SAFETY MANAGEMENT PRACTICES AND RADIATION SAFETY AWARENESS AMONG MALAYSIAN AIR DEFENCE ARTILLERY RADAR COURSE STUDENTS

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ABSTRACT

This study aimed to determine the relationship between safety management practices, such as Management Commitment, Safety Training, Operator's Involvement, Safety Communication and Feedback, Safety Rules and Procedures, and Safety Promotion Policies, and radiation safety awareness among students of the Malaysian Air Defence Artillery Radar Course. A total of 148 questionnaires were distributed to respondents selected using simple random sampling from a population of 230 students in the radar course. The data obtained from the questionnaires were analyzed using correlation analysis with the Statistical Package for Social Science (SPSS) Version 27. The study aimed to fill a knowledge gap in understanding how the safety management practices influence radiation safety awareness in a specific context. In this study, strong positive correlations were found between safety management practices such as management commitment, safety training, and operator involvement and radiation safety awareness among ADA Radar Course students, highlighting the critical role these practices play in enhancing radiation safety awareness. Despite some limitations, the study contributes to the understanding of the relationship between safety management practices and radiation safety awareness among students in this specific context.

Keywords: Safety management practices, radiation safety awareness, air defence artillery, radar course students

ABSTRAK

Kajian ini bertujuan untuk menentukan hubungan antara amalan pengurusan keselamatan seperti Komitmen Pengurusan, Latihan Keselamatan, Penglibatan Operator, Komunikasi dan Maklum Balas Keselamatan, Peraturan dan Prosedur Keselamatan, serta Polisi Promosi Keselamatan dengan kesedaran keselamatan radiasi dalam kalangan pelajar Kursus Radar Artileri Pertahanan Udara Malaysia. Sebanyak 148 soal selidik telah diedarkan kepada responden yang dipilih daripada kursus radar menggunakan persampelan rawak mudah dari saiz populasi 240 pelajar. Data yang diperoleh daripada soal selidik dianalisis menggunakan analisis korelasi dengan Pakej Statistik untuk Sains Sosial (SPSS) Versi 27. Kajian ini bertujuan untuk mengisi jurang pengetahuan dalam memahami bagaimana amalan pengurusan keselamatan mempengaruhi kesedaran keselamatan radiasi dalam konteks tertentu. Dalam kajian ini, didapati terdapat korelasi positif yang kuat antara amalan pengurusan keselamatan seperti komitmen pengurusan, latihan keselamatan, dan penglibatan operator dengan kesedaran keselamatan radiasi dalam kalangan pelajar Kursus Radar ADA, menekankan peranan kritikal amalan-amalan ini dalam meningkatkan kesedaran keselamatan radiasi. Walaupun terdapat beberapa limitasi, kajian ini menyumbang kepada pemahaman tentang hubungan antara amalan pengurusan keselamatan dan kesedaran keselamatan radiasi dalam kalangan pelajar dalam konteks yang khusus ini.

Kata kunci: Amalan pengurusan keselamatan, kesedaran keselamatan radiasi, artileri pertahanan udara, pelajar kursus radar.

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May Allah S.W.T repay all your kindness and bless you. Amin.

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LIST OF ABBREVIATIONS

ADA	-	Air Defence Artillery
DV	-	Dependent Variable
IV	-	Independent Variable
DOSM	-	Department of Statistics Malaysia
DOSH	-	Department of Occupational Safety and Health
OSH	-	Occupational Safety and Health
OSHA	-	Occupational Safety and Health Act
SPSS	-	Statistical Package for the Social Sciences

CHAPTER 1
INTRODUCTION

1.1 Background of the Study

The increasing use of non-ionizing radiation, especially in military radar systems, has become a significant concern in public and academic discussions. The term "radiation" refers to a broad range of energy forms, including X-rays, many of which have been linked to human health problems (Bobrow, 1993). According to Kew et al. (2012), the widespread usage of ionizing and non-ionizing radiation has raised concerns about the dangers of radar radiation exposure in the medical sector. However, for our research, there is insufficient focus on how radiation exposure affects the military, particularly involving the students in the Malaysian Air Defence Artillery (ADA) Radar Course. These students face unique risks due to their specialized training and work environments, which differ significantly from other military branches such as infantry, armor, and aviation. This is akin to the healthcare sector, where radiologists are more prone to radiation exposure than other healthcare workers (Subedi et al., 2014).

All personnel in ADA radar troops are at risk of direct or indirect radar radiation exposure. Mojiri and Moghimbeigi (2011) assert that occupational radiation protection is essential not only for individuals permanently working in diagnostic imaging suites but also for those who may occasionally be in radiation environments. This scenario is comparable to the medical industry, where medical radiographers are exposed to long-term health risks such as cataract development, cancers, and brain tumors, even with delayed incidents (Dehghani et al., 2014). Furthermore, studies show that nurses working in radiology premises have a 40% higher chance of developing cataracts (Shah,

2016). This is similar to ADA radar troops, where radar radiation does not discriminate between radar troops and any nearby individuals.

The study will also closely examine the impact of non-ionizing radiation on the health of ADA Radar Course students, focusing on both stochastic effects (such as cancer, which do not depend on the dose) and deterministic effects (like skin burns, which depend on the dose) according to Repacholi (1998). This aspect is critical as the health effects of radiation exposure in this specific group are less explored compared to well-researched fields like medical radiography (Dehghani et al., 2014). Understanding these health impacts is vital for developing effective safety management practices and enhancing radiation safety awareness among these students.

Observations among students attending the course reveal a significant gap in their knowledge and awareness about radiation safety and its practice. Initial talks and an interview conducted with PUSARTI's Commandant, Lt Kol Ridzuan bin Hj Abd Aziz, indicated a lack of proper knowledge about radiation safety among radar troops, especially new students. He believes that better education and improved safety rules could significantly enhance radiation safety awareness and practices.

The research aims to assess the level of radiation safety awareness and knowledge among students in the Malaysian Air Defence Artillery (ADA) Radar Course and investigate the link between Safety Management Practices (IV) and Radiation Safety Awareness (DV) among these students. This study is significant as it addresses the understanding and awareness of radiation safety in a specific military training context, which has not been extensively explored. The goal is to determine whether the current safety

management approaches are adequately equipping students with the necessary awareness and preparedness to handle radiation safety effectively.

According to the International Atomic Energy Agency (IAEA), Yamada et al. (2022), and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR, 2022), there were 24 million procedures utilizing radiation fluoroscopy in 2020, a six-fold increase in just 12 years. The complexity of interventional treatments has increased over time, possibly necessitating longer radiation exposure times and larger radiation dosages. Occupational radiation protection (RP) is a concern in this setting (Hammami et al., 2021).

Figure 1.1 shows the statistic from 2017 to 2023, where the Malaysian Army reported numerous work-related accidents resulting in injuries and fatalities. However, these reports have limited, or no incidents related to radiation exposure, suggesting either the absence of such cases or that the effects of radiation are not currently evident. This gap in incident reporting highlights the need for focused research on radiation safety, especially for military personnel operating radar systems.

This study will investigate various points of Safety Management – including management commitment, the effectiveness of safety training, the degree of student involvement in safety matters, the quality of safety communication and feedback mechanisms, compliance with established safety rules and procedures, and the implementation of safety promotion policies. This study is particularly significant because it addresses the understanding and awareness of radiation safety among these students, focusing on their knowledge of radiation risks, their attitudes towards these

risks, and their corresponding actions. This aspect is crucial, as the potential health effects of non-ionizing radiation exposure in this specific military training context have not been as extensively explored as in more commonly studied fields like medical radiography. The goal is to determine whether the current safety management approaches are adequately equipping students with the necessary awareness and preparedness to handle radiation safety effectively.

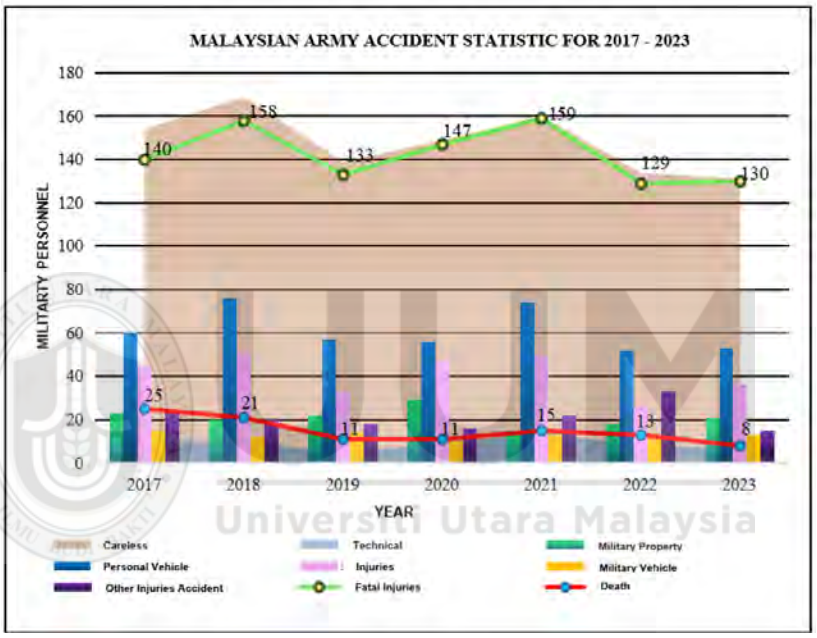


Figure 1.1.1
Malaysian Army Accident Statistics for 2017-2023

1.2 Problem Statement

The contemporary utilisation of non-ionising radiation, particularly within military radar systems, has emerged as a prominent concern in both public discourse and academic spheres. The term "radiation" encompasses a spectrum of energy forms, including X-rays, many of which are associated with adverse health effects (Kew et al., 2012). While the extensive application of ionising and non-ionising radiation has engendered concerns regarding radiation exposure, the military domain, notably the

Malaysian Air Defence Artillery (ADA) Radar Course, remains relatively understudied, warranting focused investigation. This research seeks to address this gap, given the distinctive risks that ADA Radar Course students face within their specialized training and operational environments, which diverge significantly from other military branches such as infantry, armour, and aviation. ADA radar personnel, including students undergoing training, are potentially susceptible to direct or indirect exposure to radar radiation, posing inherent risks to their health and well-being. Similar to the medical field, where radiologists face heightened vulnerability to radiation exposure compared to other healthcare professionals, radar operators within the ADA confront comparable risks due to their routine exposure to radar radiation.

The US military employs various sources of both ionizing and non-ionizing radiation. Military personnel may be exposed to radiation during operations from sources such as nuclear weapons, dirty bombs, or other devices (Mettler & Upton, 2008). The effects of radiation on personnel, equipment, and structures, whether in space, on land, or in water, are significant concerns for military planners. To address these issues, the military employs a substantial number of military, civilian, and contract personnel. Annually, the U.S. military screens around 70,000 Operators, or approximately 2% of its workforce, for ionizing radiation exposure at work (Council, 2006).

According to Hamada & Fujimichi (2014), the evolving understanding of radiation effects requires a multidimensional approach to radiation safety management, particularly within specialised sectors such as military radar operations. This approach should include implementing robust safety management practices and ongoing education and training initiatives to enhance radiation safety awareness among

personnel. They are integrating insights from research on radiation effects classification and dose limitation strategies and empirical findings from the current study on perceptions of safety management practices and radiation safety awareness among Malaysian Air Defence Artillery radar course students. However, despite the acknowledged risks, research delineating the specific impacts of radiation exposure within this military cohort remains limited, contrasting with the extensive literature available in medical radiography.

Observations and insights obtained from discussions with relevant authorities, including Lt. Col. Ridzuan bin Hj Abd Aziz, the Commandant of PUSARTI, confirm a lack of awareness regarding radiation safety among radar troops, particularly incoming students. Lt. Col. Ridzuan bin Hj Abd Aziz emphasizes the potential for significant improvements in radiation safety awareness and practices among students, stressing the importance of a comprehensive understanding and adherence to safety protocols. This deficiency is also evident from discussions with Lt. Col. Ridzuan bin Hj Abd Aziz and the evaluation reports conducted at the end of each course. The evaluation reports, entitled "Laporan Evaluasi Tamat Kursus Radar Meningkat Pertahanan Udara, 2023," provide qualitative data on the effectiveness of radiation safety training and the level of understanding and compliance among course participants. These reports serve as tangible evidence of the existing gap in radiation safety awareness among radar course students at PUSARTI. The report analyzes the extent to which radar course students adhere to established radiation safety protocols and procedures, comparing observed behaviors against established standards or best practices in radiation safety. The lack of radiation safety awareness among course participants poses significant risks to their health and well-being, as well as to others

who may be exposed to radiation in their operational environments. Insufficient awareness and adherence to safety protocols lead to an increased risk of accidental exposure to harmful radiation levels, which could result in potential long-term health consequences.

Moreover, there is a critical need to evaluate the current protocols, promotion policies, and communication strategies within the ADA Radar Course environment to enhance radiation safety (Ploussi & Efstathopoulos, 2016). This evaluation will focus on understanding the comprehensiveness and effectiveness of existing safety rules and procedures, promoting a proactive culture of safety awareness, and establishing robust channels for effective communication and feedback. By examining adherence to established protocols, assessing the effectiveness of promotion policies in encouraging proactive safety practices, and evaluating the clarity and responsiveness of communication channels, this research aims to identify areas for improvement and refinement to ensure the highest level of safety for ADA Radar Course students and personnel.

Thus, this research aims to investigate the correlation between Safety Management Practices (IV) and Radiation Safety Awareness (DV) among students attending the Malaysian Air Defence Artillery Radar Course. By identifying existing shortcomings in safety management practices and radiation safety awareness, this study seeks to provide valuable information for implementing targeted interventions that will strengthen safety protocols and enhance the level of awareness among ADA Radar Course students, consequently reducing the risks associated with radiation exposure. Through empirical inquiry and analysis, this research offers practical insights to

improve safety management practices and radiation safety awareness within the ADA Radar Course context, with wider implications for military occupational health and safety protocols.

This issue consistently emphasizes the importance of safety management practices in ADA radar troops and their correlation with radiation safety awareness. A study on individuals operating high-power radar transmitters, who are regularly exposed to their transmissions, found no evidence of harm attributable to radiating microwaves. Both ionizing and non-ionizing radiation can have direct somatic effects on the exposed individual and genetic consequences that indirectly affect the individual's offspring. Low-dose radiation increases the risk of genetic defects, cancer, and leukemia (late somatic effects). Monitoring the health of individuals exposed to high doses of radiation is crucial for evaluating radiation risks.

As the development of increasingly powerful transmitters continues, it is essential to improve the accuracy and sophistication of human tolerance assessments. This study aims to clarify safety management techniques in the ADA radar environment and enhance radiation safety awareness from a radar perspective. It outlines several potential solutions to the problem from both technological and regulatory standpoints. While the study is relevant to all military teams, it is specifically prepared on behalf of the radar community, advocating for radar safety and addressing current efforts and potential future actions to ensure safety in this field.

1.3 Research Objectives

The main goal of this research is to examine the safety management practices in ADA radar troops and their relationship to radiation safety awareness. To achieve this, the following objectives have been formulated:

RO1: To assess the Level of Safety Management Practices among ADA Radar Course Students.

RO2: To measure the Level of Radiation Safety Awareness among ADA Radar Course Students.

RO3: To Examine the Relationship between Safety Management Practices and Radiation Safety Awareness among ADA Radar Course Students.

This objective is crucial to our research, where we explore how aspects of Safety Management Practice (IV) impact Radiation Safety Awareness (DV). The study will investigate how various elements of safety management, such as the effectiveness of training programs and the extent of management's commitment, are associated with the students' knowledge, attitudes, and practices in relation to radiation safety.

1.4 Research Questions

The research questions are the foundational core of this research project which are emphasizing on the study, determining the methodology and showing all steps of inquiry, analysis and reporting. In the context of this research, they will provide bigger view on the correlation of the safety management practices towards radiation safety

awareness. Hence, from the independent variable and dependent variable, the Research Questions (RQs) that have been developed in this study are:

RQ1: What is the level of Safety Management Practices in ADA radar course students?

RQ2: What is the level of Radiation Safety Awareness in ADA radar course students?

RQ3: Is there any relationship between Safety Management Practices and Radiation Safety Awareness among ADA Radar Course Students?

1.5 Significance of the Study

The significance of this study lies in its potential to advance both theoretical understanding and practical application of radiation safety management within military contexts, particularly among Malaysian Air Defence Artillery (ADA) radar course students. By addressing critical gaps in the existing literature related to safety management practices and radiation safety awareness, this research aims to provide novel insights into the dynamics of this specialized military environment.

This study will contribute to the field by identifying current challenges and deficiencies in safety management practices and radiation safety awareness among ADA radar course students. By filling these gaps, the research will enhance our understanding of effective strategies to ensure radiation safety in military radar operations. Furthermore, the findings of this study will have practical implications for military organizations engaged in radar operations. By identifying areas for improvement, such as enhancing

training programs and communication strategies, the research will offer actionable recommendations to mitigate risks associated with radiation exposure among ADA radar course students, ultimately fostering a safer working environment for military personnel.

Additionally, the study's outcomes may inform policy decisions aimed at improving radiation safety management within military contexts. By highlighting specific challenges and deficiencies, the research could contribute to the development of more effective policies to safeguard the health and well-being of service members. In conclusion, this study represents a significant step towards enhancing radiation safety management in military radar operations, with potential benefits for operational effectiveness and the overall well-being of service members. The research aims to provide valuable insights that could shape future interventions and policy initiatives in military radiation safety.

