THE IMPACT OF CRITICAL SUCCESS FACTORS ON PERSONNEL SAFETY AWARENESS: A CASE STUDY OF GADING KASTURI SDN BHD, MALAYSIA

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MASTER OF SCIENCE

UNIVERSITI UTARA MALAYSIA

AUGUST 2024

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By

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Thesis Submitted to

School of Technology Management and Logistics,

Universiti Utara Malaysia,

in Fulfilment of the Requirement for the Master of Science in

Transportation and Logistics Management

Kolej Perniagaan
(College of Business)
Universiti Utara Malaysia

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Tarikh: **05 Ogos 2024**
Date:

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Tajuk Tesis / Disertasi
(Title of the Thesis / Dissertation) : **The Impact of Critical Success Factors on Personnel Safety Awareness: A Case Study of Gading Kasturi Sdn. Bhd, Malaysia**

Program Pengajian
(Programme of Study) : **Master of Science (Transportation & Logistics Management)**

Nama Penyelia/Penyelia-penyelia
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Abstrak

Gading Kasturi Sdn Bhd (GKSB) ialah syarikat penerbangan dikenali yang mengutamakan persekitaran kerja yang selamat. Kajian ini menyiasat bagaimana faktor seperti pengalaman kakitangan, latihan, penilaian dan reka bentuk ruang kerja mempengaruhi kesedaran keselamatan pekerja. Kakitangan yang berpengalaman mempunyai pemahaman intuitif tentang potensi bahaya, amalan keselamatan terbaik dan bertindak balas secara proaktif. Mereka membimbing rakan yang kurang berpengalaman dan memupuk budaya keselamatan. GKSB memastikan pekerjanya dilengkapi kemahiran dan pengetahuan komprehensif bagi melaksanakan tugasan dengan selamat. Kakitangan dikemas kini tentang piawaian keselamatan, meningkatkan keupayaan mereka untuk bertindak dengan sewajarnya. Penilaian berterusan adalah penting untuk mengekalkan piawaian keselamatan yang tinggi bagi memastikan pematuhan protokol, penambahbaikan, mengukuhkan amalan keselamatan dan memastikan kakitangan sentiasa berwaspada. Reka bentuk ruang kerja juga penting dalam meningkatkan kesedaran keselamatan dan menggalakkan amalan kerja yang selamat. Pertimbangan ergonomik, papan tanda yang jelas dan peralatan yang sesuai dan selamat amat diperlukan. Dengan menyepadukan faktor kejayaan kritikal ini, organisasi memupuk budaya selamat yang mengurangkan risiko dan memastikan kesejahteraan pekerja. Penambahbaikan berterusan dalam bidang ini adalah penting untuk mengekalkan standard keselamatan yang tinggi dan melindungi kakitangan dalam situasi berisiko tinggi.

Kata kunci: Kesedaran keselamatan, pengalaman kerja, latihan dan penilaian, reka bentuk ruang kerja, industri penerbangan, kakitangan penyelenggaraan pesawat, latihan penyelenggaraan pesawat.

Abstract

Gading Kasturi Sdn Bhd (GKSB) is a leading aviation company that prioritizes a safe working environment. This case study investigates how factors such as personnel experience, training, assessment, and workspace design influence the personnel safety awareness of its employees. Experienced personnel have an intuitive understanding of potential hazards and best safety practices, enabling them to anticipate and respond proactively. They mentor less experienced colleagues, fostering a safety culture through shared knowledge. GKSB provides comprehensive training programs to ensure employees are equipped with the necessary skills and knowledge to perform their tasks safely. Regular updates keep personnel updated on safety standards, improving their ability to identify hazards and respond appropriately. Continuous assessment is crucial for maintaining high safety standards, as it ensures compliance with protocols, identifies areas for improvement, reinforces safety practices, and keeps maintenance personnel vigilant. The design of the workspace also plays a significant role in raising safety awareness. A well-designed workspace reduces potential hazards and promotes safe working practices. Ergonomic considerations, clear signage, and proper equipment are necessary for a safe workplace. By integrating these critical success factors, the organization fosters a safe culture that reduces risks and ensures employee well-being. Continuous improvement in these areas is critical to maintaining high safety standards and protecting personnel in high-risk situations.

Keywords: Safety awareness, working experience, training and assessment, workspace design, aviation industry, aircraft maintenance personnel, aircraft maintenance training.

Acknowledgement

Alhamdulillah, all praise to the Almighty Allah, s.w.t., the most merciful and most benevolent, for giving me the strength and patience to complete this project paper. I would like to express my gratitude to my parents, wife, and respected supervisor, Dr. Md Abdul Kafi, for his time, moral support, ideas, suggestions, assistance, supervision, and continued guidance throughout the study period in order to complete this project paper. I would also like to thank GKSB maintenance personnel for their cooperation and time in order to complete this project. I also would like to thank my entire lecturers, from Universiti Kuala Lumpur (Malaysian Institute of Aviation Technology) and Majlis Amanah Rakyat (MARA), for their guidance, knowledge, and fee sponsorship since I studied there. I also extend my gratitude to all lecturers from the School of Technology Management and Logistics (STML), as well as the entire staff of the University Utara Malaysia (UUM) library, for their invaluable assistance in locating the necessary materials for this project. Once again, I wanted to thank my parents and wife for their understanding and support throughout this study. Without their prayers and encouragement, this project paper would not have been feasible. Also not forgotten is my sponsor, Perbadanan Tabung Pendidikan Negara (PTPTN). Thanks a lot for supporting me in terms of the financial aid to study at Universiti Utara Malaysia. My greatest appreciation also goes to everyone who was directly or indirectly involved in the guidance and support of completing this project paper. Any further comments and suggestions would be appreciated.

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List of abbreviations

AMO	Approved Maintenance Organization
EI	Emotional Intelligence
MRO	Maintenance Repair Overhaul
CRM	Crew Resources Management
SPSS	Statistical Package for Social Sciences

CHAPTER 1:

INTRODUCTION

1.0 Background of the study

The maintenance staff of aircraft were an essential component in the aviation industry, as they were responsible for ensuring the aircraft's airworthiness and safety (Bishu & Munuswamy, 2003). Adi et al. (2021) stated that aircraft maintenance was a critical aspect of the aviation industry, as it ensured the safe operation of aircraft and safeguarded the lives of passengers and crew members. Jaiswal et al. (2018) revealed that safety had always been a priority for aviation organisations, but most studies in this sector have focused on safety culture in aviation operations rather than directly addressing challenges in aircraft maintenance organisations (AMOs). However, Gramopadhye et al. (2000) found that ensuring a strong safety culture in aircraft maintenance organizations could be a great challenge, as there were various human factors that could influence the safety performance of these personnel. Beyond technical skills, creating a strong safety culture within the organization was essential to fostering safety awareness among aircraft maintenance personnel (Wiegmann et al., 2004). Gorbačovs (2016) emphasised the need for a thorough understanding of the background and awareness of aircraft maintenance personnel, as they were a major contributor to the safety and reliability of aircraft operations.

Experienced workers had better safety perceptions, higher job satisfaction, higher compliance with safety procedures, and lower accident frequency compared to inexperienced workers (Ayim Gyekye & Salminen, 2010). Chandola et al. (2023)

revealed that challenges in aircraft base maintenance engineering include the need for experienced engineers to perform all major work on the aircraft. Padil et al. (2018) found that personnel who were responsible for maintenance played an important role in this process because their knowledge and experience were essential in avoiding errors and ensuring that aircraft systems continued to function properly. Furthermore, Saleh et al. (2019) revealed that experienced personnel were better prepared to navigate the complexities of aircraft maintenance, such as adhering to strict safety protocols and operational procedures, which were essential to ensuring the safety of overall flight operations.

