FACTORS CONTRIBUTE TOWARDS SAFETY AWARENESS AMONG STUDENTS IN TEACHING LABORATORIES AT NORTHERN PENINSULAR OF MALAYSIA PUBLIC UNIVERSITY

BY

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ABSTRACT

The purpose of this study is to determine the relationship of safety commitment, management commitment and safety rules and procedure towards safety awareness among student in teaching laboratories at public university. The independent variables are safety commitment, management commitment, safety rules and procedures while the dependent variable is safety awareness. A total of 250 participated in this study by answering survey questionnaire. Data was collected through 55 items questionnaires on a five-point Likert scales and another 7 items were demographic questions. Data was analyzed using descriptive statistics (mean and standard deviation) and inferential statistics (correlation and multiple regressions). The findings from this study showed that safety commitment, management commitment, safety rules and procedure have significant relationship with safety awareness. Based on multiple regression result, among independent variables, safety commitment shows the highest level of regression variance accounted for safety awareness variables which is 39% of the factors studied. The most influential factor is safety commitment, followed by management commitment and safety rules and procedure. The recommendation is students should be more responsible and commit to comply the regulation of Occupational Safety and Health (OSH) in the area of teaching laboratories in the public university. Furthermore, faculty management should encourage student participation in programme of OSH (Occupational Safety and Health) organized by the faculty of management is important.

Keywords: safety commitment, management commitment, safety rules and procedures, safety knowledge, safety motivation

ABSTRAK

Tujuan kajian ini adalah untuk mengetahui hubungan komitmen keselamatan, komitmen pengurusan dan peraturan keselamatan serta prosedur terhadap kesedaran keselamatan dalam kalangan pelajar di makmal pengajaran di universiti awam. Pemboleh ubah bebas adalah komitmen keselamatan, komitmen pengurusan, peraturan keselamatan dan prosedur sementara pemboleh ubah bergantung adalah kesedaran keselamatan. Sebanyak 250 orang mengambil bahagian dalam kajian ini dengan menjawab soal selidik tinjauan. Data dikumpulkan menerusi 55 item soal selidik yang menggunakan skala Likert lima mata dan tujuh item lagi adalah soalan demografi. Data dianalisis menggunakan statistik deskriptif (min dan sisihan piawai) dan statistik inferensi (korelasi dan regresi berganda). Dapatan dari kajian ini menunjukkan bahawa komitmen keselamatan, komitmen pengurusan, peraturan dan prosedur keselamatan memiliki hubungan yang signifikan dengan kesadaran keselamatan. Berdasarkan hasil regresi berganda menunjukkan bahawa pemboleh ubah bebas yang menyumbang sebanyak 39% ke atas kesedaran keselamatan. Pemboleh ubah yang paling berpengaruh adalah, komitmen keselamatan, diikuti dengan komitmen pengurusan dan peraturan dan prosedur keselamatan. Saranan yang harus diambil ialah pelajar harus lebih bertanggungjawab dalam mempraktikkan peraturan Keselamatan dan Kesihatan Pekerjaan semasa menggunakan makmal pengajaran di universiti awam. Selain itu, pihak pengurusan fakulti perlu menggalakkan pelajar untuk mengambil bahagian dalam mana-mana program Keselamatan dan Kesihatan Pekerjaan yang dianjurkan oleh fakulti.

Kata kunci: komitment keselamatan, komitmen pengurusan, peraturan keselamatan dan prosedur, pengetahuan keselamatan, motivasi keselamatan

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CHAPTER 1

INTRODUCTION

This chapter describes the background of the study and critical discussion on the problem statement related current issues. The research questions, research objectives, scope of the study, significance of the study and definition of key terms for this study were also mentioned.

1.1 Background of the Study

The primary goal of Occupational Safety and Health (OSH) is to protect the safety, health and well-being of workers in the workplace. Alli (2008) describes Occupational Safety and Health (OSH) as a science of the anticipation, recognition, assessment and control of creating hazards in the workplaces that may harm the health and well-being of employees. Besides that, Ganesh and Krishnan (2016) discovered, safety practices it is an essential element of an organisation for the growth of the safety performance and morale of employees, and financial implications of the organisation (Ganesh & Krishnan 2016). A safe working environment created the safety and health of employees, which benefits organisation's productivity and economic productivity of a country (de Kok, Deijl, & Veldhuis-Van Essen, 2013) whereas unsafe working conditions are likely to have an impact on employees.

According to Fernández-Muñiz, Montes-Peón and Vázquez-Ordás (2012), occupational accidents affect management's reputation and competitiveness which accidents usually occurred when a person at work in negligence and lack or knowledge of proper practice at the workplace. Hofmann, Burke and Zohar (2017) mentioned that there are many factors which are safety procedure and rules, management commitment, and safety commitment that contributes towards safety and health issues at the workplace. Those findings indicate that occupational accidents at the workplace is an essential issue that need to be managed properly. Prevention and strategic measures implementation aim to reduce unsafe condition is a crucial role of employers in accident prevention as mentioned by (Robson, Clarke, Cullen, Bielecky, Severin, Bigelow & Mahood, Q (2007).) in his studies. Employers are accountable to provide a safe and healthy workplace to the employees where a safety and health management system is essential to foster a safe work environment.

According to Vinodkumar and Bhasi (2010), implementation of policies, strategies, procedures and activities for employees' safety reflects the safety management practices at the workplace. Safety management practices at the workplace benefit the organisation in improving safe working environment and influence the employees' safety behaviour. Safety management practices refer to six elements which are management commitment, safety training, employee involvement, safety rules and procedures, safety communication and feedback and safety promotion policies (Vinodkumar and Bhasi, 2010). Occupational safety and health management system (OSHMS) has generated a systematic, coordinated and effective approach to manage safety and health issues at the workplace. OSHMS promotes organisation to constantly identify safety and health risks, reduce possible accidents, continuous safety and health improvement and compliance to

law and legislation (ILO, 2011) as well for better organisation competiveness, productivity and welfare of the employees (Vinodkumar & Bhasi, 2010). However, OSHMS effectiveness in an organisation required full commitment from all parties including employers and employees.

Based on the study of Vinodkumar and Bhasi (2010), safety commitment, management commitment and safety rules and procedure play the crucial roles for accident prevention. Similarly, Griffin and Neal (2000) stated that safety knowledge and safety motivation were essential elements to increase safety performance. Furthermore, safety awareness among employees also play the main indicator for safety practices (Wu, Liu & Lu, 2007), safety climate and safety behaviour (Lu & Yang, 2011). However, the discussion on safety management practices and organizational safety in laboratory still not widely published. According Karim and Choe, (2000) there were many accidents occurred in laboratory during running the practical works due to poor attitude towards safety. Thus, this study focuses on safety awareness, safety commitment, management commitment, safety rules and procedure to generate alternative solution to prevent accident happen in the laboratories.In other words, to improve level of safety behaviour and attitude towards safety. Outcome of this study are expected to improve safety policy and procedures for laboratory setting environment

1.2 Problem statement

Teaching laboratories plays a crucial role in learning process for undergraduate students. Most of education institution has provided a high-quality teaching laboratory for conducting research using high risk chemical substances. Laboratories usually were occupied with various equipment that are exposed to various hazards (Copeland 2018).

Laboratories for teaching and research in an educational setting need to be a safe environment for the students. The laboratory setting can be a hazardous place to work since it mainly endows with microbial, chemical, glassware, equipment, radiation and explosion hazards.

Therefore the laboratory user always exposed various hazards during practical activities.For a long period as a result, the person's health and safety may be severely threatened unless adequate preventive measures are not taken (Zaveri & Karia, 2012). Poor laboratory safety practices can cause laboratory accidents and severe injuries (Karim & Chloe,2000). Laboratory staffs and all students should obey rules and procedures during performing laboratory works to prevent accidents or injuries (Zubir et al., 2016). According to Anuar et al., (2008) and Withanage and Priyadarsh (2017), there is a significant increase in laboratory accidents due to lack of awareness and information in safety practices, and it became a major factor in contributing to accidents occurred at the laboratory.

Study by Karim and Choe (2000) revealed that many accident occurred due to lack of safety knowledge among health sciences students.Similarly, nearly 27% of the injuries misuse of chemical.Most of the laboratory user have to deal with biological agents, chemical agents and clinical specimens such as sputums, urine, blood and also other body fluids. Thus, they need to prepare their knowledge of safety procedures and precautions in the laboratory itself, specifically for undergraduate students who are running the practical work at the teaching laboratories

Safety awareness towards hazards in the laboratory environment such as chemicals, radiation, fire and waste disposal were crucial. UK Statistic shown that, the explosion and fire related to work account for more than 5000 burn injuries per year (Mian et al, 2011). Moreover, the study also stated that laboratory workers attitudes and behaviour towards safety precautions were very important. Especially, laboratory user at university is the place where undergraduate students first develop their laboratory practices and the practice, they learnt from the laboratory may carry throughout their career.

Based on study by Withanage and Priyadarshani (2017), through system of occupational safety and health management practices including continuous education, safety training and prevention accident for improving precautions among workers or staff in the university. Furthermore, to increase the safety commitment through safety induction and safety procedures should be made mandatory during registration. Safe environment among the student during running practical in the laboratory within the university setting is not only important to the administration, but also in the demand of parents (Dyer & Andreasen, 1999). Safety knowledge can be obtained by facilitating the students activity during safety training and briefing, laboratory monitoring and safety training presentation (Alaimo et al., 2010). Laboratories teaching play a crucial role in the learning process for science students as it usually forms a significant portion of their syllabus (Karim & Chloe, 2000)

Based on the study of Sallehuddin, (2013), there are several cases of accidents that occur in engineering laboratories in Malaysian university. The study stated that out of 12 workshops or civil engineering laboratory at Universiti Tun Hussein Onn Malaysia (UTHM) , there are two workshops which accident occurred. Based on the findings of the study, it was found that the accident causes shortness of breath due to inhalation of

toxic gases, wounds from objects sharp, burns due to burns, eye injuries, electric shock, and damage of hearing.

In year 2004, a total of 36 accident cases were reported to the Unit Keselamatan dan Kesihatan Pekerjaan (UKKP) at Universiti Sains Malaysia (USM) .The reported cases has been investigated in all three campuses which are 27 cases in the main campus, four cases in engineering campus and five cases on health campus. Most of the accidents reported was minor injuries which 5 cases out 27 cases that occurred on the main campus, there were five cases takes place in a workshop or engineering laboratories (Sallehuddin, 2013)

In 2016, an undergraduate student from UCSI University collided with a hydrochloric acid (HCl) bottle while conducting an experiment in science laboratory causing three students suffered from shortness of breath and one student suffered injuries (Abdullah, 2018).Other than that , in year 2013 ,there is an occurrence of fire reported at applied science laboratory in Universiti Teknologi MARA, Malaysia was caused by an explosion of the hot plate stirrer while students were conducting the experiment in science laboratory.

Therefore, based on the statistics of laboratory accidents in several public universities, its indicates that there are many issue on safety management in the laboratory especially from the aspect of safety awareness, safety commitment, management commitment and safety rule and procedures. These elements directly and indirect related towards attitudes, knowledge and skills of the students, Without a high awareness of safety practices can cause accidents and injuries as well as loss of life. Thus, a study to examine towards laboratory safety awareness in the teaching laboratories area is crucial. (Sallehuddin, 2013)

This study was conducted due to thin discussion on safety practices in teaching laboratory (Khairul ,2018) specifically involve science university student. This study was involved respondent who were the undergraduate students in the Faculty of Applied Science in one of the public university in Northern Peninsular of Malaysia. This study also investigates how safety commitment, management commitment, safety rules and procedure practices contribute to safety awareness among students at teaching laboratories in the public university.

1.3 Research question

This research was carried out to answer the following research question regarding the safety management practices and safety awareness among students in teaching laboratories in public university

i.What is the level of safety commitment, management commitment, safety rules and procedures among students in teaching laboratories at a public university in Northern University of Malaysia?

ii. What is the level of safety awareness among students in teaching laboratories at public university in Northern Peninsular of Malaysia?

iii. Are there any associations between safety commitment, management commitment and safety rules and procedures towards safety awareness among students in teaching laboratories at public university in Northern Peninsular of Malaysia?

1.4 Research objectives

The study was conducted to determine the relationship of safety commitment, management commitment and safety rules and procedure towards safety awareness among student in teaching laboratories at public university. In order to achieve the main objective, a specific aim of this study are as follows:

i. To examine the level of safety commitment, management commitment and safety rules and procedure among students in teaching laboratories at a public university in Northern Peninsular of Malaysia.

ii. To investigate the level of safety awareness among students in teaching laboratories at public university in Northern Peninsular of Malaysia.

iii. To determine the relationship between safety commitment, management commitment and safety rules and procedure towards safety awareness among students in teaching laboratories at public university in Northern Peninsular of Malaysia.

1.5 Research significance

Significance of this study can be viewed both from a practical and theoretical aspect. Practically, the outcome of this study benefits the Faculty of Applied Science in the university X at Northern Peninsular of Malaysia. This study contributes the faculty management, employers, and students to identify lack of induction on Occupational Safety and Health programs for new university students. The faculty can provide guidelines, build awareness or outline an action plan as a preventive measure to improve the productivity that may lead to increase efficiency, accidents reduction and effective job performance and motivation.

Furthermore, this study contributes to improve current knowledge on safety and health information for the faculty. Besides that, the outcome of this study also contributes to general body of knowledge on safety awareness, safety knowledge and safety motivation. Future researchers, government and policy makers can use findings to emphasise the issue of safety management especially in laboratories.

1.6 Scope of study

This research was done on undergraduate students in Faculty of Applied Science of the public university in the Northern Peninsular of Malaysia. The research population of this study focused on students who are using science laboratories. This includes students from the first semester until sixth semester.

This study involved three independent variables which are safety commitment, management commitment and safety rules and procedure. It also covered one dependent variables (safety awareness) consisting of two dimensions namely safety knowledge and safety motivation. These variables are important to discover to ensure that student are safe during teaching and learning in laboratories.

1.7 Definition of key terms

(a) Occupational Safety and Health (OSH)

Occupational safety and health aim on prevention of injuries and diseases that related to work. In other word, OSH protects and promotes safety and health of employee in order to improve working environment (ILO, 2011).

(b) Employees Safety Commitment

According to Copeland (2018), safety commitment refers to a safety aspect that can been seen as everyone's concern for being proactive in protecting safety in the organization.

(c) Management Commitment

Management commitment implies direct involvement of the employer in safety related matters at the workplace, which consequently leads to the total reduction in accident and injury rates (Hofmann & Stetzer, 1996; Yule et al., 2006).

(d) Safety Management

Safety management systems are integrated mechanisms in organisations designed to control the risks that can affect workers' health and safety, and at the same time to ensure the firm can easily comply with the relevant legislation. Safety management influences employees' perceptions of organisational safety through the extent of organisational support that cares for them (Murphy, Sturdivant, & Gershon, 1993)

(e) Safety Rules and Procedure

Safety rules and procedure act as a guideline for employees to work safely at the workplace which prevent accidents from happen and reduction in accident rates (Cheyne & Cox, 2000; Mearns et al., 2003).

(f) Safety Awareness

Safety awareness is mindful of the surroundings, avoiding potentially dangerous circumstances, using common sense and trusting instincts, according to the Department of Public Safety (2020).