1.6 Definition of Key Terms

The following terms of art or professional jargon are used throughout the chapters and are defined in this section to provide operational clarity.

1.6.1 Safety Management Practices

Safety management practice is an integrated system within the organization and is designed to avoid accidents and injuries and control hazards that could jeopardise the safety and health of workers (Labodova, 2004).

1.6.2 Safety Awareness

Safety awareness is a constant acknowledgement that each Operator ought to have consistently on how they are working and having option to identify the hazards at their working place (Naderpour et al., 2014).

1.6.3 Management Commitment

Management commitment refers to the extent to which management demonstrates its dedication to implementing and maintaining effective safety practices within an organization. It includes the allocation of resources, active involvement in safety activities, and the establishment of safety policies and procedures (SafetyStratus, 2023)

1.6.4 Safety Training

Safety training involves structured programs designed to educate operators on workplace safety protocols, hazard recognition, safe work practices, and emergency response procedures. Effective safety training aims to enhance workers' knowledge, skills, and attitudes towards maintaining a safe working environment (Burke et al., 2006; Work, 2023).

1.6.5 Operators' Involvement

Operators' involvement refers to the active participation and engagement of operators in safety-related activities and decision-making processes. This includes reporting hazards, participating in safety meetings, and contributing to the development and implementation of safety policies (Administration, 2023; Zacharatos et al., 2005).

1.6.6 Safety Communication and Feedback

Safety communication and feedback involve the exchange of safety-related information between management and operators. Effective safety communication ensures that operators are informed about potential hazards, safety procedures, and changes in safety policies, while feedback mechanisms allow for reporting safety concerns and suggesting improvements (DeJoy, 2005; Work, 2023).

1.6.7 Safety Rules and Procedures

Safety rules and procedures are the specific guidelines and protocols established by an organization to ensure the safety and health of its operators. These rules and procedures outline the correct methods for performing tasks safely, the use of personal protective equipment, and emergency response actions (Administration, 2023; Hale & Hovden, 1998).

1.6.8 Safety Promotion Policies

Safety promotion policies are organizational strategies and initiatives aimed at enhancing the overall safety culture within a workplace. These policies include safety campaigns, incentives for safe behavior, safety awards, and continuous safety education programs to motivate and encourage operators to prioritize safety (Lingard & Rowlinson, 2005; Work, 2023).

1.7 Organisation of Thesis

This paper consists of five chapters. Chapter 1 includes the research background, problem statement, research questions, objectives, scope, significance, definitions of key terms, and the thesis structure. Chapter 2 presents literature reviews on previous studies related to safety management practice, radiation safety awareness and the

relationship between both variables. Chapter 3 details the research methodology, including the research framework, hypothesis, operational definitions, instrumentation of variables, data collection, and sampling methods. Chapter 4 covers the results of data interpretation and analysis using SPSS software, with tables provided to aid understanding. Chapter 5 offers a comprehensive report on the interpretation and analysis of the findings from Chapter 4.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter discusses the outline of applicable legislation implemented on safety and health in Malaysia, the literature on safety awareness, including safety knowledge, attitude, and actions, safety management practice, which includes the Management commitment, Safety training, Operator involvement, Safety communication and feedback, Safety rules and procedures and Safety promotion policies together with all the related hypotheses. The overview of applicable safety and health legislation, particularly regarding radiation, refers to the Atomic Energy Licensing 1984 (ACT 304). The literature review in this chapter will also focus on safety management practices, radiation safety awareness, and other associated empirical studies that will explain the relationship between safety management practices and radiation safety awareness in depth.

2.2 Radiation Safety Awareness

Taking a scenario from the Indian Army, a study conducted by Singh and Kapoor (2015) examined the exposure to electromagnetic radiations emitted from radar among 166 active Indian Army soldiers. The soldiers were divided into three groups: Group I (n = 40, exposed to X-band radar frequency range 8–12 GHz), Group II (n = 58, exposed to Ku-band radar frequency range 12.5–18 GHz), and a control group (n = 68) (Singh et al., 2015). The study assessed physiological parameters and examined electromagnetic field levels at various sites, including the top front of the radar vehicle, inside the radar cabin, and occupational areas within a 50-meter radius where personnel were expected to be present during their duty. Measurements were taken as

instantaneous readings throughout daily work schedules for radar operations and maintenance at various areas around the personnel's workstation and surroundings. Therefore, these examples illustrate differing practices in managing and maintaining radiation safety among ADA radar course students

The phrase "radiation safety," as defined by Gonzalez (2011), is used to justify any action taken to avoid or reduce harm, damage, or danger from radiation exposure. Furthermore, the word exposure is used to describe the state of being exposed to radiation danger, whether from sources that offer precise doses or those that deliver real risk. According to Gonzalez (2011): "Radiation protection is more than just a scientific issue. It is a philosophical, moral, and wisdom dilemma." Noriah (2008) defines radiation safety as "a broad range of legislation and acts, enforcement agencies, safety culture, and training that all contribute to the regulatory control of occupational exposures and the avoidance of radioactive material disposal into the environment." The attitudes, conduct, and actions of the organization's stakeholders toward radiation safety may describe the organization's radiation safety awareness culture (Cole, Chapple, Thurston, Rogers, Murray, Riley, Bradley, & Reay, 2016). To create and sustain a strong radiation safety culture, all levels of working practises must work together in a holistic and continuous manner.

The relationship between safety management practices and radiation safety awareness within the ADA radar course students' needs to be studied in the concept that a robust safety management system will provide the necessary framework to promote and improve safety awareness of radiation protection among Operators. Effective safety management practices, such as comprehensive training, clear safety procedures, and

resource allocation and enforcement, provide the basis for establishing a safety culture within the organisation (Turner, 2019; Kontogiannis et al., 2017; Khalid et al., 2021). According to Bisbey (2019), enabling factors that facilitate the adoption of safety culture values, assumptions, and norms by Operators, such as comprehensive training, clear safety procedures, and resource allocation, create conditions within the organization that support developing and reinforcing a safety culture. Additionally, behaviours enacted within the organisation can reinforce or revise existing safety culture elements, highlighting the crucial role of consistent enforcement of safety procedures in shaping and maintaining a strong safety culture. Generally, Bisbey (2019) emphasises the importance of implementing effective safety management practices, including training, clear procedures, resource allocation, and enforcement, to cultivate a safety culture within an organisation. Implementing and reinforcing these practices can enhance Operator awareness of radiation hazards, improve their safety protocols, and take responsibility for their own and others' health (Al Dhaen, 2022). However, adequate safety management practices can result in sufficient knowledge about radiation protection, which could put Operators at greater risk due to inadequate training and enforcement and low-security measures (Khamtuikrua & Suksompong, 2020).

Radars are generally designed to operate in what is known as the "microwave" region' of the radio-frequency spectrum. This range includes frequencies from approximately l000 me to 30,000 mc or higher. Expressed in wavelengths, this region is from 30 cm to 1 cm. Microwave radiation energy is generally produced by means of specially constructed electronic tubes such as the magnetron and the klystron. Klystrons, magnetrons, traveling-wave tubes, and high-voltage hydrogen thyratrons are high-

power electronic tubes used in radar that generate this microwave radiation. (US Army Ordnance Missile Command, 1962).

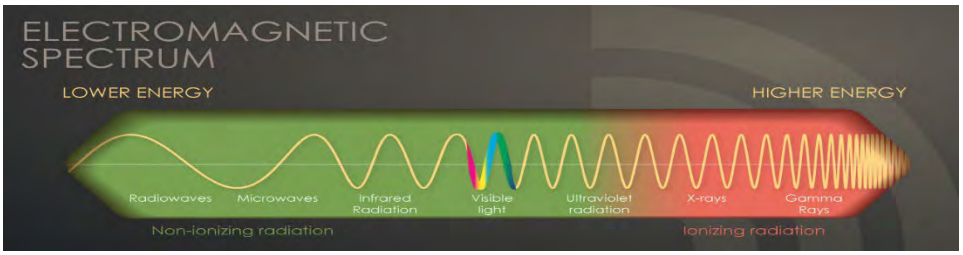


Figure 2.2.1
The Electromagnetic Spectrum Source: Center of Disease Control and Prevention Website, 2015

Ionizing radiation and non-ionizing radiation are both types of radiation that are present all around us from both natural and artificial sources. Ionizing radiation is a type of energy that works by taking electrons away from the atoms and molecules of various substances, such as water, biological tissue, and air. These materials are permeable to invisible ionising radiation. There are several sources of non-ionizing radiation all around us. It is to the left of ionizing radiation on the electromagnetic spectrum in the Figure 2.1 above. Examples include Radiofrequency (RF) radiation used in many broadcasts and communications applications, microwaves used in the home kitchen, infrared radiation used in heat lamps and all radar-based equipment's.

The ultraviolet region of the electromagnetic spectrum is where ionising and non-ionizing radiation are separated from one another (shown in the illustration of the electromagnetic spectrum above). Lower frequencies are reached as we move to the left of the visible light band in the diagram above. The energy decreases with decreasing frequency. Infrared, microwave, radio waves, mobile phone range radiation, and radar radiation can all be found at these lower frequencies on the left

side of the electromagnetic spectrum. The manner that non-ionizing radiation affects substances like air, water, and living tissue sets it apart from ionising radiation. Non-ionizing radiation, unlike x-rays and other types of ionising radiation, lacks the energy to take electrons from atoms and molecules, yet it can nevertheless heat materials. For example, the microwave radiation inside a microwave oven heats water and food rapidly. Exposure to intense, direct amounts of non-ionizing radiation may result in damage to tissue due to heat. This is not common and mainly of concern in the workplace for those who work on large sources of non-ionizing radiation devices and instruments. Intense, direct exposure to radiofrequency (RF) or microwave radiation may result in damage to tissue due to heat (Ng, 2003).

In theory, non-ionizing radiation utilized in medical facilities could potentially pose a risk to health. Examples of this type of radiation include UV light, laser beams, magnetic fields, and radiofrequency radiation. It has been reported that ophthalmologists who use lasers for extended periods each week experience reduced central visual acuity, abnormal colour perception, and other defects that may indicate macular damage. Although these reports have not been verified, various organizations have established standards for the use of laser equipment. Kupersmith and Jette (2023) mention that the use of monitor screens has been linked to posture problems, eye strain, and psychological changes resulting in "technostress." However, the likelihood of health issues resulting from non-ionizing radiation is very low. Based on this experience with non-ionizing radiation in medical facilities, this study encourages the investigation of safety levels faced by ADA radar course students when exposed to radiation systems.

Exposure of body tissues to non-ionizing radiation can result in thermal effects that can increase body temperature (Lahir, 2023). If a person is exposed to radiation, there are two sorts of biological impacts, according to the Malaysian Nuclear Agency (2006). The first is the somatic effect, in which cells within the body are damaged and visible. Second, a genetic consequence happens in reproductive cells, such as chromosomal damage, which can be inherited. Radar generates RF radiation that, when individuals are exposed to it under conditions of high intensity and direct contact, can lead to significant tissue heating. This phenomenon aligns with the observed thermal effects of other non-ionising RF emission sources, including telecommunications devices and microwave ovens, underscoring the primary health concern of RF radiation exposure.

Furthermore, non-ionizing radiation, which encompasses ultraviolet (UV), infrared (IR), as well as RF radiation, is implicated in a variety of adverse health outcomes (Prevention, n.d.). These range from skin burns and premature aging of the skin to more severe conditions, such as eye damage and skin cancer, attributable to UV exposure. Additionally, there is evidence to suggest potential reproductive health implications, notably a decrease in sperm motility and viability, linked to prolonged exposure to electromagnetic fields (EMFs). This category includes RF radiation from radar (Saliev et al., 2019). According to Omer (2021), understanding the fundamentals of non-ionizing electromagnetic radiation is crucial for medical personnel and students regarding various medical applications. Omer (2021) extensively explains different types of non-ionizing radiation, including ultraviolet radiation, visible light, LASER, infrared radiation, microwaves, and highly low-frequency radiation. By simplifying these concepts and discussing their physics, hazards, means of protection, and medical

applications, he aims to equip individuals with the necessary knowledge to mitigate potential health risks associated with non-ionizing radiation exposure.

The complexity of non-ionizing radiation's health effects has prompted rigorous scientific inquiry. Research efforts are continually supported and evaluated by leading health and safety organizations worldwide, including the World Health Organization (WHO), the Federal Communications Commission (FCC), and the International Commission on Non-Ionizing Radiation Protection (ICNIRP). These bodies play a pivotal role in synthesizing the latest scientific evidence to establish and update guidelines to safeguard public health against the potential risks posed by exposure to non-ionizing radiation, including that from radar systems. According to Bushberg (2017), the amount of dose received, the rapidity of the dose received, the size of the area exposed to a human being, the degree of tissue sensitivity to radiation, the presence of genetic abnormalities that can affect DNA repair, the individual's age at the time of exposure, and the individual's general health status are all factors that influence radiation effects.

2.2.1 Radiation Safety Principles

Radiation safety, often known as radiological protection, is the science and practice of safeguarding people and the environment against the dangers and risks of ionising radiation. It is thought that cancer risks are growing statistically, even at lower levels of radiation exposure, if the exposure duration is increasingly lengthened (Sapiin, 2014). According to the Malaysian Nuclear Agency (2006), the goals of radiation safety are to protect people and the environment from unnecessary radiation exposure while maintaining the benefits of radiation, to prevent deterministic effects

by limiting exposure to individuals below the logical threshold, and to reduce the stochastic effect induction process.

Optimisation of radar transmission, safety through the ALARA (As Low as Reasonably Achievable) Principle, and exposure limit management are the three critical aspects of radiation exposure restriction that must be executed entirely to achieve the output of radiation safety. Shielding radar transmitters and using PPE (Personal Protective Equipment) when operating radars are two other procedures.

Monitoring and dosimetry are critical for ensuring radiation safety in workplaces where individuals are exposed to ionizing radiation (IKN-RS-SOP-12: Monitoring of Personnel Working with Ionizing Radiation, n.d.). Regular monitoring practices to assess radiation levels in work areas and among personnel are essential. This involves using dosimetry to track external radiation exposure and internal doses, especially for individuals handling radioactive materials or operating radiation-emitting equipment. Routine monitoring allows organizations to comply with safety standards and quickly identify any overexposure, mitigating potential health risks associated with radiation exposure (Frane & Bitterman, 2022). Monitoring is a proactive risk management approach, enabling organizations to protect their personnel's health and safety. Additionally, monitoring internal doses is vital for assessing the effectiveness of protective measures and ensuring radiation exposure stays below permissible limits. Implementing robust monitoring and dosimetry practices is essential for safeguarding against

ionizing radiation's adverse effects and promoting a safety culture in radiation-related workplaces.

Training and education are integral components of radiation safety initiatives aimed at empowering personnel with the knowledge and skills to mitigate risks effectively (Maharjan et al., 2020). Comprehensive training programs are essential for fostering a culture of safety awareness and ensuring adherence to established safety protocols. These programs should encompass various topics, including radiation hazards, proper handling procedures, emergency response protocols, and the correct usage of protective equipment. By providing personnel with multidimensional training, organisations can enhance their understanding of radiation safety principles and equip them with the tools to navigate potential hazards confidently. Education initiatives also play a crucial role in promoting accountability and conscientiousness among personnel, encouraging them to uphold safety standards diligently. Through continuous training and education endeavours, organizations can cultivate a workforce that is well-informed and prepared to address the complexities of radiation safety effectively (Frane & Bitterman, 2022). Investing in training and education initiatives is paramount for fostering a culture of safety excellence and ensuring the well-being of personnel exposed to radiation in occupational settings.

2.2.2 Legislature

The International Atomic Energy Agency (IAEA) asserts that the government's current roles and duties include creating, upholding, and

enforcing the legal framework for radiological safety (Ng, Ng, & Mishar, 2016), and that each nation should set up an independent regulatory agency to control all "radiation-related activities." According to IAEA (2014), the regulatory body's general responsibilities include:

- "Establishing requirement for the application of the principles of radiation protection as specified in IAEA Fundamental Safety Principles for exposure situations, and establishing or adopting regulations and guides for protection and safety";
- "Establishing a regulatory system for protection and safety";
- "Adopting a graded approach to the implementation of the system of protection and safety, such that the application of regulatory requirement is commensurate with the radiation risks associated with exposure situation";
- "Ensuring the application requirements for education, training qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety";
- "Ensuring the mechanisms are in place for the timely dissemination of information to relevant parties, such as the suppliers and users of the sources, on lessons learned for protection and safety regulatory experience and operating experience, and from incidents and accidents and the related findings. The mechanisms established shall appropriate, be used to provide relevant information to other relevant organizations at the national and international level";
- "In conjunction with other competent authorities, adopting other specific requirements for acceptance and for performance, by regulation or by the

application of published standards, for any manufactured or constructed source, device, equipment, or facility that when in use, has implications for protection and safety";

- "Establishing mechanisms for communication and discussion that involve professional and constructive interactions with other relevant parties for all protection and safety related issues";
- "Establishing, implementing, assessing and striving to continually improve a management system that is aligned with the goals of a regulatory body and that contribute to the achievement of those goals".