Maintenance errors caused by poor training could have a direct influence on the safety of passengers, crew, and passengers in general (Dalkilic, 2017). Proper training and assessment of aircraft maintenance personnel were essential to ensuring the airworthiness of aircraft and the safety of passengers and crew (Hashim et al., 2020). Johnson (1997) proposed that to ensure safe and effective maintenance, training should not only focus on technical skills but also on human factors and error management. According to Bernard et al. (2017), to ensure the safety and reliability of aircraft maintenance, a comprehensive assessment of the human factors involved was essential. This assessment should consider the diverse range of maintenance personnel, including different levels of maintenance, aircraft types, and social and economic positions, as observed in military aircraft maintenance settings (Bao & Ding, 2014).

According to Habib and Turkoglu (2020), their analysis of aircraft maintenance-related accidents in Nigeria determined that maintenance personnel often faced various challenges, such as time pressure, system complexity, infrequent feedback, and cramped workspaces, which potentially contributed to incidents safety. In their study

of the Malaysian aviation sector, Musa and Isha (2021) also emphasised the significance of workspace design, personnel experience, training, and evaluation on the safety awareness of aircraft maintenance staff. Some researchers (Rawahi et al., 2020) had shown that a lack of proper training, inadequate staff competency assessment, and suboptimal workspace design could contribute to safety incidents and accidents in aircraft maintenance operations.

1.1 Problem statement

The main constraint in aircraft maintenance was the lack of a skilled workforce, making it challenging to schedule maintenance jobs to ensure sufficient aircraft availability for future flight programmes (Safaei et al., 2011). According to Efthymiou et al. (2022), barriers to implementation in aircraft maintenance facilities included a lack of experience and the sector's complexity. There was a correlation between a lack of experience in aircraft maintenance and problems that occurred during maintenance, which could impact the aircraft's overall operation (Kulíšek & Bugaj, 2021). Chandola et al. (2023), in their study on the importance and challenges of aircraft base maintenance engineering, revealed that a lack of experience in aircraft base maintenance engineering could create challenges in maintaining airworthiness. Similarly, Thulasy et al. (2022) found that lack of experience and skill mismatch contributed to many aircraft incidents and problems, highlighting the need for upskilling and reskilling initiatives.

A decline in training and education in the aircraft maintenance sector had led to drift in working practices and a wider power-distance gap (Naweed & Kourousis, 2020). Kulíšek and Bugaj (2021) determined that a lack of training in the aircraft maintenance

sector could cause problems during maintenance, affecting the overall operation of the aircraft. According to Karunakaran et al. (2021), their study on the impact of aircraft maintenance human factors training on the profitability and safety of Indian MROs revealed that the lack of quality aircraft maintenance training was a major obstacle for future development in the Indian MRO sector. Chen et al. (2011) thought that poor assessment of human error control in aviation maintenance could lead to ineffectiveness in evaluating the state of human error control, affecting aviation safety. Ding et al. (2013) conducted a study on the evaluation of safety and quality in military aircraft maintenance and revealed that poor assessment of military aircraft maintenance could cause inaccuracies in the level of maintenance and reduce flight safety. Similarly, Evdokimenkov et al. (2021) determined that poor assessment in the aircraft maintenance sector could lead to increased costs and flight delays due to malfunctions.

Poor workplace design in aircraft maintenance could lead to musculoskeletal injuries, visual fatigue, and accidents related to head injury with aircraft structures (Neto et al., 2018). Similarly, Nadeau and Morency (2017) revealed that poor workplace design in the aircraft maintenance sector could lead to increased occupational health and safety risks for workers and the environment. Jaiswal et al. (2020) found that poor workplace design in aircraft maintenance organizations could impact work performance and morale.

1.2 Research objectives

The objectives of the project are:

1. To measure the impact of critical success factors on socio-demographic characteristics on personnel safety awareness.

2. To measure the relationship between personnel experience, training, assessment, and workspace design on personnel safety awareness.

3. To determine the impact of personnel experience, training, assessment, and workspace design on personnel safety awareness.

1.3 Research questions

1. How do socio-demographic factors affect the safety awareness of maintenance personnel in the workplace?

2. Is there a relationship between personnel experience, training, assessment, and workplace design on personnel safety awareness in the workplace?

3. What role do personnel experience, training and assessment, and workspace design play in improving safety awareness among aircraft maintenance personnel?

1.4 Scope of the study

This study was conducted in Kepala Batas which was located in Kedah. A study on safety awareness among aircraft maintenance personnel had not yet been conducted at the Air Force College, which was why the state of Kedah was chosen as the research location. Kedah was one of the aircraft maintenance hubs located in the northern part

of Peninsular Malaysia. The aviation industry relied heavily on the expertise of aircraft maintenance personnel to ensure aircraft safety and reliability. This population sample study aimed to examine the relationship between staff experience and the impact on safety awareness among aircraft maintenance personnel. Furthermore, this study aimed to determine whether training and assessment had effectively increased safety awareness and evaluate the effectiveness of workplace design in promoting safety awareness among maintenance personnel. Understanding this perspective allowed us to identify areas for improvement and improve overall performance and safety awareness in aircraft maintenance.

i. Sampling: A random selection of 40 aircraft maintenance personnel from the Gading Kasturi Sdn. Bhd. company would be made. Located at Air Force College, Kepala Batas, Kedah, GKSB, a hundred percent Malaysian-owned company, was primarily engaged in defense and security, flight training, and aerospace MRO services.

ii. Survey Instrument: A comprehensive survey questionnaire would be developed to collect data in the following key areas:

a. Individual Experience: It was expected that they would be questioned about the number of years of work experience they had and the number of companies they had worked for.

b. Training and Assessment: Questions would be evaluated based on the training given and the assessment period according to the set time period.

c. Workspace Design: Participants would provide insights into their workplace markings and zones, including workspace area, layout, and workflow efficiency.

iii. Data Collection: To reach a wide range of maintenance personnel, I will send an online survey using google forms. The data collection period lasted for one month.

iv. Data Analysis: Descriptive statistics would have applied to the quantitative data for analysis. Descriptive statistics offered basic overviews of the sample and the measurements, summarizing and described the key aspects of a dataset..

v. Ethics: Ethical considerations would have been upheld, ensured participant anonymity and obtained informed consent. Data security and privacy would maintain throughout the studied.

Expected Outcomes:

This population sample study aimed to provide a comprehensive understanding of aircraft maintenance personnel's awareness regarding their individual experience, training and assessment, and workspace design. The findings would help identify the impact of personnel experience, training and assessment, and workspace design that may impact job performance and safety awareness in the aviation maintenance field. The results could inform improvements and adjustments to enhance aircraft maintenance personnel's safety awareness.

1.5 Significance of the study

A comprehensive studied on personnel safety awareness among these professionals, investigating the intricate connections between maintenance personnel experience, training and assessment programmes, and workspace design, carried immense significance. Aircraft maintenance personnel was a critical link in the safety chain,

responsible for kept aircraft in pristine condition. Their awareness of safety and potential risked directly influenced the safety of flight operations. By delving into the relationship between experience, training and assessment programmed, and workspace design, the studied could uncover gaps in safety awareness. Addressed these gaps could substantially reduced the impact of maintenance-related incidents or accidents, thus elevating the overall safety of aviation operations.

