SAFETY LEVEL ASSESSMENT AT SELECTED MALAYSIAN SCHOOLS

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FACULTY OF ENGINEERING
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ABSTRACT

Occupational safety and health management system is a system which is implemented based on a set of regulation. OSHA 1994 is being implemented in the industries and other organizations in Malaysia. The main aim is create a safe working environment. Therefore, safety audit was chosen as a tool to study the level occupational safety and health compliance level at selected Malaysian schools. Two different schools were chosen to compare the compliance level and appropriate safety and health measures were suggested. An audit checklist was used to recognize the possible issues in the chosen safety aspects which are; medical record and exposure, signage and labels, alarm system and evacuation, indoor air quality, safety measures for falling from height, occupational injury and illness reporting and traffic safety. The percentage of compliance was calculated for each aspect. The results obtained shows that School B has a better compliance standard as compared to School A. However, medical records and exposure and occupational injury and illness reporting has scored below 40%. Therefore, all the stakeholders have to cooperate in order to implement a productive safety culture at Malaysian schools.

ABSTRAK

Sistem pengurusan keselamatan dan kesihatan pekerjaan ialah sistem yang dilaksanakan berdasarkan satu set undang-undang. OSHA 1994 sedang dilaksanakan di dalam pelbaga industri dan organisasi di Malaysia. Matlamat utama pelaksanaan OSHA 1994 adalah untuk mewujudkan persekitaran kerja yang selamat. Oleh itu, audit keselamatan telah dipilih untuk mengkaji tahap pematuhan keselamatan dan kesihatan pekerjaan di sekolah-sekolah Malaysia yang terpilih. Dua sekolah yang berbeza telah dipilih untuk membandingkan tahap pematuhan langkah-langkah keselamatan dan kesihatan. Senarai semakan audit digunakan untuk mengenal pasti isu-isu yang wujud dalam aspek keselamatan yang berikut; rekod perubatan dan pendedahan, papan tanda dan label, sistem penggera dan pemindahan keluar, kualiti udara di dalam bangunan, langkah keselamatan supaya tidak terjatuh dari tempat yang tinggi, kecederaan sewaktu bekerja dan laporan penyakit dan keselamatan lalu lintas. Peratusan pematuhan telah dikira untuk setiap aspek. Keputusan yang diperoleh menunjukkan bahawa Sekolah B mempunyai piawaian pematuhan yang lebih baik berbanding Sekolah A. Walau bagaimanapun, rekod perubatan dan pendedahan dan kecederaan semasa bekerja dan laporan penyakit ialah di bawah 40%. Oleh itu, semua pihak perlu bekerjasama supaya melahirkan budaya keselamatan yang produktif di sekolah-sekolah Malaysia.

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LIST OF SYMBOLS AND ABBREVIATIONS

OHSMS : Occupational Health and Safety Management System

OSHA : Occupational Safety and Health Act

PDCA : Plan, Do, Check, Act

PDSA : Plan, Do, Study, Act

TVOC : Total volatile organic compounds

HCHO : Formaldehyde

HVAC : Heating, Ventilation, and Air Conditioning System

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CHAPTER 1: INTRODUCTION

Chapter 1 gives a brief idea of the study which starts with an introduction which is about the study background. Then it is followed by problem statement, objectives, scope of the study and the report layout.

1.1 INTRODUCTION

Based on United States Department of Labor (2015), many countries in Europe, Latin America, Asia and countries like Canada, Mexico and China have been carrying out joint effort in order to improvise the safety and health standards around the world. There are various versions of occupational health and safety management system, OHSMS has been developed throughout 20 years by different countries. OHSMS is a set of organized and interrelating features to establish OSH policy and objectives, achieve those objectives (Robson, Clarke et al. 2007). Laws of Malaysia Act 514 Occupational Safety and Health, OSHA 1994 is an act to enhance the safety, health and welfare of people at their designated work place. It is also to secure others against the risk related to safety and health in linking with the actions of people at work and to launch the National Council for Occupational Safety and Health, and for other occupational and health matters.

Unfortunately, accidents and injuries at school as an educational institute and as a working place has become a common incident. At times, these occurrence leads to serious consequences. According to Smith Jones (n.d), Specialist Personal Injury Solicitor, these cases cannot be recognized for the children's behaviour because there is a large possibility where it might be caused by negligence of safety measures by the other stakeholders. Certainly, accidents at schools are not only subjected to the children, it can happen to staffs, contractors and visitors.

Safety audit is a primary safety management action which provides the insight of recognizing possible problems which could take place before they have an effect on safety. The main aim of a safety audit is to sustain a safe working environment by hazard identification and control methods, by authenticating that the employees are obeying the most operative and effective safety measures. This is crucial in order to assure facilities, equipment, and processes meet the safety and health requirements and best practices are being practiced. Besides that, safety audits ensure that important administrative records which clarifies and supports all safety, health and medical activities are kept for reference. Basically, the key of carrying out a safety audit is to prevent injury, protect properties and avoid any hazardous consequences to the people and environment. It can be assured only complying workplace safety and health laws and regulations which is designed in order to eliminate accidents and injuries.

1.2 PROBLEM STATEMENT

According to (Planty, Provasnik et al. 2007), students are spending an average of six to eight hours excluding the hours spent for extra-curricular activities at school. The question is that if the students and staffs are given enough exposure on the safety measures in the existence of any possible hazard.

A fire accident took place at a school hostel in Maran, Pahang, Malaysia. This hostel has been supporting 73 female students. This incident took place at 7.30 in the morning when the students were having their morning assembly (Alagesh 2017). These incidents can create an insecure working and studying environment. Students are the asset of a country. Safety and health management has to be enhanced in order to create awareness and a safe school environment.

The National Institute for Occupational Safety and Health has always been promoting a productive workplace through safety and health research. Nevertheless, there are always lack of research done on the safety compliance at schools. Schools functioning as workplace and educational institute which consist of both staffs and children ranging from four year old to 17 year old children should have an adequate safety measures implemented in order to ensure safe environment. Therefore, it is crucial to carry out safety compliance study at schools to assess the compliance level at Malaysian Schools. This will ensure a safe work and study environment.

1.3 OBJECTIVES

The aim of this study is to assess the occupational safety and health compliance level in Malaysian schools by carrying out a safety audit in order to identify the comparison in the compliance. Then, major causes of accidents in schools were identified to suggest appropriate safety measures for improvement.

The objectives are:

i. To assess the occupational, safety and health compliance at a selected government and private schools respectively.
ii. To analyze the similarities and differences of compliance level between the selected government and private schools.
iii. To suggest safety measure for improvement.

1.4 SCOPE OF THE STUDY

The scope of the study was focused on the safety and health management system at two selected Malaysian schools.

1.5 REPORT LAYOUT

The first chapter emphasizes on the introduction, problem statement, objectives, scope of the study and structure of the report. The study was started with the study background in safety and health at schools and followed by the problem statement which arise from the increasing number of accidents at schools and the lack of studies related to safety in schools. The research purpose and objectives were stated based on the literature reviews which has been done in chapter two of this study.

Chapter 2 describes the present understanding with practical findings, as well as theoretical and methodological contributions to this topic and research concept for the study. The literature review write up covers the importance of safety and health management, OSHA 1994, safety aspects which are chosen in the safety audit at schools checklist, medical records and exposure, accident prevention measures, alarm system and evacuation plan, indoor air quality, fall from height, occupational injury and illness reporting, traffic safety, and safety and health implementation approaches at work place. The first subtopic; 2.1 importance of safety and health management has been explained. Subtopic 2.2 discusses the brief OSHA 1994 implementation. Then subtopic 2.3 explains about safety aspects which are chosen in the safety audit at schools and finally 2.4 discusses the conclusion

Chapter 3 has described the research method which is used to study the safety and health compliance at schools. Two study sites (two different schools) were chosen and safety and health management checklist were used to carry out the audit at both schools. Study methods were planned to achieve the research objectives based on the guidelines from Department of Occupational Safety and Health Malaysia. Site visit was carried out at two schools in order to perform safety audit using the checklist was prepared to assess the overall safety and health management system of the school. Particulars of the methodology is explained in the chapter three of this report.

Chapter 4 displays the results obtained through the audit at the chosen schools. The results for each safety aspects included in the checklist is presented in the form of bar charts to show the clear comparison of both schools in safety compliance. The summary of the results and possible measures has also been discussed.

In the last chapter, a conclusion has been done from this study with suggestions for future research especially on limitations of this research.

CHAPTER 2: LITERATURE REVIEW

Literature review discusses about the safety and health management, safety and health audit, OSHA 1994, and safety aspects to prevent injuries and accidents in industries and other organizations in previous studies.

2.1 SAFETY AND HEALTH MANAGEMENT SYSTEM

The world economics is dominated by agriculture, manufacturing and other services. A poor occupational safety and health leads to accidents. Based on International Labor Organization (ILO), an average of 4 person is killed in every minutes due to work-related accidents while 600 people suffers from occupational injuries around the world. Occupational accidents and diseases cost a total of U.S $2.8 trillion annually (Abubakar 2015)

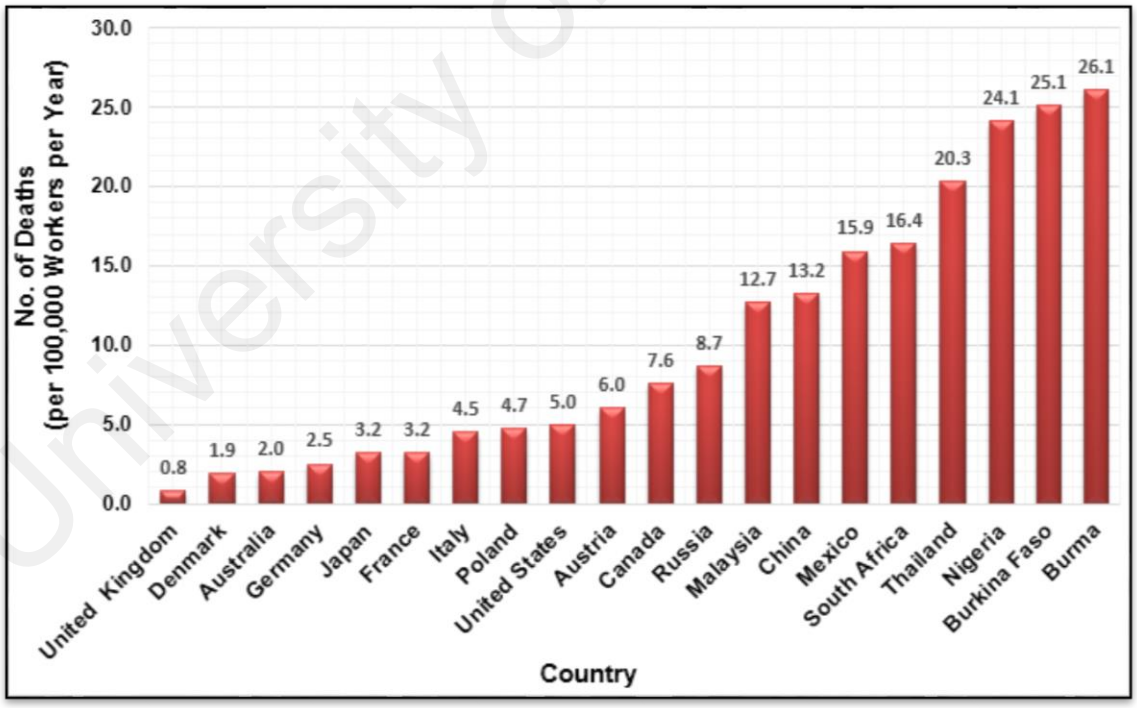

Figure 2.1: Work-related fatality rate in 2003 (Abubakar 2015)

Integrating safety and health in a work place is the best for both the employees and the organization's final outcome. This is mainly because the increasing medical cost and aging employees will have adverse impact on the health standard. In order to successfully implement safety and health together, employers and employees have to overcome all the difficulties which keep safety and health distinct (Kapp and Han 2017). According to (Gallagher and Underhill 2012) occupational safety and health can be successful but they are always found to be a failure due to poor implementation in an intimidating environment.

Petroleum enterprises in China achieved a great success by implementing safety and health management system in their international trade. Therefore, it is suggested that implementation of safety and health management system is necessary. Added to this, it is important in reducing accidents and achieve economic, social and environmental benefits (ZHENG, WANG et al. 2006).

2.2 SAFETY AND HEALTH AUDIT

Safety and health audit is an organized investigation on the processes and activities if they are taking place following the safe operation procedure, whether the safe operation procedure are implemented accordingly and if they are suitable in order to accomplish the organization's policy and objectives. In order for the objectives of a safety audit to be attained, it is crucial to look for the important features of safety and health management system, consistently review on the systems which has been deteriorating, and plan for appropriate improvement to be done (The Royal Society for Prevention of Accident, 2017).

Implementation of the checklist was associated with associated reductions in the rates of death and complications among patients at least 16 years of age who were undergoing non-cardiac surgery in a diverse group of hospitals (Haynes, Weiser et al. 2009).

The checklist is an important tool in error management across all these fields, contributing significantly to reductions in the risk of costly mistakes and improving overall outcomes. Such benefits also translate to improving the delivery of patient care. Despite demonstrated benefits of checklists in medicine and critical care, the integration of checklists into practice has not been as rapid and widespread as with other fields (Hales and Pronovost 2006).