According to a study, as noted by Ng et al. (2016), government health authorities in Malaysia, Singapore, Thailand, and the Philippines have put into place laws pertaining to radiation safety in healthcare suites. Some of the laws regarding radiation in Malaysia consist of:

2.3.5.1 Atomic Energy Licensing 1984 (Act 304)

From a legislative standpoint, this act evolved from the Radioactive Substances Act 1968 (Act 250), which was insufficiently comprehensive to encompass the enforcement of radiation safety since ionising radiation sources included both radioactive materials and irradiating apparatus. The Atomic Energy Licensing Act (AELA) 304 was enacted in 1984 to control and regulate the use of atomic energy in Malaysian education, industry, and medicine. The Atomic Energy Licensing Board (AELB) is the responsible department for regulating, safeguarding, and monitoring ionising radiation activities and programmes (Bahari, 2000 and Noriah, 2014).Even though the Malaysian Armed Forces are not bounded to the OSH Act 1994 and Atomic

Energy Licensing 1984 (Act 304), the radar assets that is use in the ADA are all subject to adhere to the standards that are setup by the IAEA in terms of specifications of the equipment and all also on the user guidelines and manuals that is published. Indirectly, ADA radar troops operations already follows the guidelines that is setup by the authorities even though they are not subject to it.

2.2.3 Radiation Safety Awareness Dimensions

Working with radiation can be dangerous to an operator's safety and health if preventative protocols are not followed, protective measures are not put in place, and safe working practises are not enforced because of subpar management or a lack of knowledge, training, accountability, and responsibility (Noriah, 2011). As a result, the aspects of radiation safety awareness in this study include knowledge, attitude, and action.

Knowledge in analyzing the consequences of military personnel's exposure to harmful materials, Ejchman-Pac et al. (2024) studied 1,331 Polish soldiers. The findings revealed that four out of five soldiers faced modest exposure to hazardous chemicals, while one in five experienced moderate exposure. Over 10% were uncertain about the specific chemicals they encountered. Five out of eight soldiers reported moderate radiation exposure, and one in five had low exposure. About 5% were unaware of the different types of physical hazards present, and three soldiers did not realize such exposures could lead to serious health issues, including mutagenesis and cancer.

Ignorance of workplace safety laws and guidelines can significantly impact the frequency of hazardous events. Adequate knowledge fosters disciplined

workers who prioritize safety (Cooper, 2000). For Air Defence Artillery, particularly radar operators, understanding radiation dangers and protection is crucial. Comprehensive knowledge about radiation risks, safety protocols, and protective measures enhances military personnel's confidence and ability to safely perform their duties, reducing anxiety and distractions (Criteria et al., 1999). This knowledge enables proactive hazard mitigation, improving safety and mission effectiveness.

In contemporary warfare, the perceptions, intents, and actions of leaders are just as crucial as military targets like tanks, ships, aircraft, command and control centers, and armed personnel. Although our armed forces benefit greatly from radar, sonar, and infrared vision, these technologies only provide a partial picture of the social, cultural, and behavioral patterns of the populace. Hard power will always be important in conflict, but in the increasingly interconnected and compact global village of the future, soft power—the capacity to inspire or motivate behavior rather than use force—will become increasingly important (Nye, 2004). Radiation protection culture, which includes radiation safety awareness, is established by the combination of attitudes, beliefs, practices, and norms among all parties involved, including professionals, Operators, patients, and members of the public (Ploussi & Efstathopoulos, 2016). This culture ensures the effective implementation of safety protocols and procedures. It cultivates a collective responsibility towards minimizing radiation exposure risks and promoting a safe environment for all individuals involved in activities where radiation is present.

Based on Ding et al. (2023), continuous access to worldwide data on the views, attitudes, opinions, sentiments, and behaviors of the general public is essential for the success of a social radar. Social media is one of several increasingly popular internet-based platforms that provide a wealth of relevant and valuable data. To facilitate an analysis of non-kinetic messaging, forecasting of messaging effects, course of action planning, and effect measurement, analysts must utilize all pertinent data in conjunction with both existing and emerging technologies. This combination of data and technological capabilities will enhance situational awareness and decision support for foreseeing instability, thwarting violent extremism, and fostering partner capacity. According to Sharma et al. (2016), Operator behavior is impacted by their understanding of radiation safety since activities that are not genuinely safe may have unfavorable effects due to their ignorance. Moreover, fostering a culture of continuous learning and knowledge-sharing regarding radiation safety empowers Operators to make informed decisions and actively contribute to maintaining a safe workplace environment, thereby reducing the likelihood of incidents and promoting overall organizational resilience.

2.3 Safety Management Practices

In 2018 we presented a study involving 47 individuals who were diagnosed with cancer after prolonged exposure, to high intensity whole body radiofrequency radiation (RFR). This group alongside research, from Belgium, Poland and Israel consistently showed frequencies of hematolymphoid (HL) malignancies and higher overall cancer rates. Our latest research focuses on 46 cancer patients who encountered radiation during military service (Meng et al., 2024). This study emphasizes the importance of

investigating the safety implications of radiation exposure especially concerning the well being of personnel facing physical demands.

Safety management is one of the aspects of an organization's safety environment (Arifin et al., 2019). Workplace safety management practices represent a fundamental change in the approach organizations take to protect their Operators, assets, and the environment. This proactive and systematic approach responds to growing awareness of the value of human capital and the potential legal, financial, and reputation consequences of workplace accidents (Dai et al., 2022). A broad spectrum of safety management approaches can be employed, encompassing risk assessment and danger identification as well as comprehensive safety protocols and Operator training. The aim of companies is to establish a safety culture that prioritizes the welfare of Operators by systematically identifying and managing risks (Adeoye and Yahaya, 2022). It will not only lessen the occurrence of workplace incidents, but also increases overall efficiency, productivity, and Operator morale.

Mishra (2022) also states that the primary goal of safety and health programmes is to reduce workplace injuries, illnesses, and deaths, as well as the suffering and economic distress these events can cause workers, their families, and employers. The researcher emphasised the importance of prevention. According to Ajmal et al. (2022a), safety management practices should aim to share the workplace safety environment. A study by Ajmal et al. (2022b) focused on occupational accidents and, based on the results, filled the gap in the literature on safety management. The research indicates that safety management measures are equally crucial to minimizing occupational accident rates in the oil and gas sector. Moreover, Sklad (2019) found that safety management

practices facilitated OSH leadership regarding stability, consistency, and fairness, which impacted OSH management systems the most.

2.3.1 Management Commitment to Safety

A significant contribution to Australia's radar development was made by Joe Pawsey, (Goss et al., 2023). Under his direction, the Division of Radiophysics (RPL) of the Council for Scientific and Industrial Research was successful from 1939 until 1945. More than anyone else at RPL, he personified and fostered in the scientific team the amalgamation of engineering know-how and practical experience coupled with an in-depth comprehension of the fundamental concepts underlying the radar apparatus, which served as the foundation for Australia's successes throughout the war years. His capacity to successfully negotiate social structures and personalities was equally essential to RPL's achievements. From Joe Pawsey shows that the fundamental concepts under the radar apparatus drive thus study to examine the contribution of management commitment to execute the proper implementation that suitable among the ADA radar course students.

Internal factors that contribute to self-regulation, such as management commitment within organizations, play a significant role in worker safety behaviour and are crucial for the effectiveness of safety management systems (Arifin et al., 2020). This study found that security management practices focus on management engagement practices as a leading indicator for measuring an organization's level of security. This shows that an effective safety management system depends on management developing organisation policies and determining resources.

Furthermore, Xu et al. (2020) gave examples of key aspects of a safety climate, such as management commitment, organizational routines, safety commitment and communication, safety equipment, housekeeping, training and safety awards. This statement is supported by a study (Arzahan et al., 2022) that analyzed the dimensions most used to measure the safety culture of healthcare organizations: management commitment management, security resources and the availability of policies reflect the organization's commitment to security. Arzahan (2021) also mentioned that management commitments include appointing at least one competent member with safety training as the safety committee secretary and it is essential to allow workers refuse to work in unsafe or unsanitary conditions to ensure that the organization is competent in handling safety-related issues.

2.3.2 Safety Training

Safety training impacts safety outcomes in highly safety-focused industries, such as oil and gas production, construction, or government administration. Additionally, the value of safety training is related to improving Operator safety behavior and developing safety skills (Stahl, 2020). In addition, safety training programs are designed to train new Operators to develop safety attitude planning, orientation, and succession programs to improve health performance. Health and safety in the workplace (Ajmal et al., 2022c; Afferi et al., 2020).

In a study conducted by Hoque et al. (2022), researchers discuss that universities should provide regular presentations on existing health and safety programs, increase the number of safety training programs, and monitor Operators who have not trained, especially those working in hazardous

environments. According to McGhan et al. safety performance is positively correlated with safety training, safety policies, and safety knowledge. A study conducted by Nurul (2019) revealed a significant correlation between safety training and performance in UMMC nursing. Therefore, it has been proven that to establish a safe environment in the organization, safety skills for workers must be developed through training activities (Arifin & Derahim, 2020b). Hence, from these studies from Hoque et al. (2022) and Nurul (2019) provide direction in safety training programs are designed to train ADA radar course students to minimize errors when facing the radar system and molecules in non-ionizing radiation.

2.3.3 Operator's Involvement

Operator involvement, or Operator engagement, refers to the commitment and willingness of Operators to go beyond defined tasks to ensure the success of their organization (Muzeyin and al., 2022). Engaging the workforce is crucial for the organization's productivity, efficiency, and effectiveness. According to Faeq (2022a), companies strive to develop a dedicated workforce by implementing the most effective strategies to ensure Operator retention. An example of such an approach is the ability of organizations to adopt more positive organizational attitudes, such as increased Operator engagement and increased job satisfaction. To increase organizational productivity, it is important to implement Operator engagement strategies that encourage both Operator participation and organizational commitment (Faeq, 2022b).

Proof from a military establishment In the reflection phase, we assessed our intervention in referring to AirTrans's senior management, applying the principles of (R. Davison et al., 2004) and (R. M. Davison et al., 2012) as a

complement. They assessed if the research study was successful and talked about the advantages and disadvantages of the strategy had been used. The top management acknowledged that one of the approach's key advantages was the participation of staff members from throughout the entire organization, which increased openness and decreased resistance to change with regard to the DT endeavor. Therefore, this paper can be relate to chow that to identify the advantages the participation of ADA radar course students to ensure the safety in radiation scope.

2.3.4 Safety Communication and Feedback

Safety communication using feedback is a pre-control measure perceived by Operators (Zhang et al., 2022a). Whether Operators communicate information about hazards and risks before an accident occurs, whether leadership encourages Operators to report hazards, and whether leadership sets goals whether safety goals and requirements are clear or not, all can predict safety accidents. The results of the study conducted by Zhang et al. (2022b) show that safety training, safety policy, and safety communication with feedback are important mediators in predicting safety performance. According to Gumus et al., the improvement of safety training leads to improved safety performance among Operators through proactive measures such as safety management, safety incentives, and safety policies., 2023).

Study from (Sari et al., 2023) indicate four themes emerged that exemplify real-world interactional communication and its interpretation or "meaning." The first and second themes, which include the following: 1) Students assume submissive roles in a feedback discussion; 2) The feedback material is centered

on explanation and students' limitations, characterize the interactional communication in feedback. The third and fourth themes, which include: 3) Clinical supervisors' opinions primarily center on discontent and teaching authority; 4) Students' acceptance of reality and negative attachment, describe how the supervisors and students perceive their feedback experience. This study demonstrates how social differences between clinical supervisors and students in Indonesia and other nations belonging to the same cultural group may act as barriers to communication during feedback exchanges. More work is needed to adopt "feedback as a dialogue." In order to highlight safety management on radiation scope, the study describes the communication abilities among students enrolled in the ADA radar course, with a focus on culture.

2.3.5 Safety Rules and Procedures

According to the Infrastructure Health and Safety Association (2020), safe work procedures are typically developed by management and workers following a JSA/HRA investigation, accident or incident, and or requirements of safe work practices. In a safe and hazardous work environment, employers must take responsibility for both the safety procedures they implement and the Operator's compliance with them (Nur Hairani & Nurul Liyana, 2022). In a previous study by Muhammad (2022), it was demonstrated that there is a positive and significant relationship between safety rules, procedures, and safety knowledge. Therefore, well-crafted security policies will result in better compliance and a better security environment.

Work health and safety measures, in general, provide strategies and protection against known hazards through various techniques of risk reduction for occupational exposure to Non-Ionizing Radiation (NIR) (Miller et al., 2024). As a result, workers are often aware that exposure to NIR is typically seen as a controlled aspect of their job. In this instance, the likelihood of overexposure accounts for the increased perception of risk. The perception of danger for NIR exposure in the population shows a negative correlation with the recognized health problems associated with the exposure. Hence, the lack of control over exposure for an individual and the abundance of contradictory studies about health consequences that are publicly available may help to explain this.

2.3.6 Safety Promotion Policies

Ajmal et al. (2022b) identified safety promotion policies as one of the most crucial safety management measures in their previous research. According to Kesevaraj (2021), the correlation between safety knowledge and safety promotion policies is both positive and significant. However, W. Nurfahizul Ifwah et al. (2022) found that safety performance is not positively correlated with safety promotion policies. The negative correlation observed in the studies by W. Nurfahizul Ifwah et al. (2022) prompted this study to examine the safety promotion policies among ADA radar course students. This will be achieved by implementing a module or syllabus that can be adjusted according to the conditions deemed suitable by the safety management team.

2.4 The Relationship between Safety Management Practices and Radiation Safety Awareness

Organizations with safety responsibilities, such as nuclear power plants and petrochemical facilities, have gradually established safety culture practices to minimize human error and simultaneously reap the benefits of human activity (Becker, 2023). These safety procedures are typically evaluated using a self-assessment toolbox before being implemented to track their effectiveness. However, the most widely used method that has contributed to the universal agreement on the significance of safety as a "leading indicator" for organizational safety is safety research (Parent & Reich, 2009).

Empirical studies on safety management practices towards radiation are essential in various sectors, including those involving radar radiation. Radar radiation falls under non-ionizing electromagnetic radiation and is extensively used in military, aviation, maritime navigation, weather forecasting, and law enforcement. While it is generally considered less harmful than ionizing radiation (such as X-rays), prolonged or excessive exposure can still pose health risks, necessitating rigorous safety management practices.

Although there is evidence that safety practices can be applied to various industries, organizations, and employment groups (Cheyne et al., 2003; Mearns et al., 2003; Anandaraja et al., 2008), there has been little focus on the aspects of safety that are unique to specific industries or cultural contexts. Each theme's elements are flexible and have a strong potential to be tailored to a particular industry or even a specific corporation.

The relevance of awareness that consists of knowledge, attitudes, and actions (KAA) research, typically associated with healthcare radiation safety, also extends to radar radiation. For professionals such as the military working with radar systems, understanding the principles of safety awareness and the potential health effects of electromagnetic radiation is crucial. In analogy to the findings of (Johnson & Smith, 2023), in the healthcare sector, where gaps in radiation safety awareness in terms of knowledge were identified among healthcare workers, similar gaps may exist among personnel handling radar technology. This highlights the importance of targeted safety practices programs designed to enhance safety awareness using radar systems.

Furthermore, a study conducted in nuclear radiation medicine departments in Saudi Arabia evaluated the level of radiation safety awareness and safety practices among nurses (Alyami et al., 2022) indicated that while there was a high level of awareness about radiation protection among the nurses, the actual safety practices were not as robust. This highlights a critical gap between awareness and practice, suggesting that more than mere awareness is needed to ensure safe practices. It emphasizes the need for continuous training and education to improve actual safety practices in radiation environments (Alyami et al., 2022).

There is also a study done in a private hospital in Edirne, Turkiye, where, despite their continuous radiation exposure, there is an evident lack of sufficient awareness, highlighting the urgent need for enhanced educational programs (Zekioğlu & Parlar, 2020). To bridge the safety awareness gap effectively, the paper advocates for regular, targeted training sessions complemented by pre-test and post-test evaluations and

safety management practices to improve training efficacy and ensure the safety of healthcare professionals and patients.

In summary, previous and similar research has looked into the impact of safety management practices on safety awareness, where few studies have examined how these practices interact with non-ionizing electromagnetic radiation, particularly radar radiation, across various sectors such as military, aviation, and maritime navigation. Prior studies on radiation safety management practices and their relations towards safety awareness, such as (Johnson & Smith, 2023), (Alyami et al., 2022), and (Zekioğlu & Parlar, 2020), have contributed to the current study's body of knowledge. However, there is a clear gap in the present research scenario. There is a lack of relevant studies explicitly focusing on safety management practices directed towards radiation safety awareness among military personnel in the radar sector. This apparent gap highlights the significance of current research. In doing so, this study aims to provide valuable information that can accommodate better safety management practices to ensure better safety awareness among the ADA radar students in PUSARTI.

2.5 Conclusion

In conclusion, this chapter reviews prior pertinent studies that encompass variables utilized in this research. The literature review aids in elucidating the interconnection between independent and dependent variables within the framework of this investigation. The independent variables considered in this research include management commitment, safety training, operator involvement, safety communication and feedback, safety rules and procedures, and safety promotion policies, while the dependent variable pertains to radiation safety awareness. Overall,

there is a substantial body of research illustrating a favorable association between the examined independent variables and radiation safety awareness. The subsequent chapter will detail the research methodology employed in this study

CHAPTER 3
METHODOLOGY

3.1 Introduction

The approach utilised to collect data and information for this upcoming study will be discussed in this chapter. The dependent and independent variables will be operationally and theoretically defined and discussed. The study's instrument scale, population, units of analysis, and data analysis will all be discussed in further detail.

