RELATIONSHIP OF SAFETY ATTITUDES, TRAINING, AND COMMUNICATION ON SAFETY COMPLIANCE IN MALAYSIA'S AUTOMOTIVE MANUFACTURING SECTOR

AHMAD NORHAFIZI BIN MUHAMAD RADZI

MASTER OF SCIENCE
(OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT)
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BY
AHMAD NORHAFIZI BIN MUHAMAD RADZI

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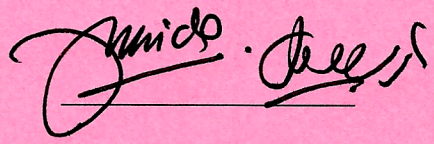
Tandatangan *(Signature)*	:	
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Abstract

Occupational accidents in Malaysia's manufacturing sector remain a critical concern despite structured safety protocols. This study aims to examine the influence of safety attitude, safety training, and safety communication on safety compliance among employees in the automotive manufacturing sector. Grounded in the Theory of Planned Behavior (TPB), the study employed a quantitative cross-sectional design. Data were collected through structured questionnaires distributed to 215 operation employees in Kedah using simple random sampling. Descriptive statistics, Pearson correlation, and multiple regression analyses were conducted using SPSS version 23. The findings revealed a statistically significant and positive relationship between all three independent variables and safety compliance. Safety attitude emerged as the strongest predictor ($\beta = 0.541$, $p < 0.01$), followed by safety training ($\beta = 0.172$, $p < 0.05$) and safety communication ($\beta = 0.144$, $p < 0.05$). These results validate TPB's constructs; attitude, perceived control, and subjective norms as key determinants of safety behaviour in high-risk environments. The study contributes theoretical insights by contextualising TPB in Malaysian industrial settings and provides practical implications for enhancing safety interventions. Specifically, organizations are urged to prioritise positive attitude formation, deliver hands-on and updated safety training, and foster open safety communication channels to improve compliance. Regulatory bodies may also consider incorporating behavioural metrics into safety audit frameworks. Overall, the study enhances the understanding of behavioural predictors in workplace safety and supports evidence-based policymaking for accident reduction in Malaysia's high-risk industries.

Keywords: Automotive Manufacturing Sector, Safety Attitude, Safety Communication, Safety Compliance, Safety Training.

Abstrak

Kemalangan pekerjaan dalam sektor pembuatan di Malaysia kekal sebagai isu kritikal walaupun terdapat protokol keselamatan yang berstruktur. Kajian ini bertujuan untuk mengkaji pengaruh sikap terhadap keselamatan, latihan keselamatan dan komunikasi keselamatan terhadap pematuhan keselamatan dalam kalangan pekerja sektor pembuatan automotif. Berpandukan Teori Tingkah Laku Terancang (TPB), kajian ini menggunakan reka bentuk kuantitatif rentas keratan. Data dikumpul melalui soal selidik berstruktur yang diedarkan kepada 215 pekerja operasi di Kedah menggunakan persampelan rawak mudah. Statistik deskriptif, korelasi Pearson dan analisis regresi berganda dijalankan menggunakan SPSS versi 23. Dapatan menunjukkan hubungan yang signifikan dan positif antara ketiga-tiga pemboleh ubah bebas dan pematuhan keselamatan. Sikap terhadap keselamatan dikenal pasti sebagai peramal terkuat ($\beta = 0.541$, $p < 0.01$), diikuti oleh latihan keselamatan ($\beta = 0.172$, $p < 0.05$) dan komunikasi keselamatan ($\beta = 0.144$, $p < 0.05$). Hasil ini mengesahkan konstruk TPB; sikap, kawalan tingkah laku yang dirasakan, dan norma subjektif sebagai penentu utama tingkah laku keselamatan dalam persekitaran berisiko tinggi. Kajian ini menyumbang kepada pengetahuan teori dengan mengaplikasikan TPB dalam konteks industri Malaysia dan memberikan implikasi praktikal bagi meningkatkan intervensi keselamatan. Khususnya, organisasi disarankan untuk memberi keutamaan kepada pembentukan sikap positif, menyediakan latihan keselamatan secara praktikal dan terkini, serta mewujudkan saluran komunikasi keselamatan yang terbuka bagi meningkatkan pematuhan. Badan pengawal juga boleh mempertimbangkan untuk memasukkan metrik tingkah laku dalam kerangka audit keselamatan. Secara keseluruhannya, kajian ini meningkatkan kefahaman terhadap faktor tingkah laku dalam keselamatan pekerjaan dan menyokong pembentukan dasar berasaskan bukti untuk mengurangkan kemalangan dalam industri berisiko tinggi di Malaysia.

Kata kunci: Komunikasi Keselamatan, Latihan Keselamatan, Pematuhan Keselamatan; Sektor Pembuatan Automotif, Sikap Keselamatan.

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Firmly believing that challenges bring growth, I have learned many lessons during this journey that have shaped me both as a student and as a person.

To my dear family and friends, thank you for your endless prayers, understanding, and encouragement. This achievement would not have been possible without their sacrifices and motivation. You have been my source of strength throughout this academic quest.

Although this work is small in scope, I hope it will be of benefit to others and bring value to the field. May Allah bless and accept all the efforts that have gone into completing this research, insya-Allah

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List of Abbreviations

CIDB	Construction Industry Development Board
DOSH	Department of Occupational Safety and Health
HR	Human Resources
HSE	Health, Safety and Health
ILO	International Labour Organization
OSH	Occupational Safety and Health
OSHMP	Malaysia's Occupational Safety and Health Master Plan
PPE	Personal Protective Equipment
SOP	Standard Operating Procedures
TPB	Theory of Planned Behaviour

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Occupational Safety and Health (OSH) compliance towards OSH regulations is a core component of safety in the manufacturing business, largely based on the risk-propensity operational landscape where heavy machinery, hazardous materials such as chemicals are involved. One of the primary causes of workplace accidents worldwide, which can result in serious injuries, fatalities, and financial losses, is noncompliance with safety regulations. According to the International Labour Organization (ILO), there are almost 3 million work-related deaths annually, among which 2.6 million by work-related diseases and 330,000 by occupational accidents – a figure that has grown by 5% since 2015 and 374 million workers suffering non-fatal injuries. Manufacturing is one of the most high risk industries in the world, and workplace hazards represent a significant amount of deaths that occur more often among men (51.4 per 100,000) than women (17.2 per 100,000). The manufacturing sector continues to struggle with chronic physical injuries, exposure to hazardous materials, and work-related diseases, creating a strong need to improve compliance with occupational safety and health (OSH) frameworks to better protect workers and reduce risks.

The ILO's Global Strategy on OSH 2024–2030 focuses on establishing the conditions that will lead to effective and preventive OSH in workplaces. The ILO stresses that policies and laws to protect workers from these hazards should include targeted interventions, especially in high-risk sectors like manufacturing, where poor working conditions have more serious consequences. Safety compliance challenges persist due to inadequate implementation of international standards, underreporting, and capacity

gaps, particularly in developing regions and high-risk sectors like manufacturing, construction, and agriculture (ILO 2023). Recent research reported that insufficient awareness and ineffective safety policy practices increase risks in manufacturing industry (Ma & Zhu, 2023). Manufacturing industries can minimize hazards in the workplace and safeguard of their staff as well as make profitability whilst adhering to safety compliance through effective measures. Safety compliance and enforcement are still huge problems in Malaysia, especially when it comes to high-risk sector industries like manufacturing (Sugumaran et al., 2017).

In 2023, Malaysia recorded 324 work-related deaths and an occupational injury rate of 2.48 per 1,000 workers, surpassing the target of 2.32 set by the National Occupational Safety and Health Master Plan 2021–2025, while the fatal occupational injury rate stood at 2.05 per 100,000 workers, a 56% reduction from 4.62 in 2013 and below the target of 3.23. Although there has been a 24% decline in occupational fatalities and injuries over the last ten years, 1,747 cases of occupational poisoning and diseases were reported in 2023, a 29% increase over 2020. In order to align safety initiatives with the principles of the International Labour Organisation (ILO), Malaysia pledged to continuously raise awareness of occupational safety and health (Bernama, 2024).

These alarming figures highlight the consequences from failing to comply with OSH regulations such as the misuse of PPE or ignoring established safety procedures which continue to endanger both health and human life. Ghopad et al (2021) highlighted that when safety measures are not followed or training is insufficient, most common accidents occurs with machinery. Despite of the presence of strong OSH systems, there

is violation reflects an urgent need for strict implementation and awareness that establishes a safety-oriented culture among workers and employers.

Safety training is the methodical process of giving workers the knowledge and abilities to handle possible risks at work, which establishes a strong basis for safety compliance. Safety training equips workers with the information and abilities needed in work environments where safety procedures are crucial, making it a crucial component of occupational safety management. In Malaysia manufacturing sector, accidents at workplace are quite common but it have always correlated with lack of training and commitment from management (Ali et al., 2009). Prior research has confirmed that safety training standards have an impact on workers' safety behaviour, which enhances compliance and reduces precautions (Hassan et al., 2020). Moreover, training in safety also reflects positively on employees as it creates a feeling of comfort regarding their environment which leads to reduced risk and improved compliance and well-being (Norizan Baba Rahim, 2021). Applied training has been demonstrated to enhance safety performance despite certain obstacles, especially when it comes to small and medium-sized businesses (SMEs) (Abdullah et al., 2022). These findings demonstrate how crucial thorough safety training is to fostering a proactive, safe culture and ensuring compliance in Malaysian manufacturing.

The term "safety attitude" describes the way that employees think, feel, and perceive safety procedures and laws. An employee's attitude towards workplace safety is directly tied to safety compliance and, in turn, to the decrease in accidents. It has been determined that the cultivation of safety attitudes in Malaysia's manufacturing sectors is crucial to addressing persistent safety concerns. According to research, the safety attitude among individuals positively affects their behavior regarding safety and leads

them to comply with existing safety protocols, thereby achieving a level of compliance (Zulkifly et al., 2020). For instance, Abdullah et al. (2022) conducted a study on Malaysian SMEs and found that safety performance is significantly improved by the management practices related to safety attitudes where greater emphasis results in lesser workplace hazards. Furthermore, the relationship between safety attitudes with leadership has increased an important behavior in workplaces and they may promote safety legitimacy (Amonodin et al., 2023) which stresses having a mindset in favourable about safety to approach it or build compliance. In order to create a safer working environment in Malaysia's manufacturing sector, this study emphasises the significance of ongoing initiatives to promote positive attitudes towards safety. A safety-focused culture can help bottom line numbers while keeping workers safer and more productive.

Safety communication is the sharing of knowledge and guidelines about workplace dangers, safety measures, and emergency protocols. Safety-related communication underpins safety compliance and the effective communication of safety information among employees and management is one important area which significantly influences overall workplace safety in the manufacturing sector. Research shows that when employees can speak freely with management, they better understand the workplace hazards as well as how to handle them.

This research examines three significant predictors of safety compliance (DV) in the manufacturing industry, include safety training, safety attitude and safety communication (IVs). The ultimate goal is attract better with the impacts of these independent variables on employees compliance behavior towards OSH in order to provide solutions to decrease the risks within workplace. This research provide insights

into how to create safe practices in the manufacturing industry. Intifada (2025) highlights that poor safety compliance in the manufacturing sector, including automotive manufacturing, can lead to high incidences of workplace accidents, resulting in injuries to workers and financial losses for companies. Additionally, it can foster a weak safety culture, leading to further non-compliance and increased risks. The lack of effective enforcement of safety regulations exacerbates these issues, ultimately compromising both worker safety and operational efficiency within the industry. Even though there have been fewer fatalities and cases of occupational injuries in Malaysia's manufacturing sector than in 2019, much more work needs to be done to meet the objectives of the Occupational Safety and Health Master Plan 2025 (OSHMP25), which is to improve a safe and healthy working culture (Ghapa et al., 2023).

1.2 Problem Statement

Ensuring safety compliance among the employees is one of the main concern in Malaysia’s manufacturing sector, which continues to contribute the highest number of occupational accidents compared to other industries. According to data taken from the Department of Occupational Safety and Health (DOSH), the manufacturing sector recorded 1,303 investigated cases as of October 2018, including 25 fatalities and 90 permanent disabilities, underscoring the sector’s high-risk nature and the need for sustained behavioral safety interventions. Despite the establishment of structured safety procedures, regular audit plan and training programs, lapses in compliances such as improper use of personal protective equipment (PPE), unsafe work behavior and non-compliance to safety standard operating procedures (SOP) still happened that contribute to preventable incidents (Mullins-Jaime et al., 2021).