(g) Safety Knowledge

This study operationalizes safety knowledge as employee knowledge about practices of safety as well as procedures (Griffin & Neal, 2000).

(h) Safety Motivation

Encouragement of good values in terms of safety issues to the employees (Che Hassan, 2007)

1.8 Organisation of the Thesis

Chapter 1 serves as an overview of the study by offering a brief understanding of the research context, problem statement, research questions and goals, scope and limitation of the analysis, followed by a definition of the main words used in the report. The following Chapter 2, addresses and includes a literature review of the studies to expedite more comprehension. Subsequently, the methodology of the analysis, the research process and the design, the development of the hypotheses for this research as well as the analytical technique and statistical methods used to analyse the data collected are listed in Chapter 3. The detailed findings and interpretation of the data collected were addressed in Chapter 4, accompanied by discussion and a review of the recommendations in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the literature on occupational safety and health specifically focusing on the safety commitment, management commitment, safety rules and procedures and safety awareness. The discussion focused on issues relevant in higher education institutions and the students learning environment.

2.1 Overview of Employees Safety Commitment

According to Copeland (2018), safety commitment means a safety aspect that has been seen as everyone's concern for being proactive in protecting safety in the organisation. Previous organisational studies revealed that various areas had been identified to explain the concept of employee's commitment (Abd Aziz, 2008). It refers to an employee's consistent behaviour (Becker, 1960), employees' involvement (Brown, 1996), employee's identification (Hall, Schneider, & Nygren, 1970), organisational citizen membership (Becker & Randall, 1995), employer and employee binding (Allen & Meyer, 1990), employee's compliance, and involvement (Abd Aziz, 2008).

2.1.1 Previous research on Employees Safety Commitment

Study by Díaz and Cabrera, (1997) stated that, employee commitment in safety issue will be reflected in employees attitude and behavior. Hence, there is a low accident or injury rates are reported when there is safety commitment and safety training in the organisation

This in line with the study of Cheyne, Cox & Tomás, (1998) which state that manager's commitment also have a main role to encourage the employees perception upon safety practices. The concept of employee's commitment at the workplace plays a crucial role in measuring the organisational and individual behaviour outcomes (Cooper, 1988). It is also widely utilized and has received increasing attention in occupational safety. Employees' safety commitment is a crucial element in safety performance and accident prevention programmes (Zohar, 1980; Cooper. 1998, Abd Aziz, 2008; Salleh, 2010). Safety commitment also has a crucial effect on employee's safety performance reflected in the employees' attitude and behaviour in the workplace (Abd Aziz, 2008; Salleh, 2010) Prior to this employees' perceptions of management's commitment to safety, of fellow employees participation in safety, and of the effectiveness of education and training efforts on the part of management have demonstrated a positive impact on safety outcomes (Bailey, 1997). The concept of employee's commitment at the workplace plays a crucial role in measuring the organisational and individual behaviour outcomes (Cooper, 1988; Goetsch, 2015). It is also widely utilised and has received increasing attention in occupational safety. Employees' safety commitment is a crucial element in safety performance and accident prevention programmes (Zohar, 1980; Cooper. 1998, Abd Aziz, 2008; Salleh, 2010; Goetsch 2015). Previous organisational studies revealed that various areas had been identified to explain the concept of employee's commitment (Abd Aziz, 2008). It refers to an employee's consistent behaviour (Becker, 1960), employees' involvement (Brown, 1996), employee's identification (Hall, Schneider, & Nygren, 1970), organisational citizen membership (Becker & Randall, 1995), employer and employee binding (Allen & Meyer, 1990), employee's compliance, and involvement (Abd Aziz, 2008). Meanwhile, a study by Clarke (1998, 1999) on railway employees found that safety commitment influences the employee's perception on safety

performance. Manager commitment and action play a crucial role in improving the employee's attitude toward safety and safety performance (Reason, 1990). Employer and employees safety commitment is the key element for safety performance in the organisation (Cox & Flin, 1998) and involves personal decision-making process (Cooper, 1998). Safety managers need to be focused on the employers' safety commitment in order to enhance their individual safety performance (Goetsch, 2015). Employees with high safety commitment would enhance safety performance and generate rewards in terms of quality and profitability (Cooper, 1998).

On the purpose of this study, employee safety commitment measured by student's safety commitment. This is because the setting of this study focuses among student who are practicing safety in teaching laboratories in public university.

2.2 Overview of Management Commitment

Management commitment implies direct involvement of the employer in safety related matters at the workplace, which consequently leads to the total reduction in accident and injury rates (Hofmann & Stetzer, 1996; Yule et al., 2006). Management commitment to the area of safety refers to the managers demonstrating value of and commitment to workers' physical safety, which is known as leading indicator of worker's safety behaviors, and injuries in a wide variety of jobs (Zohar & Luri,. 2003, 2010; Zohar, 2000). Other than that, teamwork in the management is also related to the management commitment regards of safety of the workers in the ogranisation (Nahrgang, Morgeson, & Hofmann, 2011). Management commitment to safety is a specific and critical component of safety climate, which refers to workers' perceptions of the degree to which their managers value and support safe working and are dedicated to workers' safety. Hence the management commitment in one of the organization will predicts the safety

behavior of the workers and the rate of incident or injury in the workplace. (Zohar, & Polachek, 2014). Management commitment to be defined as having a committed management team, all members of the management team should be unified in their way of thinking about safety and incorporate it into the decisions that are made on a daily basis.

2.2.1 Previous research on Management Commitment

Management commitment to safety and health related issues is an important component of safety management practices to ensure a safe working environment for the employees. Management commitment factors towards realisation of safety compliance in workplace can be achieved with constituted joint safety and health committees at site and department level, accountability of managers, engagement of safety and health representatives, dialogue among local area and line managers, access of safety and health representative to the employees, involvement of representative in reporting and monitoring OSH, and access to training for health & safety representative. This commitment can be apparent through job training programmes, consideration of safety in job design, and management participation in safety committee and review of the pace of work.

Employer should demonstrate their commitment through strong realisation of safety compliance to safety requirements to ensure that everyone in the organisation is certain about their safety and health responsibilities. Safety training is essential to educate employees on potential accidents, how to prevent accidents and how to identify the potential hazards involved in their work. Before the commencement of work, new employee must attend the safety training. Behavioural-based study should be conducted by top management representative. Individual representative has been appointed for the

particular work, the representative will observe the routine work of the employee at work place and will note his positive and negative points, representative will discuss the positive points with employee

Safety training stated by Vinodkumar and Bhasi (2010) as an essential safety management practices that predict safety knowledge, safety motivation, safety compliance and safety participation. Management commitment to safety and health related issues is important component of safety management practices to ensure safe working environment to the employees. Based on the study by Cheyne and Cox, (2000) in the area of offshore working industries, management commitment plays essential roles to the priority in safety issue in the offshore industries organisation. These results give some indications of how safety culture can perceive by those working environments.

In the other hand, a study by O'Toole (2002) , mention about the important of the roles of manager which should be responsible to the health and safety of their employees in the organisation Hence, the management should identify the risk and hazards in the workplace or organisation and to allocate the resources to ensure safety of their employees and to ensure the lowest possible number and severity of injuries experienced by employees.

The manager or management need to conserve and allocate resources to commit in health and safety for their employees. In this research, the researcher examines the perception of workers towards safety in organization , identify and suggest high level or risk-control of effectiveness, identify using survey to the workers on the effectivesness of safety programme and also to identify general factors that influence employees perception of company supervisor/management safety process. The research also suggest the top management involve in the safety issues and safety programmes, it will reduce the injury rates and medical cost for hospital bill. Other than that, based on the study of Cohen

(1977) the researcher proposed that the lower injury rate of the employees rely mostly in management decision, involvement and commitment. These include a strong management knowledge in the safety management process.

Furthermore, research found that good communication between employees and supervisor towards safety issues will give good feedback on safety issues, and proper safety training will reduce the factor of injury rates among employees. This literature suggests that there is a connection between management's approach to safety, the employees perception of management, and accident/injury rates. Besides, it has been suggested that management's commitment and leadership with safety issues is a significant determinant in obtaining necessary employee commitment to safety. Based on the study by Vredenbugh (2002) within hospital organization and environment, he stated that management commitment, workers participation, safety training to the workers, hiring practices, rewards systems and communicaton and feedback between supervisor and workers as one of the components in safety management practices. Based on the study of Zohar (1980) found that management commitment affect major roles in the success of safety programmes which include management commitment, communication safety and feedback of workers on job training programmes, management participation in safety committee, consideration of safety in job design, and review of the pace works.

Hofmann and Stetzer (1996) in their study stated that when a supervisor never take part or participate in any decision or perceive that safety is unimportant, the organisation will not place a strong emphasis on safety. The motivation to perform a job in a safe manner is a function of both the individual's concern with safety as well as management's expressed concern for safety. Safety concerns must result in an observable activity on the part of management.

Next, Zohar (1980) in his study on investigation of safety climate found that management commitment to safety is a major factor affecting the success of an organisation safety programme. Cheyne and Cox (2000) mention about roles play of the manager and management commitment in health and safety issues in offshore environment, the management have to give priority on safety issues to reduce accident in the organisation and workplace. The culture for safety within the operating company was described, in terms of employees' attitudes and perceptions, by six factors which is management commitment, the personal need for protection, appreciation of risk, attribution of blame, control and supportive environment. Contractor employees were found to have a higher appreciation of risk and a higher personal need for safety compared with the operating company employees. Similarly, offshore workers in general had a higher appreciation of risk, greater personal need for safety and were more convinced of management's commitment to safety than those working onshore (Hofmann & Stetzer, 1996). When the manager or supervisor has shown their interest in safety among the workers and the management commitment will influence the employees' behaviour to work safely at the workplace. These can reduce injury rates and accidents as suggested by the study of Zin and Ismail (2012). They discovered that the top management should make safety issues as the priority as this can lead to safety goals in one's organisation. Together with, employer should demonstrate their commitment through strong realisation of safety compliance to safety requirements and ensure that everyone in the organisation is certain about their safety and health responsibilities.

2.3 Safety Rules & Procedure

2.3.1 Overview of Safety Rules & Procedure

Occupational Health and Safety Management Systems is part of the overall management system that facilitates the management of the Occupational Safety and Health risks associated with the business of the organisation. This includes the organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the organisation's Occupational Safety and Health policy. Safety rules and procedure act as a guideline for employees to work safely at the workplace which prevent accidents from happen and reduction in accident rates. (Cheyne & Cox, 2000; Mearns,Whitaker,& Flin, R, 2003).

2.3.2 Previous research on Safety rules and Procedure

O'Toole (2002) on his research in the area of mining and construction companies found that educational programmes would affect employees' perception of safety practices. Lingard (2002) concluded that first aid training would increase construction workers' awareness of occupational injury and illness, and perception of risk behaviour.

The study by Cheyne and Cox (2000) describes application of safety rules and procedure at the workplace influencing the safety performance among the employees. Therefore, employees's behaviour also will improved at the workplace (Vinodkumar & Bhasi, 2010). Besides that, according to Mohd Kamar et al., (2014) in their research on construction business organisation, safety practices management is very crucial and important to prevent accidents and injury rates hence, the lack of this will also determine the loss of profits of the company. Accidents will make delay of the projects and site operations. This can be prevented by safety rules and procedure, strengthening safety

regulations, implementing safety programmes to the all workers (especially new workers) and continuous commitment management of top management. This finding was in line with Langford and Rowlinson, (2002) and Farouk et al., (2011) study which reported the implementation of comprehensive and effective safety rules and procedures has positive correlation in safety performance.

Vinodkumar and Bhasi (2010) mentioned that well-documented safety and rules procedures and its enforcement will influence and improve safety behavior of workers. Vinodkumar and Bhasi (2010) also mentioned that organisation with lower rate of accidents characterised by a few factors which are the important role of safety officer in the oganisations training safety for new employments, frequent of safety inspections, frequent or daily meeting about safety and health in the workplaces, display of safety posters for identifying hazards, daily communication and meeting with management to know the problems and feedback regarding safety-related issues between workers and supervisors. Another study by Vredenburgh, (2002) stated that there are six elements of related safety concern which are rewards, hiring, safety training, participation, management support, and communication and feedback between employees and employer.

2.4 Safety Awareness

Safety awareness is mindful of the surroundings, avoiding potentially dangerous circumstances, using common sense and trusting instincts according to the Department of Public Safety (2020). There must be an effort to increase safety knowledge among management and workers from the analysis of Mohd Kamar, Lop, Mat Salleh, Mamter, & Suhaimi (2014) in construction site research to minimize injury and accident rates.

Study by Vinodkumar and Bhasi, (2010) reported that a major accident involving hazard chemical units, sometimes caused by a minor error (human or technical) of a chemical reaction that may go uncontrolled and end up in major accident. It is essential for workers in such plants to know the processes, associated dangers and methods to prevent them. An effective safety management system in place will not only help improve the safety knowledge of employees but also motivate them. Motivation improves employees' understanding, confidence, and desire for improving safety results. In this study, safety motivation means encouragement of good values in terms of safety issues to the employees in the management (Che Hassan, 2007).

Occupational, safety and health requirements such as OSHA 1994 is an example of government's commitment towards regulatory compliance and being realised as a key defense against hazards in the construction industry in Malaysia (Zin & Ismail, 2012). From the study of Mohd Kamar et al. (2014) in their research at the construction site, they found that rate of injury and accident can be reduced by the effort in increasing the awareness of safety among management and employees and staff. It is really important to have a safe workplace with no health hazards; thus, it requires a good enforcer and the participation of all stakeholders. Effective safety can only be achieved when there is a proper management of the interaction between technological systems and the people.

Accidents in the workplace do happen when the "people" elements tend to engage in safe and unsafe behavior according to their interpretation. Study by Vinodkumar and Bhasi (2010) has stated Vinodkumar has stated that a major accident can be caused by a simple error made by the employee. Such simple error may be caused by lack of knowledge on importance of a task, inaccurate interpretation of what is safe, and how to address the situation when error occur.Good knowledge of the processes, associated dangers and

methods to prevent them are essential for workers in such plants. An effective safety management system in place will not only be helpful to improve the employees' safety knowledge but also to motivate them. Motivation increases the awareness, interest and willingness of the employees for better safety performance. The safety management system implemented in an organisation comprise of a set of policies and practices aimed at positively impacting on the employees' attitudes and behaviours with regard to risk, thereby reducing their unsafe acts. Its aim is to raise awareness, understanding, motivation and commitment among workers. From the above arguments, it appears that the safety management practices (employees safety commitment, management commitment and safety rules and procudres) can influence the safety knowledge and motivation of employees. The component of safety awareness comprises of safety knowledge and safety motivation

2.4.1 Overview of Safety Motivation

Safety motivation can be achieved when there is an employer or top management involvement such as relationship with employees, talk on safety and advice on safety matter is related to improve safety motivation and encourage employees' safety behavior and awareness. In another study by Che Hassan (2007), the management should encourage good values in terms of safety issues to the employees and management should involve to the various OSH-implemented programmes such as safety training and various talk on the safety issues to improve the safety motivation among the employees.