3.2 Research Conceptual Framework

Vinodkumar and Bhasi (2010) conducted a study that was utilised as a reference and served as the foundation for building the conceptual framework for this research. Safety management practises (independent variable) and components of safety performance were developed by Vinodkumar and Bhasi (2010) (dependent variable). Furthermore, as Vinodkumar and Bhasi (2010) found, safety management practises may impact the establishment of a safe environment in an organisation, and there have been some efforts to identify specific safety management practises that might influence safety performance. The relationship between the dependent and independent variables assessed in the study will be shown in Figure 3.2.1.

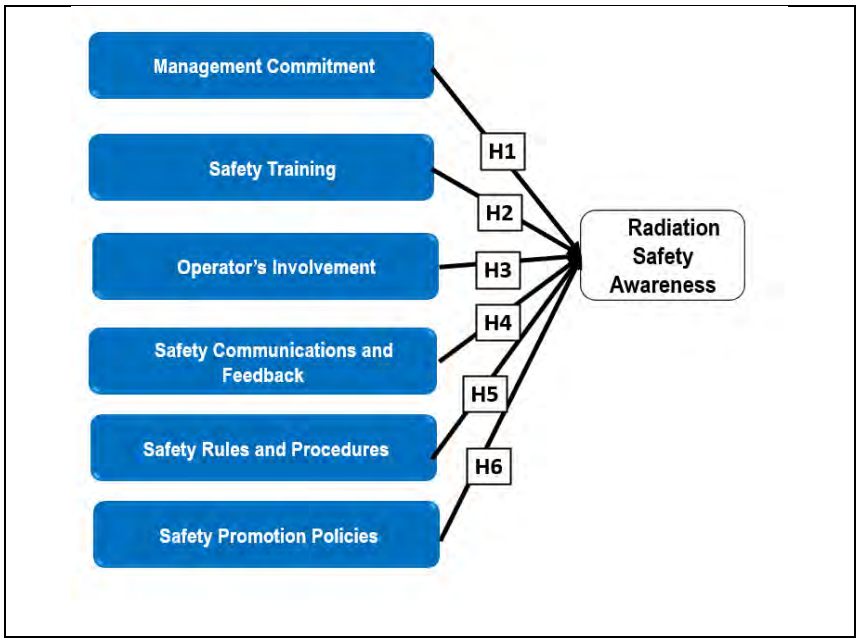


Figure 3.2.1
Research Framework

3.3 Research Procedure

The initial phase involves identifying the research issue, selecting a topic, and conducting a comprehensive literature review. Following this, survey tools are employed, and a preliminary assessment is performed to ensure the reliability of the tool, which takes the form of a quantitative survey distributed among participants. Subsequently, data is collected and analyzed using SPSS version 27 software. Finally, the analysis results lead to the conclusions and recommendations presented in this study. The research framework, as illustrated in Figure 3.3.1, has been developed to ensure a systematic approach to the research process.

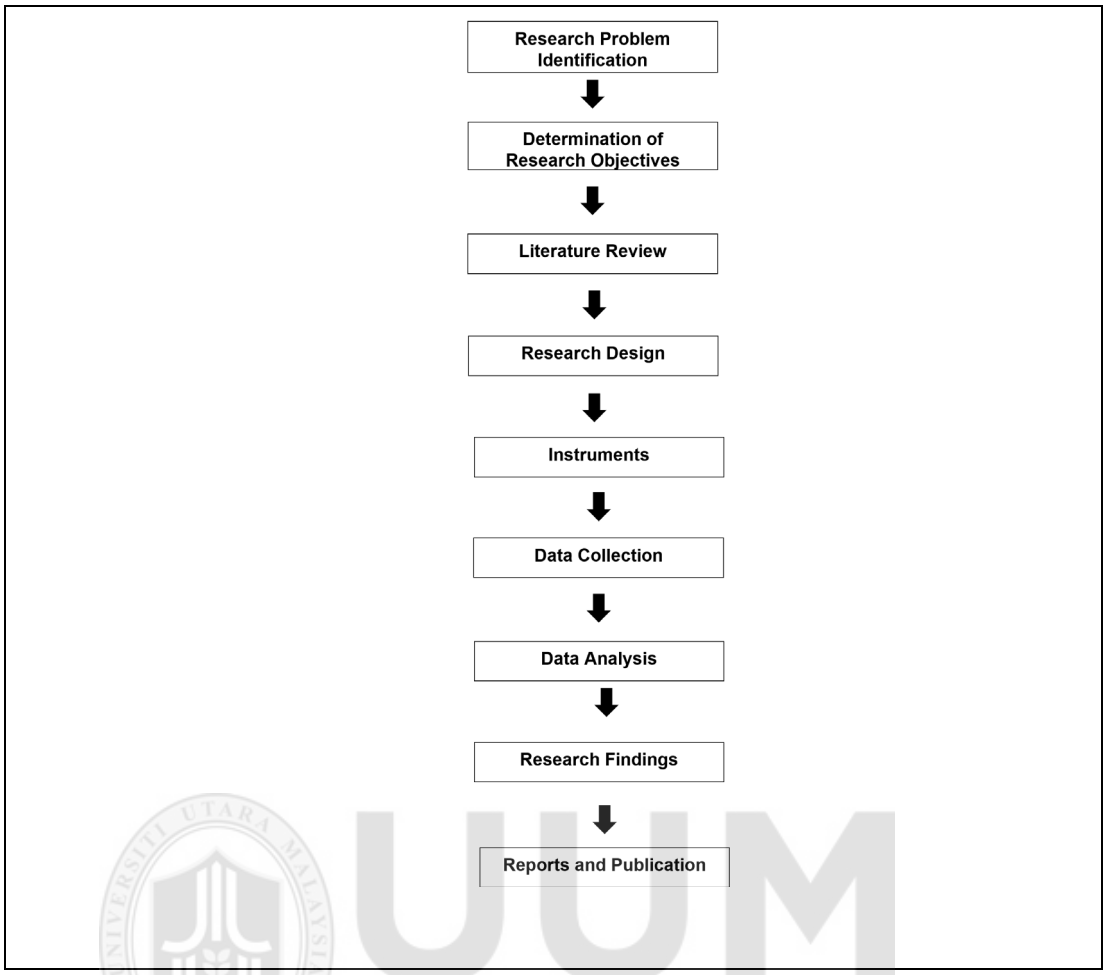


Figure 3.3.1
Research Procedure

3.4 Research Design

This research will used descriptive study to gather information and to discover whether there is any relation between the two variables (dependent and independent) used in this study. The study has been conducted using quantitative method. A questionnaire survey was adopted as the main data collection method since this research instrument has been used in many research studies (Flin et al., 2000). Respondents were asked to rate them using a five-point Likert scale where '1' corresponded to 'strongly disagree' and '5' represented 'strongly agree'. The questionnaire design stages will follow those outlined by Hayes et al (1998) and will

prepared in dual language (English and Bahasa Melayu) to provide better understanding to the respondents.

3.5 Source of Data

Primary data can be gathered in a variety of methods, including through observations, interviews, and surveys. However, it was discovered that the questionnaire approach was best suited to the study's aims and goals since it may offer a productive means of gathering data from a sizable sample by quantitative analysis. The results of this study were supported by supplementary information and research from textbooks, library sources, and international publications that were accessible online as a secondary source.

3.6 Unit of Analysis

The term "unit of analysis" refers to the entire population of the people, events, or objects of interest that the researcher aims to investigate and wants to draw conclusions from using sample statistics. The unit for this study is individuals. A survey approach was the most efficient and rapid way to acquire information on attitudes, values, and behaviours across different trades and positions. This technique will be used to collect information on radiation safety awareness and safety management procedures.

3.7 Population Frame

Presently, there is approximately 12,000 army personnel serving in the Royal Artillery Regiment (RAR). RAR currently has 19 units in the organization, in doing this research, the population of this study focused on ADA personnel consist of 240

personnel that is part of the RAR that is undergoing their career course in Artillery Training Centre in Gemas, Negeri Sembilan.

3.8 Sampling Technique and Sample Size

The most crucial factor to be taken into attention is that the sample selected from the population must be representative in order for the researcher to generalize conclusions or generalizations from the sample statistics to the population that has not been sufficiently investigated, (Maleske, 1995).

In surveys and other quantitative research designs, simple random sampling is frequently used (Rahi, 2017). Everyone has an equal chance to participate in the study, just like in a basic random selection. It works well in research projects with homogeneous and uniformly distributed populations.

Therefore, PUSARTI, Kem Syed Sirajuddin, Gemas will serve as the primary location for this research in order to cover such organizations and components. The findings of the research total population consist of all 240 students enrolled in the radar course at PUSARTI's ADA Wing. It offers advice for choosing sample sizes based on various population sizes, confidence levels, and margin of error, per the table (Krejcie and Morgan, 1970). The suggested sample size for a population of 240 would be 148.

With this approach, each person in the population is guaranteed an equal probability of being chosen. Through the use of randomization techniques, it achieves an impartial and fair selection process, hence eliminating selection bias and producing a representative sample, (Johnson, 2016).

3.9 Hypothesis Development

In order to investigate the connections between various variables, hypotheses are essential. Research hypotheses, in the opinion of Newman and Gough (2020), offer a preliminary framework for assessing the possibility that important links exist between different variables. Researchers can ascertain whether the suggested links are significant by using hypothesis testing. To evaluate the relationships between the independent factors influencing the dependent variable in this study, hypotheses are essential. To be more precise, safety performance is the dependent variable, whereas management commitment, safety communication, and risk perception are the independent factors. Drawing on extant literature, the ensuing section will explicate the intricate interrelationships among the many components of the study.

3.9.1 Management Commitment and Radiation Safety Awareness

According to a study by Johnson and Smith (2023), management commitment to safety significantly enhances safety awareness among employees. This commitment is demonstrated through active involvement and support in implementing comprehensive radiation safety programs, reflecting a genuine concern for safety issues. They proactively identify, control, and monitor hazards, which is crucial for maintaining a safe working environment. Similarly, Alyami et al. (2022) underscores the importance of management's role in regular training and communication, which greatly improves compliance and safety awareness among healthcare professionals.

Zekioğlu and Parlar (2020) also highlight that continuous education and management support are essential for fostering a culture of safety awareness.

These consistent findings across various studies reaffirm the critical role of management commitment in enhancing safety awareness and minimizing radiation exposure risks. Consequently, drawing upon the insights derived from various scholarly sources on the connection between management commitment and safety performance, **Hypothesis 1 (H1)**: There is a significant relationship between Management Commitment and Safety Awareness.

3.9.2 Safety Training and Radiation Safety Awareness

Safety training can be described as the safety programs or training sessions delivered by management to employees with the aim of ensuring their awareness of the prevailing safety hazards and their ability to effectively handle any incidents of injury or accidents that may arise. Efficient safety training has the potential to decrease the frequency of workplace and organizational accidents(Zohar, 1980). According to Alyami et al. (2022), effective safety training programs significantly improve compliance and safety awareness among healthcare professionals, indicating that well-structured training regimens are crucial for enhancing safety performance. Furthermore, Zekioğlu and Parlar (2020) emphasize the importance of continuous education and training in fostering a culture of safety awareness, suggesting that ongoing safety training is essential for maintaining high safety standards. These findings underscore the critical role of comprehensive safety training in promoting safety awareness and minimizing risks associated with radiation exposure. Consequently, drawing upon the insights derived from various scholarly sources on the connection between management commitment and safety

performance, **Hypothesis 2 (H2):** There is a significant relationship between Safety Training and Radiation Safety Awareness

3.9.3 Operator's Involvement and Radiation Safety Awareness

Operator's involvement in safety management refers to the active participation of operators in safety-related activities and decision-making processes within an organization. This involvement is crucial for enhancing safety awareness and performance. According to Johnson and Smith (2023), engaging operators in safety programs and encouraging their feedback significantly improves their awareness of safety practices and compliance. Alyami et al. (2022) emphasize that when operators are actively involved in safety discussions and training, they are more likely to adopt and adhere to safety protocols, thereby enhancing overall safety awareness. Zekioğlu and Parlar (2020) highlight that organizations fostering a culture of participation and collaboration in safety management see higher levels of safety awareness and better safety outcomes. These findings collectively suggest that operator involvement is a key factor in promoting a safe working environment and improving safety awareness. Consequently, drawing upon the insights derived from various scholarly sources on the connection between management commitment and safety performance, **Hypothesis 3 (H3**): There is a significant relationship between Operator's Involvement and Safety Radiation Safety Awareness.

3.9.4 Safety Communication and Feedback and Radiation Safety Awareness

Safety communication and feedback involve the processes through which safety-related information is shared between management and operators, and

the feedback from operators is used to improve safety practices. Effective communication and feedback mechanisms are vital for enhancing safety awareness and performance. According to Johnson and Smith (2023), open and transparent communication about safety protocols and regular feedback sessions significantly improve operators' understanding and adherence to safety practices. Alyami et al. (2022) emphasize that regular safety briefings and feedback loops where operators can voice their concerns and suggestions lead to higher compliance with safety regulations and greater safety awareness. Zekioğlu and Parlar (2020) highlight that continuous dialogue and feedback between management and operators are essential for identifying potential hazards and implementing effective safety measures. These findings collectively suggest that robust safety communication and feedback systems are crucial for promoting a culture of safety and enhancing safety awareness. Consequently, drawing upon the insights derived from various scholarly sources on the connection between management commitment and safety performance, **Hypothesis 4 (H4)**: There is a significant relationship between Safety Communication and Feedback and Radiation Safety Awareness.

3.9.5 Safety Rules and Procedures and Safety Awareness

Safety rules and procedures refer to established guidelines and protocols designed to ensure the safety of operators within an organization. These rules and procedures are critical for maintaining a safe working environment and enhancing safety awareness. According to Johnson and Smith (2023), the implementation of clear and comprehensive safety rules and procedures

significantly improves operators' understanding and compliance with safety practices. Alyami et al. (2022) emphasize that well-defined safety procedures help operators recognize potential hazards and respond effectively, thereby enhancing their overall safety awareness.

Research has shown that robust safety policies and procedures can significantly reduce workplace injuries and illnesses, leading to safer work environments and improved employee morale (Hale et al., 2010). Organizations that actively develop and update their safety protocols, incorporating feedback from employees, tend to have better safety outcomes and fewer incidents (Lingard et al., 2012). Moreover, fostering a strong safety culture where safety procedures are continuously improved and enforced can lead to higher productivity and lower costs associated with workplace accidents (Neal & Griffin, 2006). These findings collectively suggest that robust safety rules and procedures are crucial for promoting a safe working environment and improving safety awareness. Consequently, drawing upon the insights derived from various scholarly sources on the connection between management commitment and safety performance**, Hypothesis 5 (H5)**: There is a significant relationship between Safety Rules and Procedures and Radiation Safety Awareness.

3.9.6 Safety Promotion Policies and Safety Awareness

Safety promotion policies involve initiatives and strategies designed to enhance safety awareness and practices within an organization. These policies are vital for cultivating a safety-conscious culture and ensuring that safety measures are

consistently reinforced and communicated. According to Johnson and Smith (2023), effective safety promotion policies play a crucial role in improving operators' awareness and adherence to safety practices by consistently emphasizing the importance of safety through ongoing education and training. Alyami et al. (2022) highlight that safety promotion efforts, such as regular safety meetings and awareness campaigns, are key to maintaining high levels of safety awareness and engagement among operators.

Additional research supports the significance of safety promotion policies. For instance, the study by Houghton et al. (2018) underscores that organizations with well-implemented safety promotion strategies, including systematic safety communication and reinforcement, experience lower incident rates and improved safety performance. Similarly, Gist and Mitchell (1992) argue that effective safety promotion policies contribute to a stronger safety culture and better overall safety outcomes by fostering continuous engagement and improvement. Furthermore, a review by Neal and Griffin (2004) demonstrates that proactive safety promotion practices are associated with enhanced safety behaviours and reduced workplace accidents. These findings collectively suggest that robust safety promotion policies are essential for fostering a safety-oriented culture, enhancing safety awareness, and improving safety performance in the workplace. Consequently, drawing upon the insights derived from various scholarly sources on the connection between management commitment and safety performance, **Hypothesis 6 (H6)**: There is a significant relationship between Safety Promotion Policies and Safety Awareness.

3.10 Measurement

In order to obtain data from the respondents, the study employed a questionnaire technique. The questionnaire was thirteen (13) pages long, with three main sections with English and Bahasa Melayu being the languages of communication. Because the respondents had various levels of comprehension in English, which is impacted by their level of education, it was chosen to ask the questions in both English and Bahasa Melayu. In addition, the questionnaire was self-administered, with all questions being closed-ended. The contents of the questionnaire will be addressed with the research project's supervisors as well as PUSARTI's Chief Instructor, who is also the Safety Officer and a consultant on ADA radar training.

The demographics of the respondents were the subject of the first portion of the questionnaire, Section A. The employment categories, age group, sex, degree of education, and years of service in ADA radar soldiers were all questions. Management commitment, safety training, Operator engagement, safety communication and feedback, safety rules and procedures, and safety promotion policies were the six aspects of safety management practise included in the second half of the questionnaire. The questions were crafted after a thorough review of relevant literature and theory. In addition, all 57 questions were taken and adjusted from Vredenburgh (2002), Glendon and Litherland (2001), Cheyne (2000), Varonen and Mattila (2000), Flin et al. (2000), Cheyne et al. (1998), Williamson et al. (1997), Coyle et al. (1995), and Zohar (1980). Vinodkumar and Bhasi (2010) used all these tools in their study of organisational safety management methods in the petrochemical sector in Kerala, India's southernmost state. Hence, the section B contained modified versions of the questionnaires to suit the research as shown in Table 3.10.1.

