistic settings and aviation safety are numerous. Despite the extensive literature identified, the limited application in the comprehension of aviation technician decision-making perceptions is limited. Many of the NDM framework studies explored decision-making in firefighting, military, and medical operations (Flin, Stanton, & Wong, 2013). The common characteristics of cyclic goals, fluctuating conditions, and limited task completion times apply to aviation technicians in MRO organizations (Drillings, 2014; Klein et al., 1993; Klein & Klinger, 2008; Shattuck & Miller, 2006). Zsambok and Klein (2014) stated the NDM framework is limited due to the narrow scope of application in other disciplines. To redress the gap in the literature, Zsambok and Klein (2014) recommended researchers expand the application of the NDM framework and focus on devising a uniform definition of training aids and expertise. This study attempted to connect the stated gap in the literature and expand the NDM framework to aviation maintenance technician decision-making and explore associated perceptions. The use of the qualitative descriptive phenomenological approach aided in the comprehension of the phenomenon of decision-making perceptions from the lived experiences of aviation repair technicians.

Summary and Contribution of Study to Literature

The literature review indicated that humans had been intrigued by how decisions have been made in real-world situations for a long time. The formulation of decision models sought to organize what is known about how humans make decisions. Simon (1956) identified the need to explore rational decision-making absent of mathematical formulas and through bounded rationality. The NDM framework and the RPD model was introduced by Klein et al. (1986) and Klein et al. (1993) to determine how decisions were made rapidly in naturalistic settings versus inside of laboratories. Perceptions have been examined to explore how aviation maintenance technicians view risk and risk-taking activities pertaining to aviation safety.

The relevant decision theories provided key terms and concepts about technician mindsets and lists associated biases. The findings from repair technician lived experiences and decision-making can foster improvements and enhance aviation safety management processes. Chapter 3 includes a description of the qualitative descriptive phenomenological design that was used in the study and rationale for the choice of the design. Chapter 3 also includes the role of the researcher, issues of trustworthiness, participant selection logic, procedures for recruitment, participation, and data collection and the data analysis plan.

Chapter 3: Research Method

Introduction

The purpose of this transcendental phenomenological study was to explore the lived experiences of aviation repair technicians related to decision-making perceptions regarding aviation safety. The findings from this transcendental phenomenological study can benefit aviation maintenance organizations and enhance aviation safety in the United States. The findings of this study can also be used to influence aviation technician roles in performing aircraft modifications and repairs to reduce accidents and personnel injuries impacting society on a global scale. Chapter 3 includes a description of the qualitative phenomenological methodology used in the study and the rationale behind it. Chapter 3 also includes the role of the researcher, issues of trustworthiness, participant selection logic, procedures for recruitment, participation, and data collection, and the data analysis plan.

Research Method, Research Design, and Rationale

Many previous researchers have used various methodologies when viewing the main problem of this study. Scholarly qualitative, quantitative, and mixed methodologies were used to examine relevant information about decision-making and aviation safety. Researchers use qualitative methodologies to comprehend specific human behavior in various environments (Hazzan & Nutov, 2014). Gerring (2017) and Levitt, Motulsky, Wertz, Morrow, and Ponterotto (2017) defined qualitative methodology as an exploratory means in which researchers use common language to evaluate a selected sample size. The qualitative methodology was used to explore how the lived experiences of 12 aviation technicians' decision-making perceptions influenced aviation safety.

Saxena (2017) stated that qualitative methods are selected by researchers based on the phenomenon, the purpose of the study, and the research questions. The qualitative research method was used to answer the research question and collect lived experience data from aviation repair technicians through semistructured interviews. Tracy (2012) suggested that qualitative methodology is an efficient means to gather data in a naturalistic setting versus a laboratory in quantitative methodologies. The qualitative method was an appropriate fit for this study instead of the quantitative methodology to explore the lived experiences of aviation repair technicians' decision-making and how aviation safety was influenced.

Tracy (2012) suggested that qualitative research methods may foster a key relationship between the participants and the researcher to provide in-depth insight about a specific phenomenon. The researcher is the main instrument of the qualitative study and establishes an atmosphere to gather accurate research data for the study (Fusch & Ness, 2015). Qualitative research was essential to exploring and comprehending aviation repair technician experiences on a broad scale (Saxena, 2017). I used the qualitative descriptive phenomenological method to explore detailed aviation repair technician decision-making perceptions and to determine how aviation safety was influenced.

To explore the identified issue and the stated purpose of the study, the main research question of the study was: What are the lived experiences of aviation repair technicians and how do their decision-making perceptions influence aviation safety? I used Moustakas' (1994) phenomenological research design as a blueprint to gather lived experiences from aviation repair technicians. Moon et al. (2016) stated that researchers can use the phenomenological design to explore a specific phenomenon from the lived experiences of selected sample. The main phenomenon explored in this study was the lived experiences of aviation technician decision-making perceptions. The qualitative descriptive phenomenological design was appropriate for answering the study's research question in detail.

In addition to using the phenomenological research design, semistructured interviews were used to facilitate data collection from aviation technicians. DiCicco, Bloom, and Crabtree (2006) stated that semistructured interviews using open-ended questions are essential to gathering relevant qualitative study data. The in-depth responses from study participant interviews yielded a great amount of data about how repair technicians' decision-making influences aviation safety. The use of semistructured interviews involved asking probing questions and ensuring that repair technicians clarified their responses.

Research Question

RQ: What decision-making processes do aviation repair technician go through that could influence aviation safety?

The qualitative descriptive phenomenological design was used to explore the central phenomenon of how the lived experiences of aviation repair technician decision-making perceptions influence aviation safety? The phenomenological design was appropriate to gather data from a humanistic perspective with a new comprehension and insight of the phenomenon (Adams & van Manen, 2017; Gentles, Charles, Ploeg, & McKibbon, 2015). Sloan and Bowe (2014) stated that phenomenology is preferred over other methods of inquiry to explore phenomena such as perceptions from actual participant experiences. I used the descriptive phenomenological design to collect aviation repair technician decision-making lived experiences regarding aviation safety.

Sloan and Bowe (2014) suggested that phenomenological studies enable a researcher to collect firsthand experiences and examine the gathered data. Gill (2014) defined phenomenology as the examination of phenomena based on how an individual or group may physically or mentally experience a specific concept. Adams and van Manen (2017) added that phenomenology focuses on reflection of identified concepts to aid in understanding participants' perspectives. When researchers seek to comprehend the perspectives from a specific group of participants, the phenomenological design may be used (Gill, 2014; Moustakas, 1994).

Other qualitative research designs could have been used to address the problem statement of this study, such as narrative research, case study, grounded theory, and ethnography. According to Petty, Thomson, and Stew (2012), researchers use the narrative design to gather data from stories told by participants sharing a similar event. Nonetheless, the narrative design approach would not be appropriate to document the lived experiences and explore the core problem of decision-making perceptions in this study. Baxter and Jack (2008) wrote that case study designs are appropriate in research seeking to examine how a person or group may behave in a specific area or forum.

However, the case study design was not useful for exploring decision-making perceptions in this study.

The grounded theory design was not appropriate because grounded theory researchers attempt to create a theory based on participant data collection (Petty, Thomson, & Stew, 2012). The focus of this specific study was to explore the lived experiences of aviation technicians and not to develop a theory. Reeves, Kuper, and Hodges (2008) shared that ethnographic researchers focus on the exploration of social aspects and similarities within groups. The ethnography approach was not chosen for this study because the focus was on the lived experiences of aviation technician decision-making perceptions.

Role of the Researcher

The researcher is the central instrument in qualitative research studies (Walker, Read, & Priest, 2013). A researcher's focus is on gathering nonbiased information from participants while remaining an observer versus an observer-participant. I did not have any personal or professional relationship with the participants in this study. The focus of the study pertained to civilian repair technicians to mitigate any bias associated with exploring military aviation repair technicians' lived experiences. The participants were all employed by civilian aviation repair facilities and were not influenced by military operations.

Methodology

This section identifies the research design for the qualitative descriptive phenomenological study. The section includes a detailed blueprint to foster replication in future studies. The section is composed of the logic for participant selection, instrumentation, procedures for recruitment, participation, data collection, and the data analysis plan for the study.

Participant Selection Logic

The entire population for this study consisted of aviation technicians working in a large aviation MRO organization in Arizona. The repair technicians were responsible for providing aircraft and component repair services to civilian domestic airlines. The criteria for participants was aviation maintenance technicians who have been performing aircraft maintenance for a minimum of 5 years. Aviation personnel who are not actively performing aircraft maintenance as technicians was not included in the study.

Gentles et al. (2015) stated the reason for sampling in qualitative research is to gather data to be explored or analyzed based on the study of the researcher. Sampling in phenomenological studies focuses on collecting information from human sources. Purposeful sampling is defined by Gentles et al. (2015) as participants selected by the researcher which possess sought after knowledge or experience conducive to exploring a phenomenon. I utilized a purposeful sampling strategy to select participants operating at an aviation repair facility across two work schedules; it was the best method of sampling for this study.

The criteria for participant selection was (a) aviation technicians actively working on aircraft and components and (b) technicians must have been performing aircraft maintenance for a minimum of 5 years. Aviation personnel who were not actively performing aircraft maintenance in positions as technicians were not included in the study. Technicians who are not actively performing aviation maintenance may not know the current organizational safety processes. To ensure only qualified personnel were selected for the study, participants received an e-mailed or paper copy of the interviewee demographics questions (see Appendix D). The data from the participant qualification document was reviewed to determine applicable participants. Volunteers were contacted through e-mail, phone, or face-to-face if they qualified or not selected for the study.

The sample size consisted of an estimated 12 aviation repair technicians. According to Gentles et al. (2015), qualitative researchers use a minimum sample size beneficial to the comprehension of the phenomenon being explored or until data saturation is reached. Female aviation technicians were not excluded from participating in the study. No female technicians volunteered for the study, all participants were male.

Instrumentation

Researchers use several instruments to collect data in qualitative studies; interviews, questionnaires, natural setting observation and, focus groups (Gerring, 2017; Levitt et al., 2017; Mwangi, Chrystal, & Bettencourt, 2017). The main instruments that was utilized for data collection in this qualitative descriptive phenomenological study was semistructured interviews and digital audio recordings. The semistructured interview questions were designed specifically to obtain in depth descriptions of aviation repair technician decision-making perceptions.

DiCicco, Bloom, and Crabtree (2006) stated semistructured interviews are composed of open-ended questions designed by the researcher to explore participants' experiences about a phenomenon. Henriques (2014) suggested qualitative phenomenological interview questions should be broad and open to foster a detailed description of the phenomenon being examined from the participants' perspective. The research questions were written to delve deeper and provide a detailed description about the lived experience of aviation repair personal decision-making perceptions.

Jamshed (2014) identified numerous advantages of utilizing an interview guide during the qualitative interview process. The interview guide is a script which fosters interview uniformity when questioning participants (Jamshed, 2014). The interview guide served as a blueprint to aid in the organized documentation and collection of information from participants. The data collection instrument included a semistructured interview guide (Appendix A). The guide was used to ensure all participants received the same questions and for consideration of the participants' time. The data collection instruments were all created from peer reviewed data and Walden University templates.

Interviews

Interviews in phenomenological studies are a common main component of data collection (Bevan, 2014). In depth interviews are a common method used in qualitative descriptive phenomenological research studies to obtain specific research data and information from participants (Bevan, 2014). The semistructured interview strategy with open-ended questions were used for this study. The proposed semistructured interview questions for this study are identified (see Appendix B). The interview guide (Appendix A) was used to ensure interview uniformity between all participants.

The three common types of interviews are: structured, semistructured, and unstructured, all which are related to the amount of time, the skill of the researcher and experience (Tracy, 2012; Gill, Stewart, Treasure & Chadwick, 2008). The structured interview is intentionally uniform for all participants and focuses on specific written questions to be answered. The structured interview method is rigid and consumes the least amount of time to accomplish (Tracy, 2012).

The semistructured interview process is a combination of structured and unstructured interview strategies and provides a systematic method for the researcher to interact with the participant (Tracy, 2012; Gill et al., 2008). The unstructured interview fosters researcher interaction and requires more time to complete and is absent of an organized set of questions (Tracy, 2012; Gill et al., 2008). Tracy (2012) stated structured interviews are a fit for exploring large samples and unstructured requires the greatest amount of time. I used the semistructured interview approach to collect data for this study utilizing an interview guide. The semistructured method will ensure clarification of any stated points by the participant (Tracy, 2012; Gill et al., 2008).

Turner (2010) stated open-ended interviews are common amongst qualitative researchers due to the ability to gather data based on the participants' willingness to answer questions. The difficulty of open-ended interviews is realized during the coding process (Turner, 2010). The questions for the interview were open-ended and fostered participant interaction and openness.

The interviews were recorded using a digital recorder, and notes from each participants' interview was annotated. The digital recorder data was transcribed with a computer word transcription program MAXQDA Analytics Pro 2018. To ensure credibility and validity, the interview transcription data was compared with the recorded digital data to ensure accuracy. Three mock interviews were conducted with friends in an office in a library. The mock interviews helped develop interview techniques and improve the semistructured interview process.