2.3 OCCUPATIONAL SAFETY AND HEALTH ACT, 1994 (OSHA, 1994)

Existing OSH laws and legislation must be covering, complete and enforceable. The legal outline must explain the appropriate penalties to the defaulters and the power of the safety inspectors. This is crucial in order to avoid problems among organizations as the law must provide a clear scope of safety and health management authority (Abubakar 2015).

Occupational Safety and Health (Safety and Health Officer) Regulations 1997 says that safety and health officer is a person who carries out the responsibility as a safety and health officer as required by the act. In this case, employers of an organization is supposed to prepare appropriate safety facilities, tools and information for the safety and health officer to carry out his respective responsibility. Next, employers should organize continuous training program which provides adequate knowledge on safety and health management. Then, the employers has to direct a supervisor who is involved at the particular site to aid the safety and health officer to carry out investigation in case of any accident.

The responsibility of a safety and health officer is as follow:

- Provide appropriate advice and safety measures to the employer.
- Inspect and do regular check up on the machines, equipment, and facilities if there is any possible hazard.

- Carry out investigation on any dangerous incident or accident which occurs at work place.
- Support the employer or the safety and health committee to organize any occupational safety and health program.
- Acts as the secretary of safety and health committee.
- Assist the safety and health committee in carrying out inspection or investigation regarding the efficiency and compliance of safety and health management.
- Gather, analyze and sustain the data and statistics of any dangerous occurrence at the organization.
- Aid any officer in any issues affecting safety and health of the workplace.

Occupational Safety and Health (Employers' Safety and Health General Policy Statements) (Exception) Regulations 1995, section 16 says that it applies to every worker and every self-employed person except for an organization which has less than five workers (OSHA, 1994).

Occupational Safety And Health Act 1994 [Act 514] P.U. (A) 39/1996 Occupational Safety And Health (Control Of Industrial Major Accident Hazards) Regulations 1996 applies to all the industries except for nuclear installation, any installation involving armed forces, any vessel or vehicle transporting hazardous substances and also any industry which uses hazardous substances at the amount of less than 10 per cent of the threshold value (OSHA, 1994).

Occupational Safety and Health Act 1994 Occupational Safety and Health (Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease) Regulations 2004 explains the notification and report that has to be done upon any accident or injury.

2.4 SAFETY ASPECTS TO PREVENT ACCIDENTS AND INJURIES

Accident is a short, sudden and unwanted event or occurrence that results in an unwanted and undesirable outcome. It must be sudden in the sense that there is no warning (Hollnagel 2016).

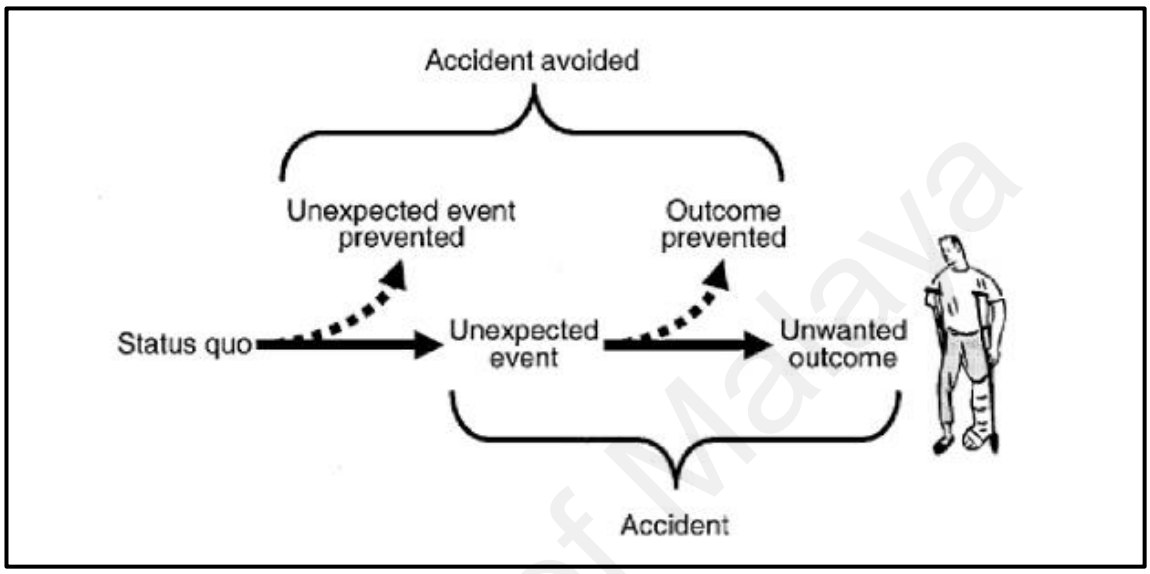

Figure 2.2: The constituents of an accident (Hollnagel 2016)

Table 2.1: Example of failure types (Hollnagel 2016)

	Place of occurrence		
Type of failure	At work	In the traffic	At home
Accident	Being injured or killed	Being killed or seriously injured	Fire or water leakage
Incident	Being hit but not injured	Being hit by a vehicle	A blown fuse; breaking a window
Near miss	Something falling down close to person	Almost colliding with a vehicle	Forgetting to lock the door

Table 2.2: National occupational accident and fatality rate

Year	2014	2015
Accident Rate	3.10	2.81
Fatality Rate	4.21	4.84

Notes:

1. Occupational accident rate per 1,000 workers

2. Occupational fatality rate per 100,000 workers

2.4.1 MEDICAL RECORDS AND EXPOSURE

According to Guidelines on Medical Surveillance (2001), the Occupational Safety and Health (Classification, Packaging and Labeling) Regulations 1997 and the Manual of Chemical Health Risk Assessment 2000 aids employers to measure if there is any significant exposure of chemicals to the employee and assess is medical surveillance is required. Whereas, the Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000 is just another attempt to improve the safe and healthy use of chemicals.

Occupational Safety and Health (Use and Standard of Exposure of Chemicals Hazardous to Health) Regulations 2000, is a guideline which serves the purpose of guiding, clarifying and explaining the content and regularity of medical surveillance which has to be carried out by the Occupational Health Doctor (OHD) in order to comply with the requirements of Regulations 27(2) which is the health surveillance. Any medical examination and investigations with the purpose of detecting exposure level, biological effects and responses defines health surveillance. Both employers and the workers must be able to understand the vitality of occupational health surveillance program and they will be able to co-operate with the OHD. This will result to a great success.

The components of Medical Surveillance Program are as below:

1) Pre-employment and pre-placement medical examination.
2) Biological monitoring and biological effect monitoring.
3) Health effects monitoring.
4) Investigation of occupational disease and poisoning including workplace inspections.
5) Notification of occupational disease and poisoning.
6) Assist in disability assessment.
7) Return to work examination after medical removal protection.
8) Record keeping and monitoring.

2.4.2 ACCIDENT PREVENTION MEASURES (SIGNAGE AND LABELS)

Absence of clear instruction like labels and signage is found to be one of the cause of accidents to occur (Chinniah 2015). This is also been supported by (Chan and Ng 2010) where it has been said that there could be various safety measures that can be emphasized on in order to reduce accidents and injuries but the most important one is the presence of precise safety signage.

Table 2.3: Safety signs (Chan & Ng 2010)

Reference number	**Sign**	**Verbal label**	**Reference number**	**Sign**	**Verbal label**
*P*1		No smoking	*P*2		No burning
*P*3		No water to put out the fire	*P*4		No laying inflammable thing

Reference number	Sign	Verbal label	Reference number	Sign	Verbal label
*P*5		No turning	*P*6		No touching
*P*7		No striding	*P*8		No climbing
*P*9		No jumping down	*P*10		No stopping
*P*11		No nearing	*P*12		No riding
*P*13		No stocking	*P*14		No tossing
*P*15		No putting on gloves	*P*16		No putting on spikes
*P*17		No drinking	*P*18		No starting
*P*19		No switching on	*P*20		No entering
*P*21		No thoroughfare	*W*1		Caution, corrosion
*W*2		Caution, poisoning	*W*3		Caution, infection
*W*4		Caution, cable	*W*5		Caution, mechanical injury

Reference number	Sign	Verbal label	Reference number	Sign	Verbal label
*W*6		Caution, injure hand	*W*7		Caution, splinter
*W*8		Caution, hanging	*W*9		Caution, falling objects
*W*10		Caution, hole	*W*11		Caution, scald
*W*12		Caution, arc	*W*13		Caution, collapse
*W*14		Caution, ionizing radiation	*W*15		Caution, fission matter
*W*16		Caution, laser	*W*17		Caution, microwave
*W*18		Caution, vehicle	*W*19		Caution, train
*W*20		Caution, slip	*W*21		Caution, stumbling
*W*22		Caution, danger	*W*23		Caution, fire
*W*24		Caution, explosion	*W*25		Danger! electric shock
*W*26		Caution, drop down	*W*27		Caution, roof fall

Reference number	Sign	Verbal label	Reference number	Sign	Verbal label
*M*1		Must wear protective goggles	*M*2		Must wear gas defence mask
*M*3		Must wear ear protector	*M*4		Must wear safety helmet
*M*5		Must wear protective cap	*M*6		Must wear protective gloves
*M*7		Must wear protective shoes	*M*8		Must wear life jacket
*M*9		Must wear protective clothes	*M*10		Must be locked
*M*11		Must wear dustproof mask	*M*12		Must fasten safety belt
*G*1		Emergent exit	*G*2		Flare up region
*G*3		Haven			

P – Prohibition sign; *W* – Warning sign; *M* – Mandatory sign; *G* – Guide sign.

2.4.3 ALARM SYSTEM AND EVACUATION PLAN

Occupational Safety and Health Act 1994 [Act 514] P.U. (A) 39/1996 Occupational Safety and Health (Control of Industrial Major Accident Hazards) Regulations 1996 emphasizes on safe operation method. Items which comes under this regulation which are applicable to schools are:

- Safe operation
- On-site emergency plan
- Notification of major accidents

It is impossible to carry out a perfect process or activity without hazard practically. Almost every activity or process has its risk in it. Preparation of a framework for a safe operation could reduce the likeliness of risk in a process. A safe process needs installation of several safety system like safety alarms, safety control and safety instrumented system (Summers and Hearn 2008).

2.4.4 INDOOR AIR QUALITY

A good indoor air quality is a basic right of any building occupant. People spend a huge amount of time indoors like at homes, offices, schools, health and care facilities or in any other buildings. The air quality which we breathe in is a crucial factor which determines our health and well-being. A poor control of indoor air quality leads to health problem. Poor indoor air quality caused by dampness and mould, chemical and other biological agents are the main factors leading to disease and death worldwide. About 1.5 million mortality has been caused by poor indoor air quality. The main group of people who are affected by the poor air quality are the women and children from low-income countries. Awareness regarding indoor air quality, its health impact and the causes of poor indoor air quality are the main factor which leads appropriate action by relevant stakeholders. The stake holders include building owners, developers and building

occupants. They employer plays the main role in maintaining the indoor air quality. This action is only possible with the existing public authority in line with rules and regulation as the guideline (Heseltine and Rosen 2009).

Ventilation rates have been hardly given attention in even though it has been found that poor ventilation is the main cause of health problems in schools. Through the study conducted, it has been found that the most frequently existing pollutants in schools were total volatile organic compounds (TVOC), formaldehyde (HCHO), and biological contaminants. The biological contaminants are bio-aerosol contaminants, airborne bacteria, dust mite, animal allergens and fungi (Daisey, Angell et al. 2003).

2.4.5 SAFETY MEASURES FOR FALLING FROM HEIGHT

There are two main pats for fall from height models which are the following: (a) the part including the events before the fall which consist of the preventive measure; and (b) the part including events after the fall which consist mostly on the measures of mitigating the impact of fall. The three stages of consequence severity are: lethal injuries, non-lethal permanent injuries, and recoverable injuries. In conclusion, safety measures are intended at preventing the fall and mitigating the effect of a fall (Aneziris, Papazoglou et al. 2008). Health and Safety Executive, United Kingdom has suggested few prevention measures for falls from height. The suggestions by Fall from height - Prevention and risk control effectiveness (2003) are as follow:

- Enhance the compliance which encompasses a complete guideline to improve the safety and health management system.
- Improve the process design by eliminating any possible hazard by referring to incident reports and information flow.
- Increase the awareness level on the risks regarding falls and its impact by providing adequate information and advice.

- Demonstrate the economic benefits of good safety and health by educating the level of competence.

2.4.6 OCCUPATIONAL INJURY AND ILLNESS REPORTING

Occupational Safety and Health (Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease) Regulations 2004 explains on OSHA's requirement of recordkeeping in a log of injuries and illness at any organization which consist of more than 10 employees. Added to it, all the employees have the rights to report and review the log of injuries and illnesses. Besides, all the employees do have the rights to review the annual summary of injuries and illnesses (OSHA 300A).

The fatal and non-fatal injuries in record in 2007 was estimated to be higher than 5, 600 and 8, 559, 000 respectively. On the other hand the fatal and non-fatal illnesses was estimated to be higher than 53, 000 and 427, 000 respectively. Yet, there are lack of studies done on job related injuries and illnesses (LEIGH 2011).

A study was carried on how work characteristic reflects on nurse's job related injury and illnesses. They found that night shifts have an impact on the health and it has been suggested to further the study on nurse-to-patient ratio and work-family problem (De Castro, Fujishiro et al. 2010).

Occupational injury and illness reporting plays a large role in record keeping. According to United States Department of Labor (2017) these record has several importance as below:

- Gives information to the employer about the worker who is injured or ill due to workplace hazard.
- Creates awareness on the existing hazard which cause injury or illness.
- Helps employer to investigate the existing hazard.
- Helps organizations to strengthen their safety and health management system.