The effectiveness of safety compliance is widely acknowledged to be influenced by several organizational and behavioral factors, particularly safety attitudes, training, and communication. While safety training imparts the knowledge and skills necessary to identify hazards and carry out procedures correctly, safety attitude reflects an employee's internalised belief and motivation towards performing tasks safely (Vinodkumar & Bhasi, 2010). Safety communication ensures that information related to risks, procedures, and feedback mechanisms is clearly transmitted and understood, promoting proactive responses and awareness across operational levels (Naji et al., 2022 & Al Faqeeh et al., 2019).

Although safety initiatives are in place across Malaysia's automotive sector, compliance rates remain inconsistent. Existing studies often explore safety factors in isolation and lack a contextual focus on the automotive industry. This highlights the need for a theoretical and practical investigation into how safety attitude, training, and communication jointly influence compliance behavior in this high-risk sector. Furthermore, the automotive manufacturing environment introduces unique challenges due to its mechanized systems, high cycle time, exposure to moving equipment and human–machine interaction (Michalos et al., 2010). Workers are required to make safety decisions on the spot at production lines, making their compliance not solely dependent on knowledge or policy, but also on their attitudes and the communication climate fostered by supervisors and safety leaders. Thus, understanding how these behavioral and communication factors collectively influence safety compliance is essential for designing more effective safety interventions and policies tailored to this sector.

In light of these concerns, this study aims to examine the effects of safety attitudes, safety training, and safety communication on safety compliance among workers in Malaysia's manufacturing sector. This study focuses on the automotive manufacturing sector, a critical and high-risk sector within Malaysia's industrial landscape, with the objective of generating empirical evidence on how safety attitudes, safety training and safety communication influence safety compliance with OSH regulations hence as a result, safety management strategies that are more behaviourally informed and effective will be developed.

1.3 Research Questions

The following research questions are intended to be addressed by this study:

1. Is there a positive relationship between safety attitude and safety compliance in the automotive manufacturing company?
2. Is there a positive relationship between safety training and safety compliance in the automotive manufacturing company?
3. Is there a positive relationship between safety communication and safety compliance in the automotive manufacturing company?

1.4 Research Objectives

The primary goal of this study is to examine the relationship between safety compliance with Occupational Safety and Health (OSH) regulations in Malaysia's automotive manufacturing sector and significant behavioural factors, specifically safety attitude, safety training, and safety communication.

Consequently, the particular goals of this research are:

1. To examine the relationship between safety attitude and safety compliance in the automotive manufacturing company.
2. To study the relationship between safety training and safety compliance in the automotive manufacturing company.
3. To evaluate the relationship between safety communication and safety compliance in the automotive manufacturing company.

1.5 Significance of the Study

Significant contributions to academic theory, industry relevance, organisational practice, regulatory policy, and employee welfare are expected from this study. Its main goal is to make clear how safety compliance is impacted by safety attitudes, safety training, and safety communication in Malaysia's high-risk automotive manufacturing sector.

This study helps the automotive industry by determining which of the three factors; safety attitude, safety training, and safety communication that has the greatest impact on safety compliance. The outcome of this study will assist company to optimise OSH programs and safety investment towards safe working workplace hence reducing the accidents and enhance the productivity. Targeted interventions can be developed based on the results and will assist HSE teams in resources prioritizations.

By combining organisational and behavioural elements into a single model, this study will advance our understanding of workplace safety. It fills a theoretical gap by examining the combined effect of safety attitude, training, and communication. It provides empirical data in the Malaysian context, which is currently underrepresented in OSH literature and will provides theoretical foundation for future research in similar contexts.

The empirical evidence generated from this study may offer valuable input to regulatory bodies such as the Department of Occupational Safety and Health (DOSH) and other governmental agencies involved in workplace safety governance. The findings may advise the development of evidence-based policies and contribute to the implementation of Malaysia's Occupational Safety and Health Master Plan (OSHMP). Moreover, the study insights may guide regulatory authorities in formulating specific safety guidelines and compliance standards for organizations within the automotive manufacturing supply chain, thereby reinforcing national efforts to strengthen OSH performance across high-risk sectors.

Result of the findings also contributed to social contribution which is workers and community wellbeing by enhances employee health and safety thus reducing accident risk and workplace injuries. This contribution creates a sustainable employment and social protection goals resulting a safer, healthier and more productive workforce.

1.6 Scope of the Study

In the context of Malaysia's auto industry, the study's focus is limited to analysing the direct correlation between the dependent variable of safety compliance and the independent variables of safety attitude, safety training, and safety communication. Based on the Theory of Planned Behaviour (TPB), the study examines the effects of these organisational and psychological constructs on employees' compliance with occupational safety and health (OSH) regulations. The purpose of the investigation is to evaluate the behavioural reactions of operational-level employees in mechanised manufacturing settings who are directly exposed to a range of industrial hazards.

The study uses a quantitative research methodology and a cross-sectional design to gather data at a particular moment in time. Data was collected from a stratified random sample of 215 respondents in a selected automotive manufacturing facility in Kedah, Malaysia, using structured, self-administered questionnaires. A total of 460 employees were used to select the sample. The site and participants were chosen with the purpose of strategically examining safety behaviour in a labour-intensive, high-risk industrial setting. Internal consistency of the constructs was ensured by operationalising the variables using previously validated instruments, measuring them on a five-point Likert scale, and testing their reliability using Cronbach's alpha.

The study's focus has been purposefully restricted to three major predictors: safety attitude, safety training, and safety communication. These factors were selected because they are consistent with the three main tenets of TPB: behavioural belief, perceived control, and normative influence. The scope excludes other organisational or individual-level components such as leadership style, safety culture, and job satisfaction in order to maintain conceptual clarity and methodological accuracy. The

study's focus on a single area in Peninsular Malaysia's northern region may limit its generalisability, but it also provides a thorough understanding of safety behaviour in the chosen organisational context. By concentrating on this specific framework, the study hopes to produce targeted, useful insights into the behavioural factors that influence safety compliance, providing empirical contributions that are both theoretically and contextually sound.

Although this study limited to one company, the findings can serve as references for other automotive manufacturers that may facing similar safety challenges. The study will address a high risk industry needs especially automotive industry hence aligned with national efforts to improve OSH compliance in high-risk industries like automotive.

1.7 Definition of Key Terms

1.7.1 Safety Compliance

Safety compliance refers to employees' obedience to mandatory safety practices, safety procedures and regulatory requirements as defined by the organization. It involves behaviors that are mandatory such as wearing PPE, reporting any unsafe conditions and unsafe acts, and strictly following standard operating procedures (Neal et al., 2000). According to Griffin and Neal (2000), safety compliance is one of the two essential elements of safety performance, along with safety participation. For this study, safety compliance is abstracted as task-specific behavior directly related to maintaining workplace safety standards and fulfilling legal obligations in accordance with OSH regulations (Griffin & Neal, 2000; Vinodkumar & Bhasi, 2010).

1.7.2 Safety Attitude

Safety attitude refers to a person's psychological propensity to view safety risks, safety practices, and safety issues either favourably or unfavourably. It is impacted by opinions, values, and beliefs about how important workplace safety is. A encouraging safety attitude is connected with higher compliance and proactive safety behavior (Al Faqeeh et al., 2019). As suggested by Jahangiri et al. (2017), safety attitudes play a crucial role in influencing the acceptance and application of safety measures. In this study, safety attitude is measured through workers' agreement, concern and perceived importance of safety practices in their job roles (Al Faqeeh et al., 2019; Jahangiri et al., 2017).

1.7.3 Safety Training

Employees who receive safety training are given organised, methodical instruction to improve their comprehension of operational risks, workplace hazards, and safe working practices. Workers who receive effective safety training are better prepared to carry out their jobs safely and in accordance with organisational and legal safety regulations (Vinodkumar & Bhasi, 2010). Nykänen et al. (2019) emphasized that safety training not only increases hazard recognition but also contributes to behavior modification and accident prevention. Safety training, as used in this study, encompasses both initial and ongoing learning initiatives intended to develop and strengthen safety competencies among manufacturing workers (Vinodkumar & Bhasi, 2010; Nykänen et al., 2019).

1.7.4 Safety Communication

Management, supervisors, and employees exchange and transmit safety-related information as part of safety communication. It includes hazard alerts, change of management, incident reporting systems and safety briefings that enable employees to make informed safety decisions (Naji et al., 2022). Effective safety communication is crucial for creating a common understanding of safety expectations and supporting organisational safety performancec(Griffin and Neal, 2000). The study defines safety communication as the responsiveness, frequency, and clarity of formal and informal channels of communication about workplace occupational safety (Naji et al., 2022; Griffin & Neal, 2000).

1.8 The Organisation of the Study

This study is comprised of five chapters, each addressing one aspect of the research. This organization provides a coherent flow that moves from problem identification to presenting findings and recommendations. The chapters progressively build upon each other, maintaining a narrative flow across the study.

Chapter 1 consist of introduction (Background, Problem Statement, Research Objectives and Questions, Scope, Significance of the Study & Definition of the Key Terms} This chapter lays the groundwork for academic research; introduces details of its aims and objectives, described in the study's hypothesis; states all variables involved in the data analysis process; and prepares the reader to follow a detailed framework for the entire thesis.

Chapter 2 focusses on the Literature Review, reviewing prior research on safety compliance, attitudes towards safety, safety training, and safety-related communication. This provides the context of the study along with gaps in existing knowledge and discrepancies between findings. This chapter also examines the theoretical framework that directs the investigation and situates the study within the broader framework of occupational safety and health compliance.

Chapter 3 provides an explanation of the research methodology, which includes the instrumentation, target population and sampling strategies, data collection methods, and research design. The data analysis procedures also provide a detailed description of the statistical techniques used to display the relationship between the independent variables (safety attitudes, safety training, and safety communication) and the dependent variable (safety compliance).

Chapter 4 presents the study's conclusions after a thorough analysis of the data. This includes both descriptive and inferential statistics that address the research's questions and hypotheses. The results are discussed in light of the study's objectives and in relation to the primary literature that is covered in Chapter 2.

Chapter 5 - Conclusion identifies key findings and their contribution to theory, practice and policy. Future research directions and management and policy recommendations are also included in this chapter. This section demonstrates how the benefits of the study add to both academic knowledge and provide recommendations for practical applications concerning safety compliance in the manufacturing industry.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The comprehensive literature review in this chapter focusses on the three independent variables of safety attitude, safety training, and safety communication, as well as the dependent variable of safety compliance. Conceptual definitions, empirical relationships between variables, and the underlying theoretical model guiding this investigation are all reflected in the organisation of the review. The literature provides a thorough grasp of the behavioural factors influencing safety compliance in automotive manufacturing environments by drawing on both international and Malaysian sources.

2.2 Safety Compliance as Dependent Variable

The term "safety compliance" describes how employees follow legal requirements, safety protocols, and procedures to guarantee a safe workplace. It encompasses actions like using PPE appropriately, following SOP, and actively participating in safety-related tasks (Griffin & Neal, 2000 and Syed et al., 2022). Hu et al. (2020) defined that deep compliance is driven by intrinsic motivation while surface compliance is motivated by external enforcement.

Empirical studies have highlighted the occurrence of safety compliance issues across high risk industry. In Malaysia, the Department of Occupational Safety and Health (DOSH) consistently reports high accident rates in the manufacturing sector,

highlighting the importance of understanding the behavioral factors that may influence safety compliance. Basahel (2021) and Chin & Chee (2023) have also emphasized the role of internal motivation and organizational practices in determining compliance outcomes at all high-risk industries. This characteristic highlights the need to explore psychological and organizational factors, such as attitudes, training, and communication, that influence result of safety compliance.

2.3 Safety Attitude

From the Ajzen's Theory of Planned Behavior (1991), attitude is one of the primary determinants of behavioral intention, which then translates into actual safety behavior such as compliance. Safety attitude has continuously been linked to positive safety behaviour and compliance in international OSH studies. Jahani et al. (2020) demonstrated that employees of Pakistani cement factories who had stronger safety attitudes adhered to safety protocols more consistently.

According to Kao et al. (2019), safety attitudes also mediated the relationship between safety behaviour and safety knowledge, indicating that knowledge is insufficient on its own without a positive attitude towards safety. Dobrowolska et al. (2020) found that a safety mindset greatly decreased perceived threat and increased confidence among airport employees in the aviation industry. While safety attitude influenced compliance behaviours, it did not always result in participation in broader safety initiatives, according to an intriguing finding from Su (2021) in a large steel manufacturing company. This implies that while a safety mindset encourages self-defence, it might not always result in group safety participation.