Table 3.10.1
References and Number Items in Survey Questionnaire

Variables	References	Number of items
Management Commitment	Vinodkumar and Bhasi, 2010	9
Safety Communication and Feedback	Vinodkumar and Bhasi, 2010	6
Operator Involvement	Vinodkumar and Bhasi, 2010	5
Safety Training	Vinodkumar and Bhasi, 2010	5
Safety Promotion	Vinodkumar and Bhasi, 2010	5
Safety Rules and Procedures	Vinodkumar and Bhasi, 2010	5

Three primary components were stressed for the dependent variable, radiation safety awareness, which were knowledge, attitude, and action. The tools from Alotaibi, Abdulsalam, Bakir, and Mohammad (2015) were modified to measure the dimension of knowledge. The instruments from Abdellah, Attia, Fouad, and Abdel-Halim (2015) and Jeong and Jang (2016) were modified for the second dimension, which was attitude. The instruments from Yurt et al., (2014) and Abdellah et al., (2015) were also adapted for this dependent variable, which was action. Thus, the section C consisted of 17 items.

The thirteen-page questionnaire included space beside each item for respondents to indicate their choice on a 5-point Likert Scale. According to Geller, Roberts, and Glimore (1996), the Likert Scale is one of the sorts of replies that is commonly used in questionnaire surveys. It is the most widely used scale in questionnaire research. As a result, the scale is as shown in Table 3.10.2.

Table 3.10 2
Five-point Likert Scale

Judgement	Scale
Strongly Disagree	1
Disagree	2
Partially Agree	3
Agree	4
Strongly Agree	5

3.11 Data Collection and Administration

This study was collected and gathered data using the questionnaire survey research technique, which respondents were asked to answer the questions presented to assess the outcome of the above-mentioned hypotheses. As a result, the researcher has written an official letter to the Commandant of PUSARTI, seeking authorization to conduct a survey for this research. The purpose of the questionnaire is to determine the impact of safety management practises and radiation safety awareness. Following that, the survey was done by gathering all the requisite respondents on a specified agreed-upon day. On the same day, the questionnaires were delivered and answered by all respondents in situ. Questions presented individually in a limited geographic region, with respondents responding to the surveys within a certain time frame. Table 3.11.1 displays the number of questionnaires which have been distributed to the respondents as well as the numbers that have been returned. The response percentage rate was 100 % and the unreturned questionnaires in which the percentage rate was nil.

Table 3.11.1
Number of questionnaires distributed and returned

Item	Quantity
Questionnaires Distributed	30
Questionnaires Returned	30

3.12 Pilot Study

"According to Creswell & Creswell (2018), a pilot study constitutes a vital component of numerous research projects, particularly in the realms of social sciences and empirical fields. Its purpose is to enable researchers to assess their research instruments, amass preliminary data, and effectuate essential modifications prior to embarking on the full-scale study. Therefore, a pilot study was conducted to evaluate the reliability of the survey questions before the commencement of the actual data collection. In this pilot study, 30 students enrolled in the Basic Radar Operator Course Serial 1/2024 participated, and the data they provided were subsequently analyzed using SPSS Version 27. The purpose of the pilot study was to identify any potential issues with the instructions or questions, detect any failures that would cause the research process to be interrupted in advance, and assess whether the selected technique would be suitable for the data. After the pre-testing study's data collection was finished, the findings were examined to ensure that each question's dependability.

This reliability was execute through the measurement of internal consistency, employing Cronbach's Alpha Value. The resulting Cronbach's Alpha Value, which ranges from 0.00 to 1.00, is indicative of the reliability level. A higher value signifies greater test reliability. As detailed in Table 3.12.1, the assessed Cronbach's Alpha Values for the pilot study are presented according to variable dimensions. Notably, all dimensions of both independent and dependent variables displayed values exceeding 0.6, indicating superior test (Hair et al., 2013).

Table 3.12.1
Tested Alpha Cronbach's Value for Pilot Study

Item	Dimension of Variable	Cronbach's Alpha Value (SPSS)
Management Commitment	Independent	0.907
Safety Training	Independent	0.908
Operators Involvement	Independent	0.768
Safety Communication and Feedback	Independent	0.760
Safety Rules and Procedures	Independent	0.916
Safety Promotion Policies	Independent	0.857
Radiation Safety Awareness	Dependent	0.950

3.13 Data Analysis Techniques

To obtain the desired result, statistical analysis using the SPSS 27 software were used. The analysis carried out involved:

i) Reliability test: A reliability test using Cronbach's Alpha measures the internal consistency of a set of items in a test or questionnaire. The value ranges from 0.00 to 1.00, with higher values indicating greater reliability, ensuring the items consistently measure the same construct.

ii) Normality Test: This step involves testing whether the data distribution approximates a normal distribution. The study used Skewness and Kurtosis Statistics to assess the symmetry (skewness) and peaked (kurtosis) of the data distribution. Skewness indicates whether the data is skewed to the left or right, while kurtosis measures the tails' heaviness.

iii) Descriptive Analysis

a. Exploratory Data Analysis (EDA): EDA will be performed to summarize the main characteristics of the data. This involves using graphical techniques (such as histograms, box plots, and scatter plots)

and quantitative methods to identify patterns, spot anomalies, test hypotheses, and check assumptions.

b. Variable Analysis using Mean Statistics: This analysis involves calculating and interpreting the mean (average) values of the variables. It helps in understanding the central tendency and provides a summary measure of the data.

iv) Correlation Analysis: Pearson correlation analysis measures the strength and direction of the linear relationship between two continuous variables. The correlation coefficient ranges from -1 to +1, where -1 indicates a perfect negative relationship, +1 indicates a perfect positive relationship, and 0 indicates no linear relationship between the variables.

3.14 Summary

The research context pertains to an investigation conducted within PUSARTI's Air Defence Wing, involving the questionnaires to collect data from the participating students. This study focused on evaluating the students' perceptions of safety management practices and their influence on raising awareness about radiation safety. To analyze the gathered data, assess its reliability, and derive meaningful insights, we used SPSS 27. The Cronbach's Alpha Value for every item in the questionnaire assessed was over 0.6, which is a noteworthy finding from this analysis. According to Hair et al., (2013). an indicator above 0.6 value is strong enough to perform genuine research. This high value suggests robust internal consistency within the scale we employed for our research.

CHAPTER 4
RESULT AND DISCUSSION

4.1 Introduction

This component of the study addresses the factors impacting the perceptions of Malaysian Air Defence Artillery radar course students regarding safety management practices and radiation safety awareness. A few major themes from the online survey that 148 Malaysian students enrolled in the Air Defence Artillery's radar training—representing three different occupational levels—completed and returned serve as a summary of the conclusions and analysis in this section. This part include a number of methods employed in the research, such as mean statistics analysis, correlation analysis, exploratory data analysis, normality analysis, and a discussion of the goals of the study. Every technique has a justification given to ensure that the data analysis is accurate.

4.2 Response Rate

One methodological issue that is rarely explored in detail is survey response rate. Response rate maximization is noted since insufficient replies raise questions about the generalizability of the findings because of possible response biases. Few researchers examine the significance of the response rate at methodological principles, despite the fact that publishing the response rate is thought to be standard procedure in satisfaction surveys.

Table 4.2.1
Response rate of the survey

Items	Total	Percentage (%)
Distributed Questionnaires	148	100
Unreturned Questionnaire	-	-
Completed Questionnaire	148	100

Table 4.2.1 displays the total of 148 questionnaires that were distributed to the Malaysian Air Defence Artillery radar training students. Out of the 148 distributed questionnaires, 148 were completed and returned, resulting in a response rate of 100%. The high response rate of 100% achieved in this study highlights the effectiveness of the survey methodology used. Achieving such a high response rate is crucial as it helps mitigate concerns about response biases and enhances the generalizability of the findings. A higher response rate ensures that the sample closely represents the population, reducing the likelihood of bias that can occur when a significant portion of the population does not respond (Groves & Peytcheva, 2008; Lindner et al., 2001).

In this study, the use of simple random sampling, where each member of the population has an equal chance of being selected, contributed to the high response rate. Simple random sampling ensures that the sample is representative of the population, which enhances the validity of the study findings (Fowler Jr., 2013). This method allows for comprehensive data collection while maintaining the principles of randomness and unbiased selection.

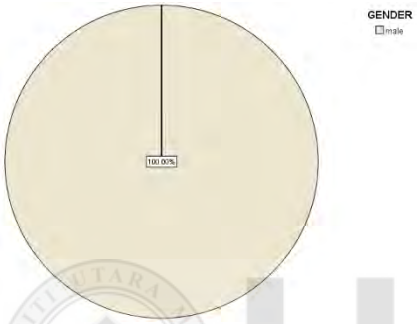
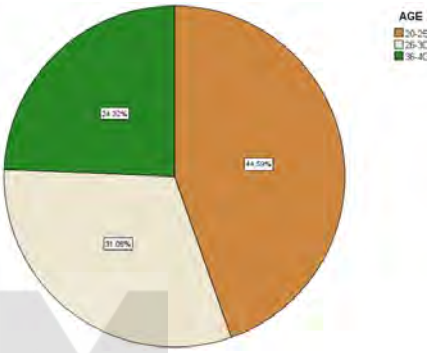
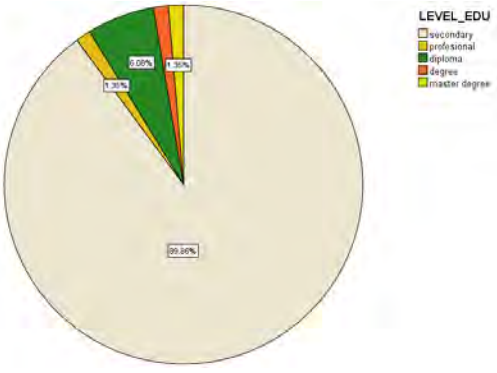
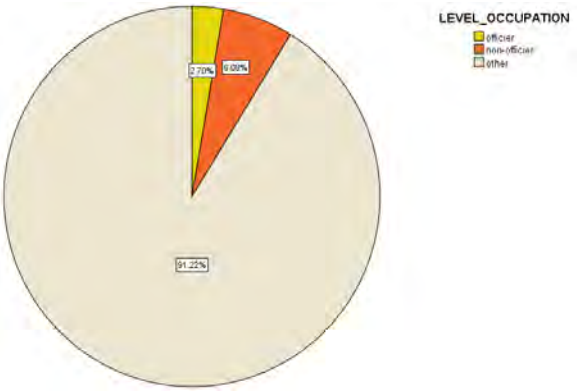
By achieving a 100% response rate, this study avoids the potential pitfalls associated with lower response rates in sample surveys. It ensures that the data accurately reflects the views and experiences of all radar course students, providing a solid foundation for analysing safety management practices and safety awareness. The comprehensive nature of the sample allows for a detailed examination of the entire population, facilitating more robust and generalizable conclusions. This approach is particularly beneficial in smaller populations, where achieving a high response rate is feasible and necessary for precise data collection (Draugalis et al., 2008).

The next step involves looking into the Air Defence Artillery Radar Course Students who were engaged after confirming that the dataset appears normal across all variables. In this phase of analysis discoveries are made gradually. The researcher starts by identifying and developing a ideas and generalizations during the sorting process. In our survey we consider socio demographic variables of the respondents. The comprehensive data, on Air Defence Artillery can be understood by examining Pie Chart 1 Pie Chart 2 Pie Chart 3 Pie Chart 4 and Pie Chart 5 which provide insights into gender distribution (male and female) age groups within the Air Defence Artillery Radar Course Students educational levels, occupational categories and years of service in the Air Defence Artillery.

Pie Chart 1 reveals that all male individuals from the Air Defence Artillery Radar Course Students partook in this survey entirely. Following this Pie Chart 2 shows that within the Air Defence Artillery Radar Course Students group the highest percentage belongs to individuals in the age bracket at 44.59% followed by those, in the age group of 26–30 at 31.08% with individuals aged between 36–40 years forming the percentage group. Subsequently Pie Chart 3 illustrates that most participants held a certificate (89.86%) while a smaller proportion possessed a diploma (6.08%).

However, all participants, in the Air Defence Artillery Radar Course Students exhibit a percentage of 1.35% for Professional, First Degree and master's degree qualifications. According to Pie Chart 4 a significant majority of Air Defence Artillery Radar Course Students standing at 91.22% are categorized as other ranks. Non-commissioned officers follow with 6.08% while officers represent the category at 2.70%. In Pie Chart 5 it is evident that the duration of service in the Air Defence

Artillery Radar Course Students is highest among individuals with 1 to 5 years of experience (51.35%). Conversely those serving between 21 and 40 years constitute the percentage at 3.38%. The distribution is also notable among those serving for periods ranging from 6 to10 years (22.30%) followed by individuals, with service durations of16 to20 years (17.57%) and11 to15 years (5.41%).

Pie Chart 1: The percentage of gender male and female among the Air Defence Artillery 	**Pie Chart 2:** The percentage of ages group among the Air Defence Artillery 
Pie Chart 3: The percentage of level of education group among the Air Defence Artillery 	**Pie Chart 4:** The percentage of level of occupation among the Air Defence Artillery 

Pie Chart 5: The percentage of years of services as Air Defence Artillery

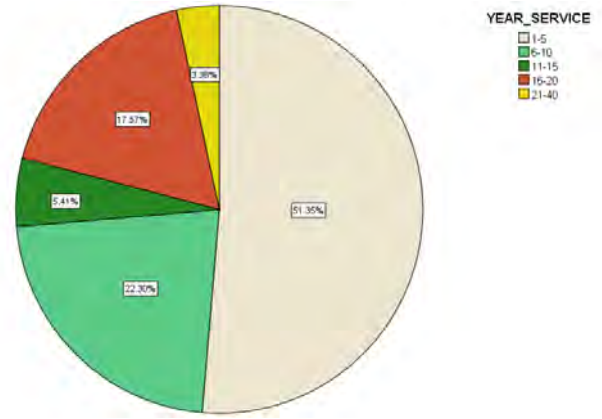


Figure 4.2.1
Pie Chart for demographic profiles

4.3 Reliability Test

This section will outline the findings of the sampled data involving 148 samples. The aim of this study was to ensure the reliability of the sampled data is consistent with the pilot study. Table 4.3.1 breaks down the Cronbach's Alpha Values for dimensions in the sampled data. Notably all dimensions for both dependent variables showed values above 0.6 indicating test reliability (Hair et al., 2013).

The table below shows the benchmarks based on a range of values by Brownlow et al. (2004) indicating that Cronbach Alpha scores between 0.0 and 0.75 are generally considered acceptable. The Cronbach Alpha values for the variables. Management Commitment, Safety Training, Operator Involvement, Safety Communication and Feedback, Safety Rules and Procedures well as Safety Promotion Policies are 0.826, 0.748, 0.747, 0.697, 0.794, and 0.800 respectively. Additionally, the Cronbach Alpha value, for the dependent variable is 0.915.

Table 4.3.1
Tested Alpha Cronbach's value for sampled data

Item	Dimension of Variable	Cronbach's Alpha Value (SPSS)
Management Commitment	Independent	0.826
Safety Training	Independent	0.748
Operators Involvement	Independent	0.747
Safety Communication And Feedback	Independent	0.697
Safety Rules And Procedures	Independent	0.794
Safety Promotion Policies	Independent	0.800
Radiation Safety Awareness	Dependent	0.915

4.4 Normality test: Skewness and Kurtosis Statistics

Next after the dataset is prepared, the normality test is conducted which crucial idea in statistics and data analysis, skewness offers important insights into how data are distributed. It supports our ability to spot outliers, comprehend the structure of the data, and arrive at wise conclusions. It is extensively applied across many domains and has important ramifications for both research and policymaking. Most statistical packages provide you with the standard errors and values for kurtosis and skewness. Determining whether a parametric or non-parametric test is required requires verifying the normality assumption. Various approaches of verifying normality are proposed in the literature. Two examples of them are skewness and kurtosis values. Which numbers, nevertheless, showed a normal distribution is a matter of debate. Thus, this study simulated the effects of several criteria on skewness levels.

Table 4.4.1
Skewness and Kurtosis values

Variables	Skewness	Kurtosis
Safety Communication and Feedback	-0.153	1.375
Management Commitment	-0.763	3.593
Operator Involvement	-0.410	2.522
Safety Training	-0.655	3.062
Safety Promotion Policies	-0.204	0.906

Safety Rules and Procedures	0.410	2.310
Radiation Safety Awareness	-0.311	3.158

Based on Table 4.4.1 display the skewness for independent variables: Management Commitment, Safety Training, Operator Involvement, Safety Communication and Feedback, Safety Rules and Procedures, Safety Promotion Policies. Dependent variable is Safety Awareness. Skewness for the IV are -0.763, -0.655, -0.410, -0.153, 0.410,and -0.204 respectively. Skewness for safety awareness is -0.311.