Procedures for Recruitment, Participation, and Data Collection

The participants for this study consisted of 12 participants with at least 5 years of actual aircraft maintenance experience currently performing aircraft maintenance in an aviation repair facility. The aviation repair facility organizational leadership located in Arizona received a phone call to organize a visit to the facility. Participant recruiting flyers were taken to the repair facility and contact information was given to leadership to gather participant' for the study. Participants were given compensation in the form of a $20 gift card for completion of the informed consent form, demographics questions, and the interview. Participants who would have elected not to complete the study would have been awarded a $5 Starbucks gift card for their time; all 12 participants completed all components of the study.

If there were not at least receive 12 participants, aviation repair leadership would have been re-engaged to recruit more personnel for the study. Once the names of volunteers were identified, e-mails from the University's e-mail account were used specifically to receive and send research participant correspondence. The participants were given full disclosure of the purpose of the interviews and 35-45 minutes was the estimated time allotted for each interview. The use of a digital audio recorder was explained to the participants as the need to efficiently collect the data. A copy of the transcript summary was provided through e-mail to each participant of his respective interview. This process allowed any clarification or information alteration of the collected data from the participant. None of the participants responded with change or clarification to the transcribed interview data.

Face-to-face semistructured interviews were used to collect data for this study. I was flexible if participants wanted to meet at specific venues, and a request for a private office in the repair facility to conduct interviews to mitigate time away from the repair facility. The interview area was secluded from possible participants and heavy facility personnel traffic to foster detailed information.

Before the interviews began, participants were notified that interviews would be recorded, use of the information, and strictly held access to the research. Participants were encouraged to ask questions and provide input or feedback as needed. The purpose, documentation process, as well as the voluntary nature of the study, was reiterated to all participants.

Data Analysis Plan

The data for this study were managed and analyzed utilizing Moustakas (1994) modified version of the Stevick-Colaizzi-Keen method. Moustakas (1994) suggested a modified version of the method to analyze phenomenological data. The modified data management and analysis method consists of epoché, transcendental phenomenological reduction, imaginative variation, and synthesis (Moustakas, 1994). The steps below were used to analyze data in the transcendental phenomenological study.

1. Gather full description of the participants' decision-making perceptions regarding aviation safety.

2. Utilize transcripts of the participants' experiences, and complete steps a through g below.
    a. Review important statements regarding decision-making and aviation safety from interview transcripts.
    b. Identify and document significant statements from the transcripts.
    c. Write down statements that are not repetitive or overlapping (invariant horizons).
    d. Develop themes from the invariant horizons.
    e. Synthesize descriptions to form a textual-structural essence
    f. Review textual description and perform imaginative variation
    g. Create a textual-structural description of each aviation repair technicians' meanings and essences.
3. Utilize repair technician transcripts to complete the above steps.
4. Combine all descriptions into a single representation of the essence of the phenomenon. The combination of textual and structural descriptions will provide a united description of the phenomenon (Moustakas, 1994).

The data the from face-to-face semistructured interviews were collected, analyzed, and used in this study. The field notes and digital recording transcripts were analyzed and reoccurring themes were documented. In qualitative phenomenological studies, interview data may be recorded and transcribed to mitigate and identify unintended biases (Gill et al., 2008). Lub (2015) agreed that identifying biases and ensuring safekeeping could ensure external validity of the study if all materials utilized in the research are annotated in the study.

After the data from the digitally recorded interviews were transcribed using computer software, the recorded information was listened to and compared with all interview data against the computer-generated interview transcription. MAXQDA Analytics Pro 2018 was used to assist in the storage, organization, and analysis of collected data. Tracy (2012) suggested the use of qualitative software programs to designate a centrally controlled data destination and aid in the coding of the collected data. Any discrepant data identified were labeled in the software program as such, and notes were taken to acknowledge the specific data in the study to increase research credibility.

Coding. Coding is used in qualitative research to meticulously organize collected data by a variety of methods ranging from handwritten notes to elaborate software programs (Tracy, 2012; Vaughn & Turner, 2016). Coding data manually is time consuming, detailed, and may require a specific area to store collected information (Tracy, 2012). MAXQDA Analytics Pro 2018 was used for the collection and coding of participant interview data in this study. Coding serves as a visual representation to organize relevant research information such as perceptions, attitudes, and themes (Tracy, 2012). All data were input into the selected qualitative software program to identify major relevant themes and enhance data assist with analyzing data.

Qualitative coding may be method used by researchers to interpret data gathered for the exploration of a specific phenomenon (Rogers, 2018). Coding requires a clear identification of any biases and limitations in the study to ensure trustworthiness. The coding of qualitative data is created and interpreted by the researcher (Rogers, 2018). Researchers conducting qualitative coding are the main instrument of the study and impact data evaluation through personal beliefs and mindsets (Rogers, 2018). Each of the coding methods are divided into smaller categories such as descriptive, process, and in vivo (Rogers, 2018).

Descriptive coding. Saldana (2012) defined descriptive coding as the construction of short phrases to identify research data. The descriptive coding approach is highly favored by novice qualitative coders and researchers employing the ethnographic design (Saldana, 2012). The descriptive method is helpful in identifying researcher observations of participants in the study (Saldana, 2012). This study did not focus on participant observations; therefore, descriptive coding was not used in this study.

Process coding. The process coding method is used in qualitative studies to code information identifying action (Saldana, 2012). The process coding method is appropriate for coding actions in data such as reading, writing, and playing (Saldana, 2012). The data in this study pertained to decision-making perceptions and not actions to be coded. The initial and in vivo coding method was used in this study to explore aviation technician decision making perceptions.

Initial coding. The initial coding method is conducted within the first cycle of the coding process (Saldana, 2012). Researchers use initial coding to develop a plan for the study path after thorough qualitative data review (Saldana, 2012). The semistructured interview data was analyzed to identify initial similarities and patterns within each participants' interview data. Once the data were past the initial stages the in vivo coding method was used to refine the patterns and themes.

In vivo coding. The in vivo coding method is used by researchers to develop codes and patterns from the actual data gathered from the participants (Rogers, 2018). The in vivo coding method is essential in qualitative studies seeking to identify how the participant feels about a chosen phenomenon (Saldana, 2012). The in vivo coding method is used to comprehend participant mindsets and perspectives through researcher interpretation (Saldana, 2012). The in vivo coding method was used in this study to identify patterns pertaining to the decision-making perceptions of aviation repair technicians. Identifying patterns from interview information is paramount to successfully capturing the participants' voice pertaining to decision-making perceptions (Saldana, 2012).

Issues of Trustworthiness

Credibility

Credibility is a formal representation of how the key components of a qualitative study which affect the overall trustworthiness (Moon et al., 2016). Noble and Smith (2015) suggested meticulous documentation and note keeping, a reflection of data analysis, and self-identification of researcher and sampling biases establish qualitative research credibility. Participant interaction was documented in separate journals and any personal biases prior to the interviews was documented. Detailed notes after each interview session were kept and reviewed. Credibility in qualitative research is attained when the stated phenomenon is pictured to gain a positive audience of members who can immediately identify with the phenomenon (El Hussein, Jakubec, & Osuji, 2016).

Member checking. Morse (2015) suggested member checks are an essential component of qualitative research studies. Member checks are a quality reflection tool that enables participants to view what was stated in the interview process and alter information if needed (Morse, 2015). Simpson and Quigley (2016) agreed with Morse (2015) pertaining to member checks being a method in qualitative studies used to explore accurate participant data fostering validity. Member checks were used to provide a closing point to the interview process and show transparency in the process for future studies. The participants received their interview transcription results through e-mail and were provided the opportunity to accept or disagree. The participants had the opportunity to change or revise any part of the interview and changes or alterations were noted in the study. No changes to the initial interview transcripts were received; therefore, the data from the initial interviews were used.

Reflexivity. Reflexivity is a tool by which researchers may document actions and decisions during the study (Noble & Smith, 2015). Member checks and reflexivity were used ensure research credibility and internal validity. Reflexivity was used by creating a detailed journal prior to the start of the interview process. The detailed journal was kept and stored with the research data generated after each interview. The journal holds information pertaining to the participants' actions, behaviors, and nonverbal actions. The information in the journal aided in the reinforcement of data validity through the recording of researcher and participant interactions.

Transferability

Transferability is the ability for a specific research study to be used in other disciplines or cultures (Noble & Smith, 2015). Transferability or external validity can be increased with the researcher outlining a detailed blueprint of the study. Identifying the methods, participants' choice, and data analysis and collection processes are essential to enhance the transferability of the study (Noble & Smith, 2015). The sections in the study were specific so that transferability was increased.

Dependability

Morse (2015) stated qualitative research studies achieve dependability when credibility is reached. Dependability was obtained from the increase of credibility through reflexivity and member checking as stated by (El Hussein et al., 2016; Noble & Smith, 2015). Hadi and Closs (2016) suggested audit trails aid in dependability so the researcher can document stages and data, to included omitted information. Audit trails also serve as a method for future researchers to accomplish the same study and determine new information (Hadi & Closs, 2016). Audit trails were used to document milestones in the data collection and analysis process to capture dependability.

Confirmability

El Hussein, Jakubec, and Osuji (2016) defined confirmability as the detailed documentation of the researcher processes to foster the replication of the study by future researchers. Moon et al. (2016) noted confirmability is achieved in qualitative studies when a systematic process is maintained throughout the study. Reflexivity as defined by Noble and Smith (2015) and Walker et al. (2013) is used to increase the confirmability of the research study. Reflexivity is used in qualitative studies to separate the beliefs and ideas of the researcher from the participants (Walker et al., 2013). I utilized reflexivity in the study to provide a detailed log of personal biases and behaviors during the interview process to enhance objectivity.

Ethical Procedures

Informed consent forms were issued to all the participants detailing the purpose of the research and sample questions for the interviews. The informed consent form for each participant were reviewed before the interviews and required the participants' signature. The letter of cooperation was used to request permission from MRO facilities to solicit participants for the study and utilize a private office. The participant recruitment flyer (Appendix C) was used to contact volunteers by e-mail. The participants were given the opportunity to stop the interview or skip questions at any time. The audit trail ensured all omitted information was annotated in the study, there was no omitted information. There were no ethical concerns identified for this qualitative study.

The research materials and data were transported to the interview site in a locked computer bag. Two USB drives to back-up each of the participants' data after the interviews were carried to interview location. The research materials were labeled prior to beginning the interviews. The data is confidential, and pseudonyms were referenced to each participant to avoid identification by anyone other than Walden University academic leadership.

The participants in the study did not experience any harm or undue stress. Rapport was established at the beginning and end of the interview to ease any angst about the process. The study began by telling the participants about who I am briefly, and I afforded them the same courtesy. The semistructured interviews commenced after the establishment of rapport.

Summary

Chapter 3 consisted of the introduction to the qualitative phenomenological study, the rationale for the research methodology, design, role of the researcher, and participant selection logic, instrumentation, and data collection procedure, procedures for recruitment, data analysis plan, and issues of trustworthiness. I used the findings of this transcendental phenomenological study to explore the lived experiences of aviation repair technicians related to decision-making perceptions regarding aviation safety. The qualitative research methodology was used to explore the research questions (Tracy, 2012). The descriptive phenomenological research design was appropriate to study the lived experience of aviation maintenance repair technicians (Adams & van Manen, 2017; Gentles et al., 2015).

The participant target was 15 to 20 aviation maintenance repair technicians possessing between 5 and 20 years of actual aircraft repair experience. Due to extensive workloads and participants not meeting criteria for the study only 12 technicians met all criteria. The detailed demographics for the participants utilized in the study is included in Chapter 4. Purposeful sampling was used to collect data from participants. The main instrument for data collection for the study was face-to-face semistructured interviews. Semistructured interviews were used to gather data using an interview strategy that followed an interview guide but fostered participant elaboration to specific questions.

Issues of trustworthiness was addressed in the study to increase credibility, transferability, dependability, and confirmability. Methods such as member checks, reflexivity, and audit trails were used to enhance the study and ensure study replication by future researchers. Chapter 4 includes the results of the data analysis, coding summary, and documented participant experiences.

Chapter 4: Results

Introduction

The purpose of this qualitative phenomenological study was to explore the lived experiences of aviation repair technician decision-making and how it influences aviation safety. I designed a single research question to gather detailed data pertaining to the lived experiences of aviation maintenance technician decision-making and how aviation safety is influenced. The research question for this study was:

RQ: What decision-making processes do aviation repair technician go through that could influence aviation safety?

This chapter includes a detailed overview of the study results pertaining to aviation technician decision-making and aviation safety from the technicians' perspectives. The chapter includes the research setting, demographics, data collection procedures, data analysis, evidence of trustworthiness, and the results of the study. In Chapter 5, the interpretation of the findings, limitations, study recommendations, implications, and the conclusion will be provided.

Research Setting

Data collection for this study was conducted through face-to-face semistructured interviews with aviation maintenance technicians. The sample size consisted of 12 aviation technicians from one MRO facility operating in Arizona. Volunteers responded to the participant recruitment flyer (Appendix C) and were contacted and e-mailed or handed a demographics form (Appendix D) to ensure participants met the eligibility requirements for the study. An informed consent form was also e-mailed or handed to participants explaining the purpose of the study. All participants who completed the entire study filled out all forms before the face-to-face interviews were conducted.