- Provides statistical data to OSHA and helps them rectify the condition.

2.4.7 TRAFFIC SAFETY

Changeable behavioral and vehicle-related risk aspects are probably leading to work-related traffic injury. Fatigue and sleepiness are the most commonly studied topics because they were constantly related with increased risk (Robb, Sultana et al. 2008).

Therefore, a written workplace traffic rules and regulations must be established to be complied by all the stakeholders. This is because, rules and regulations acts as a framework of commitments and responsibilities. Each organization can come up with appropriate set of rules and regulation which suits their requirement. According to workplace safety and health guidelines: work place traffic safety management (2014) important points that should be included in the set of rules are:

- Only authorized vehicles and personnel are allowed into the compound.
- Keep all traffic safety measures at workplaces under observation.
- Keep all the traffic signage and display under observation.
- Ensure that the pedestrians use the designated walkway.
- Ensure that the speed limits are obeyed.

2.5 SAFETY CULTURE

Safety culture is the continuing significance and priority placed on employee and safety by everybody in every group in any organization or institution with reference to figure 2.3. It discusses about the degree to which individuals and groups will be committed and responsible to personal responsibility for safety, act to preserve, improve and communicate safety matters, learn continuously, adapt and transform their behavior based on instructions and lesson learned from errors (Wiegmann, Zhang et al. 2002).

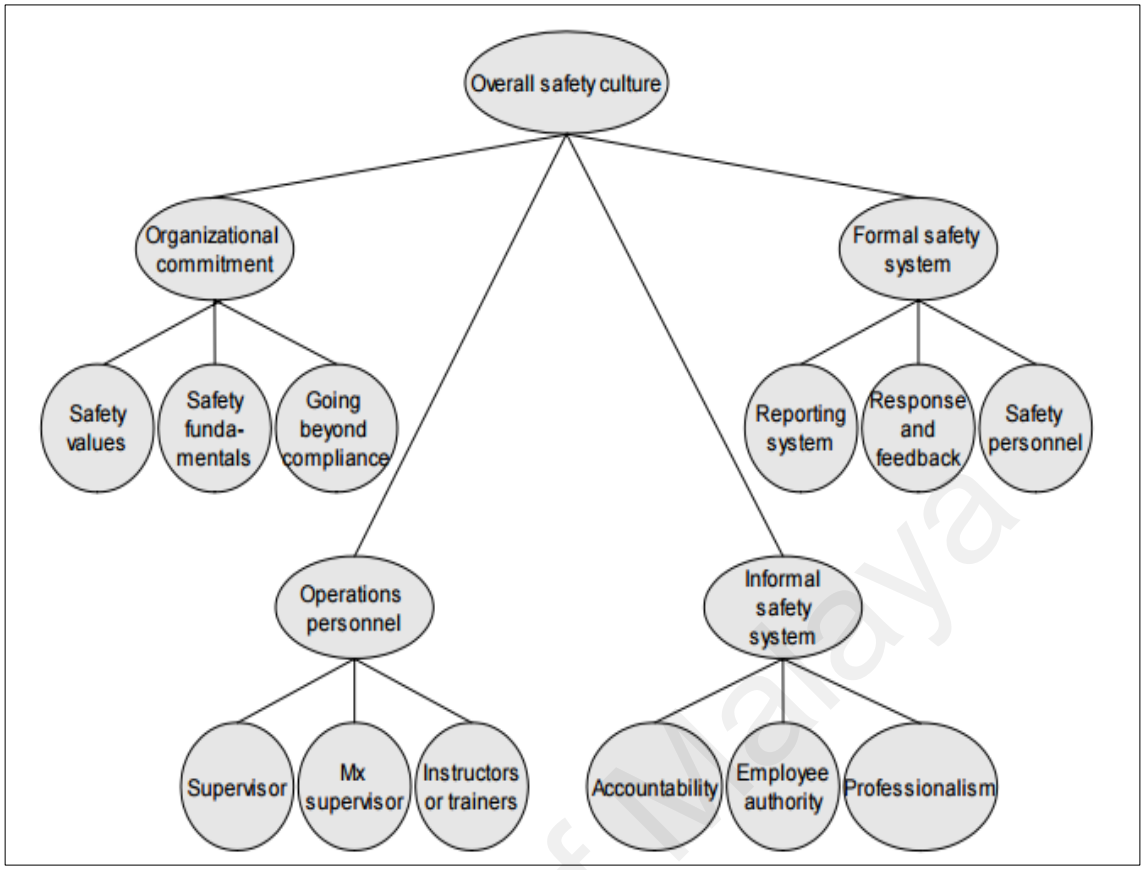

Figure 2.3: Organizational indicators of safety culture (Gibbons, Thaden, and Wiegmann, 2006)

Referring figure 2.4, every organization has to implement an appropriate way to keep track of the quality of their activity. PDCA cycle, is a basic concept for a continuous improvement or enhancement. This is also called as the Deming circle, named after W. E. Deming. Another version of PDCA is PDSA (Sokovic, Pavletic et al. 2010).

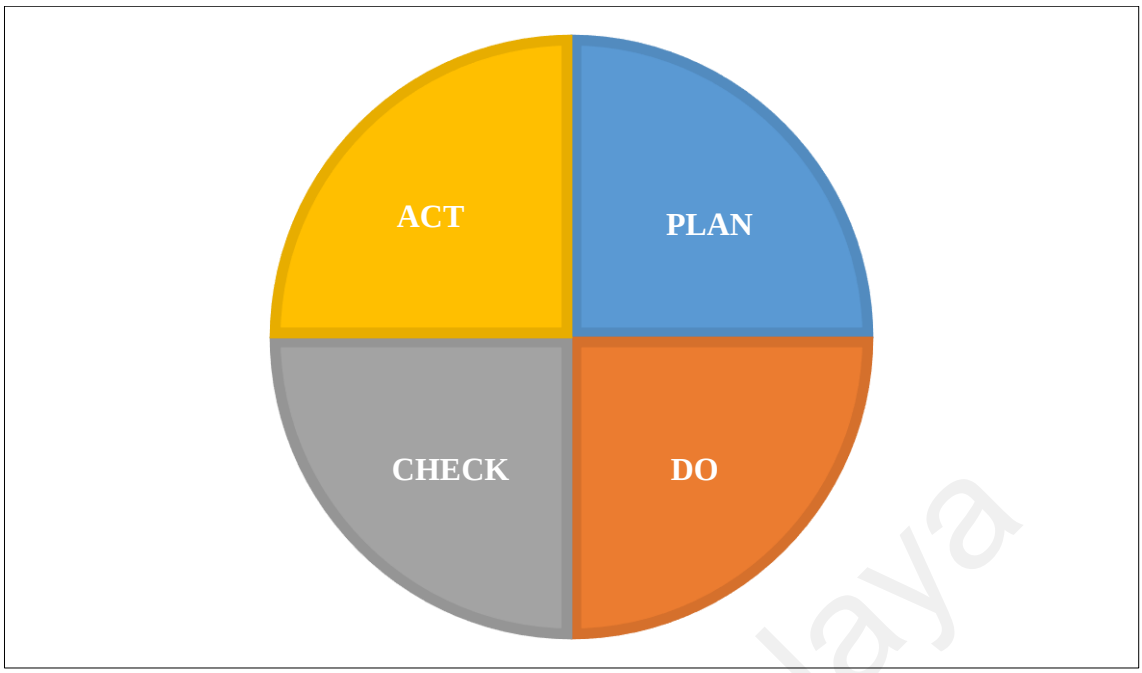

Figure 2.4: PDCA cycle

2.6 SUMMARY

The key of success of OSH implementation depends highly on the co-operation of the stakeholders and the strength of OSH's centrality. This success can be attained by regulatory inspection and sturdy enforcement of law while emphasizing public awareness towards safety and health by explaining the risk which present with a poor safety and health implementation. Therefore, risk communication plays a big role (Anyfantis, Boustras et al. 2016).

CHAPTER 3: METHODOLOGY

This chapter explains the methodology used to study the safety management system at two selected Malaysian schools through a safety audit. The assessment was carried out through site visit which allows us to have a clear and real understanding of the environment, medical records and exposure, accident prevention measures, alarm system and evacuation plan, indoor air quality, fall from height, occupational injury and illness reporting, and traffic safety. All these information were used in the safety and health checklist in order to justify and measure the occupational, safety and health compliance at both government and private schools before carrying out the audit. Then, the percentage of compliance at each aspects chosen were calculated in order to show the comparison in the level of compliance at both schools. Finally, the appropriate measures on the safety and health implementation at schools were discussed in order to minimize accidents and injuries in the school compound. The frame work of the activities is shown in figure 3.1.

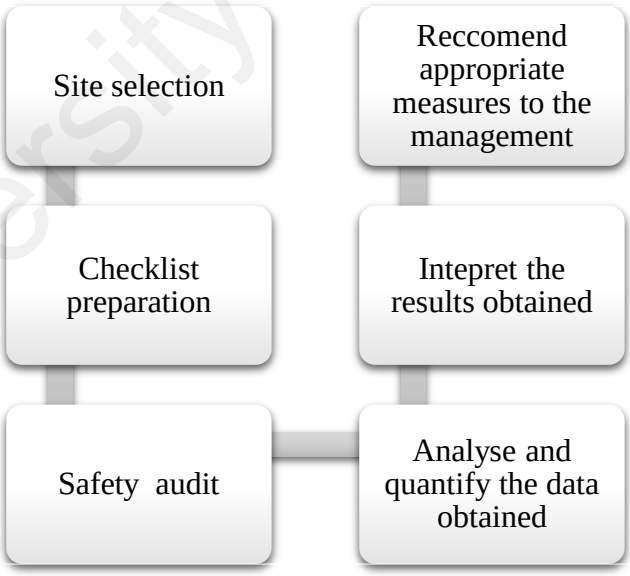

Figure 3.1: Framework of the Study

3.1 STUDY SITE

The selected study sites are two different schools which will be which is located in Penang and Selangor respectively. Table 3.1 shows the detail about the schools which were chosen as the study site.

Table 3.1: Study Site

Study Sites	**School A**	**School B**
Location	Penang, Malaysia	Selangor, Malaysia
Coordinates	5.1713° N, 100.4711° E	3.1028° N, 101.8005° E
Status	Private International School (Secondary)	Government School (Secondary)

Two schools were chosen at different status to study the gap in the compliance level in both private and international school.

3.2 SAFETY AND HEALTH AUDIT CHECKLIST PREPARATION

Safety and health audit checklist is a list of items which are required to be evaluated in order to determine the standard of safety and health compliance in an organization. A systematic checklist was developed based on the requirements in OSHA 1994. The requirements were explained in detail in Chapter 2, literature review. Evaluation standards which were listed in the checklist were included specifically by considering school as a workplace and an educational institute. The main safety and health components which were included in the evaluation checklist are:

a) Medical records and exposure
b) Signage and labels
c) Alarm system and evacuation plan
d) Indoor air quality
e) Prevention measure for falling from height

f) Injury and illness reporting

g) Traffic safety.

Based on the components chosen, all the inspection items (APPENDIX A) were listed for each and every component. The inspection checklist is prepared in a way that the inspector could carry out the inspection and respond "yes" if everything is in order and "no" for any absence of compliance. The answer should be accompanied by comments to assist in further analysis for identifying and correcting measure.

3.3 SAFETY AND HEALTH AUDIT

A walkthrough visit was carried out at the selected schools. It took three days for a complete audit at each schools. The main goals of a safety and health is to ensure a constant enhancement of an organisation or company's safety and health compliance. Practically, an audit aided in recognising the risks and its level at a particular working environment, assessing the compliance of legal safety procedures, comparing current practices with the best practices based on the legal requirement and finally recommend improvements in your safety procedures. According to Alberta Construction Safety Association (2014), the frame work of the audit process is shown in figure 3.2.

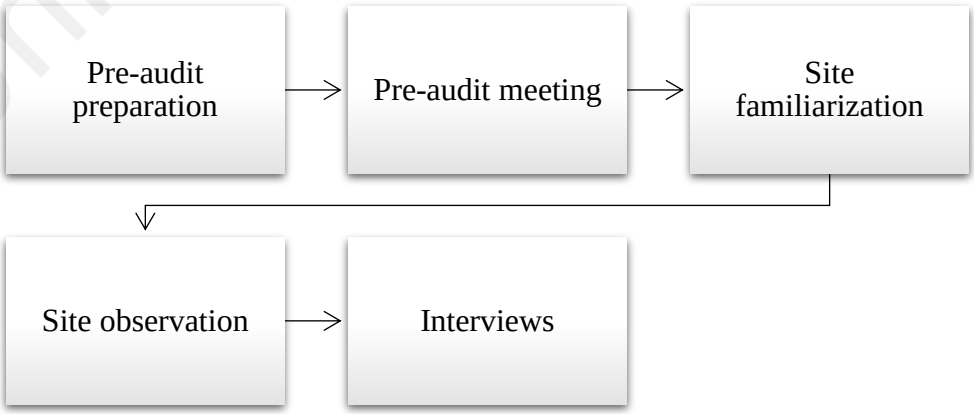

Figure 3.2: Framework of the Audit Process

3.3.1 PRE-AUDIT PREPARATION

The schools were contacted in prior to the audit in order to rectify the following information:

a) Name and position of the auditor
b) Date, time and location for the pre-audit meeting
c) Date, time and location of the audit
d) Audit document
e) Potential interviewees
f) Pre-audit site tour

The pre-audit details are attached in APPENDIX B.