Similar trends have been noted in a number of studies conducted in Malaysia. In confined space settings, Ngah et al. (2022) showed a strong correlation between water utility employees' compliance and safety attitude. The significance of attitude in influencing behaviour in high-risk confined spaces was emphasised by their study. Saleh (2015) investigated safety attitudes in the manufacturing sector and discovered that personal involvement, communication, and workplace perceptions all significantly influenced safety behaviour. Sugumaran et al. (2017) also found that safety compliance in Malaysia's manufacturing sector was greatly enhanced by a positive safety attitude, well-defined safety procedures, and strong management support. According to Othman et al. (2024), safety attitude was the most significant factor influencing safety behaviour among facilities maintenance staff at Malaysian higher education institutions.

Malaysian studies place more emphasis on organisational and demographic factors, such as job roles and management involvement, than the global literature, which focusses on the cognitive and emotional foundations of safety attitudes. However, not much has been studied about how safety attitudes affect real-time safety decision-making in hectic settings like the automotive industry, where safety standards may clash with production targets. The purpose of this study is to bridge this gap by examining the direct correlation between employee attitudes and safety compliance in Malaysia's automotive manufacturing sector, an environment that is both high-risk and poorly understood.

Table 2.1
Summary of Literature Review Related to Safety Attitude

Author	Literature Review
Al Faqeeh, F., Khalid, K., & Osman, A. (2019)	The impact of safety climates on healthcare professionals' safety behaviours was examined in this study, with a focus on safety attitudes as a mediator and safety stressors as a possible moderator.

Table 2.1 (Continued)

Author	Literature Review
Dobrowolska et al. (2020)	This research studied safety attitudes among airport ground staff, identifying them as critical predictors of reduced workplace threat perception. Positive attitudes fostered better compliance and created a safer working environment.
Kao et al. (2019)	The authors looked at how safety attitudes mediated the relationship between compliance behaviours and safety knowledge. Their results emphasise how crucial it is to foster positive attitudes in order to improve employees' capacity to apply safety knowledge.
Li et al. (2022)	Investigates the themes underlying Chinese managers' work ethics in state-owned enterprises (SOEs) through a qualitative lens
Neal and Griffin (2006)	The study investigated both top-down and bottom-up influences on safety behavior and accident outcomes using a longitudinal design over five years
Ngah et al. (2022)	The study assessed safety attitudes among water service workers in Malaysia. It revealed that attitudes significantly impact compliance behaviors, particularly in confined spaces, emphasizing the role of awareness and attitudes in high-risk tasks.
Othman et al. (2024)	Investigates the key factors that affect safety compliance among facilities maintenance workers in Malaysian higher education institutions.
Saleh, N. (2015)	Focuses on how organizational and physical factors influence employee safety attitudes and behaviors in Malaysian manufacturing settings
Sugumaran et al. (2017)	Investigates the effects of safety attitude, management support, and rule and procedure adherence on compliance safety behaviour (CSB) among workers in Malaysia's manufacturing sector.
Su et al. (2021)	Investigates how organizational and individual factors influence safety behaviors and performance within a large steel company.

2.3.1 The Relationship Between Safety Attitude and Safety Compliance

Employee attitudes towards safety are significantly influenced by their perceptions of workplace hazards and the value they attach to safety protocols. The relationship between adopting safe work practices and having positive safety attitudes is supported by empirical data. Neal and Griffin (2006) demonstrated that the likelihood of employees adhering to safety protocols is positively correlated with their safety attitudes, suggesting that attitude is a significant predictor of safety compliance. Research by Yang et al. (2021) and Li & Madsen (2010) suggests that work ethic is a complement to work-related values and attitudes. It has also been acknowledged as a key element influencing behaviour related to the workplace. According to Kao et al. (2019), safety attitude plays a crucial role in behavioural safety models by mediating the relationship between safety behaviour and safety knowledge. Positive safety attitudes also improved safety decision-making in aviation environments and decreased risk perception, according to Dobrowolska et al. (2020).

One of the findings in study Wen-Jywan Su (2021) at large steel company, it indicates that while employees' safety attitudes are significantly associated with safety compliance, they do not necessarily extend to participation in wider safety programs. This suggests that a positive safety attitude may drive individuals to adhere to safety regulations primarily for their own protection, but may not sufficiently motivate them to engage in collective safety efforts or look out for the well-being of others in the workplace.

In the Malaysian context, Saleh (2015) investigate employee's attitude and behaviour towards safety compliance among manufacturing industries in Malaysia and found that the positives relationships between employees' attitude of personal

involvement, communication and physical work environment and the safety management. According to Sugumaran et al. (2017), safety rules and procedures, management support, and safety attitude are all positively and significantly connected with safety compliance behaviour. The attitude and practice towards occupational risk among the students were high (Mohamed at al.; 2021). According to Ngah et al. (2022), among water utility employees working in confined spaces, there is a significant positive correlation between safety compliance behaviour and safety attitude. Safety attitude is the main factor influencing the safety management procedures used by the facilities maintenance employees, according to the data analysis results from Othman et al. (2024).

It has been empirically demonstrated that safety attitudes have a positive impact on safety compliance behaviours in both international and Malaysian contexts. Employees with positive safety attitudes are more likely to apply organisational safety values, convert them into behavioural intentions, and ultimately show adherence to safety regulations. This bolsters the theoretical idea of the Theory of Planned Behaviour (Ajzen, 1991), according to which attitude plays a significant role in determining intention and behaviour.

2.4 Safety Training

Safety training, as defined by Vinodkumar and Bhasi (2010), is a planned intervention designed to increase workers' awareness, knowledge, and skills to perform tasks safely and in accordance with occupational safety and health (OSH) regulations. It includes emergency drills, toolbox talks, induction programs, and refresher courses, and its goal is to give staff members the skills they need to identify, control, and report risks.

Training improves perceived behavioural control within TPB, which affects real compliance behaviour.

Safety compliance and injury prevention have been acknowledged as being largely dependent on safety training on a global scale. Customised safety training lowers incident rates by preparing employees for task-specific hazards, according to Colligan and Cohen (2004). Obong et al. (2021) studied that manufacturing firms' compliance and efficiency were greatly enhanced by structured health and safety training. In Turkey's metal industry, Bayram et al. (2022) found that management's overt dedication to safety training increased worker engagement and compliance. When compared to conventional classroom methods, virtual reality (VR)-based safety training increased compliance and hazard awareness significantly (Nykänen et al., 2020). This shows how important delivery methods are becoming for improving training efficacy.

During the COVID-19 pandemic, Chin and Chee (2023) discovered that thorough safety training in Malaysia increased healthcare workers' compliance, especially when it came to addressing quickly changing workplace hazards. According to Aziz and Osman (2019), workplace safety procedures in manufacturing industries were greatly enhanced by required OSH training. Lack of safety training was noted by Aman-Ullah et al. (2022) as a major obstacle to compliance in the healthcare industry. Safety non-compliance in Malaysian manufacturing industries was attributed by Azhar et al. (2024) to a failure to update safety training with evolving SOPs. Construction sector-specific training enhanced hazard recognition and decreased injury rates, according to CIDB's previous study (Ghani et al., 2010).

Malaysian research frequently focusses on post-training behaviour and the efficacy of regulatory training, whereas international studies highlight novel training

formats and their behavioural effects. However, the relationship between real-time compliance and safety training in high-cycle, automated manufacturing environments has received little attention. The automotive industry relies heavily on quick decisions and machine interaction, so it's important to know how training affects behaviour under operational pressure. In order to close this gap, this study looks at how safety training directly affects compliance in Malaysia's auto manufacturing sector.

Table 2.2
Summary of Literature Review Related to Safety Training

Author	Literature Review
Azhar et al. (2024)	This study identifying factors for safety non-compliance such as discomfort, time pressure, and training gaps hence proposes an "Effective Compliance Model" to address these issues.
Aziz & Osman (2019)	Investigates whether mandatory OSH training enhances workplace safety practices in Malaysia, with evidence supporting positive behavioral shifts.
Aman-Ullah et al. (2022)	This study explores how workplace safety (WPS) affects employee retention (ER) in healthcare, focusing on Azad Jammu and Kashmir, Pakistan.
Bayram & Ozkan (2022)	Data from Turkish metal industry workers revealed that the relationship between employee behaviour and management priority is mediated by safety training.
Bottani et al. (2009)	This study investigates the efficacy of safety management systems (SMS), which include safety training. Businesses that use SMSs perform better overall, according to the findings.
Colligan & Cohen (2004)	This study encourage for training as a primary prevention strategy and stress the importance of tailoring content to specific job hazards and employee needs
Griffin & Neal (2000)	Foundational framework for occupational safety research, highlighting how a supportive safety environment empowers employees with the appropriate mindset and knowledge base to improve compliance and participatory safety behaviours.

Table 2.2 (Continued)

Author	Literature Review
Hertanto et al. (2023)	An Indonesian company's 200 employees' safety behaviour and safety climate were found to be strongly correlated by the study, highlighting the significance of enhancing safety climate in order to lower workplace accidents.
Vinodkumar & Bhasi (2010)	Illustrates how management practices impact safety behaviour through intermediaries such as motivation and safety knowledge.
Wu et al. (2015)	Research found that workers' exposure to training is correlated with higher trust in safety procedures and rules, thereby increasing compliance and participation behavior.
Zin & Ismail (2012)	According to the study, "training and education" is one of the primary behavioural factors influencing safety compliance in the construction industry.

2.4.1 The Relationship Between Safety Training and Safety Compliance

According to Griffin and Neal (2000), safety knowledge and safety motivation are two distinct but equally significant predictors of safety compliance. An employee may own adequate knowledge of safety requirements but lack the motivation to adhere to them, while another may be highly motivated yet unable to comply effectively due to insufficient knowledge or skill. As such, both constructs must be evaluated independently to assess accurately and enhance safety compliance within the workplace. Safety training stands as one of the most significantly studied and widely implemented policies in safety management.

According to Colligan and Cohen (2003), employees who undergo constructed safety training are significantly unlikely to experience work-related injuries compared to those who have not received such training. This underlines the critical role of training

in enhancing workplace safety performance and reducing incident rates. According to Bottani et al. (2009), the primary causes of workers' unsafe behaviours in manufacturing are a lack of proper safety training, a vague or insufficient description of work procedures and responsibilities, and management's tendency to prioritise production over safety. Vinodkumar and Bhasi (2010) identified safety training as a fundamental predictor of compliance, especially when it improves workers' understanding of hazards and highlights their safety commitment. Wu et al. (2015) analytically found that in Chinese construction enterprise; safety training, safety supervision and safety communication are affected by both safety priority and safety rules and procedures.

Bayram et al. (2022) revealed that in Turkish metal industry, employees' observations of management's prioritization of safety have a direct influence on safety compliance and engagement in safety training. Furthermore, this perception indirectly impacts participation in safety programs and overall safety behavior through the mediating role of safety training. The results also show that adherence to safety regulations increases the efficacy of safety training and indirectly encourages positive safety behaviour and active participation in safety initiatives.

According to CIDB research conducted in Malaysia by Ghani et al. (2010), good safety training is essential for educating staff members about potential mishaps, safety precautions, and the particular risks associated with their work duties. Therefore, structured training and education initiatives are crucial for raising worker awareness of safety issues generally and for improving workplace safety in the construction industry. Zin and Ismail (2012) discovered that employee attitudes regarding safety in the construction sector are greatly impacted by how they view workplace dangers and how

much importance they place on safety measures. Empirical evidence supports the link between positive safety attitudes and the adoption of safe work practices. According to a recent study conducted in Malaysia, the mandatory training proved to be successful, as evidenced by the significant increase in respondents' OSH implementation within a month of training completion (Aziz and Osman, 2019). Study done by Aman-Ullah et al. (2022) in Malaysia healthcare sector highlighted that insufficient safety training will reduce workers awareness regarding risk at their workplace hence increase non-compliance towards safety procedures. Azhar et al. (2024) also confirm that in Malaysia manufacturing sectores; continuous safety training need to be updated from time to time to ensure employees aware the latest safe working procedure hence comply with the safety requirement.

2.5 Safety Communication

Safety communication is the timely and effective exchange of information about safety between management, supervisors, and employees. It consists of open-door feedback mechanisms, incident reporting systems, SOP modifications, and hazard alerts (Naji et al., 2022). Communication in TPB is a reflection of the concept of subjective norms, which shape behaviour by way of organisational and social expectations.

Cigularov et al. (2010) discovered that by fostering error reporting and lowering blame anxiety, an open communication culture improved safety practices in construction companies. Consistent supervisor communication improved procedural fairness and safety compliance in mining operations, according to Haas & Yorio (2021). Zhang et al. (2020) emphasised how two-way communication helps decentralised construction teams develop safety ownership and trust. According to Lee et al. (2019),

there was a direct correlation between increased accident rates in South Korea's industrial sector and inadequate organisational communication. These studies all agree that compliance behaviour is influenced by the quality of communication rather than its quantity.