The main source for the recruitment of participants for this study was the participant recruitment flyer (Appendix C), which was placed in strategic locations around the organization. I worked directly with organizational leadership to gain permission to interview participants who volunteered and met the study requirements on the organization's property. The authorized leadership member signed the letter of cooperation to conduct interviews and provide an office for private interviews.

Participants called, sent text messages, and e-mailed the Walden University e-mail address on the recruitment flyer (Appendix C). Interested participants received an e-mail with the demographics form (Appendix D) and the informed consent form and were asked to complete, sign, and send them back to me. Volunteers were met on location at the organization and they filled out the two documents for the study after the demographics forms were reviewed screening them for the study. The informed consent form was explained to each participant and signed using a pseudonym.

Interviews were conducted on site and at the participants' discretion and leisure. A week was set aside to meet with interested participants at the organization to conduct interviews. All face-to-face interviews were conducted within 3 days. Organizational leadership allowed me to conduct interviews in a private office. I made contact with interested personnel to determine if they met study requirements, and we coordinated interviews based on availability and time.

One of the maintenance facilities was impacted by delayed schedules that forced personnel to work long hours. The second organization had just completed an inspection by the FAA. The only impact was the delayed time in which interviews were scheduled to occur by 1 week. Participants showed no signs of anxiety or stress during the interviews.

Demographics

The inclusion criteria for this qualitative phenomenological study were that each participant was (a) an aviation technician actively working on aircraft and components and (b) had been performing aircraft maintenance for a minimum of 5 years. The participants were aviation maintenance technicians working at an MRO facility in the state of Arizona. All the technicians interviewed in the study were male; however, female participants would not have been excluded from the study if they volunteered. The participants selected a pseudonym based on the letters of the alphabet starting with the letter A through N. The final participant chose to use the pseudonym P12 and did not choose a pseudonym with the letter L.

There were a total of 20 volunteers interested in participating in the study. Three volunteers did not meet the requirements of performing aircraft maintenance between 5 and 20 years. Three other volunteers completed and returned all the required documents but did not meet the criteria of currently performing aviation maintenance on aircraft or components. Two more participants received all documents and did not return them to prove that the required criteria were met. All the aviation technicians who participated in the study met all requirements and completed the informed consent, demographics form, and the face-to-face interview.

Seven participants (58%) possessed over 20 years of aviation maintenance experience. Three participants (25%) had 11 to 20 years of aviation maintenance experience. Two technicians (16%) had 5 to 10 years of aviation experience, and eight technicians (66%) completed past aviation safety training. Four participants (33%) did not complete any aviation safety training. The pseudonyms chosen by the participants, years working in their current job, and length of time working in their current organization are detailed in Table 2.

As of December 2018, there were 10,316 certificated aviation mechanics and repair men in Arizona (FAA, 2018). The number of female certificated repair technicians was significantly lower at 286 (FAA, 2018). Female aviation technicians were not excluded from the study but none volunteered to participate. The participants in the study happened to be men due to the small population of female aviation repair technicians performing maintenance in the Arizona aviation industry.

Table 2

Participant Demographics

Participant	Years in current job	Years in aviation maintenance	Years at current organization	Prior safety training?
P1	0–5 years	11–20 years	0–5 years	Yes
P2	20+ years	20+ years	20+ years	No
P3	11–20 years	20+ years	11–20 years	Yes
P4	0–5 years	5–10 years	0–5 years	Yes
P5	20+ years	20+ years	11–20 years	Yes
P6	20+ years	20+ years	0–5 years	Yes
P7	5–10 years	11–20 years	11–20 years	No
P8	20+ years	20+ years	20+ years	No
P9	20+ years	20+ years	5–10 years	Yes
P10	0–5 years	11–10 years	11–20 years	Yes
P11	0–5 years	5–10 years	5–10 years	No
P12	20+ years	20+ years	0-5 years	Yes

Data Collection

Data collection for this study was initiated on November 1, 2018, after IRB granted final approval (#11-01-18-0508630). Interviews are essential to data collection in qualitative phenomenological research and provide critical data from participants' perspectives (Bevan, 2014). Through semistructured interviews, I was able to ensure a uniform interview process. The semistructured interview format allowed for detailed perspectives from participants on all responses about decision-making and aviation safety.

The first step in collecting data for this study was to recruit 15 to 20 aviation maintenance technicians who met the inclusion criteria for this study. I created a study participant recruitment flyer (Appendix C) and obtained permission from maintenance leadership to place the flyers in strategic locations around the organization. The aviation maintenance facility leadership granted me an exclusive tour of the facility and its operations. Key aviation management personnel placed flyers in heavy traffic areas, such as breakrooms and offices, to assist in recruitment.

Participants interested in the study called, sent text messages, and contacted the Walden University e-mail account on the recruitment flyer (Appendix C) expressing interest in participating in the study. Viable participants also met in person at the organization volunteering for the study. The informed consent form and the demographics form (Appendix D) were sent to personnel by e-mail or handed out on organization property. Participants wanting to volunteer for the study who did not have the demographics form or informed consent form were recruited on location and screened for meeting study criteria. All personnel screened and recruited at the maintenance facility met the required criteria for the study.

Prior to beginning the interviews, each participant and I met face-to-face at the repair facility and the informed consent form and demographics form were thoroughly explained. Study participants expressed interest starting on July 3, 2019, but we awaited approval by the IRB to conduct interviews on the maintenance facility's property. Interviews were conducted from August 26, 2019, through August 28, 2019, with the average interview lasting approximately 35 minutes.

The interview consisted of me asking six open-ended questions (Appendix B) that sought a detailed perspective on technician decision-making and aviation safety. The interview questions were designed to answer the main research question about what decision-making processes aviation repair technician go through that could influence aviation safety. The questions were worded and organized to provide a clear image of the participants' lived experiences pertaining to decision-making and aviation safety.

Interview Process

The interview process began once I arrived at the MRO facility on August 26, 2019, and contacted interested participants. Two personnel sent interest through e-mail and all the participants were interviewed at the organization. The aviation maintenance leadership team provided me with a private office away from heavy personnel traffic and any interruptions. The telephone ringers were turned off so there would be no interruptions during interview recordings. None of the participants had completed the required informed consent or the demographics form. Prior to travel to the organization, I printed 25 of each required document in case participants lacked printing capabilities and still wanted to volunteer for the study. Participants filled out the forms as they expressed interest in the study and all documents were collected and screened on location for meeting requirements. All volunteers met the criteria for the study, and the interviews were completed one by one as the participants met at the predesignated office. Interviews were accomplished one participant at a time. A total of 12 aviation technicians were interviewed for this study.

Once a participant entered the office, an audio recorder and a notepad were on the desk. The purpose of the study, length, data protections, and the voluntary nature of the study were explained to each participant. A portable digital audio recorder capable of storing 96 hours of data was used to record the interviews. I also carried back-up batteries and a back-up digital recorder just in case of technical issues. Participants were referenced in the study by a created pseudonym. Each interview began with an estimated 10 minutes of conversation prior to recording to establish rapport. After the recorded portion of the interview was complete, another 10 minutes was used to close the interview. The second step began with the reading of the introduction on the interview guide to ensure all participants comprehended the purpose, confidentiality, and voluntary nature of the study. The reading of the introduction on the interview guide ensured all personnel understood and met the criteria for the study.

Variations in Data Collection

During the early participant recruitment process, a recruitment letter was used to gather volunteers for the study. A change in procedure form was submitted to the IRB to allow the creation of a recruitment flyer (Appendix C) and to offer a $20 gift card to volunteers. All 12 participants completed the study and received gift cards as compensation for participating. Data collection was difficult from one aviation maintenance facility due to personnel working extensive hours. Three technicians filled out the informed consent form and demographics form but did not meet the study criteria of currently performing aviation maintenance.

Data Analysis

The sample size for the participants were between 15 and 20 aviation maintenance technicians for this study. In response to the flyers and interested participants located onsite at the aviation repair facility, 20 participants volunteered for the study. Out of the 20 volunteers for the study only 12 met all the criteria requirements. Three participants were disqualified for not currently working aviation maintenance on aircraft or components, and three were disqualified for not meeting the minimum of 5 years working as a technician. Two volunteers expressed interest through e-mail, but never returned the research study documents. The average interview time was an estimated 35 minutes, in length. The shortest interview was 30 minutes and the longest interview was 50 minutes. Data saturation occurred after 12 participants were interviewed for the study. According to Moustakas (1994) epoché is the first step in a transcendental phenomenological study.

Researcher Epoché

I have 30 years of experience as an aviation maintenance technician and utilizing epoché was critical to view the phenomenon of decision-making from a new perspective. Epoché guided the documentation of the participants' actual lived experiences and eliminated researcher bias, preconceived notions, and personal beliefs prior to data analysis. The process of epoché and bracketing ensured the separation of past aviation safety decisions from the participants' lived experiences. Thoughts and feelings about the importance of military aviation safety and how personal past decision-making was set aside. The more the phenomenon of decision-making from a new perspective was viewed, the focus on repair technicians' lived experiences became evident in the study.

The interviews provided an enormous amount of data utilizing a single audio recording device. The second recording back-up device was not needed in the interview process. Once the interviews were complete, the recordings were transferred into MAXQDA Analytics Pro 2018 and saved under a file labeled audio interview data. The technicians' interview recording was labeled with a pseudonym chosen by the participants. Each interview was transcribed verbatim using the qualitative data software

MAXQDA Analytics Pro 2018 and the data was stored in a file labeled transcribed interview data.

Once the interviews were transcribed and stored in MAXQDA Analytics Pro 2018, a copy of the transcribed interview was e-mailed to each participant for member checking. According to Morse (2015), member checking enhances the trustworthiness of the study. Member checking ensures the participants' actual experiences are recorded and allows participants to clarify or change information (Morse, 2015). The participants were given 24 hours to review the transcribed interview data and make changes as necessary. If changes were requested the changes would have been implemented and the change in data would have been documented in the doctoral journal. None of the study participants requested changes to the transcribed interviews and the data was used as transcribed from the participants' perspective.

Field notes were written as the participants responded to interview questions and non-verbal, key words, and researcher reflective notes were documented on the interview guide (Appendix A). The journal notes written during and after the interview assisted in the visualization of the aviation maintenance technicians' lived experiences. A package was created for each participant and consisted of the demographics form, the interview guide, and the consent form. The last four digits on the gift card were annotated on each consent form to identify gift card distribution to participants.

Data analysis was conducted utilizing Moustakas (1994) modified version of the Stevick-Colaizzi-Keen method. In the first step, I gathered a descriptive picture of each participants' lived experiences from reading the interview transcripts. Key statements from the interview transcripts were examined and themes were created. The significant statements pertaining to aviation safety and decision-making were identified and documented. The statements that were not repetitive or overlapping (invariant horizons) were documented.

According to Moustakas (1994), the key statements are needed to build a foundation of the phenomenon. This component of data analysis fostered a comprehension of how aviation technicians viewed decision-making. The themes for the study were created from the invariant horizons and imaginative variation. All the descriptions were synthesized to form a textual-structural essence. A textual-structural description of each aviation repair technicians' meanings and essences was created from the interview transcripts.

Coding Process

The first step to coding the data was reviewing each transcript key statements. The interview transcripts were read twice to ensure the participants' key statements were captured and the comprehension of the participants' perspective was achieved. The textual structural description for each technicians' interview transcript was reviewed. The interview transcripts were input into MAXQDA Analytics Pro 2018 along with the field notes to provide a detailed examination of the interview data. The transcript data was also coded manually utilizing the in vivo method and using MAXQDA Analytics Pro 2018. The in vivo coding method is also referred as verbatim coding (Rogers, 2018). The in vivo method focuses on using the participants actual transcript verbiage to develop patterns and codes (Rogers, 2018). The themes were created from the participants' semistructured interview question responses. The common repair technician responses generated the codes in the study from the number of similar interview question words and phrases as shown in Table 3.

Table 3

Codes From Aviation Technician Interviews

Codes	Participants who used the coded common words and phrases
Past knowledge	P2, P7, P11
Written guidance	P3, P5, P6, P10, P11
Technical guidance	P3, P6, P8, P12
Task knowledge	P2, P4, P8
Critical decisions	P1, P3, P6, P8, P10, P11
Task prioritization	P1, P2, P4, P10
Responsibility	P2, P4, P6, P7, P9
Damage prevention	P2, P5, P7, P8, P9, P10, P11
Personal protection	P2, P5, P7, P8, P9, P10
Priority	P2, P3, P4, P6
Lead by example	P1, P4, P7, P8
Education	P5, P7, P8, P9
Communication	P6, P10, P12
Environmental barriers	P4, P5, P7, P9, P12
Attention to detail	P4, P5, P7, P11, P12
Lack of experience	P2, P6, P8, P9
Accident prevention	P5, P8, P9, P12

Table 2 shows how the repair technicians responded to the interview questions and the categories of the responses.

Evidence of Trustworthiness

Credibility

According to Noble and Smith (2015), credibility is formed by the researcher through detailed documentation of study procedures and key processes. Moustakas

(1994) stated, researchers must gather an accurate detailed perspective from the participants' lived experiences void of biases. The Collaborative Institutional Training Initiative was used to guide the interaction and protection of all participants in this study. The modules in the Collaborative Institutional Training Initiative course provided a blueprint used to protect human rights and ensure all aviation maintenance technicians were protected ethically.