3.3.2 PRE-AUDIT MEETING

The audit started with a meeting with the higher management who is the principal. Prior to the meeting, all the key points were listed down as below:

a) Aim, purpose and scope of the audit
b) Audit schedule
c) Auditor Code of Ethics (confidentiality of information)
d) Document to be used for audit process
e) Minimum scores for the audit

The pre-audit meeting details are attached in APPENDIX C.

3.3.3 SITE FAMILIARIZATION

After the pre-audit meeting, a walk through was done in the school compound in order to have a chance to observe the aspect added in the checklist.

3.3.4 SITE OBSERVATION

Each and every aspects in the checklist was observed closely and the checklist questions were answered according the existing condition of the aspects. As a safety precaution, the auditor was in covered shoe as there is no rough environment in the school compound.

3.3.5 INTERVIEWS

Some of the questions were asked to the teachers, staffs and students for as interviews confirms documentation and observation data.

3.4 QUANTIFY AND ANALYZE THE AUDIT FINDINGS

The findings obtained were converted into percentage and presented in a bar chart to show the comparison between the schools chosen. It enabled the identification of gaps in the safety compliance.

3.5 ACTION PLAN (SAFETY MEASURES)

Based on the bar chart, the strength and weakness of schools safety and health management were identified. Then, suggestions on the ways to improve safety and health management system were given.

CHAPTER 4: RESULTS AND DISCUSSION

Chapter 4 presents the results obtained through the audit, issues in safety and health management system at schools and finally appropriate safety measures for each of the aspects listed in the checklist. The main purpose is to improvise the standard of safety and health management system at Malaysian schools in order to create a safe study and work environment.

4.1 SAFETY CHECKLIST

Safety checklist which has been prepared consist of eight aspects of safety which are chosen according to the study sites which are schools. The eight aspects are; medical records and exposure, signage and labels, alarm system and evacuation plan, indoor air quality, fall from height and traffic safety. Each aspects are followed by questions based on the inspection item as below.

Study site: School A				**Date: 8th-10th May 2017**
Medical Records and Exposure				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Are the workers (teachers and staffs) and students provided the access to their personal medical and exposure records?		/		
2. Are the workers (teachers and staffs) and students made aware of the presence, place, and accessibility of medical and exposure records?		/		
3. Are the workers (teachers and staffs) and students made aware of the person responsible for maintaining and providing access to medical and exposure records?		/		
4. Are the workers (teachers and staffs) and students made aware of their rights to access to their respective medical and exposure records?		/		
5. Are all the workers (teachers and staffs) and students informed yearly of the presence, place, and accessibility of medical and exposure records?		/		

6. Are all workers (teachers and staffs) and students informed yearly of the person in charge for keeping and providing access to medical and exposure records?		/		
7. Is a copy of medical and exposure records accessible on request to any workers (teachers and staffs) and students?		/		
8. If there is any workers (teachers and staffs) or students transfers to another job or school, are all medical and exposure records transferred with the person?		/		
9. Are medical and exposure records kept for 30 years of duration?		/		

There are nine questions were listed under medical records and exposure. School A does not comply any of it and it accounts for 0% compliance. There is no pre-employment medical record for teachers and staffs. Besides, there is also no medical record found for the students. Therefore the health status of the people are not recorded and retained.

Signage and Labels				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Are all emergency buttons and electrical switches marked in red?	/			
2. Is yellow used as an instruction of caution?	/			
3. Are danger signs used only where an immediate hazard exists?	/			
4. Is the path to any manual fire alarm kept unobstructed?	/			
5. Have all workers (teachers and staffs) and students been educated that danger signs specify instant danger, caution signs specify a potential hazard, and precautionary methods are instructed whenever any of the signs witnessed?	/			
6. Are safety instruction signs used wherever safety instructions or reminders are needed?	/			
7. Do the signs have curved angles or angles (free from sharp edges)?		/		

8. Are danger signs placed in red, black, and white in color?	/			
9. Are accident prevention tags or signage used to alert people to hazards which are temporary (out of the ordinary)?	/			• Used when the floor is wet
10. Do mandatory tags have an indication word of either *Danger, Caution, Biological Hazard, or BIOHAZARD*?	/			• Mandatory hazards are found but they are insufficient.
11. Do mandatory tags explain the exact hazardous condition or the instruction to be communicated, either in words, or pictures, or both?	/			
12. Are the signage and tags readable from a distance of at least five feet?	/			
13. Is the tag's signal word and major message understandable to everyone who may be exposed to the hazard?	/			• Students could interpret when they were questioned.
14. Has everyone been informed about what those different tags mean and their respective precautions?	/			
15. Are tags attached in a way that prevents their loss with string, wire, or adhesive?	/			
16. Are danger tags used only in conditions where an instant hazard causing a threat of serious injury (death)?	/			
17. Are warning tags used to characterize a hazard level between caution and danger?	/			• Warning tags are used but they do not explain the hazard level.
18. Are biological hazard tags used to identify apparatus, flasks, rooms, and experimental animals that may contain a hazardous biological agent?		/		• Hazardous biological agents present but there is no hazard tags used

Out of 18 questions under signage and labels as an accident preventive measures, 88.9% have been complied. There are only two items which are not complied where the signage which are being used at school A does not have a curved angle and there is no appropriate biological hazards tag on the materials and apparatus used in the lab where practical activities take place.

Alarm System and Evacuation Plan				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is the school fitted in with a manual fire alarm system?	/			
2. Is the school fitted with an automatic fire alarm system?		/		
3. Are manual fire alarms fitted in the path of escape for areas which allows 50 or more persons?	/			
4. Is the path to any manual fire alarm kept unobstructed?	/			
5. Is a smoke or heat detector fitted in every classroom?		/		
6. Is the detector unobstructed?			/	
7. Is disabling, tampering, or interfering with fire detectors and the fire alarm system prohibited?	/			
8. Are fire drills carried out at least twice in a year?	/			
9. Are records taken for each fire drill comprising the date, time, and weather conditions, number of the occupants' evacuated, and total time for evacuation?	/			
10. Are all building occupants evacuated during every fire drill?	/			
11. Are all alarm and fire-detection systems conserved in operating condition?	/			
12. Is the servicing and maintenance of fire-detection systems carried out only by the people trained regarding the operation?	/			
13. Are fire detectors cleaned at a constant intervals?	/			
14. Are fire-detection systems secured from corrosion?	/			
15. Is fire-detection equipment protected from mechanical or physical impact?	/			

16. Is an approved fire safety plan been circulated to all building occupants?	/			
17. Does the official fire safety plan include (a) the location of the nearest exits and fire alarms and (b) the procedures to be followed when a smoke or fire alarm sounds?	/			
18. Is the evacuation plan noticeably posted on every floor for the occupants' reference?	/			
19. Is the evacuation plan retained to reflect alterations in the use and plan of the building?	/			
20. Are all teachers trained in the duties they are to execute under the evacuation plan?	/			
21. Are all occupants familiar with the location of the nearest manual fire alarm system?	/			
22. Can the alarm be perceived above ambient noise by all the building occupant and everyone in the area?	/			
23. Are alarms distinct and perceptible as an indication to evacuate the building?	/			
24. Are manually operating devices that are used in conjunction with alarm systems unobstructed and readily accessible?	/			
25. Is a written fire prevention plan available that includes the following items? (a) Emergency escape procedures, signals, and routes (b) Procedures for designated staff who must remain in the facility in order to shut down equipment before they evacuate (c) Procedures to account for all building occupants (d) Rescue and medical duties (e) Appropriate mechanisms for building occupants to report emergencies	 / / / / /			• Emergency exit • Teachers are responsible of this duty. • Nurse is present • Students are informed to inform the teachers immediately

26. Is a written fire prevention plan available that includes the following items?				
(a) A list of major fire hazards, their proper handling and storage procedures		/		
(b) Potential ignition sources and their control procedures		/		
(c) The type of fire protection equipment		/		
(d) The names and contact detail of the personnel responsible for maintaining emergency equipment and systems	/			
(e) The names and contact detail of the personnel responsible for control of fuel-source hazards			/	
(f) Housekeeping procedures to prevent the accumulation of flammable and combustible waste materials.	/			
27. Are the written emergency and fire prevention plans made available to building occupants for reference?	/			
28. Is training provided to all the designated staffs to help with the safe and systematic emergency evacuation of all building occupants?	/			• Fire drill
29. Is the emergency and fire prevention plan been reviewed with all new and current building occupants?	/			

Alarm system and evacuation plan is one of the most crucial part of safety management system. Almost 86.5% of the items have been complied. There is no automatic alarm system fitted in school A.

Indoor Air Quality				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is a person or any organization been selected to develop and implement an indoor air quality management plan for the school?		/		
2. Does the school have an indoor air quality management plan that contains methods for preventing and resolving indoor air quality problems?		/		

3.	Has the school been confirmed for being radon free, and have radon-mitigation system fitted?		/		
4.	Does the school district use incorporated pest management principles in all areas?		/		
5.	Is pesticides used to control infested areas?	/			
6.	Are all pesticide applicators qualified or trained on the safe use of pesticides?	/			
7.	Have painted surfaces in the school been tested for lead and has a lead control or removal program been applied?		/		
8.	Are school buildings checked once or twice each year for circumstances that may cause indoor air quality problems?		/		
9.	Is a preventative care schedule established and in operation for the HVAC system?	/			• Fan and air conditioner is present
10.	Does the HVAC preventative care include the following?: checking and/or changing air filters and belts, lubricating equipment parts, checking the motors, and confirming that all kit is in functioning order.	/			
11.	Are spoiled or inoperable constituents of the HVAC system replaced or fixed as appropriate?	/			
12.	Are reservoirs or kits of the HVAC system with stagnant water checked for microbial growth?	/			
13.	Are water leaks that could cause growth of biologic agents fixed on time?	/			
14.	Are damp or wet materials that could cause growth of biologic agents dried, replaced, removed, or cleaned on time?	/			
15.	Are microbial contaminants removed from HVAC and building system components, and from building surfaces when they are found during inspection?	/			
16.	Is general or local exhaust ventilation used where housekeeping and maintenance activities take place?	/			

17. If buildings do not have mechanical ventilation, are windows and doors are used for ventilation purpose?	/			
18. Are building-related illness complaints quickly investigated?	/			
19. Is smoking in school buildings forbidden except as part of a learning activity?	/			
20. Do written district board of education policies and procedures prohibit smoking in school buildings?		/		• No board found in the school compound.
21. During renovation work or new construction, are local ventilation or other protecting equipment used to safeguard workers and students from dust, stones, other small particles, and toxic gases, which may be harmful in certain quantities?	/			
22. Are renovation areas in occupied buildings separated so that dust and debris is confined to the renovation or construction area?	/			
23. Are protections applied in case lead-based paint is disturbed during renovation or new construction?			/	
24. When renovating or construction process, are product labels checked, or is information obtained on whether paints, adhesives, sealants, solvents, insulation, particle board, plywood, floor coverings, carpet backing, textiles or other materials contain volatile organic compounds that could be emitted during regular use?		/		
25. Is the information referred to in question above taken into account in order to select appropriate products and to determine essential steps to be taken to comply with indoor air quality regulations?		/		
26. Are employees informed at least 24 hours earlier, or on the spot in emergency situations, of work to be executed on the building may introduce air contaminants into their work area?		/		
27. Is the maintenance schedule updated on the building systems?	/			

28. Does the maintenance schedule contain the dates that the building systems maintenance was executed and the names of the persons or companies carrying out the work?	/			
29. Are maintenance schedules sustained for at least three years?	/			

The percentage of compliance for indoor air quality at school A is 65.5% only as there is not much attention given to radon, lead-paint, smoking prohibition and protection during renovation and construction. On top of that, there is also no regular monitoring on the indoor air quality.

Fall from Height				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is every open side or opening which a person may fall is covered or guarded by an effective barrier to avoid falls?	/			
2. Are fall injury deterrence systems present?		/		
3. Has it been assessed if a fall will be prevented before beating the ground or other structure?		/		
4. Is a rescue plan prepared?		/		• No rescue plan.
5. Are walkways maintained in good condition and free from obstacles?	/			

Falling from height has a very high risk but only 40% of the items are fulfilled here. There is no fall injury prevention system and rescue plan which can result in a serious injury.

Occupational Injury and Illness Reporting				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Does the school (employer) maintain a record for any injury or illness occurrence? (OSHA 300A or equivalent)		/		
2. Are all injuries or illnesses recorded within 6 working days after the occurrence?		/		

3. If the employer keeps the record as soft copy, is there any hard copy record available?		/		
4. Is a complementary record on OSHA 301 or equivalent exist for each recordable occupational injury or illness?			/	
5. Does the summary of the previous calendar year showing the totals from the OSHA 300 completed by February 1 and posted from February 1 to March 1?			/	
6. Does the summary include totals from the OSHA 300 the following information; calendar year, establishment name and address, signature of approver title, and date?			/	
7. Is the summary posted in places where information for employees is normally posted?			/	
8. Do the staffs who do not regularly report to their institution receive the summary with their pay check or in the mail?			/	
9. Are all of the injury and illness records sustained for 5 years?			/	
10. Are all the staffs and teachers, former teachers and staffs, and their representatives allowed to access to the summary and the OSHA 300 for examination and copying?			/	
11. Is every fatality or the in-patient hospitalization of three or more workers caused by job-related incident reported within 8 hours to the nearest OSHA Area Office in person or by using the OSHA toll-free central telephone number?			/	
12. Are work-related needle stick injuries and cuts from sharp objects that are contaminated with another person's blood or potentially infected material recorded in the OSHA 300 log?			/	
13. Does your institution complete OSHA's yearly survey form, if needed?			/	

School A has a poor occupational injury and illness reporting system. None of the item required in OSHA 1994 is practiced where it shows 0% compliance.