2.4.1.1 Previous research of Safety Motivation

Based on a study by Teo et al., (2005) proposed two types of motivation that can be given by the management to the employees which are positive reinforcement and negative reinforcement. For positive reinforcement, employer can give benefits, allowances or job promotion to motivate the employees to perform their task in a safe manner. Whereas the negative reinforcement includes punishment and critics when the employees does not follow the rules and regulations. However, reinforcement on positive motivation is more encouraged by many safety practitioners to improve employees' good safety behaviour. Safety motivation can also derive from giving incentive schemes to motivate employees to change their behavior and to motivate them to perform jobs in safe manner (Vrenderburgh, 2002). Safety training stated by Vinodkumar et al., (2010) is an essential safety management practices that predict safety knowledge, safety motivation, safety compliance and safety participation. Another study by Leung, Chong and Cheung (2004) stated that when the top management creates a good environment and relationship between employer and employee, there will be retention of workers and impact of good performance among employees

2.4.2 Overview of Safety Knowledge

This study operationalizes safety knowledge as employee's knowledge about practices of safety as well as procedures (Griffin & Neal, 2000). It includes work activities to gather, organize, maintain, and provide information to other process safety elements. Process safety knowledge primarily consists of written documents such as hazard information, process technology information, and equipment-specific information. Safety knowledge

is related to information, which is often associated with policies, and other rule-based facts.

2.4.2.1 Previous research on Safety Knowledge

Safety knowledge refers to the amount of safety information that employees possess inside (Smith-Crowe, Burke & Landis, 2003). Based on the study by Bust, Finneran, Hartley and Gibb (2014). safety knowledge is the information which one person gain from their experience in the workplace and learning through time. In other side of the study of Vitharana De Silva & De Silva (2015) in terms of construction organisation, safety awareness also can be achieved when there is knowledge of safety issues among workers. These can be obtained by specific training of the workers, regular meeting and safety communication within management and staff and sufficient training of safety and health program which provided by the management. Safety knowledge is capable of providing information and know-how to employees to ensure they work safely and with no danger to health (Abdullah et al, 2009). However, for the existing safety models, there is relatively little research applying theoretical rationale to investigate the mechanism underlying the relationship between safety knowledge and safety performance.

Other than that, the study Okoye et al., (2016) stated that if the workers have the awareness and knowledge of the process and possible risk factors to safety, this can also help reduce the injury rates and accidents among workers. Besides that, safety knowledge will be enhanced and encompasses awareness within workers and will reduce the incident rates in the workplaces. Study by Akinwale et al, (2016) stated that safety knowledge can be gain by an organisation through regular safety meetings, incident and accident investigation, accident report system and survey in an organisation itself. Problem-solving entails making specific decisions on occupational health and safety risks in an

organisation. This implies decision-making is needed for the maintenance of occupational health and safety based on available knowledge. Many studies such as that from Idubor et al. (2013) and Okoye et al. (2016) have stated that roles of training on safety will improve safety knowledge among workers. Besides that, a study from Kumar et al. (2013) in the area of construction site stated that effective safety knowledge will reduce accident among of the workers and reduce cost of project. On the other hand, a study from Sunindijo (2014) supported the statement to encourage all workers to be equipped with safety knowledge and safety skills to work in a safe manner. These also attribute them to encourage and motivate other workers in the organization. It is proven that from all the studies done by the researchers, it can be concluded that safety knowledge is not only gain from training in the room, seminar, formal settings or workshops but must be wholly participated by employers and employees (Tsoukas, & Mylonopoulos, 2004)

2.5Relationship between safety awareness safety commitment, management commitment, and safety rules and procedure.

Safety awareness reflects individual perceptions about safety practices in workplaces (Zohar & Polachek, 2014). Naderpour, Lu and Zhang (2014) stated that occupational safety awareness was the important thing to improve safety performance and reducing human error. Numerous studies on safety awareness applied safety knowledge and safety motivation as the main dimensions of this variable (Wu,Liu & Lu, 2007).The discussion on direct relationship between safety awareness and employees commitment and management commitment stil not details explained. However, the discussion on the relationship between employees commitment and management commitment towards safety knowledge and safety motivation already published. Vinodkumar and Bhasi (2010)

applied safety motivation and safety knowledge as intervening variables in the relationship between safety management practice and safety behaviour. The study found that safety knowledge and safety motivation play the crucial roles to influence employees safety behaviour.In other words, safety awareness(safety motivation and safety knowledge) play the crucial roles in safety management in the workplace. Furthermore, management commitment was one of the dimensions of safety management practice, thus safety awareness also have relationship with management commitment toward safety in the workplaces.

Employees safety commitment reflect their attitude and behaviour towards safety during performing jobs at the workplaces. Its, directly and indirectly influences their safety practices in organisation (Mearns, Whitaker & Flin 2003).Normally, employees safety behaviour in organisation was totally reflects by safety motivation and safety knowledge. Many studies reveled that safety knowledge and safety motivation play the crucial roles to influence employees behaviour and attitude (Mearns et al, 2003.; Vinodkumar & Bhasi ,2009.; Vredenburgh, 2002,; Zohar & Polachek, 2014).Safety motivation as internal factor to encourage employees to enhance their commitment towards safety (attitude and behaviour).Hence, safety awareness also have a strong relationship with safety commitment.

During performing the job, all employees have to obey the safety rules procedures and regulation.Safety motivation was identified as internal factor to comply all the safety rules and procedure.A study by Salleh (2010) on the relationship between safety behaviour and safety consciousness found that safety motivation have positive impact towards the relationship.

Other than that ,well documented safety and rules procedures and the enforcement of regulation directly influenced the safety behaviour of workers (Vinodkumar & Bhasi, 2010) Futhermore, Akinwale et al (2016), stated that safety knowledge can be attained by attending safety meetings, safety training and accident investigations.Thus, gradually will enhance their knowledge by compliance of safety rules and procedure in the workplace.Thus ,safety rules and procedure indirectly will enhance employees safety awareness.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter discusses the research design, population and sample, data collection instruments, sources, and proposed procedures for data analysis. The various methods and techniques to be employed for data collection and analysis were mentioned in detail in this chapter. This chapter also included location, time and units of analysis as well as sample technique and size to be adopted.

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3.2 Research Framework

The research framework was defined as a structure to elucidate the natural progression of the phenomenon to be studied and it clearly describes on how the research problem would be explored (Camp, 2001). This study was designed to explore the safety commitment, management commitment and safety rules and procedure towards safety awareness among the student in teaching laboratory in public university in the North Peninsular of Malaysia. This study adapted conceptual framework developed by Vinodkumar and Bhasi, (2010) and Abdul Aziz (2008). The framework is shown in Figure 3.1.

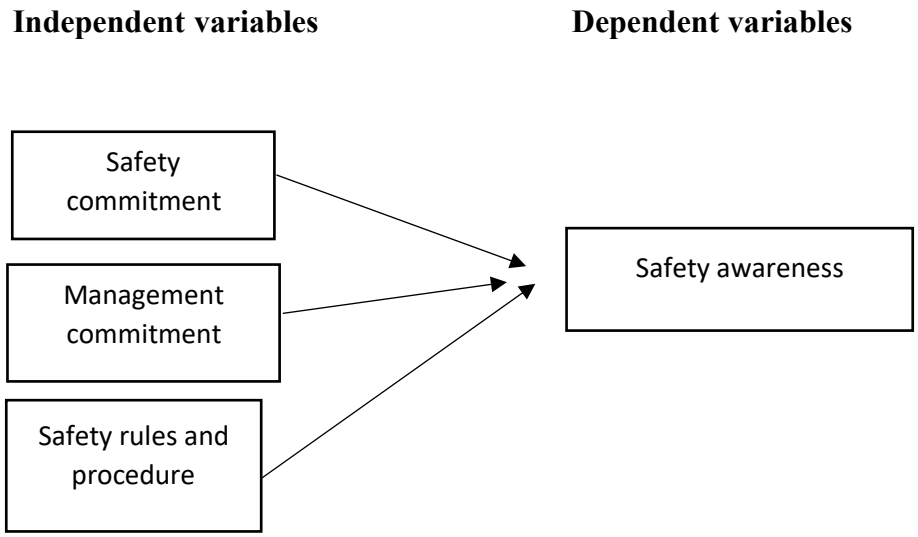

Figure 3.1
The relationship between independent and dependent variables

3.3 Hypotheses

The hypotheses for this study were developed based on research questions and objectives to express the relationship between safety commitment, management commitment, safety rules and procedure towards safety awareness among student in teaching laboratory in public university in Malaysia. To attain the objectives of the study, the hypotheses are as below:

H1: The safety commitment has significant relationship with safety awareness among students in teaching laboratories in public university at the North Peninsular of Malaysia.

H2: The management commitment has significant relationship with safety awareness among students in teaching laboratories in public university at the North Peninsular of Malaysia.

H3: The safety rules and procedure has significant relationship with safety awareness among students in teaching laboratories in public university at the North Peninsular of Malaysia.

3.4 Research Design

Research design is important as a guide for the researcher to ensure that all details about ideas, data and analysis procedure can support this study (Cresswell , 2003) According to Robert et al. (2001), a quantitative study is a research method which involve the analysis of data or information that is descriptive in nature and subsequently quantified. Researcher utilize quantitative research approach to determine the relationship between student's safety commitment, management commitment, safety rules and procedures and safety awareness.

This study was conducted among laboratory students in teaching laboratories of the public university in the Northern Peninsular of Malaysia. This research uses cross-section, quantitative method, and questionnaire as a medium for data collection. The questionnaires were developed from the adaptation of previous studies on the similar topics where employee's safety commitment, management commitment and safety rules and procedures as independent variables and safety awareness as dependent variables. The findings and conclusion of the study will fully depend on utilization of statistical data collected and analyzed using Statistical Package for the Social sciences (SPSS) version 20.0

3.5 Type of Study

There are three types of research design which are exploratory, descriptive, and causal design (Hair et al., 2007). This study was conducted descriptively and causal. This is because the descriptive study is suitable with the research that is performed at any time and was able to provide an extensive view for future research development (Sekaran,

2003). In addition, further clarification was also supported by Cavana et al. (2000). The authors stated that descriptive study is most suitable and benefit for a better understanding of the issue systematically within the use of structured data collection. This study aims to describe the relationship between independent variable and the dependent variable. Therefore, a cross-sectional design with quantitative analysis were used.

Research method can be divided into quantitative and qualitative. In this study, it was conducted in the form of a quantitative approach. Aliaga and Gunderson (2002) have stated that quantitative research is a process of "collecting numerical data that are analyzed using mathematically based methods (in particular statistics)". This method is chosen because it enables the researcher to measure the relationship between research constructs.

According to Creswell (2003), quantitative research enables a better understanding of the factors that influence an outcome. This is the reason why quantitative research design is selected for this study because the relationship between variables can be tested using statistical methods.

This research aims to explore the relationship between safety commitment, management commitment and safety rules and procedures towards safety awareness among students in teaching laboratories of a public university in Malaysia. This study chose to use a survey questionnaire to collect quantitative data. The survey questionnaire was composed of closed-ended questions compared to interview-administered surveys. This is because as suggested by Spunt (1999), self-administered surveys are more convenient and less expensive to administer, eliminate interviewer bias, gives respondents privacy, and

results can be analyzed faster. Secondly, the survey questionnaire enables the researcher to research a large sample which can be spread to the entire population.

On top of that, this study used close-ended questionnaire because the researcher can ensure the data collection can be done within the time stipulated. The researcher also ensures the validity and reliability of the study without any unbiased error (Creswell, 2003).

3.5.1 Sources of data

This study relies on primary data. The data was collected through a self-administered questionnaire distributed by the researcher. This method is chosen so that any clarification needed by the respondents can be made on-the-spot.

3.5.2 Unit of analysis

In this study, the unit of analysis is referred to the individual which is the undergraduates students who are performing practical work in laboratory at one of the public university in the Northern Peninsular of Malaysia.

3.6 Population

The population is defined as an entire group of people, events or things that was used by the researcher in their investigation to test the hypothesis (Sekaran, 2003). According to Cooper and Schindler (2006), the population could be people, place, object and cases which a researcher wishes to make inferences. This study was carried out with the purpose to identify whether there are relationships between independent variables towards safety awareness among students in teaching laboratories of a public university in the Northern Peninsular of Malaysia. The population of this research is the students in teaching

laboratories of a public university in the North of Malaysia. Currently, there are 500 undergraduate students who are in various field in Applied Science Programme. This group was selected as there were a minimal number of studies that have been done regarding laboratory safety and safety management in the teaching laboratories especially in public university in Malaysia

3.7 Sample size

According to Cooper and Schindler (2006), sampling is the process of choosing some elements from a population so that they represent that population. The sample is the subset of the population (Uma & Roger, 2009; Zikmund, 2003), which is studied so that the research findings be generalized to the overall population of the study (Creswell, 2008). This is because it is unrealistic to collect all the data from this population; therefore, the determination of the sample size is essential (Zikmund, 2003). It is vital to have a proper sampling design and sampling size because it helps the researcher to appropriately examined and conclude the result from the finding (Sekaran, 2003).

For this study, the table for determining sample size for a given population developed by Krejcie and Morgan (1970) has been adopted. The target respondent in this study is laboratory students in one of the public universities in Malaysia. Therefore, based on Krejcie and Morgan (1970) table, for a population of 500 students, 217 samples are adequate for the data collection. This sample size was also according to Roscoe's rule of thumb cited in (Sekaran, 2007), which stated that a sample more than 30 and less than 500 is appropriate for most research.

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3.8 Sampling Technique

There are two types of sampling, which are probability and non-probability sampling. According to Zikmund (2003), probability sampling is a sampling technique in which every member of the population has a chance of being selected in the sample. Whereas, for non-probability sampling, the unit of samples are based on personal judgement or convenience (Zikmund, 2003). In this study, the probability sampling method is selected. The method used was simple random sampling. Simple random sampling is a sampling procedure that allows each individual in the defined population to have an equal and independent chance of being included in the sample (Zikmund, 2003).

This method is chosen because of the following:

a) it is free of classification error

b) it requires minimum advance knowledge of the population other than the frame.

c) its simplicity also makes it relatively easy to interpret data collected in this manner.

d) it does not favour any part of the population.

For the above reasons, simple random sampling was chosen where only minimal advance knowledge of population is needed. It is also easy to analyze the data and compute error. Based in the student list given by Faculty of Management, every undergraduates student has an equal chance of being selected which can increase the accuracy, relevancy, and the credibility of the research. There are multiple ways of creating a simple random sample such as, using a random number table, using a computer, and sampling with or without replacement.

3.9 Operational Definition and Measurements

An operational definition describes the terms and glossary of the variables in the study for further clarification and explanation of each variable was discussed. The operational definition for each variables is elucidated in subtopic 3.91.In this study, the selection of the item for each variables depends on the reliability of the variables. This is because data obtained from behavioural research studies are influenced by random errors of measurement that rely on the internal consistency of the variables (Drost, 2011). The internal consistency of the variables in this study was surpassed satisfactory level proposed by Nunally (1978), i.e 0.7 .As a result ,the items of each variables were found to be good internal consistency and suitable for use in this study . The variables areas following:

3.9.1 Safety commitment

Safety commitment means a safety aspect that has been seen as everyone's concern for being proactive in protecting safety in the organization. (Copeland, 2018). Past studies have reported that the instrument has an adequate internal consistency with Cronbach alphas ranging from 0.85 to 0.87, (Abd Aziz, 2008; Ali, 2019). Cronbach Alpha values for the measurements were valued above 0.7, which is ideal for good internal consistency (Nunnally, 1978).