Participants who expressed early interest in the course were sent the informed consent form and the demographics form prior to interviews. Volunteers wanting to participate at the organization were given hard copies of the two forms to complete. The participants were instructed to return the forms to me, all personnel were actively conducting aviation maintenance and I asked them prior to completing the forms, they were asking how long they have been working aviation in maintenance. The participants were given my contact number from the recruitment flyer and schedule for interviews at their leisure.

Rapport was established through conversation for 10 minutes prior to and after the recorded interviews. The participants were less anxious and provided detailed answers to all the interview questions. At the end of the interviews, each participant was thanked for their time. The participants were reassured as to the confidentiality of the information. The interview transcripts were e-mailed to each respective participant 12 days after the final interview. The technicians were allotted 24 hours to respond with clarifications or changes to the transcript. The participants did not request any changes by e-mail stating all the information in the interview transcriptions were correct and member checking was complete. Reflexivity was used to document the data collection process using a detailed journal.

To ensure data triangulation, MAXQDA Analytics Pro 2018 was used to store the transcribed interview data. Field notes were written on individual interview guides for each participant, and memos annotated in the qualitative database. The field notes were written under each question asked and consisted of non-verbal gestures and key statements from the participants.

Transferability

Noble and Smith (2015) posited that transferability in qualitative research fosters study replication by future researchers across disciplines or fields. In qualitative research, the researcher is the key collector of data and the facilitator of study processes. The processes and steps for this study was clearly outlined as a detailed blueprint throughout the chapters. The documentation of methods, participant choice, data analysis, and collection processes were essential to enhance the transferability of the study. All field notes, memos, and interview data were stored in MAXQDA Analytics Pro 2018 to provide a central depository for an accurate replication of the study.

Dependability

According to Morse (2015), dependability is attained when the credibility of the study is strong. The dependability of this study was achieved through reflexivity, the documentation of decisions and actions in a detailed journal during the study. Member checking was also critical to ensure participants provided lived experiences from their perspective, ultimately enhancing research dependability. Audit trails were also essential in the documentation of processes at various stages in the study.

Confirmability

Confirmability in qualitative studies provides a detailed documentation of processes completed by the researcher to facilitate replication of the study (Moon et al., 2016). Reflexivity was used to ensure confirmability was reached in the study. I wrote a detailed journal of personal biases and all noted participant interview behaviors. The accurate documentation of interview responses and participant behaviors will ensure replication of the study by future researchers. A detailed transcription of each participants' interview and member checking ensured an accurate description of aviation technicians lived experiences.

Study Results

Participants who met the study criteria of currently performing aviation maintenance for at least 5 years were interviewed. The semistructured face-to-face interviews were conducted in a private office on the aviation maintenance facility's property. The interview guide was used to ensure all members were briefed on confidentiality and the voluntary nature of the study. Each participant was interviewed separately; and the interview question responses provided answers to the main research question.

The aviation maintenance technicians answered the interview questions thoroughly about their decision-making lived experiences and how it pertains to aviation safety. The participants described vivid detailed stories about how their decision-making was applied to aviation safety. The technicians spoke openly about how they felt about making decisions concerning aviation safety. All technicians clearly explained how their decision-making experience influenced aviation safety in the MRO organization. The results of the study were organized by the overarching research question, and the themes developed from the coding of the transcripts. The research question and interview questions fostered five main themes: decision-making experience, decision-making application, importance of decision-making, technician job experience, and decision-making influence. Four subthemes also emerged: situational awareness, aviation hazards, aviation safety, and personal safety. Table 4 displays a diagram of the overarching research question, research question, the interview questions which addressed the research question, and emergent themes. Table 5 shows the emergent subthemes of the study.

Table 4

Study Themes

Overarching question	Research question	Interview questions	Emergent themes
What are the lived experiences of aviation repair technicians and how do their decision-making perceptions influence aviation safety?	RQ1. What decision-making processes do aviation repair technician go through that could influence aviation safety?	Q4	Decision-making experience
		Q2, Q6	Decision-making application
		Q3	Importance of decision-making
		Q1, Q5	Technician job experience
		Q5	Decision-making influence

Table 5

Study Subthemes

Central question	Research question	Interview questions	Emergent themes
What are the lived experiences of aviation repair technicians and how do their decision-making perceptions influence aviation safety?	RQ1. What decision-making processes do aviation repair technician go through that could influence aviation safety?	Q4, Q6	Situational awareness
		Q2	Aviation hazards
		Q3	Aviation safety
		Q1, Q5	Personal safety

Theme 1: Decision-Making Experience

The fourth interview question, "How would you describe your decision-making experience regarding aviation safety?" The question facilitated a detailed description of how each technician viewed decision-making experience from their personnel perspective. The participants responded with extensive knowledge about aviation maintenance techniques and experiences. The technicians stated using technical guidance and prior task knowledge fostered a strong knowledge base to make aviation safety decisions. All respondents expressed the utilization of aircraft maintenance manuals at the top of their decision-making list when performing tasks. The respondents stated the prioritization of maintenance tasks are essential to making decisions. P11 stated his decision-making experience was enhanced through the following prior to beginning any aircraft maintenance task:

> The first thing is the manual, the manual going to give you a lot of guidance for the task—not everything pertaining to safety, but it has the majority of the

> information, if I really need it. I'll get the SOP [standard operating procedure] manual, but everything I deal with I have already seen it before.

P6 described how his decision-making experience is utilized prior to performing aviation maintenance and it is similar to P11's approach:

> Well, to begin I first consider the depth of the problem I have, and how it can affect the task in the beginning. I also think about the people who are operating the aircraft, in this case, pilots. I spent most of my time working flight line maintenance, so I have to consider first the pilots' opinion and then my opinion, also I consider the safety of passengers. So that's how I decide how to fix the problems, but I never think by myself, I always have someone to give one more opinion, and sometimes, when you work you have to tell the management center it's a group, it's a team decision so we can give them the most information, and we know that the more information we give them, they're going to make the best decision, and we have to be concerned that … any decision that we are making is for the safety of the airplane and not to damage people or equipment.

P6 also rated his level of experience on a scale of one to 10, with 10 being the most experienced and one being the least as a nine. When asked why he stated: "Perfection does not exist. So, the closer to perfection is what we try and achieve. Something will always arise that don't fall within the maintenance manuals, but we still strive for perfection."

P2 described his decision-making experience as the following:

> So, with me again that goes back to my experience with, all the aircraft that I've dealt with. First and foremost, it depends on what the maintenance manual tells us to do and then after that it falls on my experience. Now, let me give you an example of that, every manual will tell you, to use this tool and use this tool right here. So, we try our hardest to get this tool…that doesn't always happen, so when we don't have the specific tool, we have to come up with an alternative, and make sure that's acceptable and not just with me…it depends on the job. If it's a relatively light job, I can make the decision to use something else but, I must go above me and say okay we don't have this, but I thought about it, and I'd like to use this, and I get the approval. So, it falls on…first the manual, what the manual says to do, and after that, everything after that is my experience, my expertise.

P2 also described his experience level being high from working on various aircraft:

> My experience level…I worked on many different types of transport jets here, and that's an advantage to working at this company, you don't just work on one airframe, you can work on anything and everything here and that allows you to gain so much knowledge and so much experience, and that in itself has contributed to this, my ability to make these decisions.

P2 was the only participant to rank his decision-making experience level regarding aviation safety at a ten. P2 said he ranked himself high because, "I'd say it's pretty good, I mean, I have made mistakes before and luckily they haven't resulted in injury or excessive damage. I would consider myself pretty good."

P5 ranked his decision-making experience level high and said:

> Well admittingly I don't always make the right decision, so I give myself a 9, but I can tell you the decisions I do make, I don't get injured from it, and I don't damage airplanes from it. There may be a better way of doing it or a quicker way of doing it, but nobody gets hurt. At least when I tell someone to do something, they don't get injured because of what I tell them to do, and then the planes are not damaged because of what I tell them to do.

P10 rated his decision-making experience level the lowest out of all participants and he described the following: "Oh, I think that my decision-making experience is not too high." He rated himself as a seven stating that "I don't know everything in aviation, because you learn something every day."

P12 described a detailed story pertaining to his decision-making and aviation safety:

> We had an aircraft in the hangar from National, a 747-passenger aircraft that came in with some extensive damage, and one night it started to lightning and rain. We were supposed to hang this panel that was seven feet long by four feet wide, the wing is wet, and we didn't have the right personnel lift to get to the airplane. There were three technicians working the job, and P12 was hooked to the hoist on the wing, but could not move freely, to get over the flaps. Now remember a 747 is big so the distance between the man-lift and the wing is pretty big, it was around 1145 at night and I just said, you know what, this is not working, I'm not going to injure myself and I'm not going to injure you and I'm not going to drop the panel on the floor, when I do that…then, we talk about decision-making. Would that

> have been the right decision, to keep going? To me no, To somebody else maybe...but I'm not that somebody else, so I've learned that more now by being in the role I play now, because as a worker, before as you're working out of your tool box, it's all about you, it's what you're able to do, what you can do, and what you become, cause you know yourself.

The technicians' responses to the fourth interview question identified the common consensus to utilize maintenance manuals when performing aircraft maintenance. The conscious decision to follow written guidance defines how repair technicians select logical processes to positively influence aviation safety. The associated sub-theme of situational awareness focuses on the technicians' ability to assess work environments for dangers or barriers to safety.

Subtheme 1: Situational awareness. Participants responded to interview question four and a subtheme was developed describing how technicians' experience levels are influenced by situational awareness.

P4 described the importance of situational awareness by the following:

> "I'd say that situational awareness is very important." He describes organizational hazards:
>
> You have so many things out there that can really harm you, you have liquids, confined spaces and all kinds of chemicals, tooling can hurt you, components, you have so many hazards. Technicians must be aware of their surroundings when performing maintenance.

P12 described a story told by an aviation technician in the organization about an accident that occurred when situational awareness was not a central focus. He began with:

> There is a computer printer in the hangar over in bay two. There was a man-lift that malfunctioned and fell on the stand and broke the back wheels from, collapsing the case on to the container. It didn't damage it, but the wheels just fell off from under it. In order to continue using the equipment, technicians used two by fours and lifted it up allowing the equipment to rest against the hangar wall. The equipment stored in an unsafe condition without any second thought about the unit. Nobody, thought about that being safe or unsafe, if it rolls off the wood, it's going to hit somebody in the leg, well guess what? One of my technicians was at the printer trying to get paperwork, he goes to open the door, very lightly and somehow how that podium rolls off from the two by fours and hit him on the ankle, it didn't hurt him bad, but it got him on the ankle.

The participants equated high experience levels to preventing personnel injury, aircraft damage, and aviation accidents to situational awareness. Experienced repair technicians recognize the importance of assessing the area surrounding the aircraft. The proactive approach of removing hazards from the workplace fosters safe maintenance operations. The participants' responses to the interview question also identified the need for all personnel to act as a sensor in identifying workplace hazards. Situational awareness is essential to technicians' decision-making process and application.

Theme 2: Decision-Making Application

The number of decisions made by aviation maintenance technicians regarding safety vary based on situation, task at hand, and experience level. The pressure of making aviation safety decisions can be stressful, dangerous, and mentally taxing. Aviation maintenance technicians perform simple to complex tasks that can alter the airworthiness of an aircraft or components. Effective and efficient decision-making is paramount to mitigating aviation safety accidents and mishaps. The second interview question, "Please, can you describe any situation in which you had to apply your decision-making skills regarding aviation safety?" The interview question enabled technicians to describe situations identifying the challenges and impact of decision-making from personal experiences.

All participants answered the second interview question with detailed situations where decision-making skills and experiences were key to averting possible catastrophes. Some of the most common stories pertained to following safety protocol and referring to training. P5 described a situation where his decision-making skills had to be applied:

> The one situation that comes to mind is, I'm also a crane operator and we were tasked to a support the wing of a 747 that they were cutting a section off of. From my vantage point in the crane you can see a lot and there were people that, as they were making to cuts to take the wing off, there were people that were under the wing looking inside the empty fuel tank, and I had to stop it. I told them to move from under the wing and not more than five minutes later… the wing came free

> and the cables failed, and the wing came crashing down. So, had that person been where he was, they wouldn't be here today.

P8's personal lived experience described a life altering situation which could have caused himself significant harm. His story went as follows:

> You know I tried to be a hero one day and I went up into a fuel tank without a fuel tank monitor and I sprayed some penetrant in there and I was almost overcome by the fumes, luckily I got out of there with probably a minute to spare before I would have passed out and died. After that situation, I never allow anyone to go in the fuel tank without the sniffer, without a fuel tank monitor, and without the proper breathing apparatus.

P3 described applying his decision-making to evaluating aircraft rubber packings as the following:

> Here's a good example, we were using a component packing, when it tells you not to reuse it again. Packings are on the inner portions of aircraft tubing to prevent leaks on hydraulic or fuel tubing. So, you take a line off, there's a packing on it, the manuals tell you to take the packing out, throw it away and put a new one on. Well if you inspect that packing and it looks good, you don't throw it away, you check your supply section and if there is none, you inspect that packing and say it looks good, it's been done, I've done it. Now you can tell when a packing is squished, when it's cut you take it off.