Meanwhile, Table 4.5 also display the kurtosis for independent variables: Management Commitment, Safety Training, Operator Involvement, Safety Communication and Feedback, Safety Rules and Procedures and Safety Promotion Policies.. Dependent variable is Safety Awareness. Kurtosis for Safety Communication and Feedback Management Commitment, Operator Involvement, Safety Training, Safety Promotion, and Safety Rule are 1.375, 3.593, 2.522, 3.062, 0.906, and 2.310 respectively. Kurtosis for Safety Awareness is 3.158. Sum up all kurtosis value are satisfied between -7 to +7 (H. Y. Kim, 2013) . Similarly, West, Finch, and Curran (1995) suggest that an absolute kurtosis value greater than 7 indicates substantial non-normality. Whereas all the variables are follows normal. Based on these points the researcher can confidently conclude that all variables studied in this research exhibit data distribution characteristics with normality criteria outlined by Hair et al. (1998). These results enhance confidence, in the accuracy of the data analysis conducted in this study.

Another significant factor in relation to normality is sample size. A tiny sample size makes it impossible to quarantine data normality. A sample of fifty people drawn from

a normal distribution was demonstrated to be nonnormal in one instance (Altman, 1991, as reported in (Rochon et al., 2012). Comparing this study result toward (Bendayan et al., 2014) investigated the skewness and kurtosis of 693 data sets with sample sizes ranging from 10 to 30. Only 5.5% of the distributions (skewness and kurtosis between positive and negative 0.25) were determined to be reasonably near to a normal distribution. It was advised that normalcy should be controlled before analysis, even with tiny sample sizes.

4.5 Data Preparation

To ensure that the data is understandable and prepared for further evaluation, this data preparation stage is crucial. The first step of data preparation involves several processing tasks, such as converting numerical variables into categorical variables, eliminating duplicate cases, eliminating incorrect values, and checking categorical variable groups for invalidity and missing values. The dataset contains information on Malaysian Air Defence Artillery radar course students such as demographic data like age, gender, level of education, years of services, and level of position. Students undergoing radar course Malaysian Air Defence Artillery will score each question on a Likert scale. Codes 1 through 5 represent strongly disagree, disagree, neutral, agree, and strongly agree, respectively. The five categories for variable age classification are as follows: code 1 represents 20 to 25 years old; code 2 represents 26 to 30 years old, code 3 represents 31 to 35 years old, code 3 represents 36 to 40 years old, and code 5 represents age above 40. Gender code '1' designates male students in the ADA radar course, while code '2' designates female pupils.

Subsequently, every respondent has a different educational background. Thus, code "1" for secondary school, code "2" for a professional certificate, code "3" for a diploma

certificate, code "4" for a first degree, and code "5" for a master's degree are all successfully identified by this study. Their level of occupation is also indicated in this study by the codes "1" for officers, "2" for non-commissioned officers, and "3" for other ranks. The study concludes by designating their years of service as Air Defence Artillery using the following codes: 1 for 1 to 5 years, 2 for 6 to 10 years, 3 for 11 to 15 years, 4 for 16 to 20 years, and 5 for more than 21 years. Table 4.5.1 and Table 4.5.2 summarize of Likert-scale and categorical variables displayed.

Table 4.5.1
Summarized of transformed categorical variables

Variable Name	Value	Code	Description
Likert-Scale	Strongly Disagree	1	As someone strongly disagree with the questions
	Disagree	2	As someone disagree with the questions
	Neutral	3	As someone neutral with the questions
	Agree	4	As someone agree with the questions
	Strongly Agree	5	As someone strongly agree with the questions

Table 4.5.2
Summarized of transformed categorical variables

Variable Name	Value	Code	Description
Age	20-25	1	A person Air Defence Artillery from 20 to 25 years old
	26-30	2	A person Air Defence Artillery from 26 to 30 years old
	31-35	3	A person Air Defence Artillery from 31 to 35 years old
	36-40	4	A person Air Defence Artillery from 36 to 40 years old
	Above 40	5	A person Air Defence Artillery above 40 years old
Gender	Male	1	A male Air Defence Artillery
	Female	0	A female Air Defence Artillery
Level Education	Secondary certificate	1	A Air Defence Artillery that have secondary certificate
	Professional certificate	2	A Air Defence Artillery that have professional certificate

	Diploma certificate	3	A Air Defence Artillery that have diploma certificate
	First Degree	4	A Air Defence Artillery that have first degree certificate
	Master's Degree	5	A Air Defence Artillery that have master degree certificate
Level Occupation	Officer	1	A Air Defence Artillery position as officer
	Non-commissioned officers	2	A Air Defence Artillery position as non-commissioned officers
	Other Rank	3	A Air Defence Artillery position as other ranks.
Year Service	1-5	1	A Air Defence Artillery serving range one to five years
	6-10	2	A Air Defence Artillery serving range six to ten years
	11-15	3	A Air Defence Artillery serving range eleven to fifteen years
	16-20	4	A Air Defence Artillery serving range fifteen to twenty years
	Above 20	5	A Air Defence Artillery serving more than twenty years

4.6 Descriptive Analysis using Mean Statistics and Standard Deviation

In this section, this study wants to describe the mean score by the independent variable (IV) for Safety Communication and Feedback Management Commitment, Operator Involvement, Safety Training, Safety Promotion, and Safety Rule. Followed by the examination for dependent variable (DV): Radiation Safety Awareness. This research aims to initiate this process of inquiry and development by developing theoretical assessments of the theory of knowledge of ideas, namely the mean and standard deviation. Alternatively said, that an Air Defence Artillery Radar Course Students could utilize to gain a deeper understanding of each of these theories. This section addressed the first objective of assessing the degree of safety management practices among students enrolled in the Air Defence Artillery radar course, as well as the secondary objective of determining the students' level of radiation safety awareness.

Table 4.6.1 shows the mean score for variable safety management practice based on six factors: Operator Involvement (3.75), Safety Training (3.76), Safety Communication and Feedback (3.60), Safety Rules and Procedures (3.85), Safety Promotion (3.68) and Management Commitment (3.80). All indicators have mean values that are within average ranges. In the meantime, the radiation safety awareness mean score, which is 3.72 based on knowledge, attitude, and action, shows that there is still a moderate understanding of information and guidance in the radiation safety awareness behaviour.

The degree of data dispersion relative to the mean is quantified by the standard deviation. Data with small or low standard deviations are centred around the mean, while large or big standard deviations are widely distributed. A standard deviation of less than or equal to zero indicates that the data points are around the mean; a higher standard deviation suggests that the data points are spread out farther from the mean. (Bluman, 2018). This analysis indicates that the data points are in close proximity to their respective means. The standard deviations for the following are displayed in this table: 0.66 for Safety Training, 0.67 for Safety Rules and Procedures, 0.62 for Operator Involvement, 0.65 for Safety Communication and Feedback, and 0.56 for Management Commitment.

Table 4.6.1
Descriptive statistics value

Category	Variables	N	Mean	Standard Deviation
Independent variables	Management Commitment	148	3.80	0.56
	Safety Communication and Feedback	148	3.60	0.65
	Operator Involvement	148	3.75	0.59
	Safety Training	148	3.76	0.57

	Safety Promotion	148	3.68	0.68
	Safety Rules and Procedures	148	3.85	0.62
Dependent variable	Safety Awareness	148	3.72	0.56

4.7 Correlation Analysis

One popular technique for determining how closely two sets of variables are related is correlation analysis (Kumar, 2014; Sekaran & Bougie, 2016). Researchers can determine how strongly these factors are related by using this strategy. The Pearson Correlation test is used in this study to evaluate hypotheses and accomplish research goals.

The Pearson correlation coefficient (r) in statistics is a number between -1 and 1. Benesty et al. (2009) state that the variables are deemed uncorrelated when (r = 0). The closer the value of r is to 1, the stronger the correlation between the two variables. A perfect positive correlation is indicated by (r = 1), while a perfect negative correlation is indicated by (r = −1). Pallant (2020) notes that the magnitude and direction of r can be categorized based on the classifications outlined in Table 4.7.1 below.

Table 4.7.1
The value and level of the Pearson correlation coefficient

Pearson Correlation Coefficient	Strength
(r) = ±0.01 to ± 0.29	**Weak**
(r) = ± 0.3 to ± 0.49	**Moderate**
(r) = ±0.5 to ± 1	**Strong**

After performing correlation analysis between all independent variables and the dependent variable, which is Safety Awareness, the Pearson correlation coefficients obtained are presented in Appendix III and Table 4.7.2 below.

Table 4.7.2
Correlation Analysis between Independent Variables and Dependent Variable

Independent Variables	Pearson Correlation Coefficient
Management Commitment	0.744**
Safety Training	0.825**
Operator Involvement	0.829**
Safety Communication and Feedback	0.684**
Safety Rules and Procedures	0.752**
Safety Promotion Policies	0.755**

** Significant at $p < 0.05$

The analysis findings indicate a significant positive correlation between safety awareness and all six independent variables. Operator Involvement exhibited the strongest correlation with safety awareness, with a correlation coefficient of ($r = 0.829$), indicating a robust relationship. Safety Training showed a slightly lower but still strong correlation, with a coefficient of ($r = 0.825$). Safety Rules and Procedures, Safety Promotion Policies and Management Commitment demonstrated a moderate relationship with safety performance, with correlation coefficients of ($r = 0.752$), ($r=0.755$) and ($r = 0.744$) respectively. Additionally, Safety Communication and Feedback also showed a moderate to relationship, reflected by a correlation coefficient of ($r = 0.684$).

4.7.1 Relationship Between Management Commitment and Safety Awareness

Table 4.7.3 below shows the results of the correlation analysis between the Management Commitment variable and safety awareness.

Table 4.7.3
Relationship Between Management Commitment and Safety Awareness

		Safety Awareness
Management Commitment	Pearson Correlation	0.744**
	Sig.(2 Tail)	<0.01
	N	148

** correlation is significant at $p < 0.05$ (2tailed)

Based on the data in Table 4.7.3, the Pearson correlation coefficient is 0.744**, indicating a significant relationship between Management Commitment and Safety Awareness. This relationship is positive and has a strong level of strength, with (r) = 0.744 and a p- value less than 0.01. Therefore, referring to Table 4.7.4, this analysis also indicates that hypothesis 1 in this study is accepted.

Table 4.7.4
Hypothesis between Management Commitment and Safety Awareness

Hypothesis	Hypothesis Statement	Result	Strength
H1	There is a significant relationship between Management Commitment and Safety Awareness	Accepted	Strong

4.7.2 Relationship Between Safety Training and Safety Awareness

Table 4.7.5 below shows the results of the correlation analysis between the Safety Training variable and Safety Awareness.

Table 4.7.5
Relationship Between Safety Training and Safety Awareness

		Safety Awareness
Safety Training	Pearson Correlation	0.825**
	Sig.(2 Tail)	<0.01
	N	148

** correlation is significant at p < 0.05 (2tailed)

Based on the data in Table 4.7.5, the Pearson correlation coefficient is 0.825**, indicating a significant relationship between Safety Training and Safety Awareness. This relationship is positive and has a strong level of strength, with (r) = 0.825 and a p- value less than 0.01. Therefore, referring to Table 4.7.6, this analysis also indicates that hypothesis 2 in this study is accepted.

Table 4.7.6
Hypothesis between Safety Training and Safety Awareness

Hypothesis	Hypothesis Statement	Result	Strength
H2	There is a significant relationship between Safety Training and Safety Awareness	Accepted	Strong

4.7.3 Relationship Between Operator's Involvement and Safety Awareness

Table 4.8.7 below shows the results of the correlation analysis between the Operator's Involvement variable and Safety Awareness.

Table 4.7.7
Relationship Between Operator's Involvement and Safety Awareness

		Safety Awareness
Operator's Involvement	Pearson Correlation	0.829**
	Sig.(2 Tail)	<0.01
	N	148

** correlation is significant at p < 0.05 (2tailed)

Based on the data in Table 4.7.7, the Pearson correlation coefficient is 0.829**, indicating a significant relationship between Operator's Involvement and Safety Awareness. This relationship is positive and has a strong level of strength, with (r) = 0.829 and a p- value less than 0.01. Therefore, referring to Table 4.7.8 this analysis also indicates that hypothesis 3 in this study is accepted.

Table 4.7.8
Hypothesis between Operator's Involvement and Safety Awareness

Hypothesis	Hypothesis Statement	Result	Strength
H3	There is a significant relationship between Operator's Involvement and Safety Awareness	Accepted	Strong

4.7.4 Relationship Between Safety Communication and Feedback and Safety Awareness

Table 4.7.9 below shows the results of the correlation analysis between the Safety Communication and Feedback variable and Safety Awareness.

Table 4.7.9
Relationship Between Safety Communication and Feedback and Safety Awareness

		Safety Awareness
Safety Communication and Feedback	Pearson Correlation	0.684**
	Sig.(2 Tail)	<0.01
	N	148

** correlation is significant at p < 0.05 (2tailed)

Based on the data in Table 4.7.9, the Pearson correlation coefficient is 0.684**, indicating a significant relationship between Safety Communication and Feedback and Safety Awareness. This relationship is positive and has a strong level of strength, with (r) = 0.684 and a p- value less than 0.01. Therefore, referring to Table 4.7.10, this analysis also indicates that hypothesis 4 in this study is accepted.

Table 4.7.10
Hypothesis between Safety Communication and Feedback and Safety Awareness

Hypothesis	Hypothesis Statement	Result	Strength
H4	There is a significant relationship between Safety Communication and Feedback and Safety Awareness	Accepted	Strong

4.7.5 Relationship Between Safety Rules and Procedures and Safety Awareness

Table 4.7.11 below shows the results of the correlation analysis between the Safety Rules and Procedures variable and Safety Awareness.

Table 4.7.11
Relationship Between Safety Rules and Procedures and Safety Awareness

		Safety Awareness
Safety Rules and Procedures	Pearson Correlation	0.752**
	Sig.(2 Tail)	<0.01
	N	148

** correlation is significant at p < 0.05 (2tailed)

Based on the data in Table 4.7.11, the Pearson correlation coefficient is 0.752**, indicating a significant relationship between Safety Rules and Procedures and Safety Awareness. This relationship is positive and has a strong level of strength, with (r) = 0.684 and a p- value less than 0.01. Therefore, referring to Table 4.7.12, this analysis also indicates that hypothesis 5 in this study is accepted.

Table 4.7.12
Hypothesis between Safety Rules and Procedures and Safety Awareness

Hypothesis	Hypothesis Statement	Result	Strength
H5	There is a significant relationship between Safety Rules and Procedures and Safety Awareness	Accepted	Strong

4.7.6 Relationship Between Safety Promotion Policies and Safety Awareness

Table 4.7.13 below shows the results of the correlation analysis between the Safety Promotion Policies variable and Safety Awareness.

Table 4.7.13
Relationship Between Safety Promotion Policies and Safety Awareness

		Safety Awareness
Safety Promotion Policies	Pearson Correlation	0.755**
	Sig.(2 Tail)	<0.01
	N	148

** correlation is significant at p < 0.05 (2tailed)

Based on the data in Table 4.7.13, the Pearson correlation coefficient is 0.755**, indicating a significant relationship between Safety Promotion Policies and Safety Awareness. This relationship is positive and has a strong level of strength, with (r) = 0.755 and a p- value less than 0.01. Therefore, referring to Table 4.7.14, this analysis also indicates that hypothesis 6 in this study is accepted.

Table 4.7.14
Hypothesis between Safety Promotion Policies and Safety Awareness

Hypothesis	Hypothesis Statement	Result	Strength
H6	There is a significant relationship between Safety Promotion Policies and Safety Awareness	Accepted	Strong

4.8 Summary

The examination of the gathered data is the main topic of this chapter. It starts with a reliability assessment of the data, then moves on to tests for distribution normalcy. After that, the chapter offers a synopsis of the demographic data of the participants, a thorough descriptive analysis, and a comprehensive investigation utilizing Pearson correlation. These techniques are used to determine which independent factors are the most important as well as to forecast the dependent variable. The research questions mentioned in Section 1.6 are addressed in these analyses. The research findings will be further examined in the following chapter, which will also evaluate the study's limits, highlight the theoretical and practical consequences of the findings, and make suggestions for additional research.

CHAPTER 5
DISCUSSION AND CONCLUSION

5.1 Introduction

To sum up, this chapter will give a general review of the research and talk about the conclusions drawn from the analyses and findings. Along with thoroughly examining its flaws, it will also explore the study's ramifications. Ultimately, suggestions for additional study and general conclusions will be provided.

5.2 Discussion of Research Findings

5.2.1 Relationship Between Management Commitment and Radiation Safety Awareness Among Malaysian Air Defence Artillery Radar Course Students

The Pearson correlation coefficient between Management Commitment and Radiation Safety Awareness indicates a statistically significant positive relationship between these two variables. The statistically significant correlation coefficient ($p<0.01$) underscores the critical role of management commitment in enhancing radiation safety awareness. This strong positive correlation suggests that when management is committed to safety, it significantly influences the awareness levels of radiation safety among the students.

Effective management commitment is pivotal in establishing a robust safety culture within organizations, including military training environments. Research indicates that active management involvement and dedication to safety protocols are essential for improving safety awareness and compliance among personnel (Neal & Griffin, 2006; Zohar, 1980). In the context of the Malaysian Air Defence Artillery, where students are exposed to radiation

hazards, strong management commitment is vital for ensuring adherence to safety standards and preventing accidents.

Neal and Griffin (2006) conducted a study highlighting the impact of management commitment on safety performance. Their findings demonstrated that when management prioritizes safety, it leads to improved safety outcomes through better hazard recognition and preventive measures. Similarly, Zohar (1980) emphasized that management's visible commitment to safety practices fosters a proactive safety culture, encouraging personnel to follow safety protocols diligently.