Table 3. 1
Item for Safety commitment

Code	Items	Adapted from
ESC1	I would not be worried about hazard and risk at my laboratory	Abd Aziz (2008)
ESC2	I am willing to do extra jobs in order to improve the safety environment at my laboratory	
ESC3	Students here are not happy to wear the personal protective equipment	

ESC4	I really care about safety procedures and regulations at my laboratory
ESC5	I am willing to put in great effort to achieve safety goals.
ESC6	Near-miss accidents are not important in safety records
ESC7	I never give cooperation to my laboratory assistant about safety issues.
ESC8	I would like to obey the safety regulations in order to keep laboratory safe.
ESC9	All students should be actively involved in safety promotion activities
ESC10	I would be extremely glad to be a member of a safety committee at my faculty
ESC11	I would like to be involved in safety discussion at my faculty.
ESC12	I am ready to involve myself in the faculty safety activities
ESC13	It is very important to work in a safe environment
ESC14	I would not feel guilty if I used a "shortcut" while completing my practical job in my laboratory.
ESC15	I really would like to take part in occupational safety rule / procedure / regulation reviews in my faculty
ESC16	Safety procedures and regulations reflect the safest techniques of doing a practical task in my laboratory
ESC17	I think putting more effort into understanding all safety rules is a waste of time.
ESC18	It is student duty and responsibility to support and encourage their classmate to obey the safety rules / procedures / regulations in the laboratory
ESC19	I would like to be involved in the safety goal planning at faculty
ESC20	I always ensure that the safety equipment is working properly before I start a practical task in my laboratory
ESC21	I will ensure the risks are assessed before starting my practical job in my laboratory

3.9.2 Management Commitment

Management commitment implies direct involvement of the employer in safety related matters at the workplace, which consequently leads to the total reduction in accident and injury rates (Hofmann & Stetzer, 1996; Yule et al., 2006). Past studies have reported that the instrument has an adequate internal consistency with Cronbach alphas which is 0.86 (Vinodkumar & Bhasi, 2010).

Table 3. 2
Item for Management commitment

Code	Item	Adapted from
MC1	Safety is given high priority by the faculty management	Cheyne, Cox, Oliver, and Tomás (1998)
MC2	Safety rules and procedures are strictly followed by the faculty management	
MC3	Corrective action is always taken when the faculty management is told about unsafe practices in laboratory	
MC4	In my faculty, management of faculty do not show interest in the safety of students in the laboratory	
MC5	Faculty Management considers safety to be equally important as safety environment in my faculty	
MC6	Members of the faculty management do not attend safety meetings.	
MC7	I feel that faculty management is willing to compromise on safety for increasing safety environment in my faculty	
MC8	When near-miss accidents are reported in the laboratory, my faculty management acts quickly to solve the problems	
MC9	My faculty management provides sufficient personal protective equipment for the students in the laboratory	

3.9.3 Safety rules and procedure

Safety rules and procedure act as a guideline for employees to work safely at the workplace which prevent accidents from happen and reduction in accident rates (Cheyne & Cox, 2000; Mearns et al., 2003). Past studies have reported that the instrument has an adequate internal consistency with Cronbach alphas ranging from 0.81 (Vinodkumar & Bhasi, 2010). Cronbach Alpha values for the measurements were valued above 0.7, which is ideal for good internal consistency (Nunnally, 1978).

Table 3. 3
Item for safety rules and procedure

Code	Item	Adapted from
SRP1	The safety rules and procedures followed in my faculty are sufficient to prevent incidents from occurring	Glendon and Litherland (2001)
SRP2	The facilities which are provided by the Occupational Safety and Health Committee are not adequate to meet the needs of the faculty.	
SRP3	My laboratory assistant and lecturers always try to enforce safe working procedures	
SRP4	Safety inspections are carried out regularly in my faculty	
SRP5	The safety procedures and practices in this laboratory are useful and effective	

3.9.4 Safety Awareness

Safety awareness is mindful of the surroundings, avoiding potentially dangerous circumstances, using common sense and trusting instincts, according to the Department of Public Safety (2020). In this study, there are two dimension of safety awareness which are safety motivation and safety knowledge.

In this study, safety motivation means encouragement of good values in terms of safety issues to the employees in the management (Che Hassan, 2007). Past studies have reported that the instrument has an adequate internal consistency with Cronbach alphas, ranging from values of 0.72 to 0.95 (Vinodkumar & Bhasi , 2010; Abdullah, 2018). Thus, the Cronbach alpha value exceeds the accepted value 0.7, which is ideal for internal consistencies (Nunnally, 1978).

Table 3. 4
Item for safety motivation

Code	Item	Adapted from
SM1	I feel that it is important to promote safety programmes	Vinodkumar and Bhasi, (2010)
SM2	I feel that it is important to encourage others to use safe practices	
SM3	I believe that safety that can be compromised for increasing safety environment in the laboratory	
SM4	I feel that it is important to maintain safety at all times	
SM5	I feel that it is necessary to put efforts to reduce accidents and incidents at laboratory	
SM6	I feel that safety at laboratory is a very important issue	

3.9.5 Item for safety knowledge

This study operationalizes safety knowledge as employee knowledge about practices of safety as well as procedures (Griffin & Neal, 2000) Past studies have reported that the instrument has an adequate internal consistency with Cronbach alphas of 0.77 (Vinodkumar & Bhasi , 2010) .Thus, the Cronbach alpha value exceeds the accepted value 0.7, which is ideal for internal consistencies (Nunnally, 1978).)

Table 3. 5
Item for safety knowledge

Code	Item	Adapted from
SK1	I know how to perform my job in a safe manner	
SK2	I know how to use safety equipments and standard work procedures	Vinodkumar and Bhasi, (2010)
SK3	I know how to maintain or improve health and safety environment in the laboratory	
SK4	I know how to reduce the risk of accidents and incidents in the laboratory	
SK5	I know what are the hazards asociated with my practical works and the necessary precautions to be taken while doing my practical works	
SK6	I don't know what to do and whom to report it if a potential hazard is noticed in my laboratory	

3.10 Questionnaire Design

This study used a questionnaire as an instrument for data collection. The questionnaire is in the English language because the English language is the official language of teaching and learning in the university. The questionnaire was designed to measure the safety employee's commitment, management commitment and safety rules and procedure towards safety awareness among student in teaching laboratories in public university in Malaysia. The questionnaire consists of three parts, which are described as follows:

(a) Part 1 is a Demographic Profile which contained seven (7) items on demographic.
(b) Part II is to measure three independent variables which is Safety commitment (21 items), Management Commitment (9 items) and Safety Rules and Procedures (6 items).
(c) Part III is to measure 1 dependent variable which is Safety awareness and it comprises of two dimension of Safety knowledge (6 items) and Safety motivation (6 items). The actual questionnaire is at the appendix.

3.11 Pretesting of Instruments

Prior to conducting the actual survey, an initial questionnaire has been pretested by asking experts to check if there is any ambiguity in the items. The content validity for the measurable variables in this study was further examined and validated by two experts in the field of occupational safety and health management. They were academicians that served at the Human Resource Department, School of Business Management, Universiti Utara Malaysia. Based on the criteria mentioned above, suggested corrections were inputted and included in the survey instrument accordingly.

3.12 Pilot test

In order to discover the reliability and validity of the instrument, a pilot test has to be done (Flynn et al., 1990). This is because the pilot test verifies and check if there is any error or limitation from the instrument. Furthermore, the acceptability of the instrument can be established through the pilot test because the researcher can identify whether the respondent understands the questions from the instrument. Moreover, the original scales were developed from other countries, so Malaysian respondents might respond the questionnaire differently, so the internal consistency, reliability and discriminant validity of the instrument can be ascertained through this pilot test.

On the other hand, McIntire and Miller (2007) called a pilot test a scientific type investigation to ascertain a newly developed test's validity and reliability in regard to its intended purpose. The process conducting a pilot test involves administering the test onto a small group of the test target audience and then evaluating the information that is obtained from the pilot test. The purpose is as mentioned earlier, that is to test the reliability of the question. Because of this, the researcher needs to choose a group of people who are closely resemble or even directly part of the target audience that the test will be used.

The pilot study was conducted on first week of November 2019 until third week of November 2019. For this research, pilot test was conducted by sending questionnaires to 30 students in one of the public universities in Kuala Lumpur. That particular public university is chosen because it has similar characteristic and nature of practical work with the actual respondents. Time taken to complete the questionnaires ranged from 15-30 minutes. Feedback from the respondents showed that most of them could understand the

clarity of words with minimal changes needed. The reliability test was measured to ensure no bias (error-free). Cronbach's Alpha is a reliability coefficient that will indicate the correlation between the variables (Sekaran & Bougie, 2010). The results of the reliability tests are presented in Table 3.6.

Table 3.6
Pilot test result

No.	Variable/Code	No of Items	Cronbach Alpha
1	Students Safety Commitment (SSC)	21	.79
2	Management Commitment (MC)	9	.77
3	Safety Rules and Procedure (SRP)	5	.79
4	Safety Awareness (SA)	12	.92
	Safety Motivation (SM)	6	.95
	Safety Knowledge (SK)	6	.82

Table 3.6 shows the tested Cronbach Alpha value of the pilot study. The highest value of Cronbach alpha value is 0.948 while the lowest value of Cronbach alpha is 0.774. In other words, the value of Cronbach alpha for all dimension exceed 0.6. According to Hair et al (2006), if the value of Cronbach alpha is more than 0.6, it indicates the item in the questionnaire are good and applicable. Thus, this instrument for all variable was accepted for actual data collection

3.13 Data Collection Procedures

Prior to collection of data from public university X, a letter of authorization and to whom it may concern for the purpose of data collection was obtained from the Othman Yeop Abdullah Graduate School of Business (OYAGSB) requesting for their kind cooperation and assistance in data collection. After that, approval from public university X was gained before distributing the questionnaire.

The questionnaire was used as the main instrument to collect data from the respondents. The advantage of using questionnaire include the relatively low cost, no interview bias, no prior arrangement are needed and the facts of anonymity among respondents (Schermerhorm et al., 2000).

The questionnaires were distributed in February 2020. The respondents were given assurance that their responses will be kept confidential in order to encourage participation from respondents. The distribution of the questionnaires was done with the help of one of the lecturers who is attached to that university. The respondents were not allowed to answer the questionnaire more than once. Due to the differences in the class schedule, this has posed restriction for the collection of questionnaires, and it took about two weeks for the data collection period to complete.

3.14 Technique of Data Analysis

Data collected through the survey was analyzed using SPSS (Version 23) program for windows. SPSS 23 was used for the purpose of conducting descriptive statistics analysis, data was screened, examined, and validated for data entry.

3.15 Descriptive Analysis

Descriptive analysis is one of the techniques used to summarize massive data from target respondents or sample Hair et al. (2006). According to Coakes and Steed (2007), descriptive analysis is used to explore, summarize and describe data collection acquired from a survey. Demographics data from a sample can be described using descriptive analysis. For variables such as accident experiences and age, mean, standard deviation, minimum and maximum values can be used to represent data. For variables such as

gender, race, types of accident and marital status, frequency analysis can be used to describe data. The frequency percentage of the samples can also be obtained. However, this analysis only provides details about respondents and unable to draw any conclusions from the sample.

The level of mean can be measured by three level which low, moderate and high .The interpretation of mean score was based on Davis (1971) stated the level of the variable is considered low when the mean score is 1.00-2.33, moderate if the score is 2.34-3.67 and high when the score is 3.68-5.00.

3.16 Inferential analysis

According to Hair, Black, Babin, Anderson and Thattham (2006), inferential analysis is the most suitable way to explain hypothesis. Examples of inferential analysis that will be discussed below are reliability test, correlation and regression analysis.

3.16.1 Exploratory Factors Analysis

In a study done by Hair et al. (2010) and Pallant and Manual (2010) and the factor analysis is referring to the technique involved to identify the fundamental arrangement of data matrix. Factor analysis is an approach method for data reduction, where items with similar characteristics shall be assembled under one (1) element (Awang, 2014). According to Norris and Lecavalier (2010), Exploratory Factor Analysis (EFA) is a method utilized to expose the contruction of a relatively large group of variables. Other than that, Fabrigar, Wegener, MacCallum & Strahan (1999) stated it is also used to classify a set of the hidden contructs of a measures variable. Thus, EFA used in the analysis to detect the underlying scope of items that are defined by factor loading. The

factor loading value for this study is 0.45, which means that the element with below 0.45, should be removed from the component of items (Osborne, Costello, & Kellow, 2008).

The process of EFA must fulfill the folowing requirements (Pallent & Manual, 2010):

i. Keiser-Meyers-Oklin (KMO) value for each variables must greater 0.60;
ii. Based on Anti-Image Matrics Table, correlation anti-image value for each items not less than 0.50;
iii. Percentage cumulative varians must exits 45% and the higher cumulative varians value is better to explains the components in the initial solution;
iv. Based on eigen values, number of component or factors determined must greater than 1;
v. Ensure the minimum items for each components or factor at least two (2);
vi. Factor loading must greater than 0.40 and there is no overlapping items fall in the other components and;
vii. Realiabitiy test must be perform and fulfill the acceptable value for realibility (0.6).

3.16.2 Reliability test

According to Zikmund (2003), reliability is the degree to which measures are error free, so consistent and similar results can be acquired. Schindler and Cooper (2003) has defined reliability as representing internal consistency in which the homogeneity of an item in the measure is demonstrated. Reliability is an indicator of a measure's internal consistency. Consistency shows how well the items measuring a concept hang together as a set. A measure is reliable when different attempts at quantifying something gives the same result (Zikmund, 2003). The reliability analysis was done using Cronbach's Alpha. The

acceptable alpha coefficient should be more than 0.7 (Nunally, 1978). The reliability is higher if the Cronbach's Alpha is closer to 1.0.

3.16.3 Correlation Analysis

According to Coakes and Steed (2007), Pearson correlation is used to test the relationship between dependent and independent variable. In this study, the researcher will identify the strength and direction of relationship between independent variables (Student's safety commitment, management commitment and safety rules and procedures) with dependent variable which is safety awareness among undergraduate students in teaching laboratories of public university in the North of Malaysia. Positive or negative correlation can be identified by measuring the strength.

Interpretation of correlation coefficient can be done by identifying the coefficient and its associated significance value (p) (Coakes, & Steed, 2007). For two quantitative variables, X and Y, a positive correlation is indicated when a higher value of X is associated with a higher value of Y, whereas if a high value of X is linked with low value of Y, a negative correlation occurs. In other words, if the result showed +1.0, interpretation indicate the value as perfect positive correlation meanwhile, if result -1.0 indicates the value as perfect negative correlation (Gliner, Morgan, & Leech, 2009). The closer to 1.0, the greater the relationship between the two variables is the coefficient value. The acceptance value is either 0,01 or 0,05 for sense value (p) (Coakes & Steed, 2007).Table 3.7 shows the strength of relationship as suggested by Davis's Scale Model. Strength of correlation can be divided into five level from very weak to very strong. A correlation coefficient of value 0 until 0.29 is interpreted as very weak, 0.3 until 0.4 is interpreted as weak, 0.4 – 0.6 is

interpreted as moderate, 0.6 until 0.8 is interpreted as strong and 0.9 until 1.0 is interpreted as very strong.