P3 suggested that system leak checks would identify a leaking seal prior to aircraft operation. P7 described his decision-making application story when providing oversight of maintenance operations. His story went as follows:

> We were working on an aircraft out of storage. We were doing the engine de-preservations and unfortunately one of the mechanics decided to put the gasket in the wrong position with the washers underneath the gasket...mating to the fuel pump. So, I was able to catch that pretty damn quick and we had to go swap them on two of the engines so we had to pull those apart and everything like that, because that would have been one hell of a mess. I just happened look close in doing an overview of his work and just happened like…uh oh.

The technicians' responses from interview question two highlighted the importance of effectively applying decision-making to aviation operations. Participants described situations that could have caused death or critical injury to personnel. The technicians' described ineffective decision-making stories and learning from those experiences. The experiences and lessons develop the decision-making processes and prevent accidents of injury. Decision-making application is paramount to effective aviation maintenance and being aware of aviation hazards is key to safe operations.

Subtheme 2: Aviation hazard. Aviation technicians are faced with numerous hazards. The application of decision-making created a subtheme of aviation hazards experience by maintenance technicians. P11 and P7 both stated the critical temperatures impact their decision-making. P7 described his experience with high temperature hazards while performing aviation maintenance below:

> I'm lucky I'm flight line, I've been down in the engine area, so it hasn't been as critical right now, I think a lot of it is heat fatigue because it's been a pretty brutal summer, we've hit some records out here, and that's not nice. I'd rather have it where it's 105 with 12% humidity, than 105 with 60% humidity, cause it kicks your ass, and at the end of a long shift you're not thinking as clearly as you would especially you're out there, 8 hours in that heat dude, you're not thinking...and you still have a couple more hours to go, you got to cool off, you got to reset, you understand that yeah, it's, I'd say that's probably one of the main things we are dealing with a lot now.

P8 and P10 shared heat hazards descriptions and how it affects their decision-making, but P5 described other hazards he faced below:

> Well they'll be fall hazards, airplanes are not all built the same, so you can actually walk into things if you're not paying attention…such as landing gear doors, antennas, hatches can be opened that you can fall through. Doors can be opened and not secured, that you can actually walk out of. There's also the chemical side, the fuels the hydraulic fluids and various cleaning chemicals that we use. You got a make sure that you are wearing your gloves, respirators if required, that kind of stuff. Of course, fuel is flammable, so you have to watch, the no smoking rules, that kind of stuff, when you're around open fuel tanks and fuel spills.

The participants' responses to interview question two described how aviation hazards present barriers to aviation maintenance and decision-making. Extreme temperatures slow technician decision-making processes and introduce additional stressors in a stressful occupation. The technicians expressed the importance of knowing the dangers and hazards in aviation. Being aware of dangerous hazards can aid in the mitigation of personal injury, equipment damage, or aviation accidents. Knowing the hazards involved in aviation maintenance enable the technicians to develop a gauge to measure the importance of making decisions.

Theme 3: Importance of Decision-Making

The third interview question, “Please describe how you feel about making decisions regarding aviation safety?” The intent of the third interview question was to explore the thought processes behind aviation technician decision-making. The main answers focused how comfortable technicians were with making decisions based on the level of importance of the decision. Experience increased the level of decision-making, ultimately increasing confidence in making decisions about aviation safety. P9 described his feelings towards making decisions pertaining to aviation safety as the following:

> I’m pretty proud to do it, that’s what I’m here for, because of inexperience in the past with our people…we learned from them the mistakes, and we don’t want it, to happen again, right. That’s what I’m kind of proud of about, telling the new people about safety.

P9 also stated:

> I have been working aviation for 25 years and I have never had any incidents nor accidents during that time. Every day, like I mentioned, every day is my first day in aviation, we think safe first, you know, my family is waiting for me.

P2 expressed the importance of decision-making from his lived experience as the following:

> I have been doing it for so long it's just something I do now. It's just something that goes along with my job, and I have been doing it for so long it's not, not really a difficult task. I assess the situation on a case by case basis and decide what needs to be done, usually almost any task out here I've usually done before, but that's not always the case and if there is something new, I look into it a little further and I research this, and I research that. I look at it with my own two eyes and decide what needs to be done, with the maintenance manual in hand. There's always a manual, so theoretically, anyone can come out here with a maintenance manual, but it's a lot easier having done it, it's a lot easier to make your decisions, if you're experienced.

P3 described his decision-making application experience as:

> I think you need to not think of yourself and not think of worrying about getting the job done in time to make the company profit. You need to think about the people that are going to be flying on this airplane, even if it's just the pilots. I mean it's still human life, that's why they say there's two souls on board when the plane leaves…you when we get a departure notice through email, two souls on board. It's true, it doesn't matter if it's your family, it's a human being, it doesn't matter if it's one person, it's morals and ethics, that's all that's about.

P8 emphasized the importance and dangers associated with making decisions in aviation safety by stating.

> This job will kill you, everything we do here has a hazard involved in it, you have fumes, everything is heavy, the temperature is hot out here, everything is cumbersome. You can hurt your back…my knees are shot, my ankles are shot, and my back is shot, because I have been doing this for 27 years, and it's just know your surroundings and protect yourself, because no one else is going to do it for you. I mean we got guys that care, but they are not always there...they're not always looking over your shoulder, you have to make the right decisions here.

P6 reiterated the importance of making decisions regarding aviation safety.

> Well, I told the guys if you do a walk-around you have to two types of aircraft walk-arounds, the one that you are going to find discrepancies and the one you're not going to find any issues. These days every walk-around you find something, you have to find something, because if you're not trying to find anything, any little detail, you are not doing a correct walk-around. It's hard, but it makes me work, so every walk-around we find something. Even if we are on the flight line, we find something. I have to write it down to make the aircraft legal to continue flying. If I know that the airplane has to stay, it's better for it to stay here, then to arrive to another station, and they say hey, you didn't see this? I prefer to discover it myself and write it down myself, then let it go.

The participants' answers to interview question three described how technicians view decision-making and aviation safety. The repair technicians expressed a sense of responsibility when making decisions about aviation safety. All participants viewed decision-making in regard to aviation safety as critical. The participants described what decision-making means to them and developed the subtheme of aviation safety.

Subtheme 3: Aviation safety. The answers to interview question two by the aviation technicians led to the subtheme about aviation safety. Participants were asked a probing question about what aviation safety means to them. The purpose of the question was to comprehend what the term aviation safety meant to aviation technicians. P7 described his definition of aviation safety as:

> Aviation safety is safety of aircraft, safety of personnel, aircraft passengers and personnel. There are so many things on a big plane that's going to be able to kill you, it's not even funny. You move flight controls and somebody's in the wrong place, some of them move a lot faster than you think, gear swings, doors. If you look at a 777 landing gear door is like 20 feet long and it closes in a couple of seconds, so if you're in the wrong place there and somebody actuates it, and the handles in the wrong position and they apply hydraulic power and that door swings shut...it's 3000 psi swinging a 20 foot door it's going to sweep whatever's in the way, out of the way. Whether it's catching people, ladders any of that stuff, God knows you can kill somebody.

P4's response aligned with P7 and said aviation safety "means everything and it is first and foremost" when performing aviation maintenance. P3 described aviation safety through a detailed story:

> You have, I don't even want to say thousands of people, you have hundreds of thousands of people dependent on you to do your job right plain and simple. I'll

> go into an example, a plane recently left here, and they didn't secure some oil lines on an engine. So, one line came loose and lost all the oil, there was an emergency shutdown of the engine…this is all during testing, so thank God there was nobody on board, so they tightened the lines that they thought needed fixing, the aircraft flew again, then another line came loose. Right there, it tells me that the mechanics who were putting these lines on just left a line loose, that's not me. If the line going to be left loose, then the line is coming back off the aircraft. Airline safety to me is number one, I'm sorry my wife and kid fly all the time, I'm not going to risk that.

The technicians' responded to the probing question with a detailed definition of what aviation safety means to them. The participants all agreed that aviation safety is involved in every decision-making process and procedure. Sharing a common meaning of aviation safety ensures repair technicians train and educate new technicians. The participants described the impact of not having a deep concern for aviation safety leads to accidents and injuries. The education of inexperienced technicians ultimately enhances the job experience of new technicians.

Theme 4: Technician Job Experience

The first interview question, "Can you describe how you make decisions pertaining to aviation safety?" Urged participants to describe how they make decisions pertaining to aviation safety. The semistructured interview question examined the lived experiences of how aviation technicians make decisions pertaining to aviation safety. The interview question was used to explore how individual technicians made decisions and examine the relationship between aviation safety.

The fifth interview question, “Can you describe (In your opinion) how you believe your decision-making influence aviation safety in your organization?” assisted in developing the subtheme personal safety from the respondents lived experiences. The response to the question also fostered a detailed description of aviation technicians lived experiences about how decisions are made from an aviation technicians’ perspective.

Technicians described nervousness and anxiety when making decisions that could cause injury, death, or property damage. The maintenance technicians’ stories created a detailed image of how maintenance personnel make decisions about aviation safety and the impact of technician job experience. P6 described his thoughts associated with technician job experience:

> I am really scared about how safety’s going on now in aviation, as I told you, I have been in more than 20 years in aviation and I have witnessed to numerous changes in aviation. We know we have a lack of pilots, we have a lack of mechanics, and in 10 years we won’t have experienced mechanics. We have people that come to work, but not people that comes with the responsibility of being professionals at work and that’s what I suggest to any company.

P6 suggests maintenance organizations provide initial training prior to performing any aircraft maintenance. He also stated, “You can get a job at Walmart or any store.” In aviation, “You have the responsibility of lives,” and technicians should “act like professionals.”

P8 described technician inexperience being a major issue in MRO organizations. He stated:

> Aviation repair facilities are not hiring the most experienced technicians, you don’t have to have an Airframe and Powerplant certification to work here anymore. The organization is now hiring out of country personal at cheaper wage rates, but less experience.” P8 described technician job experience issues as “young kids coming in, and young kids are learning from young kids.”

P7 stated technicians must “read the technical data first” when performing aviation maintenance. He described his role as a trainer of inexperienced technicians as “I like have people think for themselves, but if a technician is working on something that they have not worked before “I oversee the task to make sure everything is fine.” P2 described his technician job experience as follows:

> Well, for one thing we have a lot of new people here and they’re young and inexperienced, and even some of the older guys who haven’t really worked airplanes before simply don’t know a lot of what they are doing here. I mean they come in with basic skills, but they have to learn the systems. They have to learn our ways, they have to learn the airplane, and it’s up to people like me who have been here with the same company.

P2 has been working on aircraft for a long time that he doesn’t hesitate to “point inexperienced technicians in the right direction. Now that doesn’t mean holding their hand the entire way. It means show them, show them the right direction and make sure they stay on that path.”

The responses to interview question one and five revealed the need for experienced technicians in the aviation industry. Technicians' described a lack of experienced members operating in the industry. Several responses agreed organizations sometimes hire inexperienced technicians as a labor cost saving measure which can attribute to accidents. The participants related inexperienced technicians to affecting the personal safety of all aviation repair technicians.

Subtheme 4: Personal safety. The respondents told detailed stories about safety challenges within the organization. The subtheme of personal safety is aligned with aviation technician job experience. The stories told from technicians' lived experiences describe how individuals view personal safety while performing maintenance tasks. P12 described a vivid recollection of a personal safety story which resulted in death:

> Somebody had an accident, not an incident because there was a painter polishing the leading edge of a nose cowl, primary safety example. It happened the day before we had that safety meeting. He was polishing the leading edge of a nose cowl, so his ladder was at a 45-degree angle on the nose cowl, which is wrong. He somehow manages to climb into the nose cowl, this nose cowl is about maybe five feet tall and the ladder is barely over the nose cowl…leaning on the nose cowl, that's getting polished. You don't want to damage the nose cowl it's going to cost money, right however…the nose cowl survived he didn't. He didn't because he climbed into the nose cowl. He got another ladder, on the outside of the aircraft and leaned over. He hasn't fallen yet because he fell after the fact, because he brought the other ladder to work on the inside of the nose cowl, he

managed to climb back on the other ladder, the other ladder is leaning at a 45-degree angle, when he goes to climb on the second ladder, the ladder falls from underneath him. He falls backwards and broke some vertebrae in his back and died.

P12 added by saying the process of being safe in MRO facilities is challenging to abide by, P12 said:

Working either in a hangar or in a flight line maintenance environment time is an issue, but we all preach this about work safe, it's a compromised statement. You're trying to be safe, at the same time you're trying to be efficient, your trying to do a job in a faster manner

P3 described his personal safety experience as:

Safety wise, from my own personal safety, I stood on the top rung of a ladder before who hasn't? I have not worn a harness in a basket before, but I'm smart enough to know not to get on the edges of a man-lift and work without a harness. If I'm in a basket, it's to my personal safety, it's not that big of a deal to have a harness on or not. Other than that, morals and ethics are number one to me, my personal safety sometimes…I go a little slack on that, but I know my limits.

Detailed stories about the importance of personal safety when performing aircraft maintenance operations where recollected by the technicians. Technicians perform dangerous aircraft maintenance tasks which can lead to personal injury or death. One of the main problems is MRO organizations want technicians to conduct safe operations in an expedited manner. The dual organizational rules impact how experienced technicians influence new technicians in aviation maintenance.