Traffic Safety				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Are separate entries and exits provided for vehicles and pedestrians including visitors?	/			• Entries and exits are controlled by the security guard.
2. Do the entries and exits protect pedestrians from being struck by vehicles?	/			
3. Does the layout of the workplace effectively separate pedestrians, vehicles and school building?	/			
4. Are systems in place to keep pedestrians and moving vehicles or plant apart like physical barriers, exclusion zones and safety zones?	/			
5. Are the roads and pathways within the workplace suitable for the types and volumes of traffic?	/			
2. Are dropping and fetching zones clearly marked?	/			
3. Are there enough parking places for vehicles and are they used?	/			
4. Are traffic directions clearly marked and visible?	/			
5. If a one way system is provided for vehicle routes within the school compound, is it properly, designed, signposted and used?	/			
6. Are vehicle routes wide enough to separate vehicles and pedestrians and for the largest vehicle using them?	/			
7. Do vehicle routes have firm and even surfaces?	/			
8. Are vehicle routes kept clear from obstructions and other hazards?	/			
9. Are vehicle routes well maintained?	/			
10. Do vehicle routes avoid sharp or blind corners?		/		

11. Are pedestrian walkways separated from vehicles?	/			
12. Where necessary are there safe pedestrian crossings on vehicle routes?	/			
13. Is there a safe pedestrian route which allows visitors to access the site office and facilities?	/			
14. Are pedestrian walkways clearly marked?	/			
15. Are pedestrian walkways well maintained?	/			
16. Have drive-through, one-way systems been used to reduce the need for reversing?	/			
17. Are non-essential workers excluded from areas where reversing occurs?	/			
18. Are vehicles slowed to safe speeds, for example speed limiters on mobile plant or chicanes on vehicle routes?			/	
19. Do drivers use the correct routes, drive within the speed limit and follow site rules?	/			
20. Are there speed limit signs?	/			
21. Are there clear signage of the school?	/			
22. Is there clear signage of pedestrian?	/			
23. Have the guards received specific training and information on traffic hazards, speed limits, parking areas?	/			
24. Is instruction about safe movement around the workplace provided to visitors and external drivers?	/			
25. Is the level of supervision adequate to check the traffic and to ensure safety of pedestrians and drivers?	/			
26. Is PPE like highly visible clothing provided and used where necessary?	/			• Guards are given uniform and fluorescent west.

Traffic safety compliance at school A is about 92% out of 26 items which are listed. This shows good traffic safety management. Next, checklist below shows the results obtained from school B.

Study site: School B				**Date: 24th-26th April 2017**
Medical Records and Exposure				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Are the workers (teachers and staffs) and students provided the access to their personal medical and exposure records?		/		• Teacher's health record is kept by the ministry.
2. Are the workers (teachers and staffs) and students made aware of the presence, place, and accessibility of medical and exposure records?	/			• Students are to fill in a personal information form which includes the student's health record. • Teachers has no access to their health record.
3. Are the workers (teachers and staffs) and students made aware of the person responsible for maintaining and providing access to medical and exposure records?		/		
4. Are the workers (teachers and staffs) and students made aware of their rights to access to their respective medical and exposure records?		/		
5. Are all the workers (teachers and staffs) and students informed yearly of the presence, place, and accessibility of medical and exposure records?		/		
6. Are all workers (teachers and staffs) and students informed yearly of the person in charge for keeping and providing access to medical and exposure records?		/		
7. Is a copy of medical and exposure records accessible on request to any workers (teachers and staffs) and students?		/		
8. If there is any workers (teachers and staffs) or students transfers to another		/		

	job or school, are all medical and exposure records transferred with the person?				
9.	Are medical and exposure records kept for 30 years of duration?		/		

Only 11% which accounts for 1 out of 9 questions were fulfilled for medical records and exposure at school B. There were medical record collected when the teacher joined for their service but they have no access to it. On the other hand, the student's health record are filled up in the student information form during their admission and it is updated every year.

Signage and Labels					
Inspection Item		**Yes**	**No**	**N/A**	**Comments**
1.	Are all emergency buttons and electrical switches marked in red?	/			
2.	Is yellow used as an instruction of caution?	/			
3.	Are danger signs used only where an immediate hazard exists?	/			
4.	Is the path to any manual fire alarm kept unobstructed?	/			
5.	Have all workers (teachers and staffs) and students been educated that danger signs specify instant danger, caution signs specify a potential hazard, and precautionary methods are instructed whenever any of the signs witnessed?	/			• Staffs are not educated on the danger signs. • Students are exposed during their Science classes.
6.	Are safety instruction signs used wherever safety instructions or reminders are needed?	/			
7.	Do the signs have curved angles or angles (free from sharp edges)?		/		
8.	Are danger signs placed in red, black, and white in color?	/			
9.	Are accident prevention tags or signage used to alert people to hazards which are temporary (out of the ordinary)?	/			

10. Do mandatory tags have an indication word of either *Danger, Caution, Biological Hazard, or BIOHAZARD*?	/			• Mandatory hazards are found but not placed at appropriate place.
11. Do mandatory tags explain the exact hazardous condition or the instruction to be communicated, either in words, or pictures, or both?	/			• Not explained in detail.
12. Are the signage and tags readable from a distance of at least five feet?	/			
13. Is the tag's signal word and major message understandable to everyone who may be exposed to the hazard?	/			• Students could interpret when they were questioned.
14. Has everyone been informed about what those different tags mean and their respective precautions?	/			• Students are exposed during their science classes.
15. Are tags attached in a way that prevents their loss with string, wire, or adhesive?	/			
16. Are danger tags used only in conditions where an instant hazard causing a threat of serious injury (death)?	/			
17. Are warning tags used to characterize a hazard level between caution and danger?	/			• Warning tags are used but they do not explain the hazard level.
18. Are biological hazard tags used to identify apparatus, flasks, rooms, and experimental animals that may contain a hazardous biological agent?	/			

Signage and labels fulfilled about 88.9% of the items. Yet, there is no curved angle for signs which can be dangerous especially to the children.

Alarm System and Evacuation Plan				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is the school fitted in with a manual fire alarm system?	/			
2. Is the school fitted with an automatic fire alarm system?		/		
3. Are manual fire alarms fitted in the path of escape for areas which allows 50 or more persons?	/			
4. Is the distance to any manual fire alarm no more than 200 feet of unobstructed horizontal distance on the same floor?		/		• The pathway towards the fire alarm system is obstructed.
5. Is a smoke or heat detector fitted in every classroom?		/		
6. Is the detector unobstructed?			/	
7. Is disabling, tampering, or interfering with fire detectors and the fire alarm system prohibited?			/	
8. Are fire drills carried out at least twice in a year?		/		
9. Are records taken for each fire drill comprising the date, time, and weather conditions, number of the occupants' evacuated, and total time for evacuation?	/			
10. Are all building occupants evacuated during every fire drill?	/			
11. Are all alarm and fire-detection systems conserved in operating condition?		/		
12. Is the servicing and maintenance of fire-detection systems carried out only by the people trained regarding the operation?	/			
13. Are fire detectors cleaned at a constant intervals?	/			
14. Are fire-detection systems secured from corrosion?	/			
15. Is fire-detection equipment protected from mechanical or physical impact?		/		• Not protected (Things are placed on the fire detection equipment) and it is found to be rusted
16. Is an approved fire safety plan been circulated to all building occupants?	/			• Not distributed.

17. Does the official fire safety plan include (a) the location of the nearest exits and fire alarms and (b) the procedures to be followed when a smoke or fire alarm sounds?	/			
18. Is the evacuation plan noticeably posted on every floor for the occupants' reference?		/		
19. Is the evacuation plan retained to reflect alterations in the use and plan of the building?	/			
20. Are all teachers trained in the duties they are to execute under the evacuation plan?	/			
21. Are all occupants familiar with the location of the nearest manual fire alarm system?	/			
22. Can the alarm be perceived above ambient noise by all the building occupant and everyone in the area?	/			
23. Are alarms distinct and perceptible as an indication to evacuate the building?	/			
24. Are manually operating devices that are used in conjunction with alarm systems unobstructed and readily accessible?	/			
25. Is a written fire prevention plan available that includes the following items? (a) Emergency escape procedures, signals, and routes (b) Procedures for designated staff who must remain in the facility in order to shut down equipment before they evacuate (c) Procedures to account for all building occupants (d) Rescue and medical duties (e) Appropriate mechanisms for building occupants to report emergencies	 / / / / /			• "*Laluan kecemasan*" • Teachers are responsible of this duty. • Students are informed to report to the teachers immediately
26. Is a written fire prevention plan available that includes the following items?		/		

(a) A list of major fire hazards, their proper handling and storage procedures (b) Potential ignition sources and their control procedures (c) The type of fire protection equipment (d) The names and contact detail of the personnel responsible for maintaining emergency equipment and systems (e) The names and contact detail of the personnel responsible for control of fuel-source hazards (f) Housekeeping procedures to prevent the accumulation of flammable and combustible waste materials.	/ / /	/ 	 / /	
27. Are the written emergency and fire prevention plans made available to building occupants for reference?	/			• Not available at all the buildings or floor.
28. Is training provided to all the designated staffs to help with the safe and systematic emergency evacuation of all building occupants?	/			• Fire drill
29. Is the emergency and fire prevention plan been reviewed with all new and current building occupants?		/		

Alarm system and fire evacuation plan compliance shows about 71.4%. Many items are absent in school B. The pathway to the emergency alarm system is obstructed, fire drills are not carried out twice a year, some of the fire alarm system are not in operating state, emergency evacuation plan are not made visible to all the building occupants at every floor and it is also not reviewed with all the new building occupant as the plan is not updated.

Indoor Air Quality				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is someone selected to develop and implement an indoor air quality management plan for your school district?		/		

2. Does your district have an indoor air quality management plan that includes steps for avoiding and solving indoor air quality complications?			/	
3. Has your school district been verified for radon, and have radon-mitigation systems installed where needed?	/			
4. Does your school district use integrated pest management principles in all areas?	/			
5. Is spot-treatment of pesticides used to control infested areas?	/			
6. Are all pesticide applicators trained in the safe use of pesticides?	/			
7. Have painted surfaces in your district been tested for lead-based paint, and has a lead control or removal program been implemented?		/		
8. Are school buildings inspected once or twice each year for conditions that may lead to indoor air quality problems?		/		
9. Is a preventive maintenance schedule established and in operation for the heating, ventilation, and air conditioning (HVAC) system? Is the schedule in accordance with the manufacturer's recommendations or accepted practice for the HVAC system?	/			• Fan is present
10. Does the HVAC preventive maintenance schedule include the following?: checking and/or changing air filters and belts, lubricating equipment parts, checking the motors, and confirming that all equipment is in operating order.	/			
11. Are damaged or inoperable components of the HVAC system replaced or repaired as appropriate?	/			
12. Are reservoirs or parts of the HVAC system with standing water checked visually for microbial growth?	/			
13. Are water leaks that could promote growth of biologic agents promptly repaired?		/		• Toilet is leaking causing moss growth.

14. Are damp or wet materials that could promote growth of biologic agents promptly dried, replaced, removed, or cleaned?		/		
15. Are microbial contaminants removed from ductwork, humidifiers, other HVAC and building system components, and from building surfaces such as carpeting and ceiling tiles when found during regular or emergency maintenance activities or visual inspection?			/	
16. Is general or local exhaust ventilation used where housekeeping and maintenance activities could reasonably be expected to result in exposure to hazardous substances above applicable exposure limits?			/	
17. If buildings do not have mechanical ventilation, are windows, doors, vents, stacks, and other portals used for natural ventilation operating properly?	/			
18. Are complaints promptly investigated that may involve a building-related illness?			/	
19. Is smoking in school buildings prohibited except as part of a classroom instruction or a theatrical production?	/			
20. Do written district board of education policies and procedures prohibit smoking in school buildings?		/		• No board found in the school compound.
21. During renovation work or new construction, are local ventilation or other protective devices used to safeguard employees and students from dust, stones, other small particles, and toxic gases, which may be harmful in certain quantities?			/	
22. Are renovation areas in occupied buildings isolated so that dust and debris is confined to the renovation or construction area?			/	
23. Are precautions implemented in case lead-based paint is disturbed during renovation or new construction?		/		
24. When renovating or during new construction, are product labels checked, or is information obtained		/		

on whether paints, adhesives, sealants, solvents, insulation, particle board, plywood, floor coverings, carpet backing, textiles or other materials contain volatile organic compounds that could be emitted during regular use?				
25. Is the information referred to in Question above used to select products and to determine necessary measures to be taken to comply with indoor air quality regulations?			/	
26. Are employees notified at least 24 hours in advance, or promptly in emergency situations, of work to be performed on the building that may introduce air contaminants into their work area?		/		
27. Is the maintenance schedule updated to show all maintenance performed on the building systems?	/			
28. Does the maintenance schedule include the dates that the building systems maintenance was performed and the names of the persons or companies performing the work?	/			
29. Are maintenance schedules retained for at least three years?	/			

There are 29 questions for this aspect and 7 of them are not applicable. Therefore the percentage of compliance of the items is 59%. There is no specific person or organization to monitor the indoor air quality in the school building, lead-based paint is not given attention, growth of biological agent at the washroom, no smoking prohibition board and there is no prior notice on any emergency situation.