Abdullah et al. (2022) conducted a study among SMEs in Malaysia stated that when paired with effective safety management procedures, safety communication is essential to enhancing safety performance. Amonodin et al. (2023) emphasizes leadership to be a reason for safety communication which leads to positive safety behavior and reduces incidents. Furthermore, safety communication may integrated with training programs and feedback mechanisms strengthens compliance and promotes a proactive approach towards controlling workplace risks (Rahim, 2021). These findings highlight the necessity for well-planned safety communication in reducing risks and complying with relevant standards on the part of Malaysia's manufacturing institutions.

According to Naji et al. (2022), safety communication served as a mediator between Malaysia's petrochemical industry's performance and safety culture. According to Isa et al. (2021), safety communication had a major impact on employees' compliance in businesses with ties to the government. Yeong & Shah Rollah (2016) investigated manufacturing settings and came to the conclusion that incidents involving human error were exacerbated by poor communication. In a systematic review of the literature, Zara et al. (2023) confirmed that climate and communication satisfaction are important factors that influence safety commitment and compliance in Malaysia's oil and gas industry.

According to Naji et al. (2022), compliance and a positive safety culture are fostered by open communication. However, the real-time efficacy of safety communication is still not well studied in Malaysia's automotive manufacturing sector, where safety briefings, shift handovers, and equipment changes are normal routine. This study aims to examine how structured safety communication affects compliance behaviour under dynamic production settings in order to gain a better understanding of the role that communication plays in high-risk industrial compliance.

Table 2.3
Summary of Literature Review Related to Safety Communication

Author	Literature Review
Cigularov et al. (2020)	The study underscores that fostering open and positive safety communication within construction organizations leads to better safety behaviors and reduces work-related pain among construction workers.
Haas & Yorio (2021)	This study analyzed data from 1,955 mine workers in U.S. to understand the relationship between supervisor communication, coworker communication, and perceptions of practical integrity in influencing behavioral safety compliance.
Isa et al. (2021)	Safety training and safety communication were highlighted as particularly influential in cultivating a safe work environment and increasing adherence to procedures among GLC workers.
Naji et al. (2022)	This study investigates how safety communication (SCO0) mediates the relationship between safety culture (SC) and safety performance (SP) among employees in Malaysia’s petrochemical industry.
Yeong & Shah Rollah (2016)	This study investigates how safety communication impacts human factor accidents in manufacturing companies in Negeri Sembilan, Malaysia, and examines the mediating role of safety culture

Table 2.3 (Continued)

Author	Literature Review
Zara, Nordin, & Isha (2023)	This comprehensive review of the literature examines 1,439 studies published between 2004 and 2023 that examine the connection between safety commitment and safety communication, with an emphasis on the oil and gas sector.
Zhang et al. (2020)	This study explores how supervisory safety communication influences safety climate and safety behavior within construction workgroups, where decentralized and distributed structures are common.

2.5.1 The Relationship Between Safety Communication and Safety Compliance

The importance of communication in encouraging safety compliance is continuously recognised by empirical research. Cigularov et al. (2010) discovered that safety performance in the construction industry was positively predicted by safety communication. Additionally, it suggests that construction management should actively adopt practices that support workers in voicing and discussing safety concerns, encourage open communication about errors or near-misses, and support a proactive and constructive response to errors. Haas and Yorio (2021) highlights that in mining industry, fair and consistent implementation of safety procedures is crucial for promoting positive coworker relationships and promoting compliant safety behavior.

According to Hassan et al. (2019), workers in small and medium manufacturing (SME) companies' safety compliance behaviour is greatly influenced by safety communication and adherence to safety rules and procedures, which ultimately affects the overall organisational safety performance. Zhang et al. (2020) indicate that supervisory safety communication significantly shapes the safety climate in construction workers by guiding safety-related behavior. To be effective, supervisors

must consistently deliver safety messages, especially when safety may conflict with production goals and improve two-way communication with workers. Zara et al. (2023) examine how communication factors affect a high-risk workplace's commitment to safety.

According to the study, communication and safety commitment are crucial for improving occupational safety. Additionally, it establishes the foundation for future studies that will concentrate on developing workable strategies to strengthen these components, ultimately promoting safer and healthier workplaces. According to the findings of Isa et al.'s (2021) study on safety compliance among employees of government-affiliated companies (GLCs), every respondent recognised the value of safety feedback and communication in fostering a robust safety culture. Active communication within the organisation greatly improves both safety culture adherence and overall safety performance, according to correlation analysis, which discovered a somewhat favourable correlation between safety culture compliance and the availability of safety communication and feedback.

2.6 Related Underpinning Theories

Ajzen (1991) developed the Theory of Planned Behaviour (TPB), which offers a generally recognised framework for comprehending the psychological processes underlying intentional behaviour. TPB has been significantly applied in occupational health and safety studies to explain variations in employee safety compliance. The theory states that three factors influence behavioural intention, which is the direct precursor of behaviour: attitude towards the behaviour, subjective norms, and perceived behavioural control.

In the context of Malaysia's automotive manufacturing sector, this study adopts TPB to investigate how safety attitudes, training, and communication influence safety compliance among the employees. By integrating these predictors into the TPB framework, this research aims to uncover behavioral determinants that can inform more effective safety interventions in high-risk, technology-driven manufacturing environments.

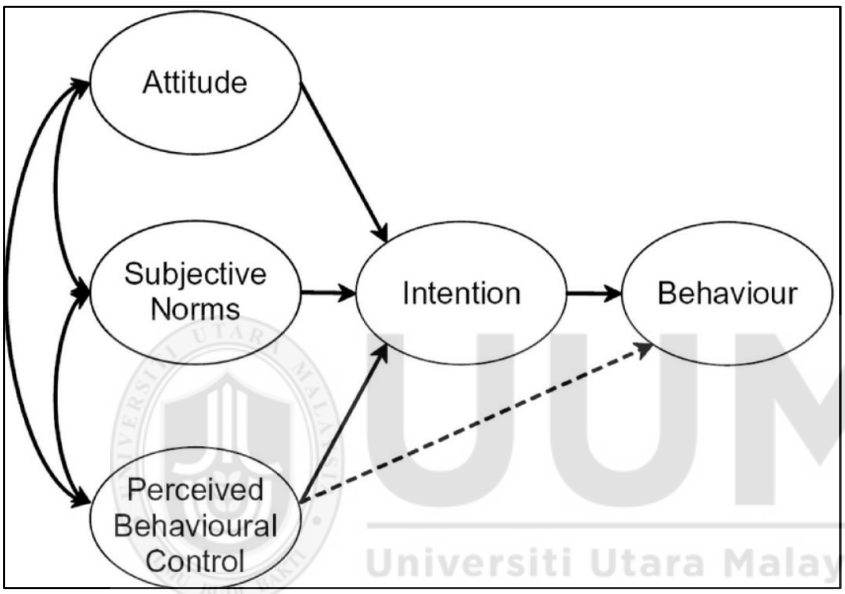

Figure 2.1
TPB Framework
Source: Ajzen, 1991

2.6.1 Safety Attitudes as Predictors of Intention

According to TPB, attitudes are a person's general assessment of engaging in a behaviour. A positive safety attitude suggests that an employee values compliance with safety procedures, believes in their effectiveness, and is more likely to act accordingly.

Prior studies (Griffin & Neal, 2000; Zin & Ismail, 2012) have shown that favorable safety attitudes are linked with increased motivation and proactive engagement in safety behaviors. In the automotive manufacturing sector, where workers are frequently exposed to automated processes, high risk activities and manual

handling, attitudes toward risk mitigation and procedural adherence are critical. Safety training can shape these attitudes by strengthening the personal and collective benefits of compliance. Attitudes formed through training serve as a motivational base for future intentions and actions.

2.6.2 Safety Communication and Subjective Norms

Subjective norms, the second construct of TPB, refer to perceived social pressures to perform certain behaviors. In manufacturing settings, these norms are influenced mainly by supervisory communication, peer interactions and organizational safety culture. Effective safety communication plays a dual role by not only knowledge transfer but also indicates expectations. Communication from supervisors that reinforces safe practices contributes to the perception that safety compliance is both valued and socially expected (Haas & Yorio, 2021; Cigularov et al., 2010). This social expectation hence promotes the worker's intention to comply.

In the Malaysian automotive industry, where shop-floor environments are highly structured and hierarchical, top-down communication is particularly significant. Well-structured safety communication strategies greatly predict safety-related intentions and behaviours by forming shared norms, according to empirical research (Naji et al., 2022).

2.6.3 Safety Training and Communication in Enhancing Perceived Behavioral Control

The term "perceived behavioural control" (PBC) describes a person's belief in their capacity to carry out an action in light of both internal and external constraints. According to this study, PBC is impacted by the standard of safety instruction and the accessibility of support materials shared during regular business operations. When

employees receive hands-on training aligned with real-world operational risks such as machine handling, ergonomic lifting, or lockout-tagout procedures; their confidence in managing those risks improves (Wu et al., 2015; Zhang et al., 2020). Similarly, two-way communication enables them to report any safety concerns, clarify uncertainties, and gain feedback, all of which strengthen their control perception.

In Malaysian automotive industry, where production schedules and accuracy are top priority, workers may feel constrained unless they are equipped with both competence and communicative access. Therefore, training and communication jointly function to enhance perceived behavioral control, empowering employees to act safely, even under pressure.

2.7 Summary of the Chapter

This chapter reviewed the literature on safety compliance and its key behavioral predictors: safety attitude, safety training, and safety communication. Evidence from both international and Malaysian contexts indicates that employees' attitudes, training experiences, and communication practices significantly influence compliance with occupational safety regulations. The Theory of Planned Behavior (TPB) was adopted as the theoretical foundation, framing how these predictors contribute to compliance behavior through attitudes, perceived norms, and behavioral control. The development of the research framework and the direction of the hypotheses examined in the following chapter are supported by this foundation.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The methodological framework for examining the impact of safety communication, safety training, and safety attitude on safety compliance in Malaysia's automotive manufacturing industry is presented in this chapter. The study uses a quantitative methodology based on the Theory of Planned Behaviour (TPB), which offers an organised framework for analysing organisational and psychological aspects that affect workers' adherence to safety protocols.

The methodology encompasses the development of a conceptual framework and research hypotheses, followed by a detailed explanation of the research design, operational definitions, measurement instruments, data collection strategy, sampling technique, and analytical procedures. The use of validated instruments and statistical techniques ensures the accuracy and reliability of the findings. This systematic approach supports empirical testing of the hypothesized relationships and contributes to advancing behavioral safety research in industrial settings.

3.2 Research Framework

This study adopts the Theory of Planned Behavior (TPB) as the foundational model to explain the predictors of safety compliance. According to the framework, safety compliance behaviour is the result of behavioural intention influenced by safety attitudes (attitude towards behaviour), safety communication (subjective norms), and safety training (perceived behavioural control). This study examines how these three

independent factors directly affect safety compliance in Malaysia's auto manufacturing industry.

In this framework:

- Safety Attitude is a person's assessment, whether favourable or unfavourable, of engaging in safety behaviours.
- Safety Communication captures the perceived social expectations communicated through supervisors, colleagues, and the organization.
- Safety Training enhances perceived behavioural control by increasing the knowledge and confidence necessary to perform safety behaviours.

Safety compliance, or the actual performance of safety behaviours in line with organisational protocols, is thought to be directly influenced by these three backgrounds. The framework TPB theories to reflect the industrial safety context, enabling a theoretically grounded exploration of compliance behaviour in high-risk manufacturing environments.

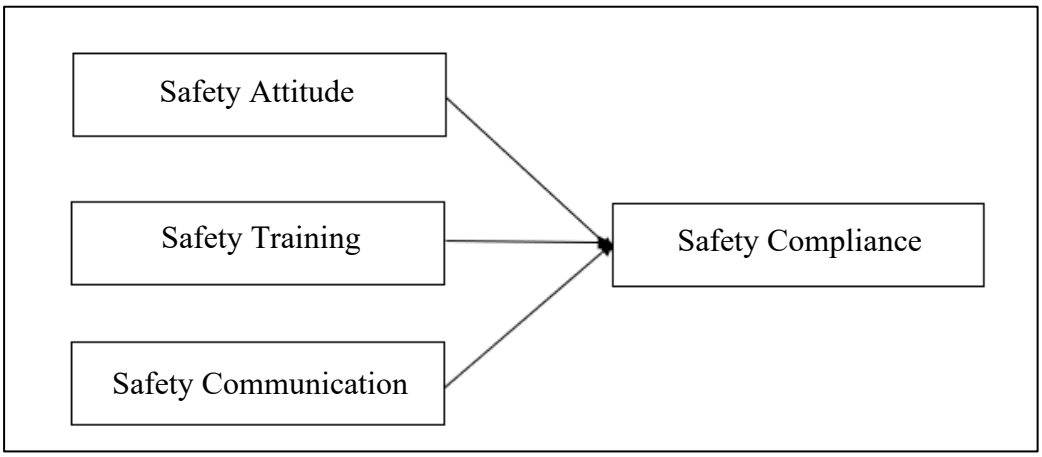

Figure 3.1
Research Framework

3.3 Hypotheses Development

The hypotheses for the study are presented in this section; they were developed using the theoretical framework and the reviewed literature. Safety compliance is the dependent variable, and the direction and strength of the relationships between each independent variable are hypothesised and empirically tested.