One of the central contributions of this studied was its ability to pinpoint areas within the aviation maintenance sector that require improvement. It was not sufficient to assumed that the existed training and assessment programme and workspace design was effective in promoting safety awareness. By methodically examined these elements, organizations could identified precisely where enhancements needed. Armed with this knowledge, they could undertake targeted interventions and improvements, resulting in a more robust culture of safety. In aviation maintenance, an effective training programmed is the bedrock of safety. This studied can provided crucial insights into the effectiveness of existed training initiatives and revealed areas requiring adjustment. This would ensured that maintenance personnel are equipped with the knowledge and skills necessary to carried out tasks in a more efficient manner while maintained the highest possible leveled of safety.

This study underscored the significance of continuous learning within the aviation maintenance profession. By demonstrating the correlation between ongoing training and safety awareness, it could inspire maintenance personnel to adopt a culture of perpetual learning. This, in turn, ensured that they remained at the forefront of safety practices throughout their careers, consistently upholding aviation safety standards.

Workspace design also had an impact on safety, so it was not solely the responsibility of individuals. The working area significantly influenced the safety culture within aviation maintenance organizations. This study could illuminate how workspace design may impact safety awareness. Equipped with this knowledge, organizations could proactively create an environment that prioritized safety at every level of their operations. A strong safety culture was an essential asset for improving aviation safety. Perhaps the most profound significance of this study lay in its potential to prevent accidents and incidents within the aviation industry.

CHAPTER 2:

LITERATURE REVIEW

2.0 Introduction

The aviation industry placed a tremendous deal of emphasis on passenger safety and attached importance to a safe work culture, particularly in the maintenance sector. A high level of safety awareness among those who were involved in aviation maintenance was of utmost importance in order to prevent accidents and ensure that they did not have an impact on the aircraft. Any sort of negligence or carelessness had the potential to cause physical harm as well as financial loss to the company. The study on GKSB focused on personnel experience, training and assessment, and workspace design, which had the potential to impact the level of safety awareness for personnel involved in aircraft maintenance.

2.1 Personnel safety awareness

Aviation maintenance practitioners needed specialized knowledge and training to handle, repair, and inspect aircraft composites, with situational awareness being the most important mitigator against impact damage (Jong et al., 2023). Endsley and Robertson (2000) revealed that situation awareness in aircraft maintenance teams was critical for performance and error prevention, and a training program could improve it through organization, system design, and training. Grote and Künzler (2000) stated that it was important for individuals to be aware of their surroundings, follow safety protocols and procedures, and actively participated in creating a safe work environment. It was crucial for employers to prioritize personnel safety awareness and provide

comprehensive training and resources to ensure the well-being of their employees (Anuar & Teh, 2021). Kim (2014) thought that aviation employers should promote a culture of safety by developing techniques, knowledge, and safety learning programs to ensure effective and positive learning experiences for all personnel.

2.1.1 An overview of personnel safety awareness in aviation

Personnel safety awareness in aviation referred to the knowledge, understanding, and mindset that individuals working in the aviation industry had regarding safety practices and procedures (Jaiswal et al., 2018). McDonald et al. (2000) revealed that by promoting and maintaining personnel safety awareness, the aviation industry could significantly reduce the likelihood of accidents and incidents, protect lives and resources, and ensure the continuous safe operation of aircraft. Endsley and Robertson (2000) emphasized that situational awareness in aircraft maintenance teams was important for performance and error prevention, and training programs could improve this through organization, system design, and training. Aviation organizations should also foster a culture of safety, where employees were encouraged to report and address potential hazards and safety concerns without fear of retribution (Gill & Shergill, 2004).

2.1.2 Empirical evidence and issues of personnel safety awareness in aviation

Situational awareness and non-adherence to procedures were the most significant human factors contributing to commercial air transport accidents and incidents from 2000 to 2016 (Kharoufah et al., 2018). Similarly, Rutsik and Timofeev (2021) pointed out that a lack of comprehensive situational awareness was a frequent cause of aviation accidents for general aviation aircraft. According to Muecklich et al. (2023), using 87

accident reports from 2000–2020, they found that lack of situational awareness and failure to follow procedures were the main causes. The most critical operational actions identified were aircraft pushback/towing, arrival/departure, and aircraft weight and balance. Jentsch et al. (1997) found that high workload distractions, a lack of crew communication, improper procedures, and maintenance or equipment malfunctions consistently caused loss of situation awareness in aircraft accidents.

2.2 Maintenance personnel experience

Experienced personnel were less likely to make mistakes due to a lack of knowledge, while discrepancies on familiar tasks involved teamwork breakdowns, absent-minded mistakes, and action slipped (Hobbs, 2008). According to Subramanian (1977), 3 to 4 years of experience in the aviation industry were prerequisites for obtaining a licence or approval to work as engineers and inspectors in inspection organisations. Aircraft maintenance personnel played a vital role in aviation safety, and their training should be improved to prevent failures in aircraft systems (Usanmaz, 2011). Shepherd (1990) thought that aircraft maintenance and inspection technicians played a crucial role in aviation safety, facing challenges related to selection, training, work environment, job performance aids, and communication. Some of the key responsibilities of aircraft maintenance personnel included conducting routine inspections of aircraft systems, identifying and diagnosing mechanical issues, repairing or replacing faulty components, performing scheduled maintenance tasks, and ensuring compliance with regulatory standards (Latorella & Prabhu, 2000). Güneş et al. (2020) pointed that the level of knowledge and experience of maintenance personnel was a significant aspect that influenced the cost of direct maintenance for organisations.

2.3 Training and assessment in aircraft maintenance

Aircraft maintenance training was crucial for performing and supervising aircraft maintenance and certifying that planes were safe afterwards (Hampson & Fraser, 2016). Similarly, Gorbačovs (2016) determined that training was crucial for improving professional qualities and competence in aviation technical maintenance personnel, enhancing flight safety. Training improved professional qualities and competence in aviation technical personnel, enhancing flight safety (Gorbachev et al., 2019). Fonseca et al. (2011) thought that aircraft maintenance training was complex and required accurate training programs, team coordination, and virtual worlds for certification training. Siriwoharn et al. (2023) revealed that providing training and skill development for employees in the aviation industry was crucial for achieving efficient and safe operations. Aircraft maintenance training involved improving the reliability of technicians by reducing their human fault rate in complex aircraft systems (Tanev, 2021). Jiang et al. (2016) stated that aircraft maintenance training required long cycles, wide content, strong practical training, and high training costs to ensure new employees could timely accept and engage in corresponding systematic training. According to Gorbačovs (2016), aviation technical maintenance personnel's professional qualities and competence were directly dependent on training. Training was essential for aircraft maintenance inspectors to ensure that damage did not go unnoticed during routine maintenance (Johnson, 1997). Shepherd and Kraus (1997) explained that increasing the emphasis on technical and human factors training in the aircraft maintenance environment could improve safety and reliability by addressing the human factors that contributed to 60–80% of aircraft incidents and accidents.

Chen et al. (2011) emphasised that individual assessment was important in aviation maintenance to improve safety management and ensure effective human error control. Individual assessment was important for ensuring flight safety and evaluating safety and quality in military aircraft maintenance (Ding et al., 2013). Similarly, Ma et al. (2021) pointed out that individual assessment was important in aviation maintenance to understand the safety quality of maintenance personnel and improve their performance. According to Güneş et al. (2020), their study of an assessment of aircraft maintenance technician competency determined that improving technician competency assessment processes could reduce maintenance errors, improve technician performance, and create positive impacts on safe and efficient flight operations.