Fall from Height				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is every open side or opening which a person may fall is covered or guarded by an effective barrier to avoid falls?	/			
2. Are fall injury deterrence systems present?		/		
3. Has it been assessed if a fall will be prevented before beating the ground or other structure?		/		

4. Is a rescue plan prepared?		/		• No rescue plan.
5. Are walkways maintained in good condition and free from obstacles?	/			

Only 40% of the requirement for the preventive measure from falling from height has been achieved. There is no fall injury prevention system and rescue plan is absent.

Occupational Injury And Illness Reporting				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
2. Does the school (employer) maintain a record for any injury or illness occurrence? (OSHA 300A or equivalent)		/		
3. Are all injuries or illnesses recorded within 6 working days after the occurrence?		/		
4. If the employer keeps the record as soft copy, is there any hard copy record available?		/		
5. Is a complementary record on OSHA 301 or equivalent exist for each recordable occupational injury or illness?			/	
6. Does the summary of the previous calendar year showing the totals from the OSHA 300 completed by February 1 and posted from February 1 to March 1?			/	
7. Does the summary include totals from the OSHA 300 the following information; calendar year, establishment name and address, signature of approver title, and date?			/	
8. Is the summary posted in places where information for employees is normally posted?			/	
9. Do the staffs who do not regularly report to their institution receive the summary with their pay check or in the mail?			/	
10. Are all of the injury and illness records sustained for 5 years?			/	
11. Are all the staffs and teachers, former teachers and staffs, and their representatives allowed to access to the summary and the OSHA 300 for examination and copying?			/	

12. Is every fatality or the in-patient hospitalization of three or more workers caused by job-related incident reported within 8 hours to the nearest OSHA Area Office in person or by using the OSHA toll-free central telephone number?			/	
13. Are work-related needle stick injuries and cuts from sharp objects that are contaminated with another person's blood or potentially infected material recorded in the OSHA 300 log?			/	
14. Does your institution complete OSHA's yearly survey form, if needed?			/	

School A has a poor occupational injury and illness reporting system also. None of the item required in OSHA 1994 is practiced where it shows 0% compliance.

Traffic Safety				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Are separate entries and exits provided for vehicles and pedestrians including visitors?		/		• Entries and exits are the same but they are controlled by the guard.
2. Do the entries and exits protect pedestrians from being struck by vehicles?	/			
3. Does the layout of the workplace effectively separate pedestrians, vehicles and school building?	/			
4. Are systems in place to keep pedestrians and moving vehicles or plant apart like physical barriers, exclusion zones and safety zones?	/			
5. Are the roads and pathways within the workplace suitable for the types and volumes of traffic?	/			
6. Are dropping and fetching zones clearly marked?		/		
7. Are there enough parking places for vehicles and are they used?	/			
8. Are traffic directions clearly marked and visible?		/		

9. If a one way system is provided for vehicle routes within the school compound, is it properly, designed, signposted and used?		/		• Not signposted but they are controlled by the guards.
10. Are vehicle routes wide enough to separate vehicles and pedestrians and for the largest vehicle using them?	/			
11. Do vehicle routes have firm and even surfaces?	/			
12. Are vehicle routes kept clear from obstructions and other hazards?	/			
13. Are vehicle routes well maintained?	/			
14. Do vehicle routes avoid sharp or blind corners?		/		
15. Are pedestrian walkways separated from vehicles?	/			
16. Where necessary are there safe pedestrian crossings on vehicle routes?	/			
17. Is there a safe pedestrian route which allows visitors to access the site office and facilities?	/			
18. Are pedestrian walkways clearly marked?		/		
19. Are pedestrian walkways well maintained?	/			
20. Have drive-through, one-way systems been used to reduce the need for reversing?		/		
21. Are non-essential workers excluded from areas where reversing occurs?	/			• Humps are made.
22. Are vehicles slowed to safe speeds, for example speed limiters on mobile plant or chicanes on vehicle routes?			/	
23. Do drivers use the correct routes, drive within the speed limit and follow site rules?	/			
24. Are there speed limit signs?	/			
25. Are there clear signage of the school?	/			

26. Is there clear signage of pedestrian?	/			
27. Have the guards received specific training and information on traffic hazards, speed limits, parking areas?	/			
28. Is instruction about safe movement around the workplace provided to visitors and external drivers?	/			
29. Is the level of supervision adequate to check the traffic and to ensure safety of pedestrians and drivers?	/			
30. Is PPE like highly visible clothing provided and used where necessary?	/			• Guards are given uniform and fluorescent west.

Traffic safety compliance at school B covers 75.9% because there is no separate entries and exit, dropping and fetching zones are not clearly marked, traffic directions are not clearly marked, inefficient one way system, and pedestrian walkway is also not marked clearly.

4.2 COMPARISON IN COMPLIANCE

Bar charts below illustrates the comparison in the percentage of compliance between school A and school B. Figure 4.1 shows the compliance level in term of medical records and exposure. School A and School B has 0% and 11.11% respectively which is lower than 40%.

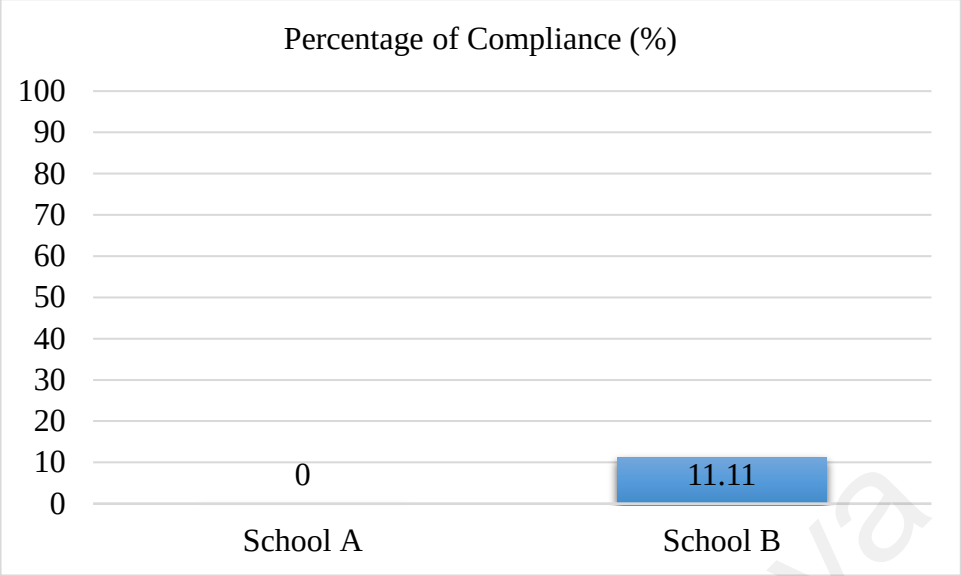

Figure 4.1: Medical Records and Exposure

This indicates that both schools have a poor safety management in term of medical records and exposure. Medical records and exposure are essential to provide information on the exposure which the employee has been exposed to. This will allow the employer take appropriate safety measure on the existing hazard if there is any hazard at the work environment to prevent further exposure. This will also enable the employee to get medical aid. By this, the government, organization or the employee could save lives, money and time. This will eventually improvise the productivity of an organization. This is because continuous exposure will lead to health problems and absentees. Thus, prevention and mitigation will lead to a productive work and study environment.

Figure 4.2 shows how both schools comply with signage and labels. Both school's compliance is at 88.9%. It can be said that a slight enhancement would do in order to sustain the safety culture in term of signage and label. It is very important to place signage and labels at appropriate places and in appropriate manner as it involves children. Labels and signage are the key to prevent accidents and injuries.

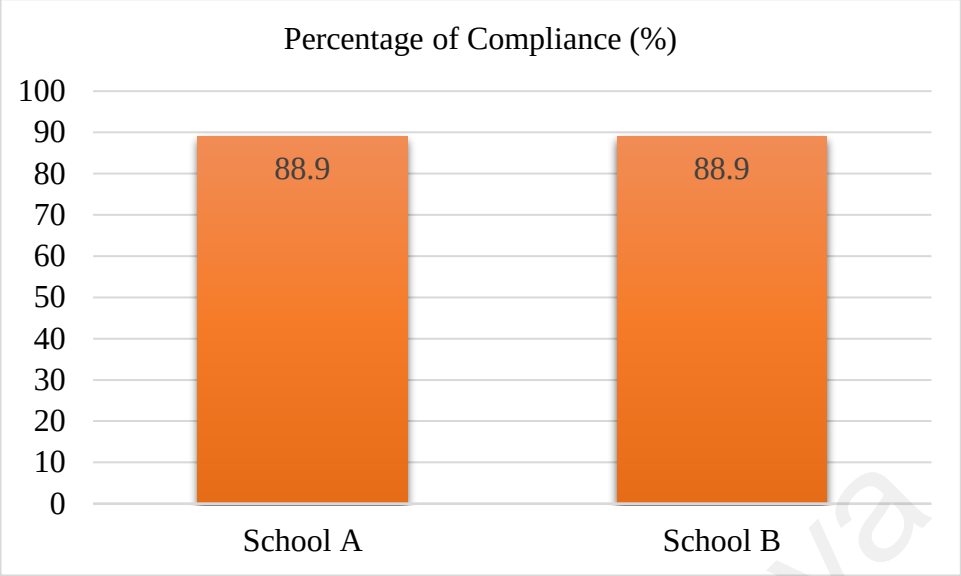

Figure 4.2: Signage and Labels

The Health and Safety (Safety Signs and Signals) Regulations 1996 (2015), says that the main purpose of safety and health signs to assist people to provide clear message on the hazard in order to prevent accident, injuries or near misses. This is mainly when the teachers and children carry out practical lessons at the lab where many hazardous substances are kept. For instance, an acid bottle without a label could lead to a major injury. Added to that, a wet floor has to be indicated that it is wet by signs to prevent slips and trips.

Next, the bar chart below in figure 4.3 show the results of comparison alarm system and evacuation plan. The compliance level of school A differs by 15.1% than school B. School A has a higher compliance level. Even though both schools exceeds 40% compliance, there are still improvement which has to be done as there is no adequate maintenance for the alarm system, evacuation plans are not distributed to all buildings, passage towards the alarm system and fire drills are only carried out once in a year especially in school B.

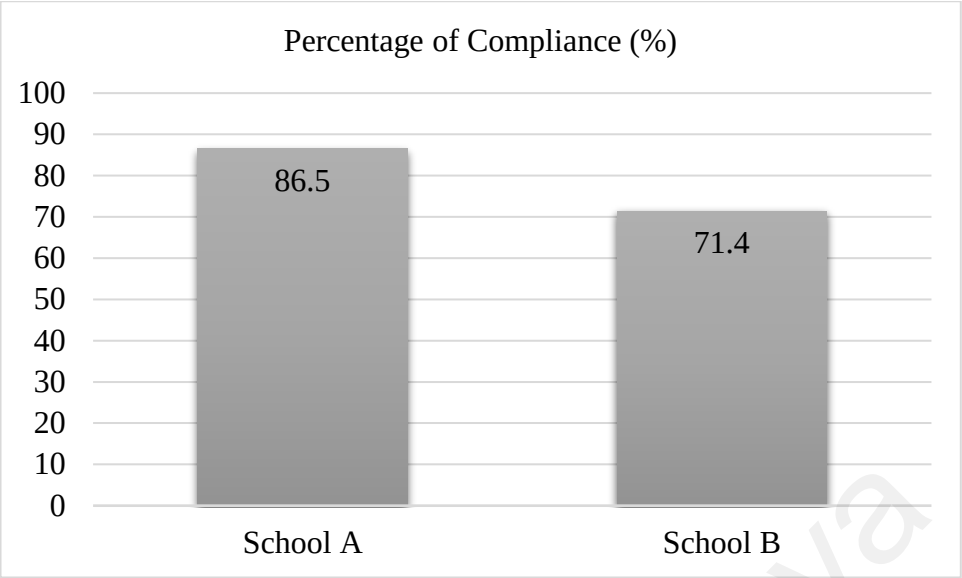

Figure 4.3: Alarm System and Evacuation Plan

Occupational Safety and Health Act 1994 [Act 514] P.U. (A) 39/1996 Occupational Safety And Health (Control Of Industrial Major Accident Hazards) Regulations 1996 emphasizes safe operation, on-site emergency plan and notification of major accidents. According to the audit results, in order for a proper emergency evacuation plan, certain improvements have to be done.

Figure 4.4 below illustrates differences in indoor air quality management at both schools. School A has a higher compliance than school B which are 65.5% and 59% respectively. Indoor air quality is an important aspect as it can cause various illness if appropriate maintenance is not done on time.