Table 3.7
Strength of correlation

Strength of correlation				
Very weak	Weak	Moderate	Strong	Very strong
0.00 – 0.20	0.30 – 0.40	0.40 -0.60	0.60 -0.80	0.90 -1.00

3.16.4 Multiple Regression Analysis

Since this research has identified three independent variables and one dependent variable, multiple regression analysis is the most suitable statistics techniques to analyze the relationship between them. According to Hair et al. (2010), to predict the changes in the dependent variable in response to changes in the independent variable multiple regression will be used. It is useful to identify which independent variables have most influence factor on dependent variable (Sekaran & Bougie, 2013). Once a multiple regression equation has been constructed, the researcher can check how good it is (in terms of predictive ability) by examining the coefficient of determination, R-square (R^2). The value of R^2 is between 0 and 1. Bhatti et al. (2012) has stated that the higher the R^2 value (variance) the better the model and its prediction. In this study, three hypotheses were generated, and to decide whether the hypotheses is rejected or not, the coefficient table at the column Sig. will produce the p-value. The hypotheses are accepted if p is < 0.05, otherwise the hypotheses will be rejected.

3.15 Chapter Summary

In this chapter, the researcher has pinpointed all the procedures involved to carry out this study. It explains on the research framework, the instrument used, population and samples involved, pilot study and the method of analyses for the collected data. The next chapter will discuss further the interpretation of finding from data analysis.

CHAPTER 4

FINDINGS

4.1 Introduction

This chapter discuss results of the study. Chapter four (4) begins by reporting the response rate, demographic characteristics of the respondents and preliminary data screening process. The discussions continue with a report on factor analysis, correlation analysis and regression analysis. The chapter ends with a discussion on summaries of hypothesis testing and conclusion.

4.2 Rate of response

In this study, 250 questionnaires were distributed to selected undergraduates students under Faculty of Applied Science in one of the public university in Northern Peninsular Malaysia. Out of 250 questionnaires, only 236 were returned. Even though the returned questionnaire did not reach 250 based on the Krecjie and Morgan table, the response rate is generally sufficient for a research (Altunisik, Coskun, Bavraktaroglu & Yildrim, 2004). This rate of returned questionnaires is considered at the acceptable level (Hair et al., 1984) as it is above 50%, thus significantly strong to be used for this study.

Table 4.1:
Rate of Response Items Total Percentage (%)

Items (%)	Total	Percentages
Distributed questionnaire	250	100
Collected Questionnaires	236	94.4
Unreturned Questionnaire	14	5.6
Rejected Questionnaire	19	7.6
Usable Questionnaire	217	91.9

4.3 Preliminary Data Analysis

The aims of preliminary data analysis are to review the data to prepare it for further analysis, describe the key features of the data, and summarize the results. This section performs four types of data screening which include exploratory factor analysis, normality, linearity and multicollinearity test.

4.3.1 Exploratory Factor Analysis

Factor analysis assist to ascertain the items fall into more manageable component or factor by retaining only item with acceptable loading value for each variable (Sekaran, 2007). The study executed process of exploratory factor analysis (EFA) for each variable and the analysis of the data is based on the final results of EFA.

4.3.1.1 Factor Analysis for Safety Awareness

To determined numbers of factors of Safety Awareness (SA), 12 items were go through the EFA process by using the principal component analysis (PCA) of SPSS version 20. Table 4.2 shows the value of Kaiser-Meyer-Olkin (KMO) is 0.887 at significant level 0.000 and acceptable for next steps in factor analysis process.

Table 4.2
KMO and Bartlett's test for Safety Awareness

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.887
Bartlett's Test of Sphericity	Approx. Chi-Square	299.073
	df	10
	Sig.	.000

Based on Anti-image Matrices Table,only 1 item has value for anti-image covariance is less 0.5, therefore, items RSK6 is deleted.Thus,process of factor analysis need to re-analyse and table 4.3 show the new KMO and Bartlett's test for Safety Awareness

Table 4.3
New KMO and Bartlett's test for Safety Awareness

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.892
Bartlett's Test of Sphericity	Approx. Chi-Square	1356.19
	df	55
	Sig.	.000

The principal components analysis revealed the presence of two components with eigenvalues exceeding 1, explaining a total of 65.62 percent of the variance with component 1 contributing 49.0 percent and component 2 contributing 16.5 percent. Table 4.4 indicated the all the two components of factors, eigenvalues and cumulative percent for the components.

Table 4.4
Results of Component Factors for Safety Awareness

Component	Initial Eigenvalues		
	Total	% of variance	Cumulative %
1	5.39	49.04	49.04
2	1.82	16.58	65.62
3	.95	8.59	74.22

By using the Scree Plot Test, this study was decided to retain the two components for further investigation. The analysis was further supported by the results of rotated component matrix which showed two components with eigenvalues exceeding the minimum value 1.0. Table 4.5 shows the all two components and the items

.

Table 4.5
Rotated Component Matrix for Safety Awareness

No.	Items	Components	
		1	2
1	I feel that it is important to promote safety programmes (SM1)	.835	
2	I feel that it is important to encourage others to use safe practices(SM2)	.863	
3	I believe that safety that can be compromised for increasing safety environment in the laboratory (SM3)	.702	
4	I feel that it is important to maintain safety at all times (SM4)	.832	
5	I feel that it is necessary to put efforts to reduce accidents and incidents at laboratory (SM5)	.800	
6	I feel that safety at laboratory is a very important issue.(SM6)	.818	
7	I know how to perform my job in a safe manner(SK1)		.644
8	I know how to use safety equipments and standard work procedures(SK2)		.742
9	I know how to maintain or improve health and safety environment in the laboratory(SK3)		.857
10	I know how to reduce the risk of accidents and incidents in the laboratory(SK4)		.706
11	I know what are the hazards asociated with my practical works and the necessary precautions to be taken while doing my practical works(SK5)		.733

The result of Rotated Component Matrix for Safety awareness confirmed 11 items. Table 4.6 show the final results for Safety awareness factors or components. Item of SM1, SM2, SM3, SM4, SM5 and SM6 fall in factor 1. Meanwhile, item SK1, SK2, SK3, SK4 and SK5 are under factor 2. The result is consistent with the previous studies and retain the name of the factors which are safety motivation for factor 1 and safety knowledge for factor 2.

Table 4.6
Rotated Component Matrix for Safety awareness

Components/Factors	
Safety Motivation	Safety Knowledge
SM1	
SM2	
SM3	
SM4	
SM5	
SM6	
	SK1
	SK2
	SK3
	SK4
	SK5
Total items = 6	Total items = 5

To confirm the items in the factor, the reliability test was performed. Table 4.7 indicated the reliability test results for each factors or components. As a conclusion, final results for Safety Awareness, remain 2 factors namely Safety Motivation and Safety Knowledge.

Table 4.7
Reliability results for all factors of Safety awareness

Components/Factors	Number of items	Cronbach value (α)
Safety Motivation	6	.909
Safety Knowledge	5	.821

4.3.1.2 Factor Analysis for Safety commitment

All 21 items for Students Safety Commitment were go through the EFA process by using the principal component analysis (PCA) of SPSS version 20. The value of Kaiser-Meyer-Olkin (KMO) is 0.825 at significant level 0.000 as stated in table 4.8 and acceptable for next steps in factor analysis process.

Table 4.8
KMO and Bartlett's test for Safety commitment

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.825
Bartlett's Test of Sphericity	Approx. Chi-Square	1566.443
	df	250
	Sig.	.000

The Anti-image Matrices table, confirmed that all value for anti-image covariance are above 0.5, therefore all the items are reliable for futher factor analysis process. The principal components analysis revealed the presence of six components with eigenvalues exceeding 1, explaining a total of 62.6 percent of the variance with component 1 contributing 28.3 percent, component 2 contributing 10.5 percent, component 3 contributing 7.4 percent, component 4, 5 and 6 contributing 6.1, 5.2 and 5.2 respectively. Table 4.9 indicated the all the six components of factors, eigenvalues and cumulative percent for the components.

Table 4.9
Results of Component Factors for Safety commitment

Component	Initial Eigenvalues		
	Total	% of variance	Cumulative %
1	5.9	28.3	28.3
2	2.2	10.5	38.8
3	1.6	7.4	46.2
4	1.3	6.1	52.3
5	1.1	5.2	57.5
6	1.1	5.1	62.6
7	0.869	4.1	4.1
8	0.789	3.8	3.8

By using the Scree Plot Test, this study was decided to retain the five components for further investigation. Component sixth was dropped due to the number of items not fulfill at least two items for each component. Therefore, item namely ESC2 was dropped for the

analysis. The analysis was further supported by the results of rotated component matrix which showed five components with eigenvalues exceeding the minimum value 1.0. Table 4.10 shows the all six components and the items.

Table 4.10
Rotated Component Matrix for Safety commitment

No.	Items	Components					
		1	2	3	4	5	6
1	I would like to be involved in safety discussion at my faculty (SSC 11)	.805					
2	I am ready to involved my vself in the faculty safety activities (SSC 12)	.796					
3	I would like to be involved in the safety goal planning at faculty (SSC 19)	.720					
4	I really would like to take part in occupational safety rules / procedures /regulation reviews in my faculty (SSC 15)	.686					
5	I would be extremely glad to be a member of a safety committee at my faculty (SSC 10)	.639					
6	All students should be actively involved in safety promotion activities (SSC 9)		.728				
7	I am willing to put in great efforts to achieve safety goals (SSC 5)		.687				
8	I really care about safety procedure andc regulations at my laboratory (SSC 4)		.610				
9	It is very important to work in a safeenvironment (SSC 13)		.515				
10	I would not be worried about hazard and risk at my laboratory (*RESC1)		.461		.414		
11	I will always ensure that the safety equipment is working properly before i start a practical task in my laboratory (SSC 21)			.776			
12	It is student duty and responsibility to support and courage their classmate to obey the safety rules /procedures/ regulations in the laboratory (SSC 18)			.730			
13	I will ensure the risks are assessed before starting my practical job in my laboratory (SSC 20)			.714			

14	I would like to obey the safety regulations in order to keep laboratory safe (SSC 8)			.529			
*15	Safety procedures and regulations reflect the safest techniques of doing a practical task in my laboratory (SSC 16)	.411		.427	.397		
16	I never give cooperation to my laboratory assistant about safety issues.(RESC7)				.685		
17	Students here are not happy to wear the personal protective equipments (RESC3)				.635		
18	Near-miss accidents are not important in safety records (RESC6)				.569		
19	I am willing to do extra jobs in order to improve the safety enviroment at my laboratory (SSC 2)					.816	
*20	I think i putting more effort into understanding all safety rules is a waste of time (SSC 17)				-.471	-.547	
*21	I would not feel guilty if I used a "shortcut" while completing my practical job in my laboratory.(RESC14)						.860

* item was deleted

The result of Rotated Component Matrix for Safety commitment show that items RESC1, SSC16 and SSC17 was dropped from the analysis due to loading value for the items fall in more than one components or factors. Consequently, component or factor 5 was deleted due to only 1 item left and not fulfill the requirement of reliability test. Therefore, only 16 items remain for further interpretation of factor analysis. Inspection of the unrotated loading revealed that all 5 items load in component 1, 4 items in component 2 and component 3 respectively, and 3 items load in component 4. Table 4.11 show the final results for Safety commitment factors or components.

Table 4.11
Rotated Component Matrix for Safety commitment

Components/Factors			
Safety commitment 1	Safety commitment 2	Safety commitment 3	*Safety commitment 4
SSC 11			
SSC 12			
SSC 19			
SSC 15			
SSC 10			
	SSC 9		
	SSC 5		
	SSC 4		
	SSC 13		
		SSC 21	
		SSC 18	
		SSC 20	
		SSC 8	
			RESC7
			RESC3
			RESC6
Total items = 5	Total items = 4	Total items = 4	Total items = 3

* item was deleted

The final stage of factor analysis process is to check the reliability value for each factors or components. Table 4.12 indicated the reliability test results for each factors or components. Therefore, Safety commitment 4 was dropped to be one of the factors in Safety commitment due to the Cronbach value below the acceptable value which is less than 0.6 (Sekaran, 2010). After fulfill all steps in the EFA process and requirement, the researcher needs to rename the new components or factors based on the new elements in each factor.

Table 4.12
Reliability results for all factors of Safety commitment

Components/Factors	Number of items	Cronbach value (α)
Safety commitment 1	5	.84
Safety commitment 2	4	.76

Safety commitment 3	4	.74
*Safety commitment 4	3	.53

* factor was deleted

As a conclusion, final results for Safety commitment consist three (3) factors namely Safety commitment (Involvement), Safety commitment (Compliance), and Safety commitment (Responsibilities).

4.3.1.3 Factor Analysis for Management commitment

Table 4.13 shows the value of Kaiser-Meyer-Olkin (KMO) is 0.816 at significant level 0.000 and acceptable for next steps in factor analysis process.

Table 4.13
KMO and Bartlett's test for Management Commitment

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.816
Bartlett's Test of Sphericity	Approx. Chi-Square	600.441
	df	36
	Sig.	.000

Based on Anti-image Matrices Table, all value for anti-image covariance are above 0.5, therefore all the items are reliable for futher factor analysis process. The principal components analysis revealed the presence of two components with eigenvalues exceeding 1, explaining a total of 53.47 percent of the variance with component 1 contributing 41.07 percent and component 2 contributing 12.68 percent. Table 4.14 indicated the all the two components of factors, eigenvalues and cumulative percent for the components.

Table 4.14
Results of Component factors for Management Commitment

Component	Initial Eigenvalues		
	Total	% of variance	Cumulative %
1	3.6	41.0	41.0
2	1.1	12.6	53.7
3	0.92	10.2	63.9
4	0.84	9.39	73.3

Scree Plot Test examine and was decided to retain two components for further investigation. The analysis was further supported by the results of rotated component matrix which showed two components with eigenvalues exceeding the minimum value 1.0. Table 4.15 shows all two components and the items.

Table 4.15
Rotated Component Matrix for Management Commitment

No.	Items	Components	
		1	2
1	Safety is given high priority by the faculty management (MC1)	.802	
2	Safety rules and peocedures are strictly followed by the faculty management (MC2)	.835	
3	Corrective action is always taken when the faculty management is told about unsafe practices in laboratory (MC3)	.663	
4	Faculty Management consider safety to be equally important as safety environment in my faculty (MC5)	.601	
5	When near-miss accidents are reported in the laboratory , my faculty management acts quickly to solve the problems (MC8)	.726	
6	My faculty management provides sufficient personal protective equipment for the students in the laboratory (MC9)	.691	
7	I feel that faculty management is willing to compromise on safety for increasing safety environment in my faculty (MC7)		-.562
8	In my faculty ,management of faculty do not show interest in the safety of students in the laboratory. (RMC4)		.505
9	Members of the faculty management do not attend safety meetings. (RMC6)		.597

Then result from Rotated Component Matrix for Management Commitment confirmed 9 items. Table 4.16 show the final results for Management Commitment factors or components.

Table 4.16
Rotated Component Matrix for Management Commitment

Components/Factors	
Management Commitment 1	Management Commitment 2
MC1	MC7
MC2	RMC4
MC3	RMC6
MC5	
MC8	
MC9	
Total items = 6	Total items = 3

After completed all steps of factor analysis, the reliability value for each factors or components should be determine. Table 4.17 indicated the reliability test results for each factors or components. Due to the Cronbach value for component Management Commitment 2 (α = .288) and which is less than 0.6 (Sekaran, 2010), therefore the component was dropped. As a conclusion, final results for Management Commitment 1 remain Management Commitment.