2.4 Workspace design in maintenance area

Poerwanto (2013) stated that an ergonomically designed aircraft maintenance facility improved accuracy and reliability by maximizing work area efficiency and minimizing distractions. The design of a new aircraft maintenance facility should consider human factors issues, such as workspace layout, aircraft positioning, and tool flow, to optimize the working environment for technicians (Rantanen et al., 2003). Factors such as workplace layout, noise, and equipment quality directly influenced the accuracy required in maintenance tasks, highlighting the need for a conducive working atmosphere (Jaiswal, Dalkilic, Papageorgiou, & Singh, 2020). Skilling (2016) revealed that work area and workspace design must consider human factors to ensure operator well-being, comfort, and efficiency while reducing human error in new and existing facilities.

2.5 Underpinning of the theory

The aviation industry placed a high priority on passenger safety and placed an emphasis on workplace safety, particularly in the maintenance sector. The PEAR model, which had been used for over a decade, provided a unified view of human factors in aviation maintenance. It identified four key considerations: people, environment, actions, and resources. This helped to understand the importance of human factors in aviation maintenance programs (“Human Factors,” n.d.). Safety awareness began with knowledgeable, well-trained, and risk-aware technicians. Experienced and trained technicians were more proactive in identifying and mitigating hazards. Mental health, workload, and emotional well-being affected safety awareness. Fatigue reduced alertness, increasing accident risk (Al-Hadabi, 2023). The actions carried out by personnel were influenced by their training and experience. Proper task sequences, decision-making under pressure, and collaboration were actions that relied heavily on the individual's preparedness and training. Continuous improvement in training methods aligned with safety procedures (Hobbs, 2008). Workspace design, which was part of the "Environment" in the PEAR model, played a major role in influencing technician performance. An ergonomically designed environment that considered lighting, noise, and spatial organization improved safety and operational efficiency (Kanki et al., 2019).

2.5.1 Personnel safety awareness

Safety awareness among aviation maintenance practitioners was paramount. These individuals required specialized knowledge and training to handle repairs and inspections of aircraft components. Situational awareness is crucial in mitigating

impact damage and preventing errors. The research underscored the significance of situational awareness in maintenance teams' performance and error prevention, emphasizing its enhancement through organizational design and training (Endsley & Robertson, 2000). Employers were urged to prioritize comprehensive safety training and resources to ensure employee well-being (Anuar & Teh, 2021). It was essential to promote a safety culture through knowledge development, safety programs, and encouraging hazard reporting without fear of retribution (Kim 2014; Gill & Shergill 2004).

2.5.2 Maintenance personnel experience

Experienced maintenance personnel are less prone to errors due to their knowledge and familiarity with tasks. Subramanian (1977) emphasized that several years of experience were required for licensing in inspection organizations. The training and experience of aircraft maintenance personnel were vital for aviation safety, as these individuals performed critical tasks such as routine inspections, diagnosing issues, and ensuring compliance with regulatory standards (Usanmaz 2011; Shepherd 1990). The level of experience directly influenced maintenance costs and operational efficiency (Güneş et al., 2020).

2.5.3 Training and assessment in aircraft maintenance

Training in aircraft maintenance was critical for ensuring safe and efficient operations. Proper training programs enhanced the professional qualities and competence of maintenance personnel (Hampson & Fraser, 2016; Gorbachev et al., 2019). Effective training reduced human error rates in complex systems and ensured new employees were well-prepared for their roles (Tanev, 2021; Jiang et al., 2016). Individual

assessment further enhanced safety management by evaluating the competency of maintenance personnel (Chen et al., 2011; Ma et al., 2021). Improved assessment processes could significantly reduce maintenance errors and improve performance (Güneş et al. 2020).

2.5.4 Workspace design in maintenance area

Ergonomically designed maintenance facilities improved accuracy and reliability by optimizing work area efficiency and minimizing distractions (Poerwanto 2013). Proper workspace design considered human factors, including layout, equipment positioning, and tool flow, which were critical for technician efficiency and error reduction (Rantanen et al., 2003; Skilling, 2016). A conducive working environment, free from noise and equipped with quality tools, was essential for accurate maintenance tasks (Jaiswal et al. 2020).

2.6 Research framework

This study showed how personnel experience, training and assessment, and workspace design impact safety awareness among aircraft maintenance personnel in Malaysia. Based on an extensive literature review, this section described the research framework as shown in figure 2.1. The research framework had four variables: Personnel safety awareness was the dependent variable in this study, while personnel experience, training and assessment, and workspace design were the independent variables.

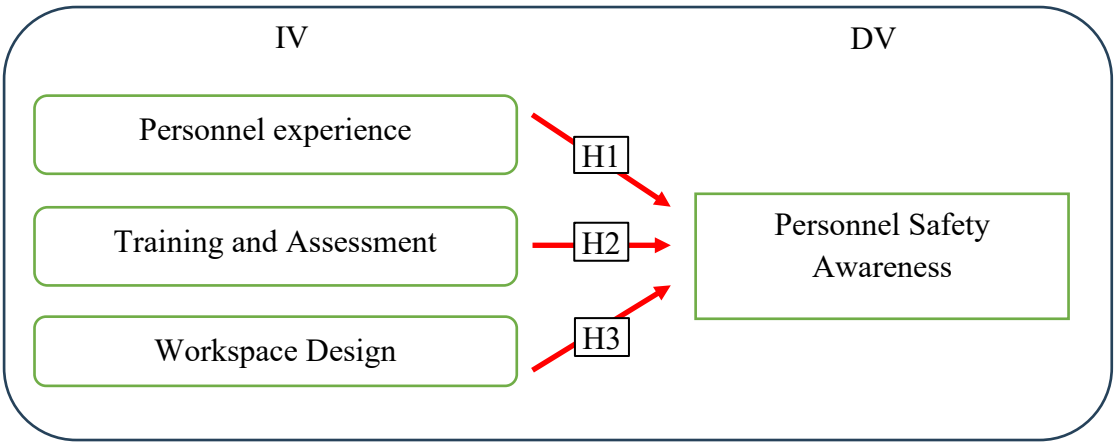

Figure 2.1
Research framework

2.7 Hypothesis development

A number of hypotheses were developed by the researchers, which could be put to the test when the objectives of the study, research questions, and literature review had been completed. All of the elements that were investigated, including known facts, potential solutions, and predicted results, all had an impact on the significance of the research hypothesis. By providing responses to questions and hypotheses, the researcher was able to make the objectives of the study more transparent and specifically defined. The hypothesis was a clear statement about what was going to be investigated. It should be specified prior to conducting research and openly stated when reporting the findings (Prasad et al., 2001). Hypotheses could be expressed in terms of a relationship between two variables, such as a numerical variable and a binary variable, to investigate the difference between the two groups based on the numerical variable (Shahbaba, 2012).

2.7.1 The relationship between maintenance personnel experience and personnel safety awareness

Individual experiences in aviation could influence perceptions of safety, affecting decisions made by both professionals and the general population (Mauro, 2019). Franjić (2019) found that experienced engineers constantly wrought on design improvements for safety and efficiency, making aircraft easier to fly and maintain. According to Higton (2005), in his study of aviation safety lessons, he identified that experienced, technically competent individuals with the best equipment still featured far too frequently in accident statistics, leading to the establishment of human factors as a key safety tool in aviation. Pettersen and Aase (2008) revealed that experience, practical skills, support from colleagues, and flexibility in problem solving were important for safe work practices in aviation line maintenance operations. According to Gill and Shergill (2004), experienced aviation personnel had an extensive range of knowledge and expertise crucial for guaranteeing the safety and effectiveness of operations. They had the ability to handle various situations and emergencies effectively, as they had encountered and dealt with similar scenarios in the past. The level of knowledge and experience of maintenance personnel was a significant aspect that influenced the cost of direct maintenance for organisations. They also observed that aircraft maintenance engineers appeared committed to operational standards and procedures, but more work was needed to improve the safety culture in the aviation industry.