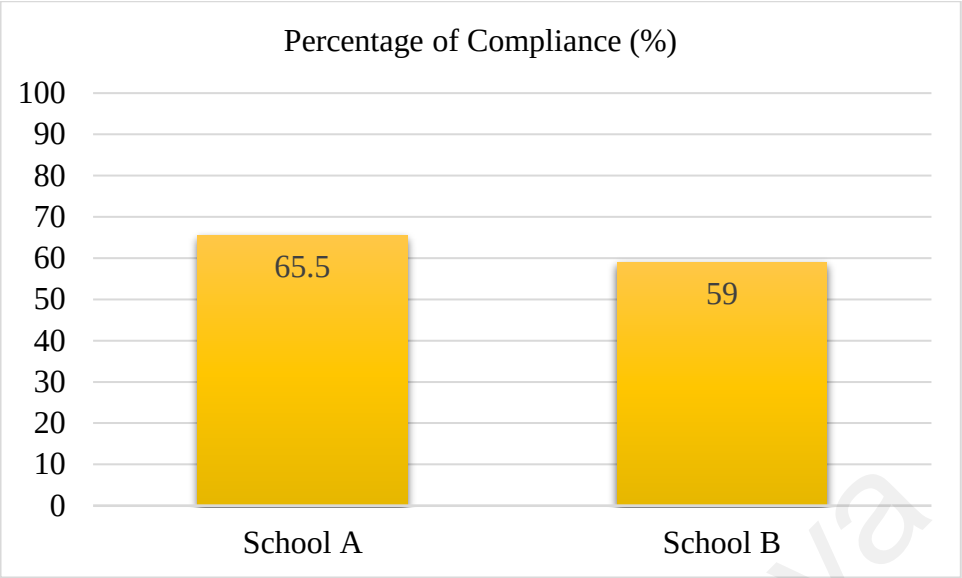

Figure 4.4: Indoor Air Quality

(Daisey, Angell et al. 2003) said that ventilation maintenance is hardly given attention although it has been found to be the main cause diseases at schools. The pollutants which are found are TVOC, formaldehyde and biological component.

According to United States Environmental Protection Agency (2017), Formaldehyde can get into the body through inhalation and results in eye, nose and throat irritation (Toxic Substances Portal – Formaldehyde, 2015). The sources of TVOC are normally paint, aerosol sprays, disinfectants and pesticides. TVOC causes throat, nose and eye irritation, headaches and at serious cases they can lead to damage of kidney, liver and central nervous system.

Figure 4.5 shows the compliance of safety measures for falling from height. Both schools scored 40% which is inadequate both schools have four storey building. The safety measures to prevent and mitigate falls has to be strengthen. Safety measures are intended to prevent falls and mitigate the impact of falls.

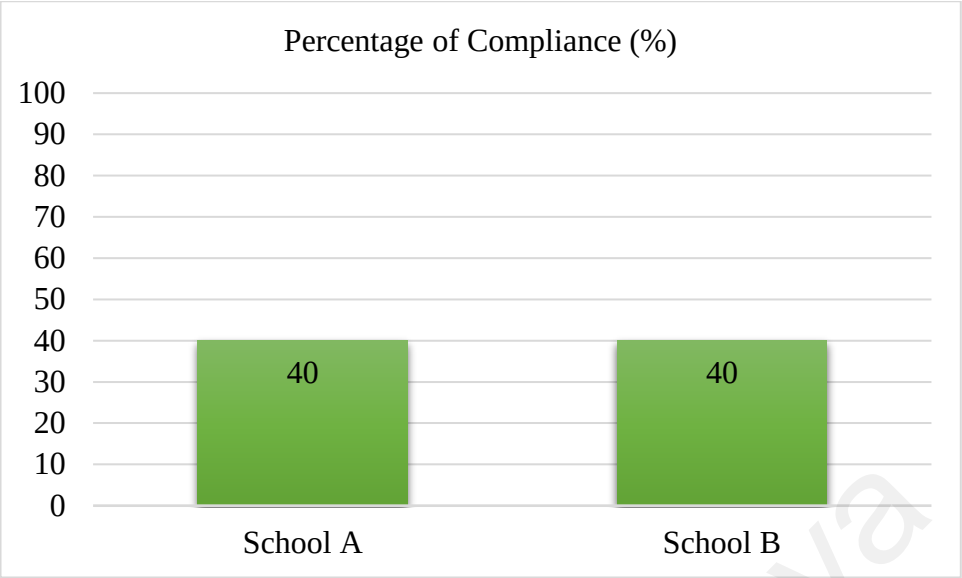

Figure 4.5: Safety Measures for Falling from Height

According to figure 4.6, the percentage of compliance of occupational injury and illness reporting is at the least where there is no injury or illness reporting is done at both schools. There is no evidence or future reference. Absence of reference will harden the process of investigation, prevention and mitigation.

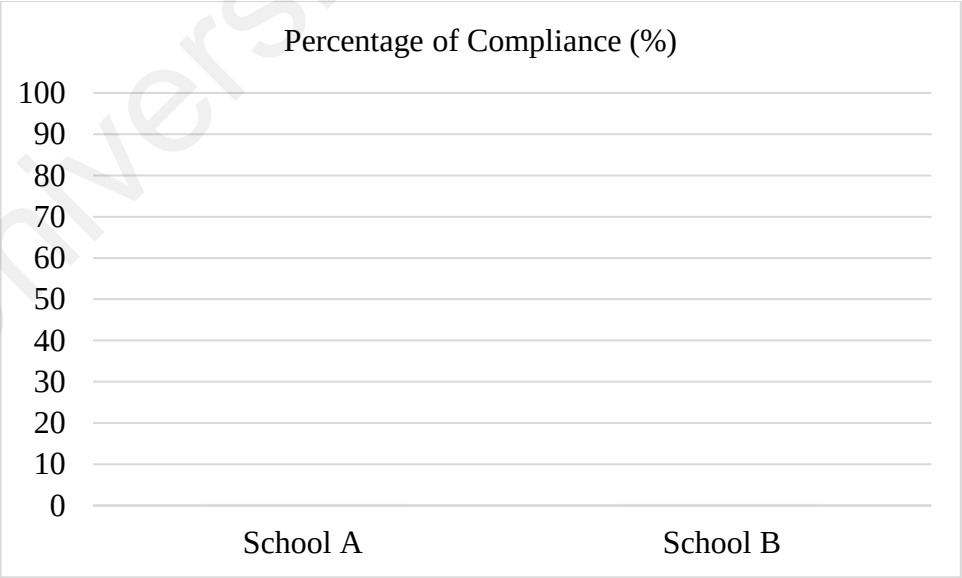

Figure 4.6: Occupational Injury and Illness Reporting

Occupational Safety and Health (Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease) Regulations 2004

explains on OSHA's requirement of recordkeeping in a log of injuries and illness at any organization which consist of more than 10 employees. This means that every organization with more than 10 workers has to establish a log for occupational Injury and illness reporting.

Figure 4.7 explains on the compliance level of traffic safety at both schools which are 92% and 75.9% each. School A has a higher score as compared to school B.

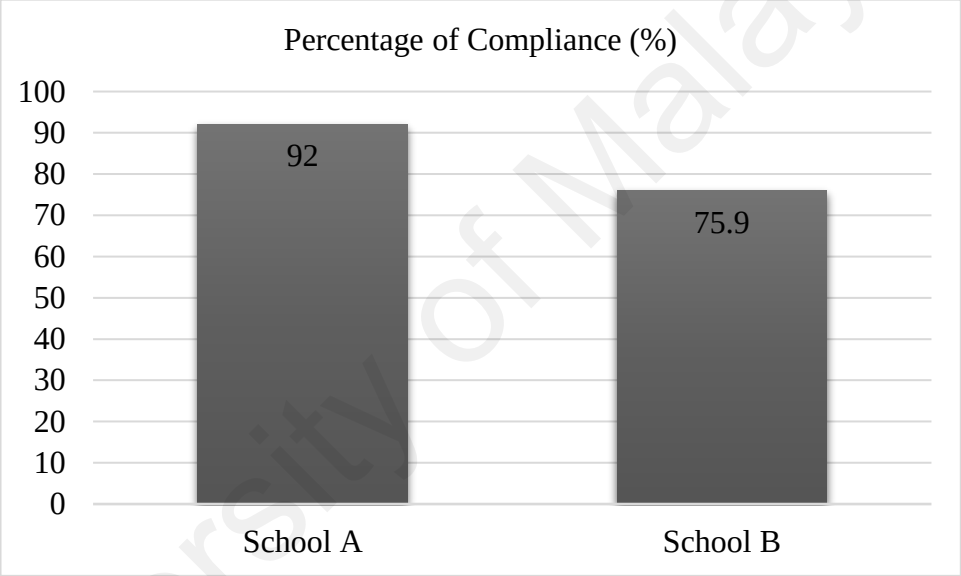

Figure 4.7: Traffic Safety

4.3 Action Plan (Safety Measures)

Every organization has to enhance their safety and health management system as it improvise the quality and performance of the whole organization. An organization which integrate safety and health and implement them will be able to succeed. A scheduled safety and health audit has to be carried out to keep track of the safe environment and actions can be taken promptly against any hazardous condition if there is any.

Therefore, the very step in order to create a safe and productive work and study environment, schools have to adopt the OSHA 1994 into their safety and health management system. A complete and appropriate guideline is a must to ensure that a system flowing in manner. According OSHA 1994, an organization has to employ a safety and health officer who carries out the role of implementing safety and health at work place. Adopting OSHA 1994 will need the schools to have a safety and health officer to monitor and carry out safety and health program for the people at school.

Table 4.1: Action plan

Safety Aspects	Action Plan
Medical record and exposure	The components of Medical Surveillance Program are as below: 1) Pre-employment and pre-placement medical examination. 2) Biological monitoring and biological effect monitoring. 3) Health effects monitoring. 4) Investigation of occupational disease and poisoning including workplace inspections. 5) Notification of occupational disease and poisoning. 6) Assist in disability assessment. 7) Return to work examination after medical removal protection. 8) Record keeping and monitoring. (Guidelines on Medical Surveillance, 2001)
Signage and Labels	Signage and label efficiency improvement can be done by the following 1) Create awareness among teachers, students and staffs on the meaning of the signage and labels

	2) Place appropriate signs and labels at the places where it is needed. 3) Attach it in a way that it is not damaged by any external obstruction. 4) Regular inspection and update on the signage and labels placed.
Alarm System and Evacuation Plan	Elements that has to be improves for alarm system and evacuation are as follow: 1) Train enough people to assist the safe emergency evacuation plan. 2) Plan and review the emergency evacuation plan. 3) Distribute the plan to all the floors. 4) Carry out fire drill at least twice a year to update the new occupants. 5) Ensure that all the equipment and tools for emergency alarm system is maintained under good condition without obstruction. (Take prompt action if there is damage) 6) Mark emergency escape routes clearly. 7) Establish a wide assembly area in case of emergency. Ensure that space is not being used for other purposes. (Emergency and Evacuation Planning Guide for Employers, n.d).
Indoor Air Quality	Indoor air quality can be improved and maintained by the following: 1) Select a person to monitor the indoor air quality od the school building. 2) Monitor the HVOC components and carry out a scheduled maintenance

	3) Take quick action on any growth of biological agents. 4) Evacuate the occupants from the renovation or construction area to ensure that the pollutants are confined in that area.
Safety Measures for Falling from Height	The risk of falling from height can be reduced by the following: 1) Create awareness on the impact of fall 2) Prepare a rescue plan
Occupational Injury and Illness Reporting	Occupational injury and illness reporting has to be established by the following: 1) Record injury and illness into OSHA 300 or any equivalent form. 2) Record incidents within 6 working days.
Traffic Safety	Crucial elements to be added to enhance traffic safety are as follows: • Only authorized vehicles and people are allowed into the compound. • Keep all traffic safety measures at workplaces under supervision. • Keep all the traffic signage and display under observation. • Make sure that the pedestrians use the designated walkway. • Make sure that the speed limits are obeyed. (Workplace safety and health guidelines: workplace traffic safety management, 2014)

Adopting a complete Occupational Safety and Health management system into an organization will be a success with the cooperation from both employers and employees. A strong implementation with the stakeholder obeying it will enhance the safety culture of an organization to a productive level at its best quality. Implementation must also be followed by continuous improvement as suggested by Deming cycle which is also known as PDCA cycle. Plan, Do, Check, Act and repeat.

CHAPTER 5: CONCLUSION AND RECCOMENDATION

5.1 CONCLUSION

The study has concluded that selected schools do not completely implement the requirements stated in OSHA 1994. The audited aspects are to score at least 40%. Signage and labels, alarm system and evacuation plan, indoor air quality and traffic safety management scored higher than 40% which indicates the effort of compliance. Safety measures for falling from height scored 40%. Medical records and exposure and occupational injury and illness reporting scored less than 40% which shows a very poor compliance level.

Overall, school A which is a private international school has a better compliance standard as compared to school B which is a government school. A poor safety and health management system will not result in productive and safe environment.

A proper implementation has to be carried out in order to practice safety culture at its best. Students, teachers and staff will feel safe in their working environment.

5.2 RECOMENDATIONS

Based on the study, it is found that there are lack of studies and attention onto schools regarding the safety and health management system. Therefore, it is strongly recommended to carry out studies on the safety aspect of schools we have our young generation there at the schools. They need a safe study environment.

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APPENDIX

APPENDIX A

SAFETY CHECKLIST

Study site:	Date:			
Medical Records and Exposure				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Are the workers (teachers and staffs) and students provided the access to their personal medical and exposure records?				
2. Are the workers (teachers and staffs) and students made aware of the presence, place, and accessibility of medical and exposure records?				
3. Are the workers (teachers and staffs) and students made aware of the person responsible for maintaining and providing access to medical and exposure records?				
4. Are the workers (teachers and staffs) and students made aware of their rights to access to their respective medical and exposure records?				
5. Are all the workers (teachers and staffs) and students informed yearly of the presence, place, and accessibility of medical and exposure records?				
6. Are all workers (teachers and staffs) and students informed yearly of the person in charge for keeping and providing access to medical and exposure records?				
7. Is a copy of medical and exposure records accessible on request to any workers (teachers and staffs) and students?				
8. If there is any workers (teachers and staffs) or students transfers to another job or school, are all medical and				

exposure records transferred with the person?				
9. Are medical and exposure records kept for 30 years of duration?				