Moreover, Clarke (2006) and Kines et al. (2010) found that management's active role in safety initiatives, such as conducting regular safety training and providing necessary resources, significantly enhances safety awareness and reduces incident rates. These studies indicate that management's commitment to safety is not just about enforcing rules but also about creating an environment where safety is a shared value.

The strong correlation (r = 0.744) found in this study signifies a robust relationship between management commitment and radiation safety awareness. It indicates that as management's commitment to safety increases, so does the safety awareness among the students, which is crucial for fostering a safe training environment.

In summary, the relationship between management commitment and radiation safety awareness among Malaysian Air Defence Artillery Radar Course

students is crucial for fostering a safe training environment. The significant positive correlation found in this study supports the notion that management's dedication to safety practices directly impacts the safety awareness levels of the students. Therefore, enhancing management commitment to safety is essential for improving overall safety performance and ensuring the well-being of all personnel involved.

5.2.2 Relationship Between Operator Involvement And Radiation Safety Awareness Among Malaysian Air Defence Artillery Radar Course Students

The Pearson correlation coefficient between Operator Involvement and Radiation Safety Awareness indicates a statistically significant positive relationship between these two variables. The statistically significant correlation coefficient ($p<0.01$) highlights the importance of operator involvement in enhancing radiation safety awareness. This strong positive correlation suggests that active involvement of operators significantly influences their awareness levels of radiation safety.

Operator involvement is crucial in establishing a proactive safety culture within organizations, including military training environments. Research indicates that when operators are actively involved in safety-related activities, it leads to better safety awareness and compliance with safety protocols (Geller, 2001; Neal et al., 2000). In the context of the Malaysian Air Defence Artillery, where students are exposed to radiation hazards, operator involvement is vital for ensuring adherence to safety standards and preventing accidents.

Geller (2001) conducted a study highlighting the significance of proactive operator involvement in enhancing safety performance. The findings demonstrated that when operators are actively engaged in safety discussions and initiatives, it leads to improved hazard recognition and the implementation of effective preventive measures. Similarly, Neal et al. (2000) emphasized that regular involvement of operators in safety activities, such as safety meetings and feedback sessions, is linked to improved safety compliance and reduced accident rates.

Furthermore, Clarke (2006) and Kines et al. (2010) found that operator involvement in safety practices, such as conducting safety observations and providing peer feedback, significantly enhances safety awareness and reduces incident rates. These studies indicate that involving operators in safety practices not only helps in enforcing safety rules but also in creating an environment where safety is a shared responsibility.

The strong correlation ($r = 0.829$) found in this study signifies a robust relationship between operator involvement and radiation safety awareness. It indicates that as operator involvement in safety practices increases, so does their awareness of radiation safety, which is crucial for fostering a safe training environment.

In summary, the relationship between operator involvement and radiation safety awareness among Malaysian Air Defence Artillery Radar Course students is crucial for fostering a safe training environment. The significant positive correlation found in this study supports the notion that active

involvement of operators in safety practices directly impacts their safety awareness levels. Therefore, enhancing operator involvement in safety activities is essential for improving overall safety performance and ensuring the well-being of all personnel involved.

5.2.3 Relationship Between Safety Communication And Feedback And Radiation Safety Awareness Among Malaysian Air Defence Artillery Radar Course Students

The Pearson correlation coefficient between Safety Communication and Feedback and Radiation Safety Awareness indicates a statistically significant positive relationship between these two variables. The statistically significant correlation coefficient ($p<0.01$) highlights the critical role of effective safety communication and feedback in enhancing radiation safety awareness. This strong positive correlation suggests that clear and consistent communication regarding safety protocols significantly influences the awareness levels of radiation safety among the students.

Effective safety communication and feedback are pivotal in establishing a robust safety culture within organizations, including military training environments. Research indicates that clear and transparent communication channels facilitate the exchange of safety-related information, improve hazard awareness, and encourage active participation in safety initiatives (Neal et al., 2000; Geller, 2001). In the context of the Malaysian Air Defence Artillery, where students are exposed to radiation hazards, effective communication and feedback mechanisms are essential for ensuring adherence to safety standards and preventing accidents.

Neal et al. (2000) conducted a study highlighting the impact of regular safety communication on safety performance. Their findings demonstrated that consistent communication about safety protocols and regular feedback sessions lead to improved safety compliance and reduced accident rates. Similarly, Geller (2001) emphasized that proactive safety communication strategies, such as safety meetings and safety newsletters, foster a culture of safety by keeping personnel informed and engaged in safety practices.

Moreover, Clarke (2006) and Kines et al. (2010) found that peer-to-peer safety communication, including safety observations and feedback sessions, significantly enhances safety awareness and reduces incident rates. These studies indicate that effective communication about safety issues, both from management and among peers, is crucial for reinforcing safety protocols and fostering a collective responsibility for safety.

The strong correlation ($r = 0.684$) found in this study signifies a robust relationship between safety communication and feedback and radiation safety awareness. It indicates that as the quality and frequency of safety communication and feedback increase, so does the safety awareness among the students, which is crucial for fostering a safe training environment.

In summary, the relationship between safety communication and feedback and radiation safety awareness among Malaysian Air Defence Artillery Radar Course students is crucial for fostering a safe training environment. The significant positive correlation found in this study supports the notion that

effective safety communication and feedback practices directly impact the safety awareness levels of the students. Therefore, enhancing communication and feedback mechanisms is essential for improving overall safety performance and ensuring the well-being of all personnel involved.

5.2.4 Relationship Between Safety Rules And Procedures And Radiation Safety Awareness Among Malaysian Air Defence Artillery Radar Course Students

The Pearson correlation coefficient of between Safety Rules and Procedures and Radiation Safety Awareness indicates a statistically significant positive relationship between these two variables. The statistically significant correlation coefficient ($p<0.01$) underscores the critical role of well-defined safety rules and procedures in enhancing radiation safety awareness. This strong positive correlation suggests that clear and comprehensive safety guidelines significantly influence the awareness levels of radiation safety among the students.

Effective safety rules and procedures are essential in establishing a robust safety culture within organizations, including military training environments. Research indicates that well-defined safety protocols help in recognizing potential hazards and implementing preventive measures, thereby improving safety awareness and compliance among personnel (Hale et al., 2010; Lingard et al., 2012). In the context of the Malaysian Air Defence Artillery, where students are exposed to radiation hazards, comprehensive safety rules and procedures are crucial for ensuring adherence to safety standards and preventing accidents.

Hale et al. (2010) conducted a study highlighting the impact of clear and detailed safety procedures on safety performance. Their findings demonstrated that organizations with well-defined safety protocols experience lower incident rates and improved safety performance due to better hazard recognition and preventive actions. Similarly, Lingard et al. (2012) emphasized that regular updates and consistent enforcement of safety rules are linked to higher safety compliance and reduced accident rates.

Moreover, Neal and Griffin (2006) found that a strong safety climate, reinforced by clear safety rules and procedures, significantly enhances safety awareness and reduces incident rates. These studies indicate that having detailed safety guidelines not only helps in enforcing safety practices but also in creating an environment where safety is a priority.

The strong correlation ($r = 0.752$) found in this study signifies a robust relationship between safety rules and procedures and radiation safety awareness. It indicates that as the clarity and comprehensiveness of safety rules and procedures increase, so does the safety awareness among the students, which is crucial for fostering a safe training environment.

In summary, the relationship between safety rules and procedures and radiation safety awareness among Malaysian Air Defence Artillery Radar Course students is crucial for fostering a safe training environment. The significant positive correlation found in this study supports the notion that clear and comprehensive safety rules and procedures directly impact the safety awareness levels of the students. Therefore, enhancing the clarity and

enforcement of safety guidelines is essential for improving overall safety performance and ensuring the well-being of all personnel involved.

5.2.5 Relationship Between Safety Training And Radiation Safety Awareness Among Malaysian Air Defence Artillery Radar Course Students

The Pearson correlation coefficient of between Safety Training and Radiation Safety Awareness indicates a statistically significant positive relationship between these two variables. The statistically significant correlation coefficient ($p<0.01$) underscores the vital role of safety training in enhancing radiation safety awareness. This strong positive correlation suggests that comprehensive and effective safety training significantly influences the awareness levels of radiation safety among the students.

Effective safety training is essential in establishing a robust safety culture within organizations, including military training environments. Research indicates that regular and well-structured safety training programs are critical for improving safety awareness and compliance among personnel (Burke et al., 2006; Cohen & Colligan, 1998). In the context of the Malaysian Air Defence Artillery, where students are exposed to radiation hazards, thorough safety training is crucial for ensuring adherence to safety standards and preventing accidents.

Burke et al. (2006) conducted a study highlighting the impact of effective safety training on safety performance. Their findings demonstrated that organizations with regular and comprehensive safety training programs

experience lower incident rates and improved safety performance due to better hazard recognition and preventive actions. Similarly, Cohen and Colligan (1998) emphasized that safety training enhances employees' ability to recognize potential hazards and respond effectively, thereby improving overall safety awareness.

Moreover, Zohar (1980) and Clarke (2006) found that safety training, which includes both theoretical and practical components, significantly enhances safety awareness and reduces incident rates. These studies indicate that well-structured safety training programs not only help in enforcing safety practices but also in creating an environment where safety is a shared responsibility.

The strong correlation ($r = 0.825$) found in this study signifies a robust relationship between safety training and radiation safety awareness. It indicates that as the quality and frequency of safety training increase, so does the safety awareness among the students, which is crucial for fostering a safe training environment.

In summary, the relationship between safety training and radiation safety awareness among Malaysian Air Defence Artillery Radar Course students is crucial for fostering a safe training environment. The significant positive correlation found in this study supports the notion that comprehensive and effective safety training practices directly impact the safety awareness levels of the students. Therefore, enhancing safety training programs is essential for

improving overall safety performance and ensuring the well-being of all personnel involved.

5.2.6 Relationship Between Safety Promotion Policies And Radiation Safety Awareness Among Malaysian Air Defence Artillery Radar Course Students

The Pearson correlation coefficient between Safety Promotion Policies and Radiation Safety Awareness indicates a statistically significant positive relationship between these two variables. The statistically significant correlation coefficient ($p<0.01$) underscores the crucial role of safety promotion policies in enhancing radiation safety awareness. This strong positive correlation suggests that well-implemented safety promotion policies significantly influence the awareness levels of radiation safety among the students.

Effective safety promotion policies are essential in establishing a robust safety culture within organizations, including military training environments. Research indicates that proactive safety promotion strategies, such as regular safety campaigns, recognition programs, and continuous safety education, are critical for improving safety awareness and compliance among personnel (Morrow et al., 2010; Huang et al., 2011). In the context of the Malaysian Air Defence Artillery, where students are exposed to radiation hazards, comprehensive safety promotion policies are crucial for ensuring adherence to safety standards and preventing accidents.

Morrow et al. (2010) conducted a study highlighting the impact of effective safety promotion policies on safety performance. Their findings demonstrated

that organizations with proactive safety promotion strategies experience lower incident rates and improved safety performance due to enhanced safety awareness and engagement. Similarly, Huang et al. (2011) emphasized that safety promotion policies, such as safety training, safety communications, and safety rewards, play a significant role in fostering a safety-conscious culture.

Moreover, Zohar (1980) and Clarke (2006) found that organizations that prioritize safety promotion policies and consistently communicate their importance to employees significantly enhance safety awareness and reduce incident rates. These studies indicate that well-structured safety promotion policies not only help in enforcing safety practices but also in creating an environment where safety is a shared responsibility.

The strong correlation (r = 0.755) found in this study signifies a robust relationship between safety promotion policies and radiation safety awareness. It indicates that as the quality and frequency of safety promotion policies increase, so does the safety awareness among the students, which is crucial for fostering a safe training environment.

In summary, the relationship between safety promotion policies and radiation safety awareness among Malaysian Air Defence Artillery Radar Course students is crucial for fostering a safe training environment. The significant positive correlation found in this study supports the notion that comprehensive and effective safety promotion policies directly impact the safety awareness levels of the students. Therefore, enhancing safety promotion strategies is

essential for improving overall safety performance and ensuring the well-being of all personnel involved.

5.3 Study's Contribution

The study's contribution lies in revealing the intrinsic connection between various safety management practices and radiation safety awareness among Malaysian Air Defence Artillery Radar Course students. While prior research has explored different sectors and industries, this study introduces a fresh perspective by examining the validity of the correlations between management commitment, safety training, operator involvement, safety communication and feedback, safety rules and procedures, and safety promotion policies within a military training context. What distinguishes this study is its focus on the organizational capability to implement comprehensive safety management practices aimed at enhancing radiation safety awareness.

The outcomes of the quantitative analysis validate a significant association between the examined safety management practices and radiation safety awareness. Specifically, the study identifies safety training, operator involvement, and safety promotion policies as the most significant predictors of radiation safety awareness, highlighting their critical roles in ensuring workplace safety. These findings provide robust evidence supporting the effectiveness of these practices in improving safety awareness and performance.

This study is poised to inaugurate a new era in research concerning safety management practices within military training environments. By demonstrating the strong positive

correlations between the independent variables and radiation safety awareness, this research offers valuable insights that extend beyond traditional industrial settings. It underscores the importance of a holistic approach to safety management that integrates multiple facets to achieve optimal safety outcomes.

The study also covers critical facets of safety management that underscore compliance and proactive safety measures as pivotal dimensions. This is not only essential for diminishing workplace accident rates but also plays a key role in injury prevention and fostering a positive influence on overall safety conditions within the organization. By delving deeply into the intricacies of safety management practices, the study provides indispensable guidance for enhancing safety performance in diverse environments, particularly within military settings where radiation safety is a significant concern.

Essentially, this study delves deeply into comprehending the complexities of radiation safety awareness and offers practical recommendations for improving safety management practices. The findings provide a solid foundation for further research and practical applications, offering military organizations a framework for enhancing safety performance and ensuring the well-being of their personnel. The insights gained from this study can be applied to various organizational settings, contributing to the broader field of safety management and fostering a safer and more efficient work environment.

In conclusion, the study makes a significant contribution by identifying and validating the critical factors that influence radiation safety awareness among Malaysian Air Defence Artillery Radar Course students. The comprehensive approach and robust findings provide valuable guidance for improving safety management practices, with

implications that extend beyond the military context to benefit a wide range of stakeholders in the field of safety performance management.

5.4 Limitations and Suggestions for Future Research

The present study focuses on exploring the correlation between management commitment, safety training, operator involvement, safety communication and feedback, safety rules and procedures, and safety promotion policies within a military training framework. This emphasis on correlation analysis limits the depth of understanding concerning the causal relationships between these safety management practices and radiation safety awareness. To delve into causality, more extensive research designs such as longitudinal studies or experimental interventions would be necessary.

The outcomes might lack generalizability outside the domain of the specific military training institution studied. Safety management practices and their influence on safety awareness could differ among various military branches and organizational settings. Hence, the results might not be directly transferable to other sectors without further confirmation.

Subsequent research could incorporate mixed-method approaches to complement correlation analysis with qualitative perspectives. Qualitative techniques such as interviews or focus groups could yield deeper insights into the mechanisms behind the observed correlations and provide a better understanding of employees' perceptions and experiences.

Carrying out longitudinal studies would enable the exploration of how safety management practices and radiation safety awareness develop over time. Longitudinal designs would offer more substantial evidence on the temporal relationships between these variables and aid in identifying potential delayed effects.

To enhance generalizability, future research could compare safety management practices and safety awareness across diverse military branches and other industries. This comparative method would reveal sector-specific disparities and similarities in safety management effectiveness.

Moreover, this particular research has exclusively focused on a single military training institution. To extend the generalizability of these findings to all branches of the Malaysian Air Defence Artillery, it is recommended to encompass other branches and military institutions in future research endeavors. Additionally, the scope of the study could be broadened to include diverse sectors and industries, thereby identifying potential discrepancies in the impacts of safety management practices within varied contextual settings.

The study is characterized as quantitative research that employed a questionnaire survey tool for data collection. To enrich the depth and precision of the gathered information, it is advisable to integrate qualitative methodologies like interviews or observations. This mixed-method approach enables researchers to acquire a more comprehensive and holistic understanding of the correlation between variables and safety awareness.

In terms of data collection techniques, besides disseminating online questionnaires to military personnel, future studies could consider methodologies that involve data collection from a singular population at a specific time point. Observational studies of this nature can offer invaluable insights into the prevalence of safety practices or behaviors within an organizational setting. Through observations, researchers refrain from influencing responses and simply observe the employees' conduct concerning safety practices. This approach also facilitates a comparison between the prevailing safety behaviors and the responses in the survey checklist. By adopting this methodology, upcoming researchers can develop a deeper comprehension of the actual behaviors of employees towards safety aspects, encompassing various age groups, cultures, ethnic backgrounds, and geographical locations.

In conclusion, while the current study furnishes valuable insights into the correlation between safety management practices and radiation safety awareness among Malaysian Air Defence Artillery Radar Course students, addressing the recognized limitations and executing the recommended strategies can enrich future research. These improvements will contribute to a more thorough comprehension of safety management effectiveness across different sectors and organizational settings.

5.5 Conclusion

The present study examines the correlation between management commitment, safety training, operator involvement, safety communication and feedback, safety rules and procedures, safety promotion policies, and radiation safety awareness among Malaysian Air Defence Artillery Radar Course students. These six independent variables have been identified as the most influential factors in this specific setting,

demonstrating robust associations and significant effects on radiation safety awareness. From the analysis it is identified that Safety Training, Operator Involvement, and Safety Promotion Policies as the most significant predictors of radiation safety awareness. Furthermore, all the hypotheses proposed in this study have been validated.