H0: Personnel experiences has no relationship with personnel safety awareness.

H1: Personnel experiences has relationship with personnel safety awareness.

2.7.2 The relationship between training, assessment and personnel safety awareness

A training program to improve situational awareness in aircraft maintenance at both the individual and team levels was recommended (Endsley & Robertson, 2000). Karanikas, Melis, and Kourousis (2017) conducted a survey assessing the balance between safety and productivity, revealing that human factors training and safety communication were crucial in enhancing safety awareness and productivity. The study underscored the importance of training programs in raising awareness about human factors and safety rules, thereby improving safety and productivity in the aircraft manufacturing environment. Wang, Jiang, and Blackman (2021) highlighted the link between emotional intelligence (EI), situational awareness, and safety training. Their study indicated that EI can enhance safety performance, particularly when safety training is perceived as inadequate. This suggested that training programmed that developed EI among aviation personnel could lead to better situational awareness and safety performance. Researched evaluating CRM training programmed, such as the studied by Salas, Burke, Bowers, and Wilson (2001), had shown that these programs generally produced positive reactions, enhanced learned, and promote behavioral changed conducive to safety. However, the impact of CRM on organizational safety metrics, liked accident rates, was harder to ascertain, underscoring the needed for more comprehensive, multilevel evaluation efforts to determine the true effectiveness of CRM training in improved safety outcomes. In summary, the relationship between training programs, assessments and personnel safety awareness in aviation was crucial. Training initiatives, especially those based on CRM principles, played a vital role in enhanced safety awareness, communication, teamwork, and decision-made skills among aviation personnel. These programs was instrumental in promoting a safety

culture that minimizes errors and enhances operational efficiency within the aviation sector.

H0: Training and assessment has no relationship with personnel safety awareness.

H1: Training and assessment has relationship with personnel safety awareness.

2.7.3 The relationship between workspace design and personnel safety awareness

According to Imrhan (1991), workspace design for maintenance activities emphasized human visual access, physical access, mobility, and physical strength and endurance, which could contribute to safety awareness in aviation. Tight spaces in aviation workspaces could affect the quality of workmanship and safety of the aircraft, depending on worker fitness (Harridon, 2018). Mulder et al. (2017) found that ecological interface design, using automation tools and novel visualizations, can enhance situational awareness and decision-making for aviation operators. Pettersen and Aase (2008) believed that safety in aviation line maintenance operations was rooted in practical skills, support from colleagues, the creation of performance spaces, and flexibility in problem-solving. Rolfe (1972) determined that ergonomics could contribute to understanding aviation accidents by highlighting human limitations and potential safety improvements. Ergonomic design in workplaces, equipment, and tools can reduce workplace injuries and improve safety, but it requires collaboration between various disciplines and organizations ('Workspace, Equipment and Tool Design,' 1991).

H0: Workspace design has no relationship with personnel safety awareness.

H1: Workspace design has relationship with personnel safety awareness.

2.8 Summary

Individual experiences, training and assessment, and workspace design played interconnected roles in promoting personnel safety awareness in the workplace. Personnel experiences influenced perceptions, attitudes, and safety awareness behaviors. Past experiences, including near-miss incidents, accidents, and safety training, influenced how individuals perceived risks, prioritized safety, and responded to safety-related challenges in the workplace. Hands-on experiences, observational learning, and feedback mechanisms provided opportunities for individuals to learn from their experiences, reflect on safety lessons, and develop proactive strategies for risk prevention.

Training and assessment were essential for enhancing safety awareness and providing employees with the knowledge, skills, and resources necessary to identify hazards, assess risks, and implement safe practices. Training and assessment also promoted a culture of continuous learning, encouraged active participation, and reinforced safety messages through positive reinforcement and ongoing feedback. Workspace design encompassed the physical layout, arrangement, facilities, and ergonomic considerations within the work environment. A well-designed workspace also prioritized employee health and safety by minimizing hazards, providing an ergonomic atmosphere, and ensuring adequate safety equipment. An optimal workspace design enhanced employee comfort, reduced the risk of accidents and injuries, and fostered a positive safety culture.

CHAPTER 3:

METHODOLOGY

3.0 Introduction

This chapter explained the methods used and how the study was conducted, including the methods and techniques used in the data collection process. In addition, several topics were covered, including the research design, population, sampling technique, and unit of analysis. The next step was to design the questionnaire, which was a research step that described the data collection strategy and data analysis technique, followed by a chapter summary.

3.1 Research design

Research design was the conceptual blueprint within which the research was conducted, outlining the collection, measurement, and analysis of data to answer the research question (Akhtar, 2016). Research design was a systematic approach to problem-solving, thinking, and learning that employed statistical design and analysis to achieve clearly defined objectives (Salkind, 2010). This study employed a quantitative approach to examine the impact of personnel experience, training and assessment, and workspace design on personnel safety awareness. The quantitative method explored the ways in which different theories were connected to one another and gathered information using a numerical system. A quantitative method was chosen because it could reach more people than a qualitative one (Bell et al., 2022). This study used Pearson Correlation and Regression Analysis, taking into account both the independent and dependent variables. Correlation analysis quantified the strength of an association between two

quantitative variables, while regression analysis described the relationship between these variables (Pandey, 2020). This research used hypothesis testing to describe the impact of personnel experience, training and assessment, and workspace design on safety awareness among aircraft maintenance personnel in Malaysia.

3.2 Population, sample and sampling technique and unit of analysis

The population researched in this study was the helicopter maintenance company Gading Kasturi Sdn Bhd. (GKSB), as the data was collected from personnel working in aircraft maintenance field. The researcher planned to communicate with the Gading Kasturi management team to determine the appropriate sample size for the target population and collect information about the target population's specific characteristics.

Singh (2003) revealed that simple random sampling was the most common method for selecting a sample from a population, as it ensured equal chances of selection for all units in the population. Latpate et al. (2021) believed that simple random sampling was useful when the population was homogeneous, as every unit had an equal probability of selection. The researcher employed probability sampling, which was essentially simple random sampling in which maintenance personnel were chosen completely at random and had an equal chance of being selected.

3.3 Questionnaire design

The online survey's questionnaire aimed to address the objectives and hypotheses of the study. This research study employed validated questionnaires to examine the impact of personnel experience, training and assessment, and workspace design on safety awareness among aircraft maintenance personnel in Malaysia. The questionnaire used for this study was obtained from previous studies that had been conducted. The

questionnaire employed a repeated measures design, with several questions about the same issue. The questions were arranged to begin with general questions about safety awareness in aviation. The questionnaire was divided into two sections, one of which addressed socio-demographic aspects. Part A of the questionnaire focused on the respondents' socio-demographics, specifically their history and work experience. Then, Part B discussed characteristics, specifically personnel experience, training and assessment, and workspace design. Likert scales were frequently used in educational and social sciences research due to their validity, reliability, and ease of use (Joshi et al., 2015).