Signage and Labels				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Are all emergency buttons and electrical switches marked in red?				
2. Is yellow used as an instruction of caution?				
3. Are danger signs used only where an immediate hazard exists?				
4. Is the path to any manual fire alarm kept unobstructed?				
5. Have all workers (teachers and staffs) and students been educated that danger signs specify instant danger, caution signs specify a potential hazard, and precautionary methods are instructed whenever any of the signs witnessed?				
6. Are safety instruction signs used wherever safety instructions or reminders are needed?				
7. Do the signs have curved angles or angles (free from sharp edges)?				
8. Are danger signs placed in red, black, and white in color?				
9. Are accident prevention tags or signage used to alert people to hazards which are temporary (out of the ordinary)?				
10. Do mandatory tags have an indication word of either *Danger, Caution, Biological Hazard, or BIOHAZARD*?				
11. Do mandatory tags explain the exact hazardous condition or the instruction to be communicated, either in words, or pictures, or both?				
12. Are the signage and tags readable from a distance of at least five feet?				
13. Is the tag's signal word and major message understandable to everyone who may be exposed to the hazard?				
14. Has everyone been informed about what those different tags mean and their respective precautions?				

15. Are tags attached in a way that prevents their loss with string, wire, or adhesive?				
16. Are danger tags used only in conditions where an instant hazard causing a threat of serious injury (death)?				
17. Are warning tags used to characterize a hazard level between caution and danger?				
18. Are biological hazard tags used to identify apparatus, flasks, rooms, and experimental animals that may contain a hazardous biological agent?				

Alarm System and Evacuation Plan				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is the school fitted in with a manual fire alarm system?				
2. Is the school fitted with an automatic fire alarm system?				
3. Are manual fire alarms fitted in the path of escape for areas which allows 50 or more persons?				
4. Is the path to any manual fire alarm kept unobstructed?				
5. Is a smoke or heat detector fitted in every classroom?				
6. Is the detector unobstructed?				
7. Is inactivating, interfering, or intrusive with fire detectors and the fire alarm system prohibited?				
8. Are fire drills carried out at least twice in a year?				
9. Are records taken for each fire drill comprising the date, time, and weather conditions, number of the occupants' evacuated, and total time for evacuation?				
10. Are all building occupants evacuated during every fire drill?				
11. Are all alarm and fire-detection systems conserved in operating condition?				
12. Is the servicing and maintenance of fire-detection systems carried out only by the people trained regarding the operation?				
13. Are fire detectors cleaned at a constant intervals?				

14. Are fire-detection systems secured from corrosion?				
15. Is fire-detection equipment protected from mechanical or physical impact?				
16. Is an approved fire safety plan been circulated to all building occupants?				
17. Does the official fire safety plan include (a) the location of the nearest exits and fire alarms and (b) the procedures to be followed when a smoke or fire alarm sounds?				
18. Is the evacuation plan noticeably posted on every floor for the occupants' reference?				
19. Is the evacuation plan retained to reflect alterations in the use and plan of the building?				
20. Are all teachers trained in the duties they are to execute under the evacuation plan?				
21. Are all occupants familiar with the location of the nearest manual fire alarm system?				
22. Can the alarm be perceived above ambient noise by all the building occupant and everyone in the area?				
23. Are alarms distinct and perceptible as an indication to evacuate the building?				
24. Are manually functioning devices that are used in combination with alarm systems unobstructed and readily accessible?				
25. Is a written fire hindrance plan available that includes the following items? a) Emergency escape procedures, signals, and routes b) Procedures for designated staff who must remain in the facility in order to shut down equipment before they evacuate c) Procedures to account for all building occupants d) Rescue and medical duties e) Appropriate mechanisms for building occupants to report emergencies				
26. Is a written fire prevention plan available that includes the following items?				

a) A list of major fire hazards, their proper handling and storage procedures b) Potential ignition sources and their control procedures c) The type of fire protection equipment d) The names and contact detail of the personnel responsible for maintaining emergency equipment and systems e) The names and contact detail of the personnel responsible for control of fuel-source hazards f) Housekeeping procedures to prevent the accumulation of flammable and combustible waste materials.				
27. Are the written emergency and fire prevention plans made available to building occupants for reference?				
28. Is training provided to all the designated staffs to help with the safe and systematic emergency evacuation of all building occupants?				
29. Is the emergency and fire prevention plan been reviewed with all new and current building occupants?				

Indoor Air Quality				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is a person or any organisation been selected to develop and implement an indoor air quality management plan for the school?				
2. Does the school have an indoor air quality management plan that contains methods for preventing and resolving indoor air quality problems?				
3. Has the school been confirmed for being radon free, and have radon-mitigation system fitted?				
4. Does the school district use incorporated pest management principles in all areas?				
5. Is pesticides used to control infested areas?				
6. Are all pesticide applicators qualified or trained on the safe use of pesticides?				
7. Have painted surfaces in the school been tested for lead and has a lead				

control or removal program been applied?				
8. Are school buildings checked once or twice each year for circumstances that may cause indoor air quality problems?				
9. Is a preventative care schedule established and in operation for the HVAC system?				
10. Does the HVAC preventative care include the following?: checking and/or changing air filters and belts, lubricating equipment parts, checking the motors, and confirming that all kit is in functioning order.				
11. Are spoiled or inoperable constituents of the HVAC system replaced or fixed as appropriate?				
12. Are reservoirs or kits of the HVAC system with stagnant water checked for microbial growth?				
13. Are water leaks that could cause growth of biologic agents fixed on time?				
14. Are damp or wet materials that could cause growth of biologic agents dried, replaced, removed, or cleaned on time?				
15. Are microbial contaminants removed from HVAC and building system components, and from building surfaces when they are found during inspection?				
16. Is general or local exhaust ventilation used where housekeeping and maintenance activities take place?				
17. If buildings do not have mechanical ventilation, are windows and doors are used for ventilation purpose?				
18. Are building-related illness complaints quickly investigated?				
19. Is smoking in school buildings forbidden except as part of a learning activity?				
20. Do written district board of education policies and procedures prohibit smoking in school buildings?				
21. During renovation work or new construction, are local ventilation or other protecting equipment used to safeguard workers and students from dust, stones, other small particles, and				

toxic gases, which may be harmful in certain quantities?				
22. Are renovation areas in occupied buildings separated so that dust and debris is confined to the renovation or construction area?				
23. Are protections applied in case lead-based paint is disturbed during renovation or new construction?				
24. When renovating or construction process, are product labels checked, or is information obtained on whether paints, adhesives, sealants, solvents, insulation, particle board, plywood, floor coverings, carpet backing, textiles or other materials contain volatile organic compounds that could be emitted during regular use?				
25. Is the information referred to in question above taken into account in order to select appropriate products and to determine essential steps to be taken to comply with indoor air quality regulations?				
26. Are employees informed at least 24 hours earlier, or on the spot in emergency situations, of work to be executed on the building may introduce air contaminants into their work area?				
27. Is the maintenance schedule updated on the building systems?				
28. Does the maintenance schedule contain the dates that the building systems maintenance was executed and the names of the persons or companies carrying out the work?				
29. Are maintenance schedules sustained for at least three years?				

Fall from Height				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Is every open side or opening which a person may fall is covered or guarded by an effective barrier to avoid falls?				
2. Are fall injury deterrence systems present?				

3. Has it been assessed if a fall will be prevented before beating the ground or other structure?				
4. Is a rescue plan prepared?				
5. Are walkways maintained in good condition and free from obstacles?				

Occupational Injury and Illness Reporting				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Does the school (employer) maintain a record for any injury or illness occurrence? (OSHA 300A or equivalent)				
2. Are all injuries or illnesses recorded within 6 working days after the occurrence?				
3. If the employer keeps the record as as soft copy, is there any hard copy record available?				
4. Is a complementary record on OSHA 301 or equivalent exist for each recordable occupational injury or illness?				
5. Does the summary of the previous calendar year showing the totals from the OSHA 300 completed by February 1 and posted from February 1 to March 1?				
6. Does the summary include totals from the OSHA 300 the following information; calendar year, establishment name and address, signature of approver title, and date?				
7. Is the summary posted in places where information for employees is normally posted?				
8. Do the staffs who do not regularly report to their institution receive a the summary with their pay check or in the mail?				
9. Are all of the injury and illness records sustained for 5 years?				
10. Are all the staffs and teachers, former teachers and staffs, and their representatives allowed to access to				

the summary and the OSHA 300 for examination and copying?				
11. Is every fatality or the in-patient hospitalization of three or more workers caused by job-related incident reported within 8 hours to the nearest OSHA Area Office in person or by using the OSHA toll-free central telephone number?				
12. Are work-related needle stick injuries and cuts from sharp objects that are contaminated with another person's blood or potentially infected material recorded in the OSHA 300 log?				
13. Does your institution complete OSHA's yearly survey form, if needed?				

Traffic Safety				
Inspection Item	**Yes**	**No**	**N/A**	**Comments**
1. Are separate entries and exits provided for vehicles and pedestrians including visitors?				
2. Do the entries and exits protect pedestrians from being struck by vehicles?				
3. Does the layout of the workplace effectively separate pedestrians, vehicles and school building?				
4. Are systems in place to keep pedestrians and moving vehicles or plant apart like physical barriers, exclusion zones and safety zones?				
5. Are the roads and pathways within the workplace suitable for the types and volumes of traffic?				
6. Are dropping and fetching zones clearly marked?				
7. Are there enough parking places for vehicles and are they used?				
8. Are traffic directions clearly marked and visible?				
9. If a one way system is provided for vehicle routes within the school compound, is it properly, designed, signposted and used?				

10. Are vehicle routes wide enough to separate vehicles and pedestrians and for the largest vehicle using them?				
11. Do vehicle routes have firm and even surfaces?				
12. Are vehicle routes kept clear from obstructions and other hazards?				
13. Are vehicle routes well maintained?				
14. Do vehicle routes avoid sharp or blind corners?				
15. Are pedestrian walkways separated from vehicles?				
16. Where necessary are there safe pedestrian crossings on vehicle routes?				
17. Is there a safe pedestrian route which allows visitors to access the site office and facilities?				
18. Are pedestrian walkways clearly marked?				
19. Are pedestrian walkways well maintained?				
20. Have drive-through, one-way systems been used to reduce the need for reversing?				
21. Are non-essential workers excluded from areas where reversing occurs?				
22. Are vehicles slowed to safe speeds, for example speed limiters on mobile plant or chicanes on vehicle routes?				
23. Do drivers use the correct routes, drive within the speed limit and follow site rules?				
24. Are there speed limit signs?				
25. Are there clear signage of the school?				
26. Is there clear signage of pedestrian?				
27. Have the guards received specific training and information on traffic hazards, speed limits, parking areas?				
28. Is instruction about safe movement around the workplace provided to visitors and external drivers?				
29. Is the level of supervision adequate to check the traffic and to ensure safety of pedestrians and drivers?				
30. Is PPE like highly visible clothing provided and used where necessary?				

APPENDIX B

PRE-AUDIT INFORMATION

School A (Private International School)

Auditor	**Name**	*Paveethra Thegarathah (KGJ 150042)*
	Position	Status: *Postgraduate student* University: *University of Malaya* Faculty: *Engineering* Department: *Chemical Engineering* Programme: *Masters of Engineering (Safety, Health and Environment)*
Audit	**Date**	*9th & 10th May 2017*
	Time	*9am-1pm*
	Location	*School A*
	Document	*Safety checklist*
	Potential Interviewees	*Staffs, Teachers and Students*
	Pre-audit Site Tour	*8th April 2017*

School B (Government School)

Auditor	**Name**	*Paveethra Thegarathah (KGJ 150042)*
	Position	Status: *Postgraduate student* University: *University of Malaya* Faculty: *Engineering* Department: *Chemical Engineering* Programme: *Masters of Engineering (Safety, Health and Environment)*
Audit	**Date**	*25th & 26th April 2017*
	Time	*9am-1pm*
	Location	*School B*
	Document	*Safety checklist*
	Potential Interviewees	*Staffs, Teachers and Students*
	Pre-audit Site Tour	*24th April 2017*

APPENDIX C

PRE-AUDIT MEETING

School A (Private International School)

Aim	*To improve the safety and health management standard at Malaysian schools.*
Purpose	*The purpose of this study is to assess the occupational safety and health compliance level in Malaysian schools by carrying out a safety audit.*
Scope	*The scope of the study was focused on the safety and health management system at the selected Malaysian schools.*
Audit Schedule	**Pre-audit Site Tour** *8th April 2017* **Date** *9th & 10th May 2017* **Time** *9am-1pm*
Confidentiality of Information	*Name and pictures of the school will not be published*
Minimum Scores for the Audit	*40% for each aspect in the checklist*

School B (Government School)

Aim	*To improve the safety and health management standard at Malaysian schools.*
Purpose	*The purpose of this study is to assess the occupational safety and health compliance level in Malaysian schools by carrying out a safety audit.*
Scope	*The scope of the study was focused on the safety and health management system at the selected Malaysian schools.*
Audit Schedule	**Pre-audit Site Tour** *24th April 2017* **Date** *25th & 26th April 2017* **Time** *9am-1pm*
Confidentiality of Information	*Name and pictures of the school will not be published*
Minimum Scores for the Audit	*40% for each aspect in the checklist*