Table 4.17
Reliability results for all factors of Management Commitment

Components/Factors	Number of items	Cronbach value (α)
Management Commitment 1	6	.820
*Management Commitment 2	3	.288

* factor was deleted

4.3.1.4 Factor Analysis for Safety Rules and Procedure

Five (5) items in Safety Rules and Procedure (SRP) were analyze through principal component analysis (PCA) of SPSS version 20. Table 4.18 shows the value of Kaiser-Meyer-Olkin (KMO) is 0.786 at significant level 0.000 and acceptable for next steps in factor analysis process.

Table 4.18: KMO and Bartlett's test for Safety Rules and Procedure

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.786
Bartlett's Test of Sphericity	Approx. Chi-Square	299.073
	df	10
	Sig.	.000

There is no anti image problem for safety rules and prosedure show by Anti-image Matrices table, therefore all the items are reliable for futher factor analysis process. The principal components analysis revealed the presence of two components with eigenvalues exceeding 1, explaining a total of 72.40 percent of the variance with component 1 contributing 52.38 percent and component 2 contributing 20.02 percent. Table 4.19 indicated the all the two components of factors, eigenvalues and cumulative percent for the components.

Table 4.19 :
Results of Component factors for Safety Rules and Procedure

Component	Initial Eigenvalues		
	Total	% of variance	Cumulative %
1	2.6	52.38	52.3
2	1.0	20.02	72.4
3	0.55	11.17	83.5
4	0.42	8.54	92.1

By using the Scree Plot Test, this study was decided to retain the two components for further investigation. The analysis was further supported by the results of rotated component matrix which showed two components with eigenvalues exceeding the minimum value 1.0. Table 4.20 shows all two components and the items.

Table 4.20
Rotated Component Matrix for Safety Rules and Procedure

No.	Items	Components	
		1	2
1	The safety rules and procedures followed in my faculty are sufficient to prevent incidents from occurring (SRP1)	.827	
2	My laboratory assistant and lecturers always try to enforce safe working procedures (SRP3)	.801	
3	Safety inspections are carried out regularly in my faculty (SRP4)	.774	
4	The safety procedures and practices in this laboratory are useful and effective (SRP5)	.813	
5	The facilities which are provided by the Occupational Safety abd Health Committee are not adequate to meet the needs of the faculty (RSRP2)		.973

The result of Rotated Component Matrix for Safety Rules and Procedure confirmed 5 items. However, factor 2 was excluded from one of the factors due to the minimum number of items is two. Table 4.21 show the final results for Safety Rules and Procedure factor or component

Table 4.21
Rotated Component Matrix for Safety Rules and Procedure

Component/Factor for Safety Rules and Procedure
SRP1
SRP3
SRP4
SRP5
Total items = 4

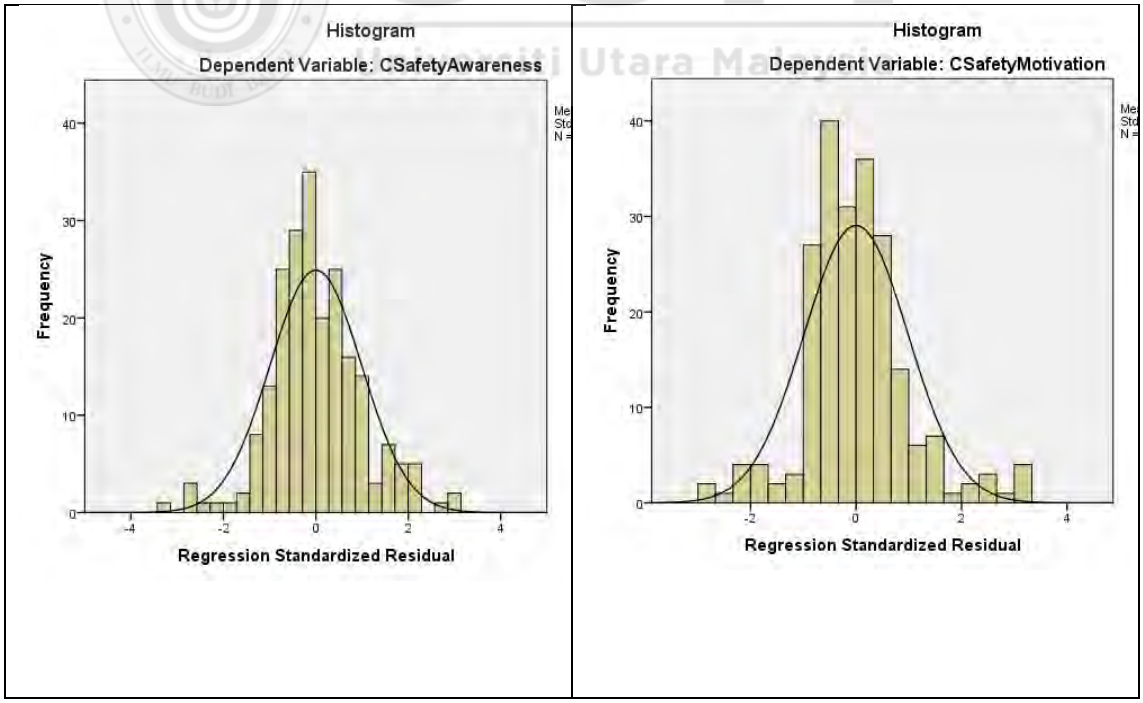
The number of items confirmed by reliability value for the factor or component. Table 4.22 indicated the reliability test results for Safety Rules and Procedure and acceptable. The name of the factor remain as a Safety Rules and Procedure.

Table 4.22
Reliability results for all factors of Safety Rules and Procedure

Components/Factors	Number of items	Cronbach value (α)
Safety rules and procedure	4	.817

4.3.2 Normality test

Normality is used to describe a curve that is symmetrical and bell-shaped. Norusis (1995) describes a simple method for examine the normality of the data is to look at the histograms diagram for residual. According to Norusis (1995), the normal distribution can be seen from the histogram diagram vertical lines. Based on the analysis conducted the data was normally distributed. The distribution curve for dependent variable and all independent variables are shown in Figure 4.1.



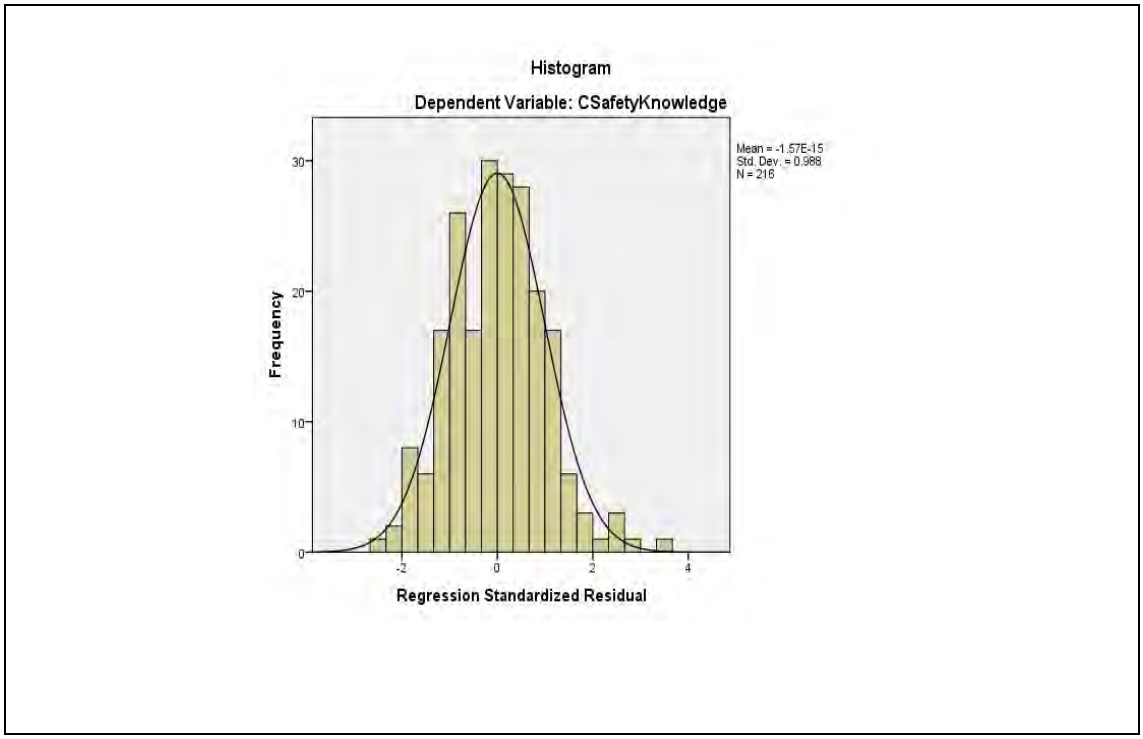


Figure 4.1 Histogram shows the frequency distribution between Safety Awareness, Safety Motivation, Safety Knowledge with all independent variables among students in University X

In addition, normal distribution also can be determined by value of skewness and kurtosis. According to Hair et al. (1988), the acceptable level of kurtosis is between 2.00 and +2.00 at a significant level of 0.05. The skewness and kurtosis test results in table 4.23 indicated that the Kurtosis value for Students Safety Commitment (Responsibilities) was more than 2.00. Therefore, there is an issue of normality and need to be identified by multivariate outliers analysis.

Table 4.23
Statistics Values of Skewness and Kurtosis (n=217)

Variables	Skewness		Kurtosis	
	Statistics	Std. Error	Statistics	Std. Error
Safety Awareness	-.111	.165	.297	.329
Safety Motivation	-.134	.165	-.388	.329

Safety Knowledge	.342	.165	.348	.329
Safety commitment	.296	.165	.082	.329
Safety commitment (Involvement)	.466	.165	-.364	.329
Safety commitment (Compliance)	-.155	.165	-.318	.329
Safety commitment (Responsibilities)	-.693	.165	2.753	.329
Management Commitment	.086	.165	-.301	.329
Safety Rules and Procedure	.015	.165	.006	.329

After performed multivariate outliers analysis as suggested by Pallant (2010), the respondents number 110 had be removed from the data analysis due to probability Mahalanobis distance is less than .001 and considered outliers. The final result for 216 respondents are as indicated in the table 4.24 , the data presented did not show any variable with skewness or kurtosis over 2.0. This indicates that, analysis of skewness and kurtosis results confirmed the variables were suitably and normal distributed.

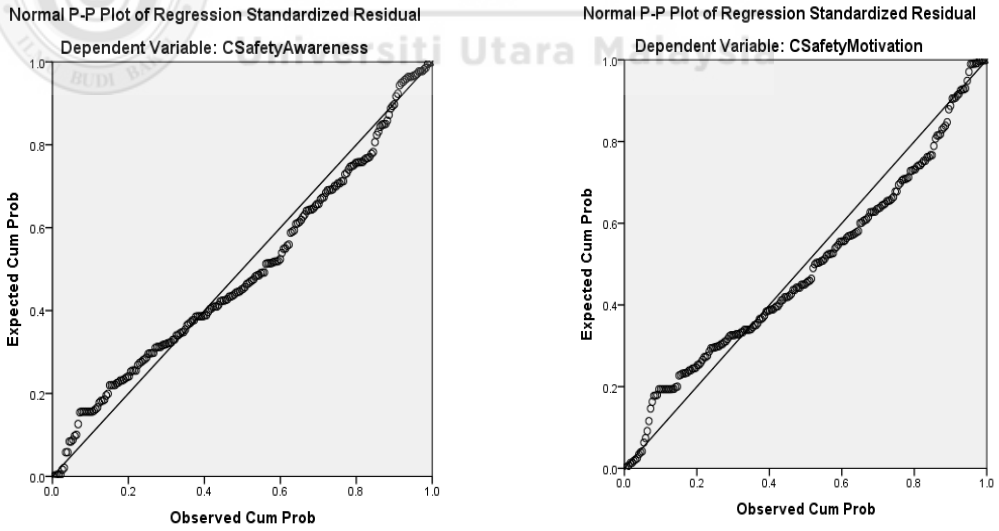
Table 4.24

Statistics Values of Skewness and Kurtosis (n=216)

Variables	Skewness		Kurtosis	
	Statistics	Std. Error	Statistics	Std. Error
Safety Awareness	-.133	.166	.316	.330
Safety Motivation	-.131	.166	-.373	.330
Safety Knowledge	.325	.166	.374	.330
Safety commitment	.293	.166	.067	.330
Safety commitment (Involvement)	.458	.166	-.357	.330
Safety commitment (Compliance)	-.157	.166	-.302	.330
Safety commitment (Responsibilities)	-.132	.166	.056	.330
Management Commitment	-.014	.166	.001	.330
Safety Rules and Procedure	.089	.166	-.312	.330

4.3.3 Linearity analysis

According Pallant (2007), linearity assumption examines the link between the residual and the predicted values. When there is no clear relationship between the residuals and predicted values, linearity assumption has been encountered. The assumption is that majority of the scores should be in the center at zero point (Flury & Riedwyl, 1998). Other than that, study of linear models by Hair et al. (2006), predict the values fall on a straight line with a constant unit change (slope) by the dependent variable for a unit change in the independent variable is constant. The residual should have a straight line connection with predicted dependent constructs scores in which figure 4.2 has always showed.



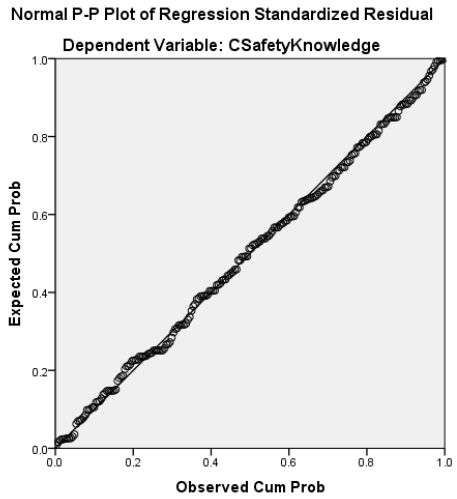


Figure 4.2 Linearity Plot between Safety Awareness, Safety Motivation, Safety Knowledge and all independent variables among students in University X

4.3.4 Multicollinearity

According to Black (2010), multicollinearity is when two or more of the independent variables of a multiple regression model are highly correlated. In other words, some of the predictor variables are correlated among themselves. Multicollinearity is a problem that affects many regression models. Presence of multicollinearity in the data can be assessed by the tolerance value and variable inflation factor value (Pallant, 2005). Tolerance is a value that measures the degree of the independent variable's variability that is not described by the other independent in the model. It is calculated by using the formula 1-R2 for each variable. Whereas variance inflation factor (VIF) is the inverse of tolerance and is counted by inverting the tolerance value (1 divided by tolerance). According to Hair et al. (2010), if the value of tolerance is less than 0.1 and VIF value is 10 and above, then the multicollinearity is problematic. Based on Table 4.25, all the tolerance values are more than 0.1, and VIF values are less than 10, so it can be concluded that multicollinearity does not exist in this study.