Table 3.1
Construct and sources

Variables	Number of items	Scales	Sources
Demographics	6	Close ended	(Acharya, 2010)
Characteristics	4	Likert scale	(Nemoto & Beglar, 2014)

3.4 Research measurement

The main technique for measuring items in a questionnaire was the Likert scale. A one out of five ordinal scale was used to record responses from respondents. Each scale had a unique value between 1 and 5, where 1 indicated strongly disagree and 5 indicated strongly agree. To select the appropriate analysis method, the level of measurement had to be determined. There were appropriate and inappropriate ways to perform each type

of measurement. Integers could be sorted in either ascending or descending order to sort or rate data using an ordinal scale. The numbers assigned to important items (1, 2, 3, 4, 5) did not correspond to equal distances between scales, nor did they represent exact quantities. They just put a number on the label. Researchers could use a Likert scale to measure the following:

Table 3.2
Questionnaire likert scale

Item	Strongly disagree	Disagree	Moderate	Agree	Strongly agree
Scale	1	2	3	4	5

3.5 Data collection strategy

To collect empirical data from aircraft maintenance personnel, the researcher decided to distribute online questionnaires to both morning and evening shifts, as well as staff working in the hangar during office hours. The researcher used an online survey to collect data from aircraft maintenance personnel at GKSB to test the proposed framework. The researcher used Google Forms to create the online survey. Online surveys provided a URL address after creating the questionnaire. An introductory message for participation in the survey with a URL link was sent via social media (WhatsApp) to the phone numbers of individuals and groups. This online survey was flexible because, to answer the questionnaire, respondents just needed to click on the "URL link," which directed them to the online questionnaire. Finally, after completing the survey, participants needed to click on the "submit" button, and the researcher

received the survey in the database. To get more feedback, the researcher met with the maintenance staff during breaks and after work. An introductory message explained to the participants the objective of the study and also mentioned that their answers would be kept private and confidential. The researcher only asked about the progress of the survey during contact at the maintenance personnel's workplace. Participating in this study was free of coercion or influence

3.6 Data analysis technique

The data that had been collected was downloaded to an Excel sheet. The next step was to choose the right statistical tool and use it to visualize the data. For analysis, version 28.0 of Statistical Package for the Social Sciences (SPSS) was used. SPSS was useful for analyzing technical data in social science research, such as survey research and market analysis, due to its simple use, familiarity, and practicality (Gogoi, 2020). The online questionnaire from Google Form was examined periodically during the data collection period to determine the current number of replies. The obtained data was entered into SPSS 28.0, and the previously downloaded data was summarized, analyzed, and interpreted to achieve the research's objectives. As a result, the research findings' issues could be addressed and replied to with exact information.

Cronbach's was used to find out the credibility of this questionnaire. Cronbach's alpha was used to determine the reliability of questionnaires in social and organizational sciences (Bonett & Wright, 2014). Coefficient alpha was a measure of how well the items in a set were related to each other (Cortina, 1993). The data was then analyzed using descriptive analysis. The purpose of descriptive analysis was to determine how to count and interpret the data based on how it was conveyed. Descriptive analysis

analyzed socio-demographic and independent variables, as well as dependent variables. Categorical variables had been analyzed used frequencies and percentages, whereas continuous variables had been analyzed used the mean and the standard deviation (SD). Additionally, correlation and regression analysis had been used together to answered the problem. These had been chosen because they were the best fit for the objectives of this researched. Analysis aids could been used to identified relationships between explanatory and explained variables. Simple linear regression was used to identify a linear relationship between one or more factors (Maulud & Abdulazeez, 2020). During this studied, the researcher was able to collected a total of 40 respondents who worked in shifted A, B, and hangar maintenance at the GKSB company

3.7 Chapter summary

Throughout the study, this chapter examined how to figure out the relationship between the dependent variable and the independent variable. This chapter discussed statistical analysis techniques for analyzing data and testing the validity and reliability of the gathering process. It also discussed research measurements, instruments, and questionnaire design. The data analysis and findings were revealed in the next chapter.

CHAPTER 4:

DATA ANALYSIS

4.0 Introduction

This chapter presents the study's findings, conducted using the current application version. The first section discussed the respondents' profiles based on frequency. The next section described normality analysis, reliability analysis, variable correlation, regression, and coefficients, highlighting the critical success factors for each analysis. This chapter also contained an outline for Cronbach's alpha analysis and the inferential analysis that used Pearson correlation and multiple regression to test the study's main hypothesis. The chapter concluded with a discussion of the critical success factors and their impact on the study's results.

4.1 Objective 1: Profile of the respondents

This section described the background of the respondents of this study. It explained the background of the respondents, including gender, age, position, work experience, and the total number of companies they had worked for before. As shown in Table 4.1 and from the analysis using SPSS, the frequency results showed the distribution of gender. Results revealed that 2 of the respondents were female (5.0%) and 38 (95.0%) were male. The statistics showed that the majority of the respondents were male. Moreover, the results showed that the highest age group was between 31 to 40 years, representing 17 respondents, which was 42.5 percent. Following that, the frequency results showed that the age group between 26 to 30 years had 13 respondents, which accounted for 32.5

percent. Next, the 50 and above age group consisted of 4 respondents, which was 10.0% of the sample.

The statistics revealed that 24 respondents, or 60% of the total, were technicians. Following that, 9 of the 40 respondents were maintenance inspectors/supervisors, which was 22.5%. There were a total of 17 individuals, accounting for 42.5% of the respondents, who had between 11 and 20 years of experience. Additionally, there were 10 individuals, making up 25% of the respondents, who had 4–10 years of experience. The remaining 10 people had 1-3 years of experience, which was 25%, and 3 people had the most experience, which was more than 21 years, accounting for 7.5%. For those who worked for more than 3 companies, there were 18 people, which was 45%, while those who worked with 2 companies numbered 13, which was 32.5%, and the rest, who worked for only one company, numbered 9, comprising 22.5%.

Table 4.1
Profile of the respondents

Socio-demographic	Category	Frequency	Percent (%)
Gender	Male	38	95.0
	Female	2	5.0
Age	20-25	5	12.5
	26-30	13	32.5
	31-40	17	42.5
	41-50	1	2.5
	50 and above	4	10.0
Position	Technician	24	60.0
	Maintenance Inspector / Supervisor (MI/S)	9	22.5
	Others	7	17.5
Work experience (years)	1-3	10	25.0
	4-10	10	25.0
	11-20	17	42.5
	More than 21	3	7.5
Total company working	1	9	22.5
	2	13	32.5
	3 and more	18	45.0

4.2 Objective 2: Correlation analysis between variables

Table 4.2
Correlation analysis SA-PE

Correlations			
		SA	PE
SA	Pearson Correlation	1	.583**
	Sig. (2-tailed)		.001
	N	40	40
PE	Pearson Correlation	.583**	1
	Sig. (2-tailed)	.001	
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			

The diagram showed the relationship between personnel experience and personnel safety awareness. Since P (0.001) < α (0.05) and the reading was smaller than 0.05, it meant that the result was significant. Therefore, there was a relationship between them. The conclusion was that personnel experience and personnel safety awareness had a positive relationship. Pearson correlation was performed to determine the relationship between them. According to the table, there was a positive correlation between personnel experiences and personnel safety awareness ($p = 0.001$, $r = 0.583$). The result indicated that personnel experience was related to personnel safety awareness, as demonstrated by this relationship.

Table 4.3
Correlation analysis SA-TA

Correlations			
		SA	TA
SA	Pearson Correlation	1	.603**
	Sig. (2-tailed)		.001
	N	40	40
TA	Pearson Correlation	.603**	1
	Sig. (2-tailed)	.001	
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			

The diagram showed the relationship between training, assessment, and personnel safety awareness. Since P (0.001) < α (0.05) and the reading was smaller than 0.05, it meant that the result was significant. Therefore, there was a relationship between them. The conclusion was that training and assessment had a positive relationship with personnel safety awareness. Pearson correlation was performed to determine the relationship between them. According to the table, there was a positive correlation between training, assessment, and personnel safety awareness ($p = 0.001$, $r = 0.603$). The result indicated that training and assessment were related to personnel safety awareness, as demonstrated by this relationship.