Previous studies (e.g., Griffin & Neal, 2000; Vinodkumar & Bhasi, 2010; Cigularov et al., 2010) have identified safety attitude, training, and communication as key predictors of compliance behavior. This study extends that body of knowledge within the context of Malaysia's automotive manufacturing sector. The hypotheses are then aligned to the study's research framework and objectives, and rationale provided for each hypothesis.

H_1: *There is a significant positive relationship between safety attitude and safety compliance in the manufacturing industry.*

H_2: *There is a significant positive relationship between safety training and safety compliance in the manufacturing industry.*

H_3: *There is a significant positive relationship between safety communication and safety compliance in the manufacturing industry.*

3.4 Research Design

The cross-sectional approach and quantitative research design used in this study enable data collection at a single point in time to investigate the connections among safety compliance, safety attitude, safety training, and safety communication. The quantitative approach ensures that data collected through structured questionnaires can be statistically analyzed to test the study's hypotheses. The cross-sectional design is particularly suitable for this study as it is time-efficient and cost-effective, providing a snapshot of the current safety practices within the automative manufacturing industry in Kedah, Malaysia.

3.5 Operational Definition

It is crucial to define operational definitions to gain clarity and consistency in the measurement of people in a study. In this section, safety compliance, safety attitude, safety training, and safety communication— the key variables of the model design are defined with their components and measurements in the manufacturing industry. This study thus offers operational definitions for the constructs under investigation, allowing for a common assessment of these variables and their relationships and strengthening data collection and analysis. All variables are theoretically driven and defined based on existing research to ensure consistency with the literature and objectives of the study. These operational definitions are aligned with the constructs in the TPB framework and support empirical measurement of behavior-related outcomes.

Table 3.1
Summary of Operational Definitions

Variables	Operational Definition
Safety Compliance	Performing tasks safely in accordance with regulations and safety rules to ensure a safe work environment (Basahel, 2021).
Safety Attitude	Employees' beliefs, perceptions, and behavioral tendencies toward workplace safety, which influence their safety-related decisions and actions (Al Faqeeh et al., 2019).
Safety Training	Providing programs and activities designed to increase employees' safety-related knowledge, skills, and behaviors to maintain workplace safety (Hertanto et al., 2023).
Safety Communication	The process of exchanging information about safety practices and protocols to foster better understanding and adherence to workplace safety regulations (Naji et al., 2022).

3.6 Measurement of Variables/Instrumentation

A structured questionnaire is used to measure all variables on a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire is divided into sections:

Part A: Demographic information, Part B: Safety Compliance, Part C: Safety Attitude, Part D: Safety Training and Part E: Safety Communication.

Table 3.2
Summary of Measurement of Variables/Instrumentation

Variables	List Of Questionnare	Number Of Items	Items Adopted From
Safety Compliance	1. I use all necessary safety equipment to do my job. 2. I carry out my work in a safe manner. 3. I follow correct safety rules and procedures while carrying out my job. 4. I ensure the highest levels of safety when I carry out my job. 5. It is always practical to follow all safety rules and procedures while doing a job.	7 items	Basahel (2021)

Table 3.2 (Continued)

Variables	List Of Questionnare	Number Of Items	Items Adopted From
	6. It is always practical to follow all safety rules while doing a job. 7. It is always practical to follow all safety procedures while doing a job.		
Safety Attitude	1. I feel that it is important to maintain safety at all times. I carry out my work in a safe manner. 2. I feel that it is necessary to put efforts to reduce accidents and incidents at the workplace. 3. I feel that it is important to encourage others to use safe practices. 4. I feel that it is important to promote safety programs. 5. I feel that it is important to promote safety programs.	5 items	Al Faqeeh et al. (2019)
Safety Training	1. There is adequate safety training in my work group. 2. Employees do not receive safety training when there is a change in work assignments. 3. Provide sufficient time for safety training. 4. My supervisor ensures employees receive adequate safety training. 5. Safety training is not delivered in a clear manner. 6. I understand how to do the job safely.	6 items	Hertanto et al. (2023)
Safety Communication	1. My company doesn't have a hazard reporting system where employees can communicate hazard information before incidents occur. 2. When it comes to safety issues, management has an open door approach. 3. There is sufficient opportunity to discuss and deal with safety issues in HSE meetings. 4. The target goals for safety performance in my company are not clear to the workers. 5. There is open communication about safety issues in this company.	5 items	Naji et al. (2022)

3.7 Sampling

3.7.1 Population

The study targets a population of 460 employees in the automotive manufacturing sector in Kedah. These employees are directly involved in operation activities such as production, logistics, maintenance, engineering, planning and quality department. All of these employees; from operator level until manager level are subject to occupational safety requirements, making them appropriate respondents for this study to ensure the data are more reliable and impactful findings.

3.7.2 Sampling Techniques

This study uses simple random sampling as its sampling technique. Simple random sampling is a probability sampling method in which each individual within the population has an equal and independent chance of being selected. This approach was selected due to its ability to minimize selection bias and to ensure that the sample accurately represents the target population, thus enhancing the impact of the findings (Noor et al., 2022) .

Given the nature of this study, which focuses on operational employees in Malaysia's automotive manufacturing comapny, simple random sampling is appropriate for ensuring that respondents from various job roles and hierarchical levels have equal opportunities to participate. This technique is also consistent with the quantitative design of the study, allowing for the application of inferential statistics such as multiple regression analysis. The sampling process was conducted

systematically using an employee list provided by the human resources department of the company.

In order to test the proposed relationships within the framework of the Theory of Planned Behaviour (TPB), the study uses this method to guarantee that the data collected represent a wide range of safety-related attitudes, training experiences, and communication exposures among workers.

3.7.3 Sample Size

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size.

Figure 3.2
Table for Determining Sample Size for a Given Population
Source: Krejcie and Morgan, 1970

The required sample size for this study was determined using Krejcie and Morgan's (1970) sample size determination table, which is widely accepted in social science research. For a target population of 460 employees, the recommended minimum sample size is 210 respondents.

This sample size provides adequate statistical power to conduct advanced statistical analyses such as multiple regression analysis with minimal risk of errors. Additionally, this sample size ensures that the study maintains a confidence level of 95% with a margin of error of ±5%, allowing for generalizable and reliable results.

3.7.4 Sampling Procedure

The selected individuals were then contacted via online platforms and invited to participate in the study by accessing an online questionnaire using Google Form. The procedure ensured that each employee in the sampling frame had an equal and independent chance of being selected, thus enhancing the representativeness and reliability of the data collected.

Every participant will have plenty of time to finish the survey, and they have been informed that all data collected will be kept totally confidential and used exclusively for the study's objectives only. They did not have to fill out the form with their names in order to identify themselves.

3.8 Data Collection Procedures

Selected participants in the automotive manufacturing company in Kedah, Malaysia, were given an online self-administered questionnaire to complete as part of the data collection process. This approach was selected because of its effectiveness, broad reach, and capacity to protect participant anonymity. Potential responders were chosen at random and contacted via enterprise platforms or internal company communication

channels like email. A digital informed consent form and a secure link to the survey platform were included with every invitation. Only those who accepted the terms were given access to the complete survey.

Four weeks were allotted for the data collection process. Weekly reminder notifications were sent out during the data collection period in an effort to increase response rates and promote involvement. Real-time monitoring of response progress was made possible by the use of digital tools, which also guaranteed ease of participation and decreased manual data handling. After being gathered, the data was safely stored for subsequent statistical analysis and downloaded in an encrypted format.

3.9 Pilot Study

A pilot study involving 30 employees from a similar manufacturing environment was conducted to test the clarity, relevance, and reliability of the questionnaire items. Feedback was used to refine question wording and layout. Cronbach's alpha was used to assess internal consistency, with all constructs exceeding the threshold value of 0.70, indicating acceptable reliability. The details are showed in Table 3.3.

Table 3.3
Realibility Analysis - PILOT

Variables	Cronbach's Alpha	N of items
Safety compliance	0.962	7
Safety attitude	0.918	5
Safety training	0.819	6
Safety communication	0.823	5
Overall instruments	**0.936**	**23**

3.10 Techniques of Data Analysis

The analysis of collected data in this study was conducted using Statistical Package for the Social Sciences (SPSS) version 23. A comprehensive approach to data analysis was employed to ensure the robustness and reliability of the findings. Several statistical procedures were systematically conducted, including reliability analysis, normality testing, descriptive statistics, Pearson correlation, and multiple linear regression analysis.

To begin, reliability analysis was performed to determine the internal consistency of each measurement scale using Cronbach's alpha coefficients. This step was essential to confirm the dependability of the survey instrument in measuring the constructs of interest which are safety attitude, safety training, safety communication, and safety compliance. A Cronbach's alpha value of 0.70 or higher was considered acceptable, indicating that the items within each construct reliably measured the same underlying concept. Following the assessment of reliability, normality tests were conducted to evaluate whether the data distributions met the assumptions of normality. This involved the examination of skewness and kurtosis values for each variable, as well as visual inspection through histograms and normal Q-Q plots. Ensuring normal distribution was critical for the validity of subsequent parametric analyses.

Descriptive statistics were employed to summarize the demographic characteristics of the respondents and to provide a basic understanding of the central tendencies and dispersion for each study variable. This analysis helped in interpreting the overall profile of the sample, including measures such as means, standard deviations, and frequencies. Subsequently, Pearson correlation analysis was used to explore the strength and direction of the linear relationships between the independent

variables—safety attitude, safety training, and safety communication—and the dependent variable, safety compliance. This analysis provided preliminary insights into the associative patterns among the variables and guided the formulation of expectations for the regression analysis.

The final analytical step involved conducting multiple linear regression analysis to examine the predictive power of the three independent variables on safety compliance. This technique allowed for the assessment of the extent to which variations in safety compliance could be explained by changes in safety attitude, training, and communication. Prior to executing the regression model, key assumptions such as linearity, independence of errors, homoscedasticity, and multicollinearity were tested to ensure model appropriateness. Linearity and homoscedasticity were examined using scatter plots of residuals, while multicollinearity was checked through Variance Inflation Factor (VIF) values, ensuring that all values remained below the acceptable threshold of 5.

Through these analytical procedures, the study aimed to derive statistically meaningful and theoretically grounded conclusions regarding the behavioral determinants of safety compliance within Malaysia's automotive manufacturing sector.

3.11 Ethical Consideration

To protect participants' rights, dignity, and well-being, this study closely followed accepted ethical guidelines for social science research. Formal approval from the appropriate academic and organisational authorities was acquired prior to data collection.

Participation was completely voluntary and an informed consent form that explained the study's objectives, the procedures, and the possible risks and benefits was given to each respondent. Additionally, the form made clear that participation was completely voluntary and that there would be no consequences if respondents decided to stop at any time.

Anonymity and confidentiality were guaranteed. All responses were treated with strict confidentiality, and no personally identifiable information was gathered. Additionally, the study complied with the research ethics guidelines of Universiti Utara Malaysia (UUM) and company policy, specifically with regard to the protection of sensitive workplace data and the treatment of human subjects. These steps were taken to build participant trust and protect the integrity of the research process.

3.12 Summary of the Chapter

Chapter 3 describes the methodology used to fulfill the research objectives and evaluate the hypotheses. This chapter describes research design, operational definition, measurement of variables, data collection methods, and sampling techniques. The data collection and analysis methods are provided to enable the reliability and validity of the results. This chapter offers a full blueprint detailing how the study was conducted and a systematic way of understanding the factors affecting safety in the manufacturing industry.

CHAPTER FOUR

RESULTS

4.1 Introduction

In this chapter, the research findings are presented after the profile of the study's respondents has been presented for a period of time. In this study, three research goals were accomplished. First, to examine the relationship between safety attitude and compliance with occupational safety and health (OSH) regulations in the manufacturing industry. The second goal is to investigate how safety training and adherence to OSH rules in the manufacturing sector are related. Third, to assess the connection between OSH compliance in the manufacturing sector and safety communication. To accomplish the goals, the data was analysed using the Statistical Package for the Social Sciences (SPSS) version 23. The study's findings are shown in tables. The study's conclusion brings this chapter to a close.