Theme 5: Decision-Making Influence

The final theme in the study was developed from the fifth interview question, "Can you describe (In your opinion) how you believe your decision-making influence aviation safety in your organization?" The intent of the fifth question was to specifically gather how technicians visualize the influence of decision-making within the current organization. The question is important to assist in the comprehension of answering the research question of how aviation decision-making perceptions influence aviation safety.

P5's lived experience about his decision-making influence consisted of a story about his past maintenance practices. P5 described the nickname from his maintenance crew "they used to call me Spiderman, because of the way I would crawl around aircraft and engines without a harness." P5 now admits to utilizing harnesses and setting the example all the time, he stated "I am much braver when I wear a harness and if I slip and fall, I'm protected." P5 says his decision-making influences the organization by leading by example. P4 and P1 agreed with P5 as learning from past experiences and representing a positive organizational safety influence. P1 described his influence as "leading by example" and P4 said you want safety to "rub off on them and hopefully it will spread."

P9 influences aviation technicians through corrective practices, he said "when somebody is doing something wrong, we stop them right? I stop them right away and I say, stop you're doing it wrong…and try to explain how to do it the right way." All of the technicians shared the same philosophy of their decision-making influencing the organization in a positive manner.

The participants' responses described how each repair technician positively influence aviation safety in the maintenance organization. Technicians explained how developing a positive mindset from past experiences influence new individuals. The participants comprehended the need for being a strong influence in the organization to ensure the positive influence process is solidified.

Summary

Researchers use qualitative phenomenological studies to focus, explore, and examine a specific phenomenon from the perspective of study participants meeting selected criteria. Chapter 4 included a detailed blueprint of the study components. It included information on the research setting, demographics, data collection, data analysis, and trustworthiness. Chapter 4 also included the study results based on a synopsis of feelings and stories about decision-making and aviation safety from the lived experiences of aviation maintenance technicians.

The responses from the participants' interviews described how technician decision-making positively influences aviation safety. Repair technicians follow technical guidance prior to performing maintenance tasks. The participants related high levels of decision-making to being aware of their surrounding when conducting repairs. The implementation and application of effective decision-making processes promotes aviation safety.

The responses to the interview questions also described how aviation hazards affect decision-making and work performance. Technicians are faced with various aviation safety hazards and possess a common definition of aviation safety needed to train inexperienced members. The decision-making processes performed by aviation technicians overall positively influence aviation safety. Chapter 5 includes an interpretation of findings from the themes identified in the aviation technicians verbatim interview transcripts. The chapter also includes the limitations of the study, recommendations, implications, and the conclusion of the study.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The comprehension of human decision-making has always been a focus in the prevention and mitigation of aviation maintenance problems (Sheikhalishahi et al., 2016). Over time, the focus on how aviation maintenance technicians make decisions and the level of influence on aviation safety has increased. Aviation delays, accidents, and incidents due to ineffective or inefficient decision-making cost money, time, and lives (Barrage, 2016; Sheikhalishahi et al., 2016; Scheelhaase et al., 2016).

The purpose of this phenomenological study was to explore the lived experiences of aviation repair technicians related to decision-making perceptions regarding aviation safety. The repair technicians' perceived decision-making experience is essential to aviation safety. The participants described challenges, such as environment, experience, hazards, that influence individual decision-making in the MRO organization. Aviation maintenance technicians described the importance of situational awareness, how they apply decision-making, and how decision-making influences aviation in their organization.

Chapter 5 includes an introduction, interpretation of findings, limitations, recommendations, implications, and conclusion. The implications section identifies how the study results can create positive social change. The study results were gathered using semistructured interview data from 12 aviation technicians. The participants answered five interview questions based on individual experiences and knowledge. The final open-ended question enabled participants to describe or add any information that was not covered in the prior interview questions. The lived experiences of aviation maintenance technicians provided by the participants displayed a detailed description of how their decision-making influences aviation safety.

Interpretation of Findings

Prior to the commencement of this study, literature by Begur and Babu (2016) and Strauch (2016) documented connections between aviation repair technicians' decision-making and their influence on aviation safety. The focus of this study was to explore what decision-making processes aviation repair technicians use that could influence aviation safety. Little research exists on aviation technician decision-making and how aviation safety is influenced. I began the study with the intent to determine how aviation technician decision-making influences aviation safety.

In this study, all participants—regardless of years as aviation technicians, time working in the current organization, and prior safety training—described similar processes when making decisions. The repair technicians use technical guidance to conduct aviation maintenance in a systematic manner. Each participant shared a common goal of positively influencing aviation safety and enhancing technician decision-making. The aviation technicians work in hazardous environments that influence decision-making capabilities and aviation safety.

The results of the study from the analysis of semistructured interview transcripts highlighted five major themes and four subthemes—(a) decision-making experience, (b) decision-making application, (c) importance of decision-making, (d) technician job experience, and (e) decision-making influence—and four subthemes: (a) situational awareness, (b) aviation hazards, (c) aviation safety, and (d) personal safety. In the following section, I discuss how the findings confirm and extend the previous research discussed in Chapter 2. The findings were reviewed using the conceptual framework, decision-making models, decision-making theories, and the NDM framework. Prior to providing an overview of the findings from the study, the conceptual framework is reviewed below.

Conceptual Framework

In Chapter 2, I described how humans make decisions through decision models, decision theories, and the NDM framework. The conceptual framework was paramount to exploring how aviation technician decision-making influences aviation safety. The decision-making models were used to focus on technicians making decisions using rational, intuitive, or recognition primed decision models. The decision theory used in this study was Simon's (1959) bounded rationality theory. In examining Simon's theory, I described how aviation technicians made decisions without considering all the alternatives.

The NDM framework provided a structure for exploring how technicians made decisions when organizations have (a) poorly defined goals, (b) ambiguous tasks with incomplete information, (c) cyclic goals, (d) fluctuation of conditions, (e) constant adjustment to transforming conditions, (f) limited task completion time for high-stake actions, and (g) decision makers possessing experience levels (Drillings, 2014; Klein et al., 1993; Klein & Klinger, 2008; Shattuck & Miller, 2006). All the components of the NDM framework did not apply to the organization or the technicians in this study. The applicable components were (d) fluctuation of conditions, (e) constant adjustment to transforming conditions, (f) limited task completion time for high-stake actions, and (g) decision makers possessing experience levels.

All aviation technicians described a personal lived experience of making decisions using maintenance manuals. P8 suggested, “The maintenance manuals give you everything you need to know, read your manual prior to any task.” P12 echoed P8’s statement by saying, “Follow the correct manuals and obtain the correct tooling to accomplish tasks.” The answers from aviation technician interview transcripts created the five themes and four subthemes for the study.

Theme 1: Decision-Making Experience

The participants in this study possessed years of experience as aviation repair technicians. The participants provided descriptive lived experiences about how decisions are made when performing aviation maintenance tasks. Nathanael et al. (2016) suggested a systematic approach would ensure all alternatives are explored prior to making decisions. All participants agreed that experienced technicians prioritize tasks in the order of urgency and use maintenance manuals when repairing aircraft or components. P6 and P11 both targeted the depth of a problem prior to performing aircraft maintenance.

Some technicians equated their decision-making experience to working on a variety of different airframes in the industry. P2 described a detailed story about not being able to acquire a tool recommended by the maintenance manual to complete a task. Technicians can decide to use the specific tool or request a substitute tool for the task through official channels. P2 suggested his “decision-making experience and expertise” is high and ranked his decision-making level a 10, the highest rating in the study. The decision-making experience level described by P2 and other participants is indicative to the mental fortitude possessed by the participants in this study.

Other participants rated their decision-making experience levels from seven to 10. Participants were forward and willing to provide decision-making examples from personal experiences. The rational decision model provides decision-makers with an organized decision-making process (Nathanael et al., 2016). Eleven of the technicians described using the rational decision-model to make decisions regarding aviation safety. Intuitive decision models enable the quick selection of a specific alternative based on experience (Klein, 2015). P7 stated that, while intuition can "guide you to some place, but gut instincts will only get you so far." P11 stated, "I guess I go with my gut" when making decisions, but also assertively followed with, "I won't do anything that is unsafe."

P10 ranked his decision-making experience a seven out of 10, the lowest of all participants in the study. P10 rated his experience level low because he believes, "You don't know everything, and you learn something every day." P10 stated that he does not always make the "right decision," but the decisions he does make, "No one gets injured or the aircraft doesn't get damaged because of him." All the technicians believed that there are numerous ways to perform maintenance tasks safely. Through their experience, aviation safety is influenced by preventing damage to equipment, aircraft, and people.

P12 described a story about performing a dangerous maintenance task during inclement weather and hazardous conditions. The possibility of personnel being injured and aircraft damaged was imminent until P12 decided to cease maintenance operations. His decision fell within the NDM framework: aviation repair technicians working in an organization with constant fluctuation of conditions. Klein (2015) stated technicians use experience to select the best alternative.

The findings in the theme of decision-making experience confirm literature about aviation repair technician decision-making perceptions. Aviation repair technicians develop mindsets from decision-making experience, and this influences how technicians review risk-taking (Liberman et al., 2014). Positive aviation repair decision-making perceptions are paramount to the success of aviation safety (Xia et al., 2017). The NDM framework components apply to maintenance repair organizations as defined by (Zsambok & Klein, 2014). High levels of decision-making experience increase technicians' abilities to assess work environment hazards.

Subtheme: Situational awareness. One of the main components of the NDM framework is situation assessment (Klein et al., 1993; Zsambok & Klein, 2014). Situation assessment grants humans the ability to observe the environment and determine a plausible course of action (Rehak et al., 2010). Situational awareness can be impacted by environment, complacency, and negligence (Dekker, 2015). Each participant acknowledged the significance of situational awareness in the repair facility. Participants described detailed stories about what situational awareness meant on a personal and organizational level.

A reoccurring statement I identified while listening to and reading the technicians' interview transcripts was how important situational awareness is in the repair facility. P4 described hazards that "can really harm you; you have liquids, confined spaces, and chemicals." P4 and the other participants identified additional hazards, such as falls, fire, and environment, which technicians should be cognizant of when performing maintenance repairs. Decision-making and experience allow technicians to focus on completing aviation maintenance tasks safely.

Organizational leadership is responsible for developing effective safety policies and mitigating workplace hazards (Birkeland Nielsen et al., 2013). P12 shared the same sentiments of the other participants with a story of how the organization failed to turn in a damaged lift for repairs. Instead the organization placed the piece of equipment next to a high traffic area where technicians printed documents. The temporary storage area was impacted by the equipment not being secured to prevent it from slipping. The hazard was well known throughout the organization, and P12 said "Nobody thought about the equipment being unsafe." One technician was using the printer and did not focus on his situational awareness and the damaged stand rolled on his ankle as he opened the office door.

Every technician performing maintenance has a responsibility to identify and assess the workplace prior to beginning any task. Maintenance repair leadership must ensure that all personnel know and understand rules and regulations about situational awareness to develop a positive safety climate (Birkeland Nielsen et al., 2013). Experienced technicians recognize the dangers of aviation repair operations and this enhances their decision-making.

Theme 2: Decision-Making Application

How technicians apply decision-making experience in aviation is crucial when performing maintenance tasks. The participants responded to the interview question with candid descriptions of how they have applied their decision-making in various situations. Mindsets determine how humans view the world learned from values, morals, and experience (French, 2016). According to French (2016), concepts such as safety and risk can be used to explore risk perception. The responses from the interview question by the participants confirm that aviation decision-making is stressful, dangerous, and mentally taxing.

Interview Question 2 led employees to describe stories from their past when they had to personally apply decision-making. Story generation is a key decision-making tool that fosters the selection of a favorable alternative (Rehak et al., 2010). The participants' stories provided descriptions of how their decision-making implemented common practices, prevented harm to others, and almost cost one technician his life.

P3 shared an experience about installation and removal procedures for aircraft fuel tubing. The maintenance manual directs the technician to replace seals on the tubing every time a tube is removed from the aircraft. The purpose of the seal or packing is to assist in preventing fuel or hydraulic leaks from metal-on-metal connections. P3 has removed many aircraft tubing and stated, "If you inspect the packing, and it looks good, you don't throw it away." The decision is contrary to what the maintenance manuals tell the technicians to do, but P3 accepts the risk. P3 accepts the risk because "system leak checks would identify a bad seal prior to operating the aircraft." P3's decision-making application and risk-taking confirms that he has been influenced by status quo bias.

Keinan and Bereby-Meyer (2017) stated status quo bias is the selection of decision-making alternatives identified as the normal procedures an organization. The process of not replacing the seal during tubing removal as directed by maintenance manuals is an organizational common occurrence. P3 stated after the technician inspects the packing, reuse it because "it's been done, I've done it." According to Keinan and Bereby-Meyer (2017) personal rewards foster the continuation of risk-taking decision-making behavior. Technicians are rewarded through the saving of time for completing the task earlier versus spending time replacing the seal.