Table 4.4
Correlation analysis SA-WD

Correlations			
		SA	WD
SA	Pearson Correlation	1	.465**
	Sig. (2-tailed)		.003
	N	40	40
WD	Pearson Correlation	.465**	1
	Sig. (2-tailed)	.003	
	N	40	40
**. Correlation is significant at the 0.01 level (2-tailed).			

The diagram showed the relationship between workspace design and personnel safety awareness. Since P (0.003) < α (0.05) and the reading was smaller than 0.05, it meant that the result was significant. Therefore, there was a relationship between them. The conclusion was that workspace design had a positive relationship with personnel safety awareness. Pearson correlation was performed to determine the relationship between them. According to the table, there was a positive correlation between workspace design and personnel safety awareness ($p = 0.003$, $r = 0.465$). The result indicated that workspace design was related to personnel safety awareness, as demonstrated by this relationship.

4.3 Objective 3: Regression analysis

Table 4.5
Regression analysis (model summary)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	3.043	2.734		1.113	.273	-2.501	8.587
	PE	.350	.115	.400	3.053	.004	.118	.583
	TA	.407	.199	.352	2.043	.048	.003	.811
	WD	.111	.156	.115	.711	.481	-.205	.426

a. Dependent Variable: SA

H1. Personnel experience has a significant impact on personnel safety awareness (P = 0.004, t = 3.053).

H2. Training and assessment has a significant impact on personnel safety awareness (P = 0.048, t = 2.043)

H3. Workspace design has a significant impact on personnel safety awareness (P = 0.481, t = 0.711).

Personnel experience (PE) and training and assessment (TA) were significant predictors of the dependent variable personnel safety awareness (SA) at the 0.05 significance level, indicating that changes in these predictors were associated with changes in safety awareness (SA). Workspace design (WD) was not a significant predictor, suggesting that changes in workspace design (WD) did not have a statistically significant impact on personnel safety awareness (SA). The intercept was not significant, which often suggested that the model without predictors would not significantly predict personnel safety awareness (SA)

CHAPTER 5:

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATION

5.0 Introduction

This final chapter will provide an explanation of the findings that were obtained from the analysis of this study. In the first section, we will talk about the findings of the study, and then we will provide a brief summary of the essential contributions that were made to the existing body of knowledge. A discussion of the limitations of this study and some suggestions for additional research are presented in the following section. The final part of this report is the conclusion, which will be attached to Section 5.6.

5.1 Discussion

Based on Figure 4.5, an unstandardized coefficient of 0.350 indicated that personnel experience had a positive influence on personnel safety awareness. According to this, it was anticipated that the level of safety awareness would increase by 0.350 units for every unit added to the amount of personnel experience, provided that all other variables remained unchanged. Among the independent variables that had an effect on safety awareness, the standardized coefficient (0.400) indicated that personnel experience had the greatest impact. This was the case when comparing the relative importance of the individual variables. As a result of the fact that the t-value (3.053) was significantly higher than 2, and the p-value (0.004) was lower than 0.05, it could be concluded that the impact of personnel experience on personnel safety awareness was statistically significant. With an unstandardized coefficient of 0.407, training and assessment also had a positive impact on personnel safety awareness. Under the

assumption that all other variables remained unchanged, it was suggested that an increase of one unit in training and assessment resulted in an increase of 0.407 units in personnel safety awareness. Training and assessment had a significant influence on personnel safety awareness, as demonstrated by the standardized coefficient (0.352), which indicated a significant impact. The t-value (2.043) was relatively close to 2, and the p-value (0.048) was lower than 0.05, which indicated that the impact of training and assessment on personnel safety awareness was statistically significant.

With an unstandardized coefficient of 0.111, workspace design had the least impact on personnel safety awareness of all the factors considered. Under the assumption that all other variables remained unchanged, this indicated that an increase of one unit in workspace design led to an increase of 0.111 units in personnel safety awareness. The standardized coefficient for workspace design was 0.115, which indicated that it had a relatively small impact on personnel safety awareness in comparison to the other variables. In light of the fact that the t-value (0.711) was lower than 2 and the p-value (0.481) was higher than 0.05, it could be concluded that the impact of workspace design on personnel safety awareness did not meet the criteria for statistical significance.

5.2 Summary of finding

This section provided an overview of the study's findings and discussed how they related to the three objectives of the research. In this study, the researcher put forward three separate research objectives, each of which was examined individually.

5.2.1 Personnel experience and personnel safety awareness

"The research's first objective was to determine the impact of personnel experience on personnel safety awareness. Regression analysis revealed a significant positive relationship between personnel experience and personnel safety awareness. The correlation analysis of explanatory variables (personnel experience) and explained variables (personnel safety awareness) revealed a significant positive relationship between them. This showed that individual experiences had an impact on personnel's safety awareness. Gill and Shergill (2004) revealed that experienced personnel had a wide range of knowledge and skills necessary to ensure safety and efficiency. Their experience in similar situations allowed them to handle a variety of emergencies. This study aligned with Mauro's (2019) findings that personal aviation experiences shaped safety senses, which in turn impacted decision-making by professionals and people in general.

5.2.2 Training, assessment and personnel safety awareness

The second objective was to determine the impact of training and assessment on personnel safety awareness. Regression analysis revealed a significant positive relationship between training, assessment, and personnel safety awareness. The correlation analysis of explanatory variables (training and assessment) and explained variables (personnel safety awareness) revealed a significant positive relationship between them. This showed that training and assessment were impacting personnel safety awareness. This explanation was supported by Endsley and Robertson (2000), who determined that a training program to improve situational awareness in aircraft maintenance at the individual and team levels was recommended. The survey

conducted by Karanikas et al. (2018) demonstrated that maintaining a balance between safety and productivity was essential. The study highlighted the importance of human factor training and safety communication in improving safety awareness and productivity. The study emphasized the significance of training programs in raising awareness of human factors and safety regulations. This was reinforced by Chen et al. (2011), who revealed that poor assessment of human error control in flight maintenance could affect flight safety.

5.2.3 Workspace design and personnel safety awareness

The last objective was to examine the impact of workplace design on personnel safety awareness. According to regression analysis, workspace design had the least significant relationship with personnel safety awareness. The correlation analysis of explanatory variables (workspace design) and explained variables (personnel safety awareness) revealed the least significant relationship between them. This was contrary to the findings of Mulder et al. (2017), who found that the layout of the interface environment, which incorporated new automation and visualization tools, could improve staff situational awareness and decision-making. Similarly, Rolfe (1972) showed that ergonomics could help understand aviation accidents by highlighting human limitations and the potential to improve safety.

5.3 Implication of the study

In addition to contributing to both theory and practice, the findings of this research also contributed to the overall body of knowledge. This study's theoretical contribution was to provide an understanding of how personnel experience, training and assessment, and workspace design impacted personnel safety awareness among GKSB maintenance

personnel. The study found that personnel experience, training, and assessment had a significant impact on personnel safety awareness. Nonetheless, the study found that workspace design had no significant impact on personnel safety awareness among GKSB maintenance personnel.