This research is expected to provide the Malaysian Air Defence Artillery especially in PUSARTI valuable insights into the safety perspectives of its students, serving as a guide for enhancing safety performance within the institution. Additionally, the findings of this study will deepen the organization's understanding of radiation safety awareness and its determinants.

Moreover, this study is anticipated to benefit a wide range of stakeholders, including scholars, students, end-users, and professionals in the field of safety performance management. With a better understanding of these correlations, stakeholders can implement effective measures to improve workplace safety, thereby creating a more secure and efficient environment.

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APPENDIX A: QUESTIONAIRE FORM

SURVEY QUESTIONNAIRE, ENGLISH AND MALAY LANGUAGE VERSION

COLLEGE OF BUSINESS UNIVERSITI UTARA MALAYSIA

Dear Sir/Madam**,**

I am Mohamed Izwan bin Isa, a Master of Science (Occupational Safety and Health Management) student from Universiti Utara Malaysia, Kuala Lumpur (Matric No.: 827928), currently conducting research entitled **"The Relationship Between Safety Management Practice and Radiation Safety Awareness Among Malaysian Air Defence Artillery Radar Operators"** under the supervision of Dr. Syazwan Syah bin Zulkifly. In endeavoring to conduct this research data will be collected from Pusat Latihan Artileri (PUSARTI) from Air Defence Artillery Radar Students.

Fortunately you have been nominated to take part in this research and may I ask that you kindly complete the questionnaire enclosed. I assure you that it would not take longer than 30 minutes as your cooperation will contribute to improving the standard of safety in PUSARTI.

All data provided will be treated as confidential and will only be used for this academic research.

Thank you for your cooperation.

Yours sincerely,

Mohamed Izwan bin Isa
UUM KL
50300 KUALA LUMPUR
H/Phone: 012-4514535, E-mail: m_izwan_isa@uum.edu.my

QUESTIONNAIRE / KAJI SELIDIK

THE RELATIONSHIP BETWEEN SAFETY MANAGEMENT PRACTICE AND RADIATION SAFETY AWARENESS AMONG MALAYSIAN AIR DEFENCE ARTILLERY RADAR OPERATORS

HUBUNGAN ANTARA AMALAN PENGURUSAN KESELAMATAN DAN KESEDARAN TERHADAP KESELAMATAN RADIASI DI KALANGAN OPERATOR RADAR ARTILERI PERTAHANAN UDARA MALAYSIA

PART A: DEMOGRAPHY OF RESPONDENT / DEMOGRAFI RESPONDEN

Please tick (√) the appropriate answer. / Mohon tandakan (√) pada jawapan yang sesuai.

1. What is your classification of occupation? Apakah kategori pekerjaan anda?

( ) Officer / Pegawai
( ) Non-Commissioned Officer/ Pegawai Tak Tauliah
( ) Other Rank/ Lain-lain Pangkat

2. Which age group do you belong to? Yang manakah kategori umur anda?

( ) 20 – 25
( ) 26 – 30
( ) 31 - 35
( ) 36 – 40

( ) Sex / Jantina:
( ) Male / Lelaki
( ) Female / Perempuan

3. Level of education / Tahap pendidikan:

( ) Secondary School / Sekolah Menengah
( ) Professional Certificate / Sijil Profesional
( ) Diploma / Diploma
( ) First Degree / Ijazah Pertama
( ) Master Degree / Ijazah Sarjana

4. Years of service as Air Defence Artillery / Jumlah tahun perkhidmatan sebagai Artileri Pertahanan Udara:

( ) 1 – 5 years / 1-5 tahun
( ) 6 – 10 years / 6-10 tahun
( ) 11 – 15 years / 11-15 tahun
( ) 16 – 20 years / 16-20 tahun
( ) More than 21 years / Lebih daripada 21 tahun

PART B: SAFETY MANAGEMENT PRACTICE / AMALAN PENGURUSAN KESELAMATAN

Instruction / Arahan:

Mark (√) in the related spaces. / Tandakan (√) pada ruang berkaitan.

Legend / Legenda:

Judgement	Rating
Strongly Disagree / Sangat Tidak Bersetuju	1
Disagree / Tidak Bersetuju	2
Partially Agree / Bersetuju Sebahagian	3
Agree / Bersetuju	4
Strongly Agree / Sangat Bersetuju	5

1) <u>Management Commitment / Komitmen Pengurusan</u>

No.	Statement	1	2	3	4	5
1.	Safety is given the high priority by the management. Keselamatan dalam pekerjaan diberi keutamaan tinggi oleh pihak pengurusan.					
2.	Safety rules and procedures are strictly followed by the management. Peraturan dan prosedur keselamatan dalam pekerjaan dilaksanakan sepenuhnya oleh pihak pengurusan.					
3.	Corrective action is always taken when the management is told about unsafe practices. Langkah penambahbaikan selalunya dilaksanakan oleh pihak pengurusan apabila dimaklumkan mengenai amalan pekerjaan yang tidak selamat.					

4.	In my workplace, Supervisors / Heads of Units do not show interest in the safety of workers. Di tempat kerja saya, Penyelia-penyelia / Ketua-ketua Unit tidak menunjukkan minat terhadap keselamatan para pekerja.					
5.	The management considers safety to be equally important as services. Pihak pengurusan menganggap keselamatan dalam pekerjaan adalah sama pentingnya dengan perkhidmatan.					
6.	Members of the management do conduct Safety Meetings. Ahli-ahli daripada kalangan pihak pengurusan melaksanakan Mesyuarat Keselamatan peringkat pasukan.					
7.	I feel that the management is willing to compromise on safety for improving the services. Saya merasakan bahawa pihak pengurusan sanggup berkompromi dalam aspek keselamatan pekerjaan demi meningkatkan perkhidmatan.					
8.	When near-miss accidents are reported, my management acts quickly to solve the problems. Bilamana kemalangan yang hampir berlaku dilaporkan, pihak pengurusan akan bertindak segera untuk menyelesaikan masalah tersebut.					
9.	My department provides sufficient Personal Protective Equipment (PPE) for the workers. Pasukan saya menyediakan Alat Pelindung Peribadi (PPE) yang mencukupi untuk para pekerja.					

2) Safety Training / Latihan Keselamatan

No.	Statement	1	2	3	4	5
1.	My department gives comprehensive training to the employees on workplace safety and health issues. Pasukan saya menyediakan latihan yang menyeluruh kepada pekerja mengenai isu-isu keselamatan dan kesihatan pekerjaan.					
2.	Newly recruits are trained adequately to learn safety rules and procedures. Anggota baharu telah dilatih secukupnya dalam mempelajari peraturan dan prosedur keselamatan dalam pekerjaan.					
3.	Safety issues are given high priority in training programmes. Isu-isu keselamatan dalam pekerjaan diberi keutamaan dalam program latihan.					
4.	I am not adequately trained to respond to emergency situations in my workplace. Saya tidak dilatih secukupnya untuk bertindak balas terhadap situasi kecemasan di tempat kerja saya.					
5.	The management encourages the employees to attend Occupational Safety and Health training programmes/ courses. Pihak pengurusan menggalakkan para pekerja untuk mengikuti program-program Latihan/Kursus Keselamatan dan Kesihatan Pekerjaan.					
6.	Safety training given to me is adequate to enable to assess hazards in the workplace. Latihan keselamatan pekerjaan yang diberikan kepada saya adalah mencukupi untuk saya menilai bahaya-bahaya di tempat kerja.					

3) Operators' Involvement / Penglibatan Operator

No.	Statement	1	2	3	4	5
1.	The management always welcomes opinion from employees before making final decisions on safety related matters. Pihak pengurusan sentiasa mengalu-alukan pendapat dari pihak pekerja sebelum membuat keputusan muktamad berkenaan perkara-perkara yang berkaitan keselamatan pekerjaan.					
2.	My department has Safety and Health Committees consisting of representatives from management and operators. Jabatan saya mempunyai Jawatankuasa Keselamatan dan Kesihatan Pekerjaan yang terdiri daripada pihak pengurusan pasukan (Pegawai) dan operator(anggota).					
3.	The management promotes operators' involvement in safety related matters. Pihak pengurusan menggalakkan penglibatan pihak operator (anggota) dalam perkara-perkara yang berkaitan keselamatan.					
4.	The management consults with operators regularly about workplace safety and health issues. Pihak pengurusan kerap berbincang dengan para operator (anggota) mengenai isu-isu keselamatan dan kesihatan pekerjaan.					
5.	Employees do not sincerely participate in identifying safety problems. Para pekerja adalah tidak sepenuh hati melibatkan diri dalam mengenalpasti masalah-masalah keselamatan pekerjaan.					

2.	My department has Safety and Health Committees consisting of representatives from management and operators. Jabatan saya mempunyai Jawatankuasa Keselamatan dan Kesihatan Pekerjaan yang terdiri daripada pihak pengurusan pasukan (Pegawai) dan operator(anggota).					

4) <u>Safety Communication and Feedback / Komunikasi Keselamatan dan Maklumbalas</u>

No.	Statement	1	2	3	4	5
1.	My department does not have a hazard reporting system in which employees can communicate hazard information before hazard occurs. Jabatan saya tidak mempunyai sistem pelaporan di mana para pekerja dapat menyalurkan maklumat berkenaan sesuatu bahaya di tempat kerja sebelum ia berlaku.					
2.	The management operates an open door policy on safety and health issues. Pihak pengurusan mengamalkan polisi pintu terbuka berkenaan isu-isu keselamatan dan kesihatan pekerjaan.					
3.	There is sufficient opportunity to discuss and deal with safety and health issues in the meetings. Terdapat peluang yang secukupnya untuk berbincang dan menangani isu-isu keselamatan dan kesihatan pekerjaan di dalam mesyuarat.					
4.	The targets and goals for safety performance in my organization are not clear to the employees. Sasaran dan matlamat prestasi keselamatan pekerjaan di dalam pasukan saya adalah tidak jelas kepada anggota.					
5.	There is an open communication about occupational safety and health issues in the workplace. Terdapat komunikasi secara terbuka berkenaan isu-isu keselamatan dan kesihatan pekerjaan di tempat kerja saya.					

5) <u>Safety Rules and Procedures / Peraturan dan Prosedur Keselamatan</u>

No.	Statement	1	2	3	4	5
1.	The safety rules and procedures followed in my department are sufficient to prevent incidents from occurring. Peraturan dan prosedur keselamatan pekerjaan di dalam jabatan ini adalah mencukupi untuk mencegah kejadian tidak diingini daripada berlaku.					
2.	The facilities which are provided by the Occupational Safety and Health Committee are not adequate to meet the needs of the organization. Kemudahan-kemudahan yang disediakan oleh Jawatankuasa Keselamatan dan Kesihatan Pekerjaan adalah tidak mencukupi untuk keperluan pasukan.					
3.	My Heads of Units and Top Management Officers always try to enforce safe working procedures. Ketua-ketua Unit dan Pegawai-pegawai Pengurusan Atasan sentiasa menguatkuasakan prosedur pekerjaan yang selamat.					
4.	Safety inspections are carried out regularly. Pemeriksaan keselamatan pekerjaan kerap dilaksanakan.					
5.	The safety procedures and practices in this organization are useful and effective. Prosedur dan amalan keselamatan pekerjaan dalam organisasi ini boleh digunapakai dan berkesan.					

6) Safety Promotion Policies / Polisi Galakan Keselamatan

No.	Statement	1	2	3	4	5
1.	In my department, safe conduct is considered as a positive factor for job promotion. Dalam jabatan saya, perlakuan selamat dalam pekerjaan dianggap faktor positif untuk kenaikan pangkat.					
2.	In my department, employees are rewarded for reporting safety hazards (thanked, cash or other rewards, recognition in newsletter, etc.). Dalam jabatan saya, para pekerja diberi ganjaran kerana melaporkan perkara berbahaya keselamatan dalam pekerjaan (diberi penghargaan, wang tunai atau ganjaran-ganjaran lain, pengiktirafan dalam buletin jabatan dan sebagainya).					
3.	In my department, Occupational Safety and Health Week celebration and other safety promotional activities arranged by the management are very effective in creating safety awareness among workers. Sambutan Minggu Keselamatan dan Kesihatan Pekerjaan dan aktiviti-aktiviti promosi keselamatan pekerjaan yang lain yang diaturkan oleh pihak pengurusan adalah amat berkesan dalam mewujudkan kesedaran keselamatan dalam pekerjaan di kalangan pekerja.					
4.	There is an existence of very healthy competition among employees to find out and report unsafe conditions and acts. Terdapatnya persaingan yang sangat sihat di kalangan pekerja dalam mencari dan seterusnya melaporkan keadaan dan tindakan yang tidak selamat dalam pekerjaan.					
5.	The Head of Unit becomes very unhappy and angry when employees find out and report unsafe conditions and acts in the unit. Ketua Unit merasa sangat tidak berpuas hati dan marah apabila para pekerja menemukan dan melaporkan keadaan serta tindakan yang tidak selamat di unit berkenaan.					

PART C: RADIATION SAFETY AWARENESS / KESEDARAN KESELAMATAN RADIASI

Knowledge, Attitude and Action / Pengetahuan, Sikap dan Tindakan

No.	Statement	1	2	3	4	5
1.	The knowledge of radiation dose of common radar operations is important. Pengetahuan mengenai dos radiasi bagi sebuah operasi radar adalah penting.					
2.	Lectures, workshops and courses on radar safety would not help the most to raise the understanding of awareness on radiation safety. Syarahan, bengkel dan kursus berkenaan keselamatan radar tidak membantu dalam meningkatkan kefahaman mengenai kesedaran keselamatan radiasi.					
3.	ALARA (As Low as Reasonably Achievable) principle is one of the practices in order to minimize radiation dose and at the same time optimizes the radar operations. Prinsip ALARA (As Low as Reasonably Achievable) adalah salah satu praktis dalam meminimakan dos radiasi dan pada masa yang sama mengoptimakan operasi radar.					
4.	The policies and procedures which are associated with radiation safety in my department are purely based on Atomic Energy Licensing Act 1984 (Act 304). Semua polisi dan prosedur berkaitan keselamatan radiasi di jabatan saya adalah berdasarkan kepada Akta Perlesenan Tenaga Atom 1984 (Akta 304).					
5.	Gloves, safety shoes and other types of personal protective equipment for RF fields are some of the Personal Protective Equipment (PPE) which are being used in Radar operators. Sarung tangan, kasut keselamatan dan lain- Alat Pelindung Peribadi medan RF adalah sebahagian daripada Alat Pelindung Peribadi (PPE) yang digunakan di oleh operator radar.					

6.	I believe that all the policies and procedures on radiation safety awareness in my department are not clear and difficult to understand. Saya percaya semua polisi dan prosedur kesedaran keselamatan radiasi di jabatan saya adalah tidak jelas dan sukar difahami.					
7.	I feel anxiety over risks of radiation exposure. Saya berasa bimbang mengenai risiko-risiko dedahan radiasi.					
8.	I know whom to contact if I have questions about radiation safety precautions which are needed for employees and patients. Saya tahu kepada siapa perlu berhubung jika saya mempunyai soalan-soalan mengenai langkah-langkah keselamatan radiasi yang perlu untuk pekerja dan juga pesakit.					
9.	I feel I can clearly explain the radiation safety precautions when operating the radars. Saya berasa saya boleh menerangkan secara jelas tentang langkah-langkah keselamatan radiasi semasa pengendalian radar.					
10.	I feel safe when operating radar transmission during exercises and real operastions . Saya berasa selamat semasa mengendalikan pancaran radar semasa latihan dan juga operasi sebenar.					
11.	I feel confident about the steps which I need to take when operating radar transmission. Saya berasa yakin mengenai langkah-langkah yang perlu diambil semasa melaksanakan operasi pancaran radar.					

12.	Emission control of radar operations should be decided by the Officers in Command. Kawalan pancaran radar hendaklah ditentukan oleh Pegawai Pemerintah Radar.					
13.	Any individual can enter the radar during transmission freely. Sesiapa sahaja boleh memasuki radar semasa transmisi sedang dilaksanakan secara secara sesuka hati.					
14.	Personal Protective Equipment (PPE) needs to be worn by related operators when performing radar transmission. Alat Pelindung Peribadi (PPE) perlu dipakai oleh operator berkaitan semasa menjalankan pancaran radar.					
15.	When performing the radar transmission , the related operator needs to ensure that radiating radar components such as waveguide and emitters are not directly expose to the operator at close distance. Semasa menjalankan transmisi radar, operator berkaitan hendaklah memastikan komponen radar yang mengeluarkan radiasi seperti waveguide dan pemancar tidak didedahkan secara langsung kepada operator pada jarak dekat.					
16.	Radar exposure time needs to be minimized in order to decrease radiation dose to operators and other people in its close vicinity. Masa dedahan radar perlu diminimumkan bagi mengurangkan dos radiasi kepada operator dan juga sesiapa sahaja yang berhampiran dengan kawasan pancaran.					
17.	Radiation Protection Policies in my radar equipments are in compliance with Atomic Energy Licensing Act 1984 (Act 304). Polisi Perlindungan Radiasi di peralatan radar saya adalah mematuhi keperluan Akta Perlesenan Tenaga Atom 1984 (Akta 304).					