P5 told his story of operating a crane during the removal of a 747 aircraft wing. Another team was responsible for cutting the wing off the aircraft while technicians below the wing began working another task. As the crane operator, P5 was able to apply his keen decision-making experience and remove personnel from working in a dangerous situation. P5 stated, "5 minutes later the cables failed, and the wing crashed to the ground." P5 also said, "If that person had been where they were, they wouldn't be here today." P7 shared a story similar to P5 where he prevented aircraft damage versus preventing human injury.

P8's description of his decision-making application story confirms risk perceptions shared by aviation repair technicians. P8 described a different type of story that pertained to his own well-being while performing aviation tasks. P8 was tasked to climb into the fuel tank of an aircraft to perform routine maintenance. He chose to disregard normal safety protocols to carry a fuel detector, fuel tank monitor, and most importantly the proper breathing apparatus. P8 accepted the risk to accomplish the maintenance task and he stated, “I got out of there with probably a minute to spare before I would have passed out and died.”

Technicians take active risks when they are aware and accept the level of risk (Keinan & Bereby-Meyer, 2017). The descriptions of decision-making application confirm the fact participants take and accept risks regarding experience and task. Passive risk is made when humans let bias prevent a decision-making alternative from being selected by the individual (Keinan & Bereby-Meyer, 2017). None of the participants in the study took passive risks as defined by Keinan and Bereby-Meyer (2017). All participants accepted active risks and were all experienced in all respective maintenance tasks. Effective decision-making application increase the repair technicians’ ability to identify aviation hazards.

Subtheme: Aviation hazard. The subtheme of aviation hazards emerged as technicians responded to interview question two about decision-making applications. During the application of participants’ decision-making, all technician decisions were influenced by the hazards they faced. Rational decision models provide technicians with a methodical way of making decisions (Nathanael et al., 2016).

Aviation technicians are exposed to various occupational hazards, the organization must develop a safety culture to limit the impact of the hazards (Birkeland Nielsen et al., 2013). P11 and P7 both stated the most common aviation hazard faced in Arizona is the high temperature. P7 and other participants agreed that “heat fatigue” is a big influence on decision-making “especially when you are out here, 8 hours in that heat, you’re not thinking.” The participants’ responses do not confirm that technicians always utilize a systematic approach to decision-making when impacted by aviation hazards. Technicians rely on experience as P7 stated when working in the heat “you got to cool off, you got to reset.” Experienced technicians know when to take breaks and stay hydrated to ensure they make correct decisions while performing maintenance.

P5 added aviation hazards are compounded from the different types of airframes in the repair facility. P5 stated, “airplanes are not all built the same.” All technicians suggested working on various airframes facilitated the navigation through aviation hazards. P5 stated if technicians lack situational awareness, “you can actually walk into things, such as gear doors or fall through unsecured doors.”

Dekker (2015) suggested assessing work environments for aviation hazards will prevent asset damage or personal injury. The respondents all stated aviation hazards can be mitigated by fostering situational awareness. When personnel are cognizant of occupational hazards inherent to aviation operations, a positive climate is sustained throughout the organization. The participants acknowledged the hazards associated with maintenance operations and assess the environment prior to performing all tasks. Understanding situational awareness in repair organizations can enhance how technicians view decision-making.

Theme 3: Importance of Decision-Making

Human perceptions are developed through past experiences which determine a level of importance to specific concepts (Liberman et al., 2014). Knowing the value technicians place on making decisions was key to comprehending how aviation safety was influenced. The respondents provided detailed answers to interview question three describing their feelings about making decisions in aviation safety. Each of the participants placed high value in making decisions about aviation safety. The findings in the emerged theme show the technicians' influencing aviation safety in a positive manner.

When asked the importance of decision-making pertaining to aviation safety, P9 smiled and loudly stated "I'm pretty proud to do it." P9 described his role as an experienced technician was to help and teach inexperienced technicians. All participants described a feeling of pride and being comfortable when making decisions about aviation safety. P9 proclaimed to live by the philosophy "every day is the first day in aviation." P9's philosophy is key to removing complacency of every day maintenance operations.

The image theory consists of four images, self-image, trajectory image, action image, and projected image (Beach et al., 1988). Self-image defines the members mindsets and determines how the person will act (Beach et al., 1988). The findings in the theme confirmed technicians view decision-making as important. P2 reported decision-making as developing a positive mindset in aviation maintenance. The participants confirmed the second image in the image theory; trajectory image. The trajectory image focuses on organizational goals (Beach et al., 1988). The technicians' responses state a unified purpose to ensure effective decisions are made, and the overall goal of aviation safety is achieved.

All 12 participants described how important decision-making is to them in the organization and how aviation safety is influenced. P3 suggested technicians should focus on "the people that are going to be flying on the airplane, and not worrying about completing the job fast." Technicians and repair organizations share the same goal of completing timely aviation maintenance in safe manner.

The third component of the image theory is the action image (Beach et al., 1988). Technicians confirm the action image by ensuring decision-making applications positively influence aviation safety. The final component of the image theory is the projected image. The final image encompasses the actions taken by aviation technicians to foster aviation safety through decision-making applications. The common theme emerged as participants described occurrences where their decision-making application influenced aviation safety.

Subtheme: Aviation safety. MRO organizations develop safety management programs to foster a uniform meaning of policies and terms (Karanikas, 2016). The same policies and definitions used in regulations ensure all personnel comprehend all key terms and mitigates confusion (Li and Guldenmund, 2018). The subtheme of aviation safety emerged from the findings when technicians were asked the meaning of aviation safety. The intent of the question was to have participants define aviation safety from their individual perspective. I did not read the text book definition to the participants and all technicians defined the term in a comprehensive manner. The technicians' all defined aviation safety as the prevention of damage to aircraft and personnel. P7 defined aviation safety as "the safety of aircraft, passengers, and personnel." The recognition and awareness of the dangers in repair facilities is key to ensure risk is effectively assessed. P4's response to defining aviation safety as "it means everything and is first and foremost."

P3's story emphasized the importance of aviation safety through a situation where technicians incorrectly performed maintenance on an aircraft. The technicians were attempting to save time by moving forward with shortcuts. Instead of disconnecting critical aircraft tubing and documenting the task in the aircraft records, technicians just disconnected the lines. The aircraft took off with lines disconnected and caused the pilots to perform emergency shutdown procedures. The technicians confirmed the use of the bounded rationality theory by Simon (1956). Technicians made the conscious decision to leave the lines disconnected to save time without considering all the alternatives. The technicians' selected a single alternative to save time from reinstalling the aircraft lines.

All respondents shared a comprehensive definition of what aviation safety means to them. The participants described the importance of performing safe aviation maintenance operations. The main consensus from the interview transcripts was the possible loss of life for technicians, pilots, or passengers could occur without aviation safety. Aviation safety is important to maintenance repair operations and technician job experience is critical to the aviation industry.

Theme 4: Technician Job Experience

Interview question one was meant to gather information from maintenance technicians on how they make decisions regarding aviation safety. Interview question five was meant to explore how repair technicians view decision-making in their current organization. The combination of the two interview questions created the theme about technician job experience and how aviation safety is influenced. There is an abundance of aviation repair technicians in the industry, but many technicians lack essential experience (GAO, 2014). All the participants expressed concern about inexperience technicians performing maintenance in aviation repair facilities.

P6 talked about how the future of safety in aviation and stated, “I am really scared about how safety is going on now in aviation. The fear P6 spoke of is due to repair technicians “coming to work, but not taking on the responsibility of being a professional.” Technicians acting as professionals instead of treating aviation repair maintenance as a job, foster organizational buy-in. The organization is responsible for ensuring new technicians receive training. P6 suggested aviation repair facility leadership “provide initial training prior to performing any aircraft maintenance.”

Aviation maintenance leadership is responsible for providing training for all personnel (Li & Guldenmund, 2018). P8 echoed the same thoughts about inexperienced technicians not requiring an Airframe and Powerplant certification. P8 suggested young technicians without experience are being hired and are tasked to provide training to newer technicians. The result of inexperienced trainers training new personnel creates technicians that lack the skill of performing aviation maintenance.

P7 oversees maintenance tasks of inexperienced personnel working on maintenance tasks he said, “I like having people think for themselves, read the technical data first.” New technicians are susceptible to MRO organizational hazards and must know the safety hazards associated with the airframe they are repairing. Technicians are responsible for understanding and following all safety rules and regulations.

P2 believed the common theme is leadership was focusing on new inexperienced technicians and not on technicians who have been working in the industry for long time. Experienced technicians may be experienced in aviation but not trained on a specific aircraft or component. The responses by P2, P7, and P8 confirm that technicians are influenced by overconfidence bias. Rehak et al. (2010) suggested people experience overconfidence bias when they act with the incorrect amount of confidence. The experienced technicians exhibit overconfidence bias as stated by P7, “older guys who haven’t really worked airplanes, they have basic skills.” All the participants mentioned the lack of experienced technicians.

Experienced technicians are drawn to larger organizations that offer benefits such as; higher wages, medical, and bonuses. Aviation repair organizations struggle with retaining experienced technicians and are forced to hire technicians out of training schools (GAO, 2014). The new technicians know the aircraft basic operations but lack the necessary skill to perform many tasks without supervision. The participants provide training to new technicians to ensure safe maintenance and increase personal safety.

Subtheme: Personal safety. The subtheme of personal safety emerged as participants described stories about performing aviation maintenance tasks. All aviation technicians viewed personal safety based on their experience. The results confirm repair technician risk perceptions and passive risk tasking. Passive risk is defined as a the least resistant alternative taken by a person, which equals decreased risk perception (Keinan &

Bereby-Meyer, 2017). P12 described how a technician was polishing the nose cowl of an aircraft using two ladders improperly. The repair technician was cognizant of not wanting to damage the aircraft and worked expeditiously to complete the task. The repair technician focused on preventing aircraft damage and ultimately perished not regarding personal safety.

P12 made a key statement when discussing personal safety, he said, “You’re trying to be safe, at the same time, you’re trying to be efficient.” The results confirm the NDM framework by Klein et al. (1993) where organizations limited completion times for tasks. Other participants spoke of how the environment impacts how technicians perceive risk. P12 stated, technicians “are trying to do a job in a faster manner,” which ultimately increase negative decision-making aviation safety processes.

P3 described his personal safety from his early years as a repair technician he said, “I have stood on the top rung of a ladder before, who hasn’t? I have not worn a fall harness before.” P3 didn’t have a high value about his own personal safety he said, “I know my limits.” P3’s risk-taking perceptions confirms repair technicians accept certain amounts of personal risk when performing maintenance tasks.

The technicians’ interview responses described how personal safety can negatively influence aviation safety. Participants discussed how not following technical guidance and no concern for safety can cause death. Many of the technicians learned personal safety from working in past dangerous situations. The way technicians view personal safety influence organizational safety culture and decision-making.

Theme 5: Decision-Making Influence

Interview question five was meant to examine how participants believe their decision-making influences aviation safety. The repair technician descriptions were central to understanding how their decision-making processes influence aviation safety. Xia et al. (2017) suggested risk comprehension is critical in organizations to foster a clear understanding of how safety behaviors are affected. The participants described stories from past maintenance practices which helped to evolve from risk-taking to positively influencing technicians and aviation safety.

P5 described his experience with taking risk when working on aircraft and how the maintenance crew he worked with used to call him “Spiderman” for the way he climbed on aircraft. P5 learned from his past and said, “I am much braver now when I use a fall harness.” P5, P7, and P1 all described lack of safety precautions early in their aviation careers. P1, P4 and P5 related their decision-making influence as fostering a positive work environment. Technicians leading by example foster a safety culture throughout the organization and create positive organizational safety processes.

Each participant described stories that detailed past events helping to form their current decision-making influence and provide a positive influence on aviation safety. P8 said, “I am just one cog in the wheel when it comes to influencing organizational aviation safety.” P8 described how throughout his personal aviation career he has, “done about 1 million dollars in damage in this facility, in 35 years.” With the enormous monetary amount of damage by one technician, P8 states, “I have made a lot of mistakes, I don’t want you to make the same mistake.”

The common response to question five was participants heavily influence aviation safety in the MRO organization. Technicians take risk based on organizational norms. Risk is inherent to aviation repair operations and leadership is responsible for managing risk (Kubicek et al. (2013). When an ineffective risk management program exists, technicians assume unknown amounts of risk and cause aircraft damage.

Limitations of the Study

Limitations to the study were composed of influences which could not be controlled. Limitations must be identified to ensure transferability in qualitative research studies (O'Brien, Harris, Beckman, Reed, & Cook, 2014). Simon and Goes (2013) stated qualitative studies are difficult to replicate precise researcher's actions; therefore, future researchers may question validity and reliability. Four limitations for this qualitative phenomenological study were identified.

The first limitation of the study was the study was conducted within the United States and the results could not be generalized for aviation repair technicians in other countries. The study was conducted in a MRO organization in Arizona, the study results can only be utilized for domestic repair organizations. The various cultures for foreign technicians were not accounted for in this study and vary based on organizational norms and aviation laws. The second limitation was the absence of obtaining the perspective of female participants. Female technicians were not excluded for the study but none participated.

The third limitation developed from the abundance of experienced aviation technicians working in Arizona. Two technicians represented mid-level career experience of 5 to 10 years as aviation technicians. Most of the repair technicians were experienced and were aviation technicians for 20 years or more. The final limitation was the researcher's novice semistructured qualitative interview experience. To address this limitation, I conducted mock interviews to gain experience in preparation for the qualitative interviews. The mock interviews were conducted with three friends in a library to improve the semistructured interview process.