4.2 Demography of Respondents

This section provides information on the respondents' demographics. Four demographic details are included: age, gender, job title, years of experience in the manufacturing sector. Based on respondent numbers and percentages in Table 4.1, the demographic data is displayed in a table format. As a result, Tables 4.2 through 4.5 display the tabulation of demographic data.

Table 4.1
Response Rate

	Number	Percentage (%)
Distributed Questionnaires	460	100.0
Returned Questionnaires	220	47.8
Usable Questionnaires	215	46.7
Unusable Questionnaires	5	0.01

4.2.1 Age

According to the age group distribution, 16.7% of respondents (n = 36) were under 25, 63.3% respondent (n = 136) was aged 25 - 34 years, 15.8% respondent (n = 34) was aged 35 - 44 years, 3.3% respondent (n = 7) was aged 45 - 54 years, and 0.9% respondent (n = 2) was aged above 55 years.

Table 4.2
Percentage of Age

	Frequency	Percentage
Below 25 years	36	16.7
25 - 34 years	136	63.3
35 - 44 years	34	15.8
45 - 54 years	7	3.3
Above 55 years	2	0.9

4.2.2 Gender

The gender profile of the respondents reveals that 152 of them are men, making up 70.7% of the sample, and 63 are women, making up 29.3%.

Table 4.3
Percentage of Gender

	Frequency	Percentage
Male	152	70.7
Female	63	29.3

4.2.3 Job Position

According to the respondents' job position profile, 56 respondents (26.0%) are assistant engineers, supervisors, or officers, and 105 respondents (48.8%) are operators, technicians, or leaders, 30 respondent (14.0%) are Engineer / Executive, 14 respondent (6.5%) are Senior Engineer / Senior Executive, and 10 respondent (4.7%) are Asst Manager / Manager.

Table 4.4
Percentage of Job position

	Frequency	Percentage
Operator / Technician / Leader	105	48.8
Asst Engineer / Supervisor / Officer	56	26.0
Engineer / Executive	30	14.0
Senior Engineer / Senior Executive	14	6.5
Asst Manager / Manager	10	4.7

4.2.4 Years of experience in manufacturing industry

The distribution of years of experience in manufacturing industry showed that 9.3% respondent (n = 20) are less than 1 year, 43.3% respondent (n = 93) are 1 – 3 years, 14.4% respondent (n = 31) are 4 – 6 years, 14.9% respondent (n = 32) are 7 – 10 years, and 18.1% respondent (n = 39) are more than 10 years.

Table 4.5
Years of experience in manufacturing industry

	Frequency	Percentage
Less than 1 year	20	9.3
1 – 3 years	93	43.3
4 – 6 years	31	14.4
7 – 10 years	32	14.9
More than 10 years	39	18.1

4.3 Realibility Analysis

Table 4.8 displays the Cronbach Alpha values for safety compliance, safety attitude, safety training, and safety communication in Malaysia's manufacturing sector based on the reliability result.

Table 4.6
Realibility analysis

Variables	Cronbach's Alpha	N of items
Safety compliance	0.973	7
Safety attitude	0.968	5
Safety training	0.701	6
Safety communication	0.710	5

Safety compliance is the dependent variable, and its Cronbach's alpha value is 0.973. The independent variables of safety attitude, safety training, and safety communication have Cronbach's Alpha values of 0.968, 0.701, and 0.710, respectively. Based on the Cronbach's Alpha table above, it can be conclude that the majority of the variables have values greater than 0.7 (>0.7), indicating that the questions are acceptable and have excellent reliability for additional analysis.

4.4 Normality Analysis

4.4.1 Skewness and Kurtosis

Table 4.9 displays the results of the data normalisation process using the Skewness and Kurtosis statistical tests.

Table 4.7
Normality analysis

Variables	Skewness	Kurtosis
Safety compliance	-1.359	1.462
Safety attitude	-1.503	1.780
Safety training	-.320	.475
Safety communication	-.183	-.521

A mean test result of between ± 2 standard deviations indicates that the variables in the study are normally distributed, according to the statistical analysis presented in Table 4.9 (Hair et al. 1998). Skewness values fall between -1.503 and -0.183. Kurtosis values range from -0.521 to 1.780 in the meantime. This result indicates that there is a significant normality for safety compliance, safety attitudes, safety training, and safety communication, as well as skewed and kurtosis data. The study's data can therefore be used for additional analysis.

4.4.2 Histogram

Based on the histogram graph plotted as Figure 4.1 shows that the study sample is normal because the curve line on the displayed histogram is bell-shaped for all data distributions. Therefore, the assumption of normality is met.

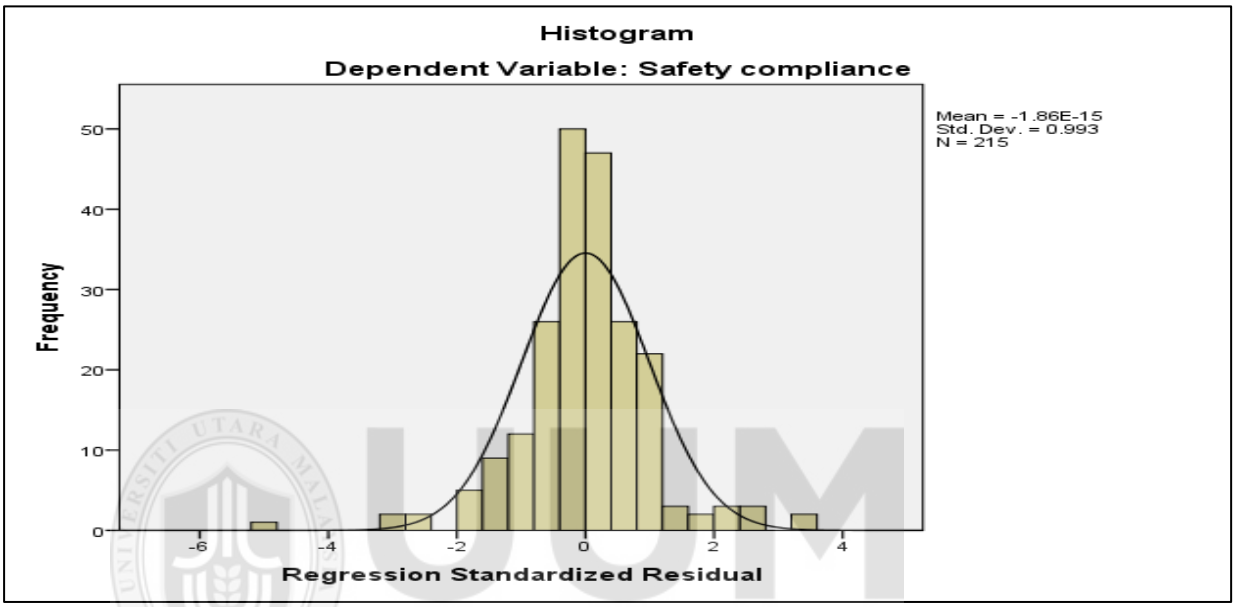

Figure 4.1
Normality Histogram Based On Standardized Residuals

4.5 Factor Analysis Results

Table 4.10 indicates that the KMO values fall between 0.657 and 0.938. KMO values for safety compliance, attitude, training, and communication are 0.938, 0.915, 0.764, and 0.657, respectively. The range of variances explained is 50.09% to 88.75%. Consequently, KMO values above 0.50 are deemed acceptable. All variables have significant Bartlett's Test of Sphericity (BtoS) values (p is less than 0.01).

Table 4.8
Results of factor analysis

Variables	No of item	KMO Value	Bartlett's Test of Sphericity	Eigen value	Variance explain	Sig. P
Safety compliance	7	.938	2091.486	6.030	86.140	.000
Safety attitude	5	.915	1379.808	4.438	88.751	.000
Safety training	6	.764	854.797	3.267	54.446	.000
Safety communication	5	.657	493.314	2.504	50.088	.000

*** Kaiser-Meyer-Olkin Index ≥ 0.50 shows that the sampling is adequate for Factor Analysis.
*** Variance percentage shows the total variance percentage for the components with eigenvalues ≥ 1.0

4.6 Descriptive Analysis

4.6.1 Safety Compliance

In this research, the safety compliance in Malaysia's manufacturing sector is measured by seven (7) items. Table 4.11 indicates that all items had a very high score value. The item that indicates the highest score is '*I carry out my work in a safe manner.*' (*M* = 4.40, SD = 0.808) and is followed by '*I follow correct safety procedures while carrying out my job.*' (*M* = 4.39, SD = 0.824), '*I use all necessary safety equipment to do my job.*' (*M* = 4.39, SD = 0.812), '*I ensure the highest levels of safety when I carry out my job.*' (*M* = 4.35, SD = 0.835), '*I follow correct safety rules while carrying out my job.*' (*M* = 4.35, SD = 0.806), '*It is always practical to follow all safety procedures while doing a job.*' (*M* = 4.33, SD = 0.852), and '*It is always practical to follow all safety rules while doing a job.*' (*M* = 4.33, SD = 0.837). Overall, the score of safety compliance (*M* = 4.36, SD = 0.765) is at the very high level.

Table 4.9
Safety compliance

No	Statements	SD	D	N	A	SA	Mean	SD
B1	I use all necessary safety equipment to do my job.	0 (0.0)	9 (4.2)	18 (8.4)	68 (31.6)	120 (55.8)	4.39	.812
B2	I carry out my work in a safe manner.	0 (0.0)	8 (3.7)	20 (9.3)	65 (30.2)	122 (56.7)	4.40	.808
B3	I follow correct safety rules while carrying out my job.	0 (0.0)	8 (3.7)	21 (9.8)	73 (34.0)	113 (52.6)	4.35	.806
B4	I follow correct safety procedures while carrying out my job.	0 (0.0)	9 (4.2)	20 (9.3)	64 (29.8)	122 (56.7)	4.39	.824
B5	I ensure the highest levels of safety when I carry out my job.	0 (0.0)	10 (4.7)	20 (9.3)	69 (32.1)	116 (54.0)	4.35	.835
B6	It is always practical to follow all safety rules while doing a job.	0 (0.0)	9 (4.2)	24 (11.2)	68 (31.6)	114 (53.0)	4.33	.837
B7	It is always practical to follow all safety procedures while doing a job.	0 (0.0)	10 (4.7)	24 (11.2)	67 (31.2)	114 (53.0)	4.33	.852
	Overall						**4.36**	**.765**

(Level: Very low = 1.00 – 1.80, Low = 1.81 – 2.60, Moderate = 2.61 – 3.40, High = 3.41 – 4.20, Very high = 4.21 - 5.00)
Note:
SD = Strongly Disagree
D = Disagree
N = Neutral
A = Agree
SA = Strongly Agree

4.6.2 Safety Attitude

In this research, the safety attitude in Malaysia's manufacturing sector is measured by five (5) items. Table 4.13 indicates that all items had a very high score value. The item that indicates the highest score is '*I feel that it is necessary to put effort to reduce incidents at the workplace.*' (*M* = 4.48, SD = 0.778) and is followed by '*I feel that it is important to always maintain safety.*' (*M* = 4.43, SD = 0.788), '*I feel that it is important to encourage others to use safe practices.*' (*M* = 4.42, SD = 0.844), '*I feel that it is important to promote safety programs.*' (*M* = 4.42, SD = 0.816), and '*I carry out my work in a safe manner.*' (*M* = 4.39, SD = 0.765). Overall, the score of safety attitude (*M* = 4.43, SD = 0.752) is at the very high level.