Table 4.25
Tolerance and Variance Inflation Factor (VIF) Value for All Variables

Variables	Safety Awareness		Safety Motivation		Safety Knowledge	
	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
Safety commitment (Involvement)	.680	1.471	.680	1.471	.680	1.471
Safety commitment (Compliance)	.585	1.709	.585	1.709	.585	1.709
Safety commitment (Responsibilities)	.529	1.889	.529	1.889	.529	1.889
Management Commitment	.552	1.812	.526	1.903	.526	1.903
Safety Rules and Procedure	.526	1.903	.552	1.812	.552	1.812

4.4 Reliability Analysis

Reliability analysis is an important tool to measure whether the instrument used is reliable and admissible. In this test, Cronbach's Alpha value is used to determine the reliability of the instrument (Hair et al., 2010). The acceptable alpha coefficient should be more than 0.7 (Nunally, 1978). Table 4.26 shows the Cronbach's Alpha value with a comparison of an original, pilot and current studies for independent variables and dependent variables.

Table 4.26
Reliability measure: Comparison of Original, Pilot and Actual Study for Independent and Dependent Variables

Adaptation Variables		Reliability (α value)		After EFA		Reliability (α value)
Variables/ Dimension	Number of item	Pilot Study	Actual Study	Variables/ Dimension	Number of item	After EFA
Safety commitment	21	.79	0.80	Safety commitment 1	5	.84
				Safety commitment 2	4	.76
				Safety commitment 3	4	.74
Safety Rules and Procedure	5	.79	0.65	Safety Rules and Procedure	4	.82

Management Commitment	9	.77	0.79	Management Commitment	6	.81
Safety Awareness			0.86		11	.87
Safety Motivation	6	.95		Safety Motivation	6	.91
Safety Knowledge	6	.82		Safety Knowledge	5	.83
Overall	47			Overall	34	

The result from Table 4.5 shows that all the Cronbach's alpha value for current study were more than 0.7. Thus, it can be concluded that both dependent and independent variables for the current study are reliable.

4.5 Descriptive Analysis of Variables

Descriptive statistics is an important tool to summarize a collection of data. Different types of descriptive analysis such as mean, median, standard deviation, percentage and frequency.

4.5.1 Mean and Standard Deviation Analysis

The measurement of central tendency (mean) and dispersion (standard deviation) of a data can be determined using descriptive statistics. According to sociologyguide.com, mean is defined as the means of absolute deviation of values from some average while standard deviation referred to as sigma that is important and widely used to measure of dispersion. The highest mean is safety motivation (mean = 4.100) and the lowest mean is Safety commitment (3.601). Table 4.27 indicated the mean and standard for all variables and mean score are high.

Table 4.27
Mean and Standard Deviation Analysis (n=216)

Variables	Mean	Standard Deviation
Safety Awareness	3.980	.464
Safety Motivation	4.100	.582
Safety Knowledge	3.840	.485
Safety commitment	3.869	.455
Safety commitment (Involvement)	3.601	.569
Safety commitment (Compliance)	4.041	.561
Safety commitment(Responsibilities)	3.921	.527
Safety Rules and Procedure	3.863	.588
Management Commitment	3.734	.531

4.5.2 Descriptive Analysis on Demographic Characteristics

Table 4.28 indicated the summarized percentage of frequencies for demographic information such as gender, age, races and others. The descriptive analysis based on Table 4.2 shows that most of the respondents were female which is around 69.9% and male accounts for 30.1 % of the total number of respondents. In the aspect of age group, respondents that aged range from 21-22 years old is the largest group with marked 51.4% while respondents were aged between 19-20 years old is the second largest group with 31.5%. Respondents aged range from 23-24 years old and 25-26 years old with each marked 15.7% and 0.9%. The least group that responded to this study marked aged between 27-28 years old which is 0.1%.

Table 4.28
Demographic Background of the Respondents (n=216)

Demographic Factors	Classification	Frequency	Percent (%)
Gender	Male	65	30.1
	Female	151	69.9
Race	Malay	198	91.7
	Chinese	15	6.9
	Indian	2	0.9
	Others	1	0.5
Age	19-20	68	31.5
	21-22	111	51.4

	23-24	34	15.7
	25-26	2	0.9
	27-28	1	0.5
Marital Status	Single	208	96.3
	Married	8	3.7
Types of Programs	Physics	21	9.7
	Applied Chemistry	110	50.9
	Biology	47	21.8
	Polymer Technology	9	4.2
	Marine Technology	17	7.9
	Science	4	1.9
	Horticulture Technology	5	2.3
	Pharmacy	3	1.4
Period of Study	Year 1	9	4.2
	Year2	22	10.2
	Year 3	138	63.9
	Year 4	47	21.8
Frequency Using Lab	1-2 hours/weekly	75	34.7
	3-4 hours/weekly	117	54.2
	5-6 hours/weekly	24	11.1
Accident History	Yes	24	11.1
	No	192	88.9
How many Accident Per semester	0	193	88.9
	1	24	11.1

In the aspect of marital status, it was found that most of the undergraduate student in the University X in the Northern Peninsular of Malaysia, were single (96.3%) and only 3.7 % of them were married. This is probably due to their age factor whereby most of them were very young to get married. In terms of the races of undergraduate students the largest group marked with Malay which is 91.7%, followed by the second larger group which is marked with Chinese which is 6.9%. Meanwhile Indian and others with each characterized by 0.9% and 0.5%.

Besides that, analysis of the types of programs category showed that majority of the respondents were students from the program of Applied Chemistry with the percentage of 50.9%, followed by Biology (21.8%), Marine Technology (7.9%), Physics (9.7%)

Polymer Technology (4.2%), Science (1.9%) and Horticulture with marked 2.3% and the least program is Pharmacy which is marked by 1.4%. It was discovered that Applied Chemistry program seems to be the most popular programs in Faculty of Applied Science in University X.

Based on the analysis of period of study in University X it has been found that majority of the respondents were from Year Three is 63.9%, followed by Year Two (10.2%), Year Four (21.8%) and the least of period study were from Year One (4.2%). When describing about the frequency using laboratories, it was found that the most of the respondents were using 3 to 4 hours weekly (54.2%), due to doing laboratory practical or doing research base on their program syllabus, followed by 1to 2 hours weekly (34.7%) and the least group were using 5 to 6 hours weekly (11.1%).

In terms of accident history experience, the result shows that most of the respondents were not having any accident history experience with the percentage of 88.9%, meanwhile only 11.1% with accident history in teaching laboratories. When describing about how many accidents that the respondents had experience per semester it was found that 88.9% of the respondents with no accidents history, while only 11.1 % with one (1) accident history in semester. This may due of many factors and one of possible reason is lack of safety knowledge and safety awareness among the students.

4.6 Correlation Analysis

Correlation analysis is used to measure the linear relationship between independent variables and the dependent variable (Sekaran, 2003). The result of Pearson's correlations analysis are presented in Table 4.29, table 4.30 and table 4.31

4.6.1 Pearson Correlation Result for Safety Awareness

All independent show the positive significant correlation with Safety Awareness. The highest relationships between Safety commitment as a unidimensional and Safety Awareness. Between the dimensions of Students Safety Commitment, Safety commitment (Responsibilities) has high correlation with Safety Awareness (r=.574; p < .01) and Safety commitment (Involvement) with lower correlation (r=.450; p < .01). However, the relationships between all independent variables and Safety Awareness are at moderate level.

Table 4.29
Pearson Correlations Analysis Safety Awareness and Independent Variables

Variables	Safety Awareness (r)
Safety commitment	.616**
Safety commitment (Involvement)	.450**
Safety commitment (Compliance)	.516**
Safety commitment (Responsibilities)	.574**
Safety Rules and Procedure	.535**
Management Commitment	.566**

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

4.6.2 Pearson Correlation Result for Safety Motivation

All independent variables has positive significant relationships with Safety Motivation. Safety Students Commitment (Involvement) has the lowest correlation value (r=.362; p < .01) while the highest correlation value (r=.517; p<.01) is overall Safety Students Commitment. Table 4.30 shown the results of correlation analysis between all variables.

Table 4.30
Pearson Correlations Analysis Safety Motivation and Independent Variables

Variables	Safety Motivation (r)
Safety commitment	.517**
Safety commitment (Involvement)	.362**

Safety commitment (Compliance)	.438**
Safety commitment (Responsibilities)	.500**
Safety Rules and Procedure	.473**
Management Commitment	.477**

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

4.6.3 Pearson Correlation Result for Safety Knowledge

Table 4.31 has shown the result of Pearson correlation analysis between Safety Knowledge and all the independent variables. The result indicated that all independent variables have positive and significant relationship between Safety Knowledge. Safety commitment remain the highest correlation value (r=.551; p<.01). The relationship between all independent variables still at the moderate level which r values ranging .426 to .551.

Table 4.31
Pearson Correlations Analysis Safety Knowledge and Independent Variables

Variables	Safety Knowledge(r)
Safety commitment	.551**
Safety commitment (Involvement)	.426**
Safety commitment (Compliance)	.456**
Safety commitment (Responsibilities)	.489**
Safety Rules and Procedure	.445**
Management Commitment	.505**

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

4.7 Multiple Regression Analysis

Multiple regression is a procedure to analyze how independent variables predict the values of dependent variable (Zikmund, 2003). This study, validated results from uni-dimension and multi-dimensions of Safety commitment and Safety Awareness.

Meanwhile, Safety Rule and Procedure and Management Commitment as a uni-dimension.

4.7.1 Multiple Regression Result for Safety Awareness, Safety Motivation and Safety Knowledge

The results of multiple regression analysis are shown in table 4.32 Based on the analysis, r square (r^2) value for Safety Awareness was .475. This means that Safety commitment, Safety Rules and Procedure and Management Commitment are able to explain 47.5% of the variance in Safety Awareness and 52.5% of the variance are not in the study. The result also indicated that the most significant prediction is Safety commitment ($\beta = .395$; $t=6.419$; $p< 0.05$) to Safety Awareness.

Table 4.32
Multiple Regression Analysis for Safety Awareness, Safety Motivation and Safety Knowledge

Independent Variables	Safety Awareness			Safety Motivation			Safety Knowledge		
	βeta value	t-value	sig.	βeta value	t-value	sig.	βeta value	t-value	sig.
Safety commitment	.395	6.419	.000	n/a			n/a		
Student Safety Commitment (Involvement)	n/a			.071	1.047	.296	.164	2.477	.014
Student Safety Commitment (Compliance)	n/a			.112	1.545	.124	.125	1.746	.082
Student Safety Commitment (Responsibilities)	n/a			.226	2.962	.003	.168	2.238	.026
Safety Rules and Procedure	.155	2.292	.023	.152	1.984	.049	.074	.976	.330
Management Commitment	.263	3.954	.000	.194	2.591	.010	.261	3.544	.000
	r square = .475 F value = 63.944 sig. F change = .000			r square = .352 F value = 22.825 sig. F change = .000			r square = .373 F value = 25.009 sig. F change = .000		

In contrast, the results for multi-dimension of Safety Awareness which consist Safety Motivation and Safety Knowledge toward multi-dimension of Safety commitment (Involvement, Compliance and Responsibilities), Safety Rules and Procedure and Management Commitment show different results of multiple regression. As shown in Table 4.32, only Safety commitment (Responsibilities) (β = .226; t=2.962; p< 0.05) under dimension of Safety commitment is significant contribute to Safety Motivation. Besides, Safety Rules and Procedure with beta value is .152 (t=1.984; p< 0.05) and Management Commitment with beta value is .194 (t=2.591; p< 0.05) also significant positive influence toward Safety Motivation. The overall contribution and explain by three independent variables are 35.2% (F=22.825; sig F change = .000).

Other result from table 4.32, demonstrate all the independent variables influence Safety Knowledge at 37.5% (F=25.009; sig F change = .000) and more than 50% influence by others variables that not included in this study. However, the percentage of variance only explained by three independent variables which are Safety commitment (Involvement) with beta value is .226 (t=2.962; p< 0.05); Safety commitment (Responsibilities) with beta value is .168 (t=2.238; p< 0.05); and Management Commitment (β=.226; t=2.962; p< 0.05).

As conclusion, the combination of dimensions in Students Safety Commitment (as a uni-dimension), Safety Rules and Procedure, and Management Commitment give high impact to Safety Awareness (as uni-dimension) (r^2=.475) compared with the role of multi-dimension of Safety Awareness consist by Safety Motivation (r^2=.352) and Safety Knowledge (r^2=.375). That mean the good role of Safety Awareness as a uni-dimension compare to discuss separately by each component.

4.8 Summary of the Hypotheses Testing

The multiple regression analysis determines either the hypotheses are rejected or supported in the study. Table 4.33 show all the hypotheses are supported.

Table 4.33
Hypotheses Summary

No.	**Hypothesis**	**Outcome**
1	Safety commitment significantly influence Safety Awareness	Supported
2	Safety Rules and Procedure significantly influence Safety Awareness	Supported
3	Management Commitment significantly influence Safety Awareness	Supported

4.9 Summary of the Chapter

This chapter described the demographic characteristics of the 216 participants, the results of the correlation, and regression analyses. All the hypotheses are supported in the study. The following chapter discuss the justification on the findings and the recommendation of the study.

CHAPTER 5

DISCUSSION AND RECOMMENDATIONS

5.1 Introduction

In this final part of the research, the researcher designs a discussion based on the three research objectives set out in Chapter One. The findings and recommendations also discussed in depth in this chapter. Besides, this chapter stated the implications and recommendations for future research.

5.2 Recap of the Study

This research is to investigate the relationship between safety commitment, management commitment and safety rules and procedure towards safety awareness among student in the teaching laboratories of public university in Northern Peninsular of Malaysia .The researcher use term of safety commitment instead of employees safety commitment because the respondent of the research are among undergraduate student who involve doing practical in the teaching laboratories in the university. This research is due of lack of research in the safety commitment, management commitment and safety rules and procedure towards safety awareness in teaching laboratories among public university and to discover the gaps in occupational safety and health in the area of teaching laboratories in the public university in Malaysia

Three (3) objectives covered in the study, which are (i) to investigate the level of safety awareness; (ii) to examine the level of safety commitment, management commitment and safety rules and procedures; and (iii) to study the influence of safety commitment,

management commitment, safety rules and procedure towards safety awareness. This research using cross-section, quantitative method and questionnaire as a medium for data collection. In this study, the probability sampling method is selected. The method used is simple random sampling. Simple random sampling is a sampling procedure that allows each individual in the defined population to have an equal and independent chance of being included in the sample (Zikmund, 2003).All the three independent variables, which are safety commitment, management commitment, and safety rules and procedures, were found to be significantly correlated with safety awareness and the safety commitment were found to be the highest significant correlated with safety awareness.

5.3 Discussion of the Finding

In the following discussion, each objectives of the study justifying the results founded and compared with the previous literature results.

5.3.1 Research Objective No.1

RO1: To investigate the level of safety awareness among students in teaching laboratories of a public university in the Northern Peninsular of Malaysia.

The result revealed that the mean for the compute safety awareness is high (3.98) which consist safety motivation (SM) was 4.10 and safety knowledge (SK) was 3.84. These values showed that the majority of the undergraduate students were concerned about safety awareness during performing their laboratory practical or experimenting in the laboratory.

The finding of this study was consistent with research conducted by Vitharana et al. (2015) in the construction organization. According to the study, safety awareness can be

achieved through the dissemination of safety knowledge among workers through the provision of specific training. This scenario has shown that the safety training that have been provided by management will increase awareness among the workers. Other than that, this finding is also consistent with the study conducted by Okoye et al. (2016) and Akinwale et al. (2016). The researchers concluded that safety knowledge was capable of providing excellent safety awareness in organizations through regular safety meetings, incident and accident investigations, accident reporting systems, and surveys in the organization itself.