Recommendations

Aviation repair facility leadership is responsible for ensuring all technicians are efficiently trained to complete maintenance tasks (Li & Guldenmund, 2018). The first recommendation is that organizations provide training to all technicians prior to performing maintenance tasks. The training should be mandatory for all new personnel, regardless of experience levels. Aviation technicians in this study suggested leadership provide initial orientation training to all technicians. The mandatory training would allow technicians to be effectively trained by experienced trainers versus improperly trained by new technicians. The orientation training will also familiarize new technicians with organizational processes, various aircraft, and aviation hazards.

The second recommendation is for organizations provide technicians with safety meetings and incentives for continual improvement. The findings in this study identified aviation organizational leadership taking immediate action following an accident or personal injury. The participants stated aviation repair organizations only take appropriate action once an accident occurs. Rashid et al. (2014) stated proactive versus reactive organizations can aid in the prevention of aviation accidents. Participants suggested regularly scheduled safety discussion would foster conversations and increase safety awareness.

The third recommendation is the FAA make the Safety Management System (SMS) mandatory in all repair facilities. MRO organizations could utilize a database capable of identifying and tracking safety trends that would enhance situational awareness and mitigate safety problems (Rashid et al., 2014). MRO organizations are currently starting to use the SMS to enhance safety operations (FAA, 2017). MRO organizations can use SMS to document all safety issues and monitor levels of risks regarding aviation safety (FAA, 2017). Participants stated SMS is not currently mandatory in all MRO facilities.

Currently SMS is slowly being integrated into aviation repair organizations and was developed to enhance organizational safety and include facilities in accident mitigation (FAA, 2017). The international aviation industry is slowly integrating SMS into MRO facilities. The findings in the study prove SMS will be the next evolution of aviation safety.

The fourth recommendation would be for MRO organizations to develop programs or training targeting maintenance technician decision-making. According to Ceschi et al. (2017), organizations can develop cognitive programs to mitigate or eliminate decision-making biases. Biases foster the acceptance of unknown levels of risk and introduce negative organization norms. The development of cognitive programs can eliminate the decision-making biases identified in this study.

The fifth recommendation would be to conduct a future study in aviation repair facilities abroad and specifically target female aviation technicians. Conducting a study about how aviation repair technician's decision-making overseas may enable all facilities to align. Once aligned, foreign and domestic organizations can work together to facilitate aviation industry changes positively influencing aviation. Including female participants will include perspectives from all technicians working in MRO organizations.

Future researchers should solicit female technicians by possibly using focus groups. The number of female repair technicians in the aviation industry is small but growing annually. Researchers could speak with MRO organizational leadership to obtain decision-making perspectives of all female technicians to add a broader view to future studies.

Implications

Positive Social Change

Human decision-making and performance have been investigated to determine the impact on aviation safety (Barrage, 2016; Sheikhalishahi et al., 2016; Scheelhaase et al., 2016). According to the literature, aviation technician decision-making directly influences aviation safety, presenting a need to prevent or eliminate negative influences. MRO organizations and federal agencies have safety policies to reduce ineffective decision-making, but problems still exist. The study was dedicated to finding methods to help aviation technicians and produce positive social change. Positive social change from this study could be created on the societal, organizational, and policy levels.

The aviation repair technicians who volunteered for this study provided detailed descriptions about decision-making and the influence on aviation safety. Through this study, technicians, maintenance repair leadership, and federal agencies can benefit from the social change. All participants provided invaluable candid descriptions which may impact the aviation industry and enhance aviation safety.

The findings of this study could impact MRO organizations in which the participants work. Briefing aviation maintenance leadership would highlight the results and assist with the creation of effective training and safety programs. The MRO leadership team was anxious to know the results and looked forward to reading the results. The MRO facility in Arizona is one of many repair organizations located stateside and overseas.

Policy Social Change

The Safety Management System (SMS) is a designed to protect organizations, prevent personnel injury, and accidents (Li & Guldenmund, 2018). The management system is essential to the tracking and documentation of safety processes and risk assessments. SMS provides aviation repair leadership with a uniform method to communicate safety related issues across the aviation industry (Li & Guldenmund, 2018). Organizational safety would benefit from the immediate implementation of SMS in all MRO facilities.

The implementation of SMS would enable MRO organizations to identify risk, communicate issues, and enhance safety procedures (Karanikas, Melis & Kourousis, 2017). Technicians suggested SMS is a great program and is currently not mandated and operating in the infancy stages. The FAA could provide a mandatory implementation date of the program into all MRO facilities and coordinate with international organizations. The mandatory program implementation date could increase aviation safety on a global scale. Repair organizations would be able to communicate aviation safety and technician decision-making issues and enhance safety within the aviation industry.

The ability to communicate common organizational hazards can prevent organizations from experiencing similar accidents, hazards, or injuries (Karanikas et al., 2017). MRO organizations would also be able to manage current safety processes and programs and develop a structured safety management plan. Currently the implementation of SMS is voluntary but making it mandatory for all organizations would enhance safety management processes.

Organizational Social Change

Aviation repair technicians suggested MRO organizational leadership begin scheduled safety meetings. The meetings will provide all personnel with current safety policies, trends, and foster positive decision-making before mishaps, accidents, or injuries occur. According to Karanikas (2016), all personnel performing aviation maintenance are responsible for knowing and comprehending safety policies and communicating information to all technicians. Ensuring technicians are educated on current policies and regulations will assist in the prevention of aircraft accidents and personnel injuries.

Aviation repair leadership is charged with developing experienced technicians because human lives are at stake based on the quality of the training (Pazyura, 2018). Technicians stated new personnel only received training once they began maintenance tasks. Personnel working on various airframes did not receive orientation training before performing aviation tasks. Repair technicians suggested initial training development for new and inexperienced personnel. Social change can come by MRO leadership creating effective training programs to eliminate inexperienced technicians training new members. The removal of inexperienced technicians enhances aviation safety and individual decision-making.

Personal Reflection

During all stages of this doctoral journey and research project, I faced many challenges. Working long extensive hours to complete milestones in a timely manner was very demanding. For new doctoral students, I would recommend you have a strong supportive group of family and friends. It was important to be able to talk to people outside of the academic field to gain a different perspective.

Social media also served as a tool to communicate with doctoral students at different stages in the dissertation process. Communicating with faculty and students helped me achieve numerous milestones. Having a great committee challenged and helped me develop a credible study. The process would have been impossible without the professionalism and dedication of my committee.

I have been a military aviation repair technician for 30 years and I was ecstatic at the opportunity to conduct a study about decision-making and aviation safety. I started the dissertation process wanting to know how technician decision-making influenced aviation safety. The study evolved into learning about decision-making processes and challenges facing civilian aviation repair technicians. The study collected the lived experiences of 12 technicians but the information attained can be used to make a substantial impact on the aviation industry.

Conclusion

Human error has plagued the aviation industry and caused aircraft accidents, property damage, and loss of life (Barrage, 2016; Sheikhalishahi et al., 2016; Scheelhaase et al., 2016). Past studies by federal agencies and the aviation industry did not explore data from the perspectives of aviation repair technicians (Barrage, 2016; FAA, 2014; Strauch, 2016). As a current result, 12 aviation technicians described how decision-making influences aviation safety. The participants' perspectives provided insight on how technicians' view aviation safety and decision-making.

I achieved the purpose of this study, which was to explore the lived experiences of aviation repair technicians' decision-making perceptions regarding aviation safety. The identified findings in this study identified how aviation technicians' decision-making influence aviation safety. The emergent themes in this study were decision-making experience, decision-making application, importance of decision-making, technician job experience, and decision-making influence. Four subthemes also emerged; situational awareness, aviation hazards, aviation safety, and personal safety. These themes and subthemes were relevant to answering the overarching and research question for this study. Future research may provide insight to MRO facilities on managing aviation technician decision-making.

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Appendix A: Interview Guide

Organization: ____

Interviewee Identifier (Participants' Pseudonym): ____________

Interviewer: ____

Interview Location: ____

Qualitative Phenomenological Interview

Introductory Protocol

Hello, my name is Dominic Hemingway, and I am currently a doctoral candidate at Walden University. I have been in aviation maintenance for 29 years. I am currently working on my doctoral dissertation in Management: concentrating on Leadership and Organizational Change. I would like to thank you for taking time out of your busy schedule to participate in this study. It means a lot to me and all aviation maintenance technicians.

To facilitate note-taking and data analysis, I would like to digitally record our conversation during this interview. Please sign the consent form and the signing of the consent form is not legally binding in any way. For your information, the interview data which will be safely stored in a password protected hard drive, and hard copies such as notes will be locked in a safe to be eventually destroyed after 5 years per Walden University rules. Essentially, this document states that: (1) all information will be held confidential, (2) your participation is voluntary, and you may stop at any time if you choose to do so, and (3) I do not intend to inflict harm in any way. Thank you for agreeing to participate. Your experience is a very critical component of this study.

I have planned this interview to last between 35 to 45 minutes. During this time, I have several questions that I would like to cover pertaining to aviation repair technician decision-making and aviation safety you may end this interview at any time and all gathered data is confidential.

Is it okay for me to begin recording the interview? Thank you,

Introduction

You have been selected to speak with me today because you have been identified as someone who has a great deal to share about aviation maintenance technician (AMT) decision-making. The research project as a whole focuses on the exploration of decision-making perceptions, with particular interest in understanding how aviation safety is influenced by AMT decision-making, how decision-making can be enhanced, and whether we can begin to share what we know about decision-making and aviation safety to other maintenance repair and overhaul (MRO) facilities. My study does not aim to evaluate your techniques or experiences. Rather, I am trying to learn more about your actual personal experiences, and hopefully learn about how MRO facility decision-making perceptions and aviation safety can be improved.

Interview Questions

RQ1: What are the lived experiences of aviation repair technicians' and how do their decision-making perceptions influence aviation safety?

1. Can you describe how you make decisions pertaining to aviation safety?
2. Please, can you describe any situation in which you had to apply your decision-making skills regarding aviation safety?
3. Please describe how you feel about making decisions regarding aviation safety?
4. How would you describe your decision-making experience regarding aviation safety?
5. Can you describe (In your opinion) how you believe your decision-making influence aviation safety in your organization?

Final Question

6. Is there anything else you would like to add or discuss pertaining to aviation safety or decision-making? Anything that I have not addressed in this interview?

Thank you again for taking valuable time out of your busy day to provide me with essential research data. My contact information is on the consent form and please contact me if you have any questions.

Appendix B: Interview Questions for Aviation Maintenance Technicians

Lead interview question: How would you describe your decision-making perceptions and your impact on aviation safety?

1. Can you describe how you make your decisions pertaining to aviation safety?
2. Please, can you describe any situation in which you had to apply your decision-making skills regarding aviation safety?
3. Please describe how you feel about making decisions regarding aviation safety?
4. How would you describe your decision-making experience regarding aviation safety?
5. Can you describe (In your opinion) how you believe your decision-making influence aviation safety in your organization?

Final Question

6. Is there anything else you would like to add or discuss pertaining to aviation safety or decision-making? Anything that I have not addressed in this interview?

Appendix C: Recruitment Flyer for Study Participants

VOLUNTEERS WANTED FOR A RESEARCH STUDY

RESEARCH ON AVIATION MAINTENANCE TECHNICIAN DECISION-MAKING PERCEPTIONS

Have you been actively performing maintenance on aircraft or components for a minimum of 5 years? I am conducting a doctoral research study about decision-making and how aviation safety is influenced by it and looking for your input! If you meet the stated criteria, you can contact me with the information listed below on the tabs. I will send you an informed consent form and a demographics form that will take an estimated 10 minutes to complete. Once the two forms are complete, you can send them to my email address, if qualified I will arrange a face-to-face interview lasting between 35-45 minutes to complete the process.

Participation in the study is voluntary and participants completing the informed consent, demographics form, and the interview will be compensated with a $20 gift card.

This research is conducted by doctoral candidate Dominic Hemingway located in [redacted].

(IRB number: #11-01-18-0508630)

Appendix D: Participants' Demographic Information

Organization: ____

Interviewee Identifier (Researcher use only) (Pseudonym): ______________

Interviewer: Dominic Hemingway

A. Interviewee Demographics

1. How long have you been working in your current position?

______0-5 (Years)

______5-10 (Years)

______11-20 (Years)

______20+ (Years)

2. How long have you been an aircraft maintenance technician?

______0-5 (Years)

______5-10 (Years)

______11-20 (Years)

______20+ (Years)

3. How long have you been working at this current repair facility?

______0-5 (Years)

______5-10 (Years)

______11-20 (Years)

______20+ (Years)

4. What is your current maintenance occupation?

____

5. Have you received any Federal Aviation Administration (FAA), organizational, or past military service safety training courses in the past? If yes, please describe how beneficial it was to you? If not, why was it not beneficial?

Thank you for your time, I will personally contact you once you send the current form back to me by email. I will notify you within 24 hours of receipt of this form if you meet the criteria or not. If you do meet the criteria, I would like to set-up an interview with you to gather more information about your decision-making perceptions and aviation safety experiences. The interview will last between 35-45 minutes.