Table 4.10
Safety attitude

No	Statements	SD	D	N	A	SA	Mean	SD
C1	I feel that it is important to always maintain safety.	0 (0.0)	8 (3.7)	16 (7.4)	66 (30.7)	125 (58.1)	4.43	.788
C2	I carry out my work in a safe manner.	0 (0.0)	6 (2.8)	19 (8.8)	75 (34.9)	115 (53.5)	4.39	.765
C3	I feel that it is necessary to put effort to reduce incidents at the workplace.	0 (0.0)	7 (3.3)	17 (7.9)	56 (26.0)	135 (62.8)	4.48	.778
C4	I feel that it is important to encourage others to use safe practices.	1 (0.5)	9 (4.2)	17 (7.9)	59 (27.4)	129 (60.0)	4.42	.844
C5	I feel that it is important to promote safety programs.	0 (0.0)	10 (4.7)	15 (7.0)	64 (29.8)	126 (58.6)	4.42	.816
	Overall						**4.43**	**.752**

(Level: Very low = 1.00 – 1.80, Low = 1.81 – 2.60, Moderate = 2.61 – 3.40, High = 3.41 – 4.20, Very high = 4.21 - 5.00)
Note:
SD = Strongly Disagree
D = Disagree
N = Neutral
A = Agree
SA = Strongly Agree

4.6.3 Safety Training

Six (6) items are used in this study to measure safety training in Malaysia's manufacturing sector. To provide an accurate picture of safety training, two negative items that were previously recoded and expressed in negative form (*) were included in the analysis. One (1) item has a very high score, three (3) items have a high score, and two (2) items have a moderate score value, according to Table 4.15. The item that indicates the highest score is '*I understand how to do the job safely.*' (*M* = 4.25, SD = 0.892) and is followed by '*My supervisor ensures employees receive adequate safety training.*' (*M* = 4.17, SD = 0.907), '*Provide sufficient time for safety training.*' (*M* = 4.10, SD = 0.927), '*There is adequate safety training in my work group.*' (*M* = 4.10, SD = 0.896), '*Safety training is not delivered in a clear manner.**' (*M* = 3.40, SD = 1.317), and '*Employees do not receive safety training when there is a change in work assignments.**' (*M* = 3.24, SD = 1.236). Overall, the score of safety training (*M* = 3.88, SD = 0.661) is at the high level.

Table 4.11
Safety training

No	Statements	SD	D	NS	A	SA	Mean	SD
D1	There is adequate safety training in my work group.	5 (2.3)	4 (1.9)	34 (15.8)	93 (43.3)	79 (36.7)	4.10	.896
*D2	Employees do not receive safety training when there is a change in work assignments.	38 (17.7)	58 (27.0)	59 (27.4)	37 (17.2)	23 (10.7)	3.24	1.236
D3	Provide sufficient time for safety training.	5 (2.3)	6 (2.8)	34 (15.8)	87 (40.5)	83 (38.6)	4.10	.927
D4	My supervisor ensures employees receive adequate safety training.	6 (2.8)	4 (1.9)	25 (11.6)	93 (43.3)	87 (40.5)	4.17	.907
*D5	Safety training is not delivered in a clear manner.	49 (22.8)	70 (32.6)	41 (19.1)	27 (12.6)	28 (13.0)	3.40	1.317
D6	I understand how to do the job safely.	4 (1.9)	5 (2.3)	26 (12.1)	78 (36.3)	102 (47.4)	4.25	.892
	Overall						**3.88**	**.661**

*Negative item
(Level: Very low = 1.00 – 1.80, Low = 1.81 – 2.60, Moderate = 2.61 – 3.40, High = 3.41 – 4.20, Very high = 4.21 - 5.00)
Note:
SD = Strongly Disagree
D = Disagree
N = Neutral
A = Agree
SA = Strongly Agree

4.6.4 Safety Communication

In this research, the safety communication in Malaysia's manufacturing sector is measured by five (5) items. To provide a true picture of safety communication, two negative items that were previously recoded were expressed in negative form (*). Every item had a high score value, as shown in Table 4.17. The item that indicates the highest score is '*There is open communication about safety issues in this company.*' (*M* = 4.10, SD = 0.932) and is followed by '*There is sufficient opportunity to discuss and deal with safety issues in HSE meetings.*' (*M* = 4.05, SD = 0.973), '*When it comes to safety issues, management has an open-door approach.*' (*M* = 4.00, SD = 0.991), '*My company doesn't have a hazard reporting system where employees can communicate hazard information before incidents occur.**' (*M* = 3.87, SD = 1.225), and '*The target goals for safety performance in my company are not clear to the workers.**' (*M* = 3.59, SD = 1.231). Overall, the score of safety communication (*M* = 3.92, SD = 0.734) is at the high level.

Table 4.12
Safety communication

No	Statements	SD	D	NS	A	SA	Mean	SD
*E1	My company doesn't have a hazard reporting system where employees can communicate hazard information before incidents occur.	86 (40.0)	63 (29.3)	30 (14.0)	23 (10.7)	13 (6.0)	3.87	1.225
E2	When it comes to safety issues, management has an open-door approach.	6 (2.8)	8 (3.7)	45 (20.9)	77 (35.8)	79 (36.7)	4.00	.991

Table 4.12 (Continued)

No	Statements	SD	D	NS	A	SA	Mean	SD
E3	There is sufficient opportunity to discuss and deal with safety issues in HSE meetings.	6 (2.8)	7 (3.3)	39 (18.1)	81 (37.7)	82 (38.1)	4.05	.973
*E4	The target goals for safety performance in my company are not clear to the workers.	60 (27.9)	67 (31.2)	42 (19.5)	31 (14.4)	15 (7.0)	3.59	1.231
E5	There is open communication about safety issues in this company.	4 (1.9)	8 (3.7)	35 (16.3)	83 (38.6)	85 (39.5)	4.10	.932
	Overall						**3.92**	**.734**

*Negative item
(Level: Very low = 1.00 – 1.80, Low = 1.81 – 2.60, Moderate = 2.61 – 3.40, High = 3.41 – 4.20, Very high = 4.21 - 5.00)
Note:
SD = Strongly Disagree
D = Disagree
N = Neutral
A = Agree
SA = Strongly Agree

4.7 Correlation Analysis

Correlation analysis explains the relationship between the dependent variable and independent variables. Its show the direction, significance and strength of the variables of this study. The results of the Pearson Correlation are shown in Table 4.19.

Table 4.13
Pearson correlation coefficient analysis

	Safety compliance	**Safety attitude**	**Safety training**	**Safety communication**
Safety compliance	1	.714**	.576**	.565**
Safety attitude	.714**	1	.548**	.541**
Safety training	.576**	.548**	1	.746**
Safety communication	.565**	.541**	.746**	1

** $p < 0.01$

Table 4.19 on Pearson Correlation Coefficient matrix shows that safety attitude ($r = 0.714$, $p < 0.01$), safety training ($r = 0.576$, $p < 0.01$), and safety communication ($r = 0.565$, $p < 0.01$) are correlated positively with the safety compliance in Malaysia's manufacturing sector. Hence, the overall correlation analysis relationship with all variables is significant.

4.8 Multiple Regression

Safety attitude, safety training, and safety communication were the three key predictive variables used in the multiple linear regression analysis. With an R-square of 0.567, the safety compliance prediction model was found to be significant [$F(3, 211) = 92.054$, $p < 0.05$], explaining 56.7% of the variance in safety compliance.

Table 4.14
Coefficient analysis for safety compliance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig. P
		B	Std. Error	Beta		
1	(Constant)	.563	.235		2.389	.018
	Safety attitude	.551	.057	.541	9.709	.000
	Safety training	.199	.081	.172	2.444	.015
	Safety communication	.150	.073	.144	2.057	.041

a. Dependent Variable: Safety compliance

R-square = 0.567, F(3, 211) = 92.054, Sig. F = 0.000

The results indicate a significant correlation between safety compliance and safety attitude in Malaysia's manufacturing sector (ß = 0.541, t (211) = 9.709, p < 0.01). Additionally, a significant correlation (ß = 0.172, t (211) = 2.444, p < 0.05) exists between safety compliance and safety training in Malaysia's manufacturing sector. Additionally, a significant correlation (ß = 0.144, t (211) = 2.057, p < 0.05) exists between safety communication and safety compliance in Malaysia's manufacturing sector. Hypotheses one, two, and three are approved for this study based on the findings. The safety attitude has the highest beta value (0.541), indicating that it is the most significant factor influencing safety compliance in Malaysia's manufacturing sector. Safety communication (0.14) and safety training (0.12) come next. Therefore, there a summary of hypothesis:

H1 There is a significant positive relationship between safety attitude and safety compliance in the manufacturing industry.

Table 4.20 explains that safety attitude is correlated and has a significant relationship with safety compliance in Malaysia's manufacturing sector, ß = 0.541, *t* (211) = 9.709, p < 0.01. Therefore, H1 are accepted and it is validated that the relationship between safety atttitude and safety compliance in Malaysia's manufacturing sector is positively significant.

H2 There is a significant positive relationship between safety training and safety compliance in the manufacturing industry.

Table 4.20 explains that safety training is correlated and has a significant relationship with safety compliance in Malaysia's manufacturing sector, ß = 0.172, *t* (211) = 2.444, p < 0.05. Therefore, H2 are accepted and it is validated that the relationship between safety training and safety compliance in Malaysia's manufacturing sector is positively significant.

H3 There is a significant positive relationship between safety communication and safety compliance in the manufacturing industry

Table 4.20 explains that safety communication is correlated and has a significant relationship with safety compliance in Malaysia's manufacturing sector, ß = 0.144, *t* (211) = 2.057, p < 0.05. Therefore, H3 are accepted and it is validated that the relationship between safety communication and safety compliance in Malaysia's manufacturing sector is positively significant.

4.9 Conclusion

The results of the research data analysis conducted to meet the study's goals are presented in this chapter. Finally, each section presents the data analysis results in an understandable manner. In this study, three (3) of the hypotheses that were tested have been accepted.

Table 4.15
Conclusion of hypothesis

	Hypothesis	Result
H1	There is a significant positive relationship between safety attitude and safety compliance in the manufacturing industry.	Accepted
H2	There is a significant positive relationship between safety training and safety compliance in the manufacturing industry.	Accepted
H3	There is a significant positive relationship between safety communication and safety compliance in the manufacturing industry	Accepted

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter presents a comprehensive synthesis of the study's findings, contextualized within the theoretical framework and supported by relevant empirical literature. The relationships between the three independent variables are the main topic of discussion. (training, communication, and attitude towards safety) and the dependent variable, safety compliance. Furthermore, the chapter outlines the theoretical, practical, and policy implications, acknowledges limitations, and suggests directions for future research. The conclusions drawn herein offer both academic value and practical guidance for improving occupational safety in Malaysia's automotive manufacturing sector.

5.2 Discussion of findings

The main conclusions from Chapter 4 are thoroughly discussed in this chapter, which is organised according to the three research goals of the study. Individual relationships between the dependent variable, safety compliance, and the independent variables, safety attitude, safety training, and safety communication, are investigated. Based on the body of empirical research, each section analyses the findings in light of the Theory of Planned Behaviour (TPB) (Ajzen, 1991). Along with outlining study limitations and proposing future research directions, the chapter also addresses theoretical, practical, and policy implications.

5.2.1 Relationship Between Safety Attitude and Safety Compliance

The multiple regression analysis revealed a significant and strong positive relationship between safety attitude and safety compliance. This indicates that employees who hold positive beliefs and values regarding safety are significantly more likely to comply with established safety regulations and procedures. This result is in line with the Theory of Planned Behaviour, which holds that intention and subsequent behaviour are primarily determined by one's attitude towards behaviour. Workers are more likely to act appropriately if they view safety as crucial and value safety regulations.

It is also consistent with the findings of Griffin and Neal (2000) and Kao et al. (2019), who both highlighted the importance of safety attitude in predicting compliance behaviour. Similar findings were obtained in Malaysia by studies conducted by Ngah et al. (2022) and Saleh (2015), which showed that employees with strong safety orientations are more likely to act in a compliant manner, particularly in dangerous industries like manufacturing and utilities. By means of leadership reinforcement, peer role modelling, and awareness campaigns, company should concentrate on nurturing positive attitudes towards safety. Compliance behaviour may be greatly improved by incorporating safety values into daily activities and coordinating them with job responsibilities.

5.2.2 Relationship Between Safety Training and Safety Compliance

The study identified a statistically significant positive relationship between safety training and safety compliance. This confirms that workers who receive adequate, timely, and comprehensible training are more likely to adhere to safety protocols. In TPB, this corresponds to perceived behavioral control, which reflects the individual's confidence in their capability to execute a behavior. Comprehensive training improves this confidence by equipping workers with necessary knowledge and skills to manage risks.

The result supports the findings of Vinodkumar and Bhasi (2010), Wu et al. (2015), and Bayram et al. (2022), who identified safety training as a vital enabler of compliant behavior. In Malaysia, Aziz and Osman (2019) and Azhar et al. (2024) confirmed that mandatory safety training significantly improves compliance levels, particularly in manufacturing settings. Training materials ought to be ongoing, relevant, and hazard-specific. Particularly in dynamic environments like the automotive manufacturing industry, organisations should make sure that safety training is in line with changing operational demands.

5.2.3 Relationship Between Safety Communication and Safety Compliance

Safety communication and safety compliance were found to be significantly and favourably correlated. This suggests that regular safety briefings, open-door management policies, and hazard reporting systems are examples of effective

communication strategies that have a positive impact on employees' adherence to safety rules. From the TPB perspective, this is related to subjective norms, wherein employees' perceptions of organizational expectations; transmitted through communication on their shape and their behavioral intentions.