The high mean of safety awareness among students in the teaching laboratories because the student has been given safety briefing on the every earlier of the semester, this is compulsory for all student in the University X. This in line with the study by Teo et al. (2005) a positive reinforcement included benefits, prerogatives, and job promotion can enhance safety awareness among workers .Besides, negative reinforcement added the penalty to be imposed if employees failed to carry out their work in a safe manner.

5.3.1 Research Objective No. 2

RO2: To examine the level of safety commitment, management commitment, and safety rules and procedures among students in teaching laboratories of a public university in the Northern Peninsular of Malaysia.

In this study, the result revealed the mean of aggregate of safety commitment is high and the mean value is 3.86, which consist of Safety commitment (Involvement) is 3.69, Safety commitment (Compliance) is 4.04, and Safety commitment (Responsibilities) is 3.90.

In comparison, the study conducted by Vinodkumar and Bhasi (2010) has a mean value of 3.84 regarding employees' commitment toward safety. In this study, safety commitment among students in the University X was lower than the findings in

Vinodkumar and Bhasi (2010). However, from the result, it was enhanced the researcher's understanding that students were still in the early phase of understanding the concept of safety in the university ,this is due to the majority of the student in year 1 and year 2.This means that students are considered those were actively seeking knowledge through the learning process and trying to adapt the safety culture in the public university Thus, continuous briefings in every semester and encourage students to communicate about safety-related matters or any incidents to their lecturers and also laboratory staff effectively. This factor indirectly will increase students' safety commitment at the public university. All the student who involve in the teaching laboratories area when doing practical should aware of rules and procedure and always involve in any safety and health activity

The mean of the Compute Safety Rules and Procedures (CPR) is 3.86, in scales from one to five. Safety rules and procedures were one of the first steps to encourage laboratory personnel and students to comply with standards and legal requirements. The implementation of safety rules and procedures will influence the awareness of safety. These findings were supported by Farouk, Richardson, and Santhapparaj (2011); Lu and Yang (2011) and Vinodkumar and Bhasi (2010). These findings have been consistent with the findings of Cheyne and Cox, (2000) and Mearns et al. (2003) both researchers have discovered that comprehensive and effective safety rules and procedures will efficiently prevent accidents and reduce accident rates. These researchers have shown that the capacity and level of communication has an impact on the safety performance of the organization. The high mean value of safety rules and procedure due to the common practice of faculty management that they always provide relevant information regarding safety rules and procedure such as posters and brochure of occupational safety and health (OSH), safety manuals, and safety information boards.

The mean for compute management commitment (MC) is high which is 3.74. Management commitment towards the safety environment at the workplace, especially in teaching laboratory, tremendously reflects the management effort to ensure the workplace is safe and healthy for the usage of the undergraduate student. This finding is significantly supported by the research of Vinodkumar et al. (2010), as an essential safety management practices that predict safety knowledge, safety motivation, safety compliance, and safety participation. Management commitment to safety and health-related issues is an important component of safety management practices to ensure a safe working environment for the employees. Although the study conducted by Vinodkumar et al. (2010) focused primarily on management commitment in the organization of chemical industries, this study found that management commitment responsibility is similar to the area of public university.

The mean value is high because of the management Faculty of Applied Science in the University X organize various activities of safety and health programs to create safety awareness among the faculty members especially who involve in practical or experiment in the teaching laboratories. This will reflect vital issues in the importance of management commitment to building safety environment in the workplace Besides that; the management also supports the OSH programs and activities such as yearly autoclave inspection, annual local exhaust ventilation inspection, safety and health training and certification as one of the management efforts to commit on safety and health issues.

Other than that, it is in line with the study by Cheyne and Cox (2000) in offshore industries identified that management commitment plays essential roles to lead to the priority in safety issue in the offshore industries organization. The results give some indications of how those working environments can perceive safety culture. A study conducted by O'Toole (2002) found that the importance of the roles of the manager, which is the

manager should be responsible for the health and safety of their employee's safety in the organization. Hence, management of faculty should identify the risk and hazards in the workplace or organization and allocate the resources to ensure the safety of their employees and to ensure the lowest possible number and severity of injuries experienced by employees.

5.2.3 Research Objective No.3

RO3: To study the influence between safety commitment, management commitment, and safety rules and procedures towards safety awareness among students in teaching laboratories of a public university in the Northern Peninsular of Malaysia.

The findings of this study discovered that safety commitment, management commitment and safety rules and procedures have a significant relationship with safety awareness among students in teaching laboratories of University X.

This supported by the findings by Choudhry (2008), Cheyne and Cox (2000), Cigularov et al. (2012), Farouk et al. (2011),Hofmann and Morgeson (1999), Lu and Yang , (2011), Michael et al. (2006), Miller and Tonks (2018), Vinodkumar and Bhasi,(2010), Vredenburgh (2002).

By referring to the standardized beta coefficient value, it shows that the highest beta coefficient value is safety commitment, this indicated that is the most significant variable that predicts safety awareness among students in the University X. These finding shows that the undergraduate student attend the briefing of safety rules and procedure in every semester provided by faculty management and shows the commitment to comply with safety rules and procedures in the teaching laboratories. Management of faculty always encourage undergraduate student to participate in all occupational safety and health (OSH) programme and safety awareness activity provided by faculty management.

The management commitment shows the second most significant variable that predicts safety awareness among students in the University X by implementing occupational safety and health (OSH) in the area of teaching laboratories in the public university. These include of providing allocation of fund and full support by providing safety training to the staff and the students in the area of teaching laboratories and proactive in any safety and health activity conducted by management of faculty to the students. Another than that, management of faculty must be willing to commit and received suggestion from the staff or students regarding the improvement of occupational safety and health in area of teaching laboratories. There are also few programmes organized by faculty management which are safety awareness week, safety talk corner and others.

Safety rules and procedures were very weakly influence towards safety awareness. The significant level was weak because of disregarding or safety rules, and procedures lead to accident or injury rate in teaching laboratories at University X. Majority of the students are new students that participate in this research from year 1 and 2 students and they do not become aware of the importance of safety rules and procedures in teaching laboratories. hence these will lead unsafe behaviour. This also reflects by the total contact hours in the practical work in the laboratories less than the academic subjects. From the findings shown that ,nearly 55% of the students spend only 3 -4 hours practical work in a week compare to other academic subjects.Hence, the student unfamiliar with the safety and rules procedure in the teaching laboratories.

5.4 Implications

The discussion then focuses on the findings that have implications to the body of knowledge and practical reviews of occupational safety and health in teaching laboratories in universities based on the findings and discussions that have been

conducted. There are many similar studies on safety awareness among employees in various industries. Thus, the study benefits the researcher to contributes the value of knowledge in improving safety awareness especially among students in a laboratory as there were the least study that been conducted in teaching laboratory especially in public universities in Malaysia. Furthermore, this study provides the basis for further research on safety awareness among students in teaching laboratories.

The findings of this study practically show a significant relationship between safety commitment, management commitment and safety rules procedures towards safety awareness among students in teaching laboratories in one of public university in the Northern Peninsular of Malaysia. This study not only contributes to the theoretical studies but also provides extensive benefits and exploration of the practical contribution to the safety management of university teaching laboratories. Practically, the management of the university should prioritize student commitment in shaping the safety training among students as this study found that safety training contributes most to the formation of safety awareness. However, the study did not take into account the differences in student and staff sample at university.

Findings of this study will be useful for the particular university management to understand and enhance the safety commitment, management commitment and. safety rules procedures in order to improve the safety awareness among students in teaching laboratories in the university. This study could provide a baseline study for faculty management to manage the gap on safety commitment, management commitment and safety rules and procedure in order to improve the safety awareness among students in the university. For example, the faculty management could appoint students as safety committee representatives, which they will have responsibilities in maintaining a safe working environment while they are doing their practical or experiment. The faculty

management should involve students in the faculty's occupational safety and health committee, safety inspections, incident investigation, assessing job hazards and risk assessment, safety and health meeting, and other safety-related issues. By doing that, they will have a sense of belongings, and it will motivate them to ensure an injury- free study environment

5.5 Recommendation for Future Studies

This study focused to study the relationship of safety commitment management commitment and, safety rules procedures towards safety awareness among students in teaching laboratories in one of the public universities in the Malaysia. This study provides empirical evidence and initial exploration for future studies. From the findings, the independent variables only contribute 47.5% to the safety awareness, hence for the future studies can benefit this study to expand the research framework by comprising other variables such as safety training, safety behaviour and safety culture.

This research only study in one of the public university in Northern Peninsular of Malaysia, limited generalization can be made by this research . Therefore, the future studies should involve other public university that involve another lab-base curriculum program. Besides that, future studies can also systematically compare the relationship differences of between safety commitment, management commitment, safety rules procedures and safety awareness between private universities and public universities.

This research utilizes only quantitative and cross-sectional research design and involve hypothesis testing to study relationship of safety commitment management commitment and, safety rules procedures towards safety awareness. Therefore, the future studies can

be expanding to include the observation approach to study behavioral safety awareness among students.

5.6 Conclusion

This study reviews the relationship of safety commitment, management commitment and safety rules and procedures and safety awareness among students in teaching laboratory in one of the public universities in Malaysia. The findings describe that safety commitment, management commitment and safety rules and procedure were significantly influencing the safety awareness. This finding is believed to provides the faculty management the benchmarking reviews on safety commitment, management commitment and safety rules and procedure that been applied for past years. There were areas that requires improvement to provide safe and healthy study environment for the students in the university.

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APPENDIX A: QUESTIONNAIRE SET

UNIVERSITI UTARA MALAYSIA

QUESTIONNAIRE

"The relationship between employees safety commitment, management commitment and,safety rules and procedures towards safety awareness among students in teaching laboratories at public university in Northern Peninsular of Malaysia"

SECTION A: DEMOGRAPHIC CHARACTERISTICS

The following questions deals with the basic information about yourself.

1.1 *Gender*

☐ *Male*

☐ *Female*

1.2 *Race*

☐ *Malay*

☐ *Chinese*

☐ *Indian*

☐ *Others* :

1.3 *Age*

☐ 18 – 24

☐ 25 – 34

☐ 35 – and above

1.4 *Marital status*

☐ *Single*

☐ *Married*

1.5 Education level

☐ Postgraduate

☐ Undergraduate

1.6 Length of study in university

☐ 1 - 4 tahun

☐ 5 - 9 tahun

1.7 Accident history

☐ Yes

☐ No

Skala Penentu / *Rating Scale*

Sangat tidak setuju/*Strongly disagree*				Sangat setuju/*Strongly agree*
1	**2**	**3**	**4**	**5**

SECTION B: EMPLOYEES SAFETY COMMITMENT

No		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
1	I would not be worried about hazard and risk at my laboratory	1	2	3	4	5
2	I am willing to do extra jobs in order to improve the safety environment at my laboratory	1	2	3	4	5
3	Students here are not happy to wear the personal protective equipments	1	2	3	4	5
4	I really care about safety procedures and regulations at my laboratory	1	2	3	4	5
5	I am willing to put in great effort to achieve safety goals. .	1	2	3	4	5
6	Near-miss accidents are not important in safety records	1	2	3	4	5
7	I never give cooperation to my laboratory assistant about safety issues.	1	2	3	4	5
8	I would like to obey the safety regulations in order to keep laboratory safe.	1	2	3	4	5

9	All students should be actively involved in safety promotion activities	1	2	3	4	5
10	I would be extremely glad to be a member of a safety commitee at my faculty	1	2	3	4	5
11	I would like to be involved in safety discussion at my faculty.	1	2	3	4	5
12	I am ready to involve myself in the faculty safety activities.	1	2	3	4	5
13	It is very important to work in a safe environment.	1	2	3	4	5
14	I would not feel guilty if I used a "shortcut" while completing my practical job in my laboratory.	1	2	3	4	5
15	I really would like to take part in occupational safety rule / procedure / regulation reviews in my faculty .	1	2	3	4	5
16	Safety procedures and regulations reflect the safest techniques of doing a practical task in my laboratory	1	2	3	4	5
17	I think putting more effort into understanding all safety rules is a waste of time.	1	2	3	4	5
18	It is student duty and responsibility to support and encourage their classmate to obey the safety rules / procedures / regulations in the laboratory	1	2	3	4	5
19	I would like to be involved in the safety goal planning at faculty	1	2	3	4	5
20	I will ensure the risks are assessed before starting my	1	2	3	4	5

	practical job in my laboratory					
21	I always ensure that the safety equipment is working properly before I start a practical task in my laboratory	1	2	3	4	5
	SECTION C: MANAGEMENT COMMITMENT					
1	Safety is given high priority by the faculty management	1	2	3	4	5
2	Safety rules and procedures are strictly followed by the faculty management	1	2	3	4	5
3	Corrective action is always taken when the faculty management is told about unsafe practices in laboratory	1	2	3	4	5
4	In my faculty, management of faculty do not show interest in the safety of students in the laboratory					
5	Faculty Management considers safety to be equally important as safety environment in my faculty	1	2	3	4	5
6	Members of the faculty management do not attend safety meetings.	1	2	3	4	5
7	I feel that faculty management is willing to compromise on safety for increasing safety environment in my faculty	1	2	3	4	5
8	When near-miss accidents are reported in the laboratory, my faculty management acts quickly to solve the problems	1	2	3	4	5
9	My faculty management provides sufficient personal protective	1	2	3	4	5

	equipment for the students in the laboratory **SECTION D : SAFETY RULES AND PROCEDURES**					
1	The safety rules and procedures followed in my faculty are sufficient to prevent incidents from occurring	1	2	3	4	5
2	The facilities which are provided by the Occupational Safety and Health Committee are not adequate to meet the needs of the faculty.	1	2	3	4	5
3	My laboratory assistant and lecturers always try to enforce safe working procedures	1	2	3	4	5
4	Safety inspections are carried out regularly in my faculty	1	2	3	4	5
5	The safety procedures and practices in this laboratory are useful and effective	1	2	3	4	5

SECTION E: SAFETY MOTIVATION

No		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agre
	I feel that it is important to promote safety programmes.	1	2	3	4	5
2	I feel that it is important to encourage others to use safe practices.	1	2	3	4	5
3	I believe that safety that can be compromised for increasing safety environment in the laboratory	1	2	3	4	5

4	I feel that it is important to maintain safety at all times.	1	2	3	4	5
5	I feel that it is necessary to put efforts to reduce accidents and incidents at laboratory	1	2	3	4	5
6	I feel that safety at laboratory is a very important issue.	1	2	3	4	5

SECTION F: SAFETY KNOWLEDGE

No		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
1	I know how to perform my job in a safe manner	1	2	3	4	5
2	I know how to use safety equipments and standard work procedures	1	2	3	4	5
3	I know how to maintain or improve health and safety environment in the laboratory	1	2	3	4	5
4	I know how to reduce the risk of accidents and incidents in the laboratory	1	2	3	4	5
5	I know what are the hazards asociated with my practical works and the necessary precautions to be taken while doing my practical works	1	2	3	4	5
6	I dont know what to do and whom to report it if a potential hazards is noticed in my laboratory	1	2	3	4	5

TERIMA KASIH DI ATAS KERJASAMA ANDA

THANK YOU FOR YOUR SUPPORT