The findings had the potential to strengthen the empirical evidence of the impact of personnel experience, training and assessment, and workspace design on safety awareness among aircraft maintenance personnel. The results of this study would assist maintenance personnel in becoming more aware of their working activities and environment, as well as improving their knowledge of their job responsibilities. Based on this research, the factors that impacted safety awareness were identified, providing valuable information to Malaysia's aircraft maintenance personnel. Furthermore, this study benefited the management team by focusing on employee awareness and increasing their level of knowledge and safety awareness when working with aircraft. Organizations should thus have concentrated on enhancing personnel experience and offering specific training and evaluation to raise aircraft maintenance personnel's safety awareness. Although workspace design had less effect on its own, it should not have been overlooked in line with a general safety enhancement strategy. This study also helped other researchers gather information and use it as a guide or reference for their own future research.

Additionally, the findings of this study offered significant benefits to civil aviation personnel by highlighting effective strategies for improving safety awareness. By implementing the recommended practices, aviation personnel could enhance their understanding of safety protocols and reduce the risk of incidents. Increased safety awareness contributed to a safer work environment, ultimately benefiting public safety

and operational efficiency within the aviation sector. This study also provided a foundation for developing targeted training programs that could address specific areas of improvement, ensuring that all personnel were well-equipped to handle safety challenges effectively.

5.4 Limitations of the study

While conducting this study, some limitations had to be considered, such as the selection of companies with a small staff and limited work space at the Air Force College, Kepala Batas Kedah. As a result, the findings of this study could not be compared to those of other civil aircraft maintenance companies because the number of employees was small and the work space was limited, both of which had an impact on the study's outcomes. Furthermore, the data could not be collected completely because some staff had quit their jobs, reducing the number of respondents.

5.5 Recommendation for future research

This study made some recommendations for future research based on its limitations. It was suggested that researchers validate the number of responses from their sample of respondents. Researchers should have collected a larger number of responses for the study. They should have conducted studies in the private aviation sector, which is more open and diverse. More time and action were needed to reach respondents. Visiting aircraft maintenance hubs, particularly in the Klang Valley, was considered for more extensive and open research.

5.6 Conclusion

According to the respondent's profile, the percentage of maintenance personnel with at least 4 years of working experience was 75%, while the percentage of those who had worked for more than 2 companies was 77.5%. This indicated that individuals with professional experience were the intended participants for this study. Finally, this study examined how personnel experience, training and assessment, and workspace design impacted safety awareness among GKSB maintenance personnel. It explained that personnel experience, training, and assessment had a significant impact on aircraft maintenance personnel's safety awareness. However, the study concluded that workspace design had no significant impact on personnel safety awareness in this company. The researcher received a small number of responses, and the workspaces in the companies involved were very limited, which is why the workspace design characteristics were not significant. Nevertheless, it is crucial to recognize that while workspace design was not identified as a critical success factor in this study, its potential role should not be dismissed in broader contexts where workspace characteristics may be more varied and impactful.

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Appendix A

Questionnaire

Assalamualaikum,

Dear respondents,

I am Nurul Hadi Bin Abdul Halim, a student of the Master of Science (Transportation and Logistics Management) from the School of Technology Management and Logistics (STML), Universiti Utara Malaysia. I am conducting a survey on my master dissertation, and I humbly seek your kind cooperation to complete the questionnaire for my study. I would like to gather useful input on **The Impact of Critical Success Factors on Personnel Safety Awareness: A Case Study of Gading Kasturi Sdn Bhd, Malaysia.**

I'd appreciate your time completing this survey. The results and particulars that respondents provide are solely for academic purposes and will be kept private and confidential. Your sincerity in completing this questionnaire is appreciated. Thank you for your kind cooperation in making this research a success. It takes about 3-5 minutes to answer the questionnaires.

Yours sincerely,

Nurul Hadi Bin Abdul Halim 829549

Supervisor: Dr. Md Abdul Kafi

School of Technology Management and Logistics (UUM)

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS

Instruction: The following items are related to personal information and Socio-demographic characteristics. Please TICK (/) your response. Please answer the following items. Your personal information will be kept confidential.

1. Name ☐
2. Age ☐ 20-25 ☐ 26-30 ☐ 31-40 ☐ 41-50 ☐ 51 and above
3. Gender ☐ Male ☐ Female
4. Position ☐ Technician ☐ Maintenance Inspector MI/MIS ☐ Others
5. Aviation work experience (years) ☐ 1-4 ☐ 5-10 ☐ 11-20 ☐ More than 21
6. Total of aviation companies you've worked for ☐ 1 ☐ 2 ☐ 3 and more

SECTION B: CHARACTERISTICS

Please click that if your answer is

SD=Strongly Disagree (1), D=Disagree (2), M=Moderate (3), A=Agree (4), SA=Strongly Agree (5).

1. **Personnel safety awareness (SA)** (Padil et al., 2018).

   SA1: Maintenance personnel showed a high level of awareness of potential workplace hazards.

   SA2: Maintenance personnel took a proactive approach to identifying and addressing any safety issues.

   SA3: Maintenance personnel immediately reported safety concerns and near misses to supervisors.

   SA4: Maintenance personnel believed safety awareness enhanced aircraft maintenance operations.

   SA5: Maintenance personnel were committed to improving workplace safety.

2. **Personnel experiences (PE)** (Ayim Gyekye & Salminen, 2010).

   PE1: Working for several companies had increased my safety awareness.

PE2: Years of experience strengthened maintenance personnel's situational awareness of aircraft systems.

PE3: Previous experiences helped aircraft maintenance personnel identify potential hazards.

PE4: Previous experience enabled maintenance personnel to resolve issues quickly and accurately.

PE5: Experience helped maintenance personnel anticipate and resolve issues, making the workplace safer.

3. **Training and assessment (TA)** (Padil et al., 2018).

TA1: E-learning assessments had a positive impact on maintenance personnel.

TA2: Technical writing was emphasized in assessment and training.

TA3: The annual assessment was conducted at an appropriate and suitable time.

TA4: The competency training was sufficient and influenced maintenance personnel's awareness.

TA5: Training and assessment improved maintenance personnel's awareness of their surroundings.

4. **Workspace design (WD)** (Padil et al., 2018).

WD1: The maintenance area had clear markings and zones for different operations to enhance safety and awareness.

WD2: In the maintenance area, access to fire extinguishers and emergency response kits improved safety confidence.

WD3: My workspace design promoted a safety culture among maintenance staff.

WD4: My workspace was designed in a way that made it easy to see any possible hazards, making me more aware.

WD5: I was confident in the safety standards of the maintenance workspace.

Appendix B

Survey Permission

04 June 2024

Mohamad Amirul Bin Buhari
Senior Maintenance Manager
GKSB Sdn. Bhd.
d/a Cawang Kejuruteraan,
Kolej Tentera Udara,
06200 Kepala Batas Kedah.

REQUEST FOR PERMISSION TO CONDUCT A SURVEY AT GKSB SDN. BHD.

Dear Sir,

I hope this message finds you well. My name is Nurul Hadi bin Abdul Halim, and I am conducting a research survey on aircraft maintenance. I am writing to request permission to conduct a survey at your company from June 4th until June 28th, 2024.

The survey's goal is to examine " The Impact of Critical Success Factors on Personnel Safety Awareness: A Case Study of Gading Kasturi Sdn Bhd". The survey will take approximately 3-5 minutes to complete and will involve an aircraft maintenance technician and a maintenance inspector or supervisor (MI/MIS).

The results and particulars that respondents provide are solely for academic purposes and will be kept private and confidential. Please let me know if you have any questions or need further information. Thank you for considering my request.

Best regards,

Nurul Hadi Bin Abdul Halim (829549)
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