This result echoes the findings of Cigularov et al. (2010) and Haas and Yorio (2021), who highlighted the significance of communication in fostering a safety-conscious environment. Malaysian studies by Hassan et al. (2019) and Naji et al. (2022) similarly emphasized that consistent safety communication correlates with higher compliance, especially in industrial settings. Both top-down and bottom-up communication must be improved in automotive company. Supervisors should receive training on how to encourage employee feedback and deliver clear safety messages. Compliance can be strengthened by establishing regular forums for discussion, like toolbox meetings or safety committees.

5.3 Theoretical Implications

Theoretically, this study extends the application of the Theory of Planned Behavior to a new empirical domain; Malaysia's automotive manufacturing sector. By demonstrating that safety attitude, training, and communication significantly predict safety compliance, the research supports the construct validity of TPB in industrial settings. Furthermore, the study enriches occupational safety literature by mapping core TPB constructs onto practical safety behaviors, thereby offering a behaviorally

grounded explanation for compliance within organizational contexts. These insights contribute to a more nuanced understanding of how cognitive, normative, and control-related factors collectively drive safe conduct in high-risk industries.

5.4 Practical and Policy Implications

From a managerial standpoint, the findings suggest that safety interventions should address all three determinants identified in the model. Organizations must cultivate positive safety attitudes by promoting safety values through campaigns, peer modeling, and reinforcement mechanisms. Safety training programs should be comprehensive, hands-on, and continuously updated to match operational demands and emerging hazards. Moreover, communication strategies must be designed to foster transparency, feedback, and shared responsibility across all hierarchical levels.

Policy implications arise from the demonstrated influence of behavioral factors on compliance. Regulatory authorities such as DOSH could incorporate training effectiveness and communication audits into their inspection regimes. Mandating behavioral safety metrics alongside technical compliance checks would offer a more holistic approach to occupational safety regulation. Furthermore, national safety blueprints may benefit from incorporating TPB-based frameworks that emphasize employee perception and engagement in safety discourse.

5.5 Limitation of the study

While the study yields meaningful insights, several limitations must be acknowledged. Firstly, the research design was cross-sectional, which restricts causal inferences. Future longitudinal studies are required to establish temporal relationships between the variables. Secondly, the use of self-reported data may introduce common method bias, although efforts such as anonymous responses were employed to mitigate this risk.

Thirdly, the study focused exclusively on automotive manufacturing employees in Kedah, Malaysia, which may limit the generalizability of the findings to other regions or industries. Additionally, this study concentrated on three TPB-aligned predictors, potentially overlooking other influential factors such as safety leadership, job satisfaction, or organizational justice. These constraints offer avenues for future inquiry and refinement.

5.6 Recommendations for Future Research

Given the limitations, future studies should consider adopting longitudinal methodologies to track changes in safety behavior over time. Qualitative approaches such as interviews or ethnographic observation could provide deeper insights into the contextual dynamics influencing safety compliance. Expanding the scope to include different industries and geographic regions would also test the robustness and generalizability of the model. Researchers are further encouraged to explore additional variables such as safety climate, organizational trust, and leadership commitment to build more comprehensive predictive models of safety behavior.

5.7 Conclusion

In conclusion, this study has successfully demonstrated that safety attitude, training, and communication are significant predictors of safety compliance within Malaysia's automotive manufacturing sector. Framed within the Theory of Planned Behavior, the findings underscore the multifaceted nature of safety behavior and the importance of addressing cognitive, educational, and communicative dimensions. The theoretical contributions, coupled with practical and policy relevance, position this study as a valuable addition to the field of occupational safety. By promoting evidence-based interventions grounded in behavioral science, organizations and regulators can work collaboratively toward safer workplaces and enhanced industrial performance.

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Appendix A

Survey on Examining Safety Attitudes, Safety Training and Safety Communication as Determinants of Safety Compliance in Malaysia's Manufacturing Sector

Dear Participants,

I am currently pursuing a **Master's in Occupational Safety and Health (OSH) at Universiti Utara Malaysia (UUM)**, and as part of my research, I am conducting this study to examine how **safety attitudes, safety training, and safety communication** influence safety compliance in Malaysia's manufacturing sector.

The objective of this study is to identify key factors that contribute to workplace safety behaviour and provide insights for improving safety policies, training programs, and communication strategies in the industry. Your participation will greatly help in understanding the current safety culture and compliance levels in the sector.

This survey is **anonymous**, and all data collected will be used solely for research and academic purposes. Your honest responses are invaluable in ensuring the accuracy and effectiveness of the study.

The survey will take approximately **10 minutes** to complete.

If you have any questions or concerns, please feel free to contact me at **013 - 5643013 (Ahmad Norhafizi Muhamad Radzi).**

Thank you for your time and participation! Your input is greatly appreciated.

Para peserta yang dihormati,

*Saya sedang melanjutkan pengajian dalam **Ijazah Sarjana Keselamatan dan Kesihatan Pekerjaan (OSH) di Universiti Utara Malaysia (UUM)**, dan sebagai sebahagian daripada penyelidikan saya, saya menjalankan kajian ini bagi menilai bagaimana **sikap keselamatan, latihan keselamatan, dan komunikasi keselamatan** mempengaruhi pematuhan keselamatan di sektor pembuatan di Malaysia.*

Objektif kajian ini adalah untuk mengenal pasti faktor utama yang menyumbang kepada tingkah laku keselamatan di tempat kerja serta memberikan cadangan bagi memperbaiki dasar keselamatan, latihan, dan komunikasi dalam industri ini. Penyertaan anda sangat penting bagi memahami budaya keselamatan dan tahap pematuhan semasa dalam sektor ini.

***Soal selidik ini adalah sulit dan tanpa nama**. Semua maklumat yang dikumpul hanya akan digunakan untuk tujuan akademik dan penyelidikan sahaja.*

*Soal selidik ini akan mengambil masa kira-kira **10 minit** untuk disiapkan.*

Sekiranya anda mempunyai sebarang pertanyaan, sila hubungi saya di **013 - 5643013 (Ahmad Norhafizi Muhamad Radzi).**

Terima kasih atas masa dan penyertaan anda!

Part A: Demographic Details

This section gathers general information to help categorize responses and analyse safety perceptions across different roles and experience levels in the manufacturing sector.

Bahagian ini mengumpul maklumat umum bagi mengkategorikan responden dan menganalisis persepsi keselamatan berdasarkan peranan dan pengalaman kerja di dalam sektor pembuatan.

1. Age / Umur

Below 25	25 – 34	35 – 44	45 – 54	Above 55

2. Gender / Jantina

Male / Lelaki	Female / Perempuan

3. Job Position / Jawatan

Operator / Technician / Leader	Asst Engineer / Supervisor / Officer	Engineer / Executive	Senior Engineer / Senior Executive	Asst Manager / Manager

4. Years of Experience in the Manufacturing Industry / *Pengalaman Bekerja di dalam Industri Pembuatan*

Less than 1 year	1 – 3 years	4 – 6 years	7 – 10 years	More than 10 years

Part B: Safety Compliance / *Pematuhan Keselamatan*

For every item, please choose your opinion based on the scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Untuk setiap item, sila pilih pendapat anda berdasarkan skala berikut: 1 = Sangat Tidak Setuju, 2 = Tidak Setuju, 3 = Neutral, 4 = Setuju, 5 = Sangat Setuju

Safety Compliance - Performing tasks safely to maintain workplace safety, including PPE usage and adherence to rules

Pematuhan Keselamatan – Melaksanakan tugas dengan selamat untuk mengekalkan keselamatan di tempat kerja, termasuk penggunaan Peralatan Perlindungan Diri (PPE) dan pematuhan kepada peraturan.

Question / Soalan	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1. I use all necessary safety equipment to do my job. *Saya menggunakan semua peralatan keselamatan yang diperlukan untuk melakukan kerja saya.*					
2. I carry out my work in a safe manner. *Saya menjalankan kerja saya dengan cara yang selamat.*					
3. I follow correct safety rules while carrying out my job. *Saya mengikuti peraturan yang betul semasa menjalankan kerja saya.*					
4. I follow correct safety procedures while carrying out my job. *Saya mengikuti prosedur keselamatan yang betul semasa menjalankan kerja saya.*					

5. I ensure the highest levels of safety when I carry out my job. *Saya memastikan tahap keselamatan tertinggi semasa menjalankan kerja saya.*					
6. It is always practical to follow all safety rules while doing a job. *Ia sentiasa praktikal untuk mengikuti semua peraturan keselamatan semasa melakukan kerja.*					
7. It is always practical to follow all safety procedures while doing a job. *Ia sentiasa praktikal untuk mengikuti semua prosedur keselamatan semasa melakukan kerja.*					

Part C: Safety Attitude

For every item, please choose your opinion based on the scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Untuk setiap item, sila pilih pendapat anda berdasarkan skala berikut: 1 = Sangat Tidak Setuju, 2 = Tidak Setuju, 3 = Neutral, 4 = Setuju, 5 = Sangat Setuju

Safety Attitude - Employees' beliefs, feelings, and behaviours toward safety practices

Sikap Keselamatan – Kepercayaan, perasaan, dan tingkah laku pekerja terhadap amalan keselamatan.

Question / Soalan	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1. I feel that it is important to always maintain safety. *Saya merasakan ianya penting untuk mengekalkan keselamatan setiap masa.*					
2. I carry out my work in a safe manner. *Saya menjalankan kerja saya dengan cara yang selamat.*					

3. I feel that it is necessary to put effort to reduce incidents at the workplace. *Saya merasakan bahawa adalah perlu untuk berusaha mengurangkan insiden di tempat kerja.*					
4. I feel that it is important to encourage others to use safe practices. *Saya merasakan bahawa adalah penting untuk menggalakkan orang lain menggunakan amalan yang selamat.*					
5. I feel that it is important to promote safety programs. *Saya merasakan bahawa adalah penting untuk mempromosikan program keselamatan.*					

Part D: Safety Training

For every item, please choose your opinion based on the scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Untuk setiap item, sila pilih pendapat anda berdasarkan skala berikut: 1 = Sangat Tidak Setuju, 2 = Tidak Setuju, 3 = Neutral, 4 = Setuju, 5 = Sangat Setuju

Safety Training - Enhancing employees' knowledge and skills for safe practices and improved productivity

Latihan Keselamatan – Meningkatkan pengetahuan dan kemahiran pekerja untuk mengamalkan keselamatan dan meningkatkan produktiviti.

Question / Soalan	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1. There is adequate safety training in my work group. *Terdapat latihan keselamatan yang mencukupi dalam kumpulan kerja saya.*					

2. Employees do not receive safety training when there is a change in work assignments. *Pekerja tidak menerima latihan keselamatan apabila terdapat perubahan dalam tugas kerja.*					
3. Provide sufficient time for safety training. *Menyediakan masa yang mencukupi untuk 83atihan keselamatan.*					
4. My supervisor ensures employees receive adequate safety training. *Penyelia saya memastikan pekerja menerima 83atihan keselamatan yang mencukupi.*					
5. Safety training is not delivered in a clear manner. *Latihan keselamatan tidak disampaikan dengan cara yang jelas.*					
6. I understand how to do the job safely. *Saya memahami cara untuk melakukan kerja dengan selamat.*					

Part E: Safety Communication

For every item, please choose your opinion based on the scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Untuk setiap item, sila pilih pendapat anda berdasarkan skala berikut: 1 = Sangat Tidak Setuju, 2 = Tidak Setuju, 3 = Neutral, 4 = Setuju, 5 = Sangat Setuju

Safety Communication - Exchanging safety-related information to influence staff behaviour and attitudes

Komunikasi Keselamatan – Pertukaran maklumat berkaitan keselamatan untuk mempengaruhi tingkah laku dan sikap pekerja.

Question / Soalan	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1. My company doesn't have a hazard reporting system where employees can communicate hazard information before incidents occur. *Syarikat saya tidak mempunyai sistem pelaporan bahaya di mana pekerja boleh menyampaikan maklumat bahaya sebelum kejadian berlaku.*					
2. When it comes to safety issues, management has an open-door approach. *Apabila berkenaan dengan isu keselamatan, pihak pengurusan mempunyai pendekatan pintu terbuka.*					
3. There is sufficient opportunity to discuss and deal with safety issues in HSE meetings. *Terdapat peluang yang mencukupi untuk membincangkan dan menangani isu keselamatan dalam mesyuarat HSE.*					
4. The target goals for safety performance in my company are not clear to the workers. *Matlamat sasaran untuk prestasi keselamatan dalam syarikat saya tidak jelas kepada pekerja.*					

5. There is open communication about safety issues in this company. *Terdapat komunikasi terbuka mengenai isu keselamatan di 85yarikat